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PART I. DISEASES AND PROBLEMS DISTINGUISHED BY WHO AND FAO
DZIAŁ I. CHOROBY I PROBLEMY WYRÓŻNIONE PRZEZ WHO I FAO

POLAND'S RAPID LUNG CANCER DECLINE IN THE YEARS 1990-2016. THE FIRST STEP TOWARDS THE ERADICATION OF LUNG CANCER IN POLAND

GWAŁTOWNY SPADEK ZACHOROWAŃ I ZGONÓW Z POWODU RAKA PŁUCA W POLSCE W LATACH 1990-2016. PIERWSZY KROK DO ERADYKACJI RAKA PŁUCA W POLSCE

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C. Data analysis/statistics
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D. Data interpretation
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Summary

In the late 1980s, Poland was one of the countries with the highest per capita cigarette consumption, smoking prevalence, and lung cancer morbidity and mortality in Europe. After the political and economic transformation of 1989, transnational tobacco companies (TTCs) entered the market. The TTCs expected the cigarette sales in Poland to increase by at least 10% in the 1990s. Unexpectedly, the opposite happened. In the 1990s, the social attitudes towards smoking began to change, spurred by the involvement of civil society, the medical community, religious institutions, as well as national and local administration in developing and conducting a comprehensive tobacco control programme. For the first time since World War II, cigarette consumption in Poland began to decline. As a report by Fagerstrom et al. published in 2001 in a renowned medical journal showed by the end of the 1990s Poland had one of the best anti-smoking climates in Europe. Between 1990 and 2015 tobacco sales in the country fell from 100bn cigarettes to 40bn. This was accompanied by a decrease in lung cancer incidence and mortality. This paper discusses the factors underlying these positive developments.

Keywords: democracy, civil society, public health, tobacco smoking, eradication (partial) of lung cancer

Streszczenie

Pod koniec lat 80. ubiegłego wieku Polska była krajem najwyższej konsumpcji papierosów, częstości palenia i zachorowalności i umieralności z powodu raka płuca w Europie. Nieoczekiwanie, po politycznej i ekonomicznej transformacji lat 90., trend ten został odwrócony. Po raz pierwszy w historii doszło nie tylko do zahamowania wzrostu sprzedaży tytoniu, ale sprzedaż papierosów zaczęła spadać. Międzynarodowe koncerny tytoniowe, które niezwykle szybko sprywatyzowały i opanowały rynek tytoniowy w Polsce, planowały wzrost sprzedaży papierosów w latach 90. o 10%. W 2000 roku, w porównaniu z 1990 rokiem, sprzedaż papierosów zmniejszyła się o 10 miliardów sztuk rocznie. Rozpoczął się trwający do chwili obecnej stały harmonijny spadek konsumpcji tytoniu. W dość krótkim czasie doszło do diametralnej zmiany klimatu wobec papierosów. W opublikowanym w 2001 roku w renomowanym czasopiśmie medycznym doniesieniu naukowym, autorzy wykazali (Fagerstrom K. i inni), że w Polsce i w Szwecji istnieje najlepszy klimat antytytoniowy w Europie. Społeczeństwo obywatelskie, społeczność medyczna i administracja państwowa przygotowały i wdrożyły do praktyki wielowymiarowy program ograniczenia zdrowotnych następstw palenia tytoniu. Program ten w ciągu 25 lat doprowadził do gwałtownego spadku palenia papierosów, co w rezultacie doprowadziło do niesłychanego zmniejszenia się zachorowalności i umieralności z powodu raka płuca palaczy. Przedstawiona publikacja omawia czynniki, które doprowadziły do tych zmian.

Słowa kluczowe: demokracja, społeczeństwo obywatelskie, zdrowie publiczne, palenie tytoniu, eradykacja raka płuca

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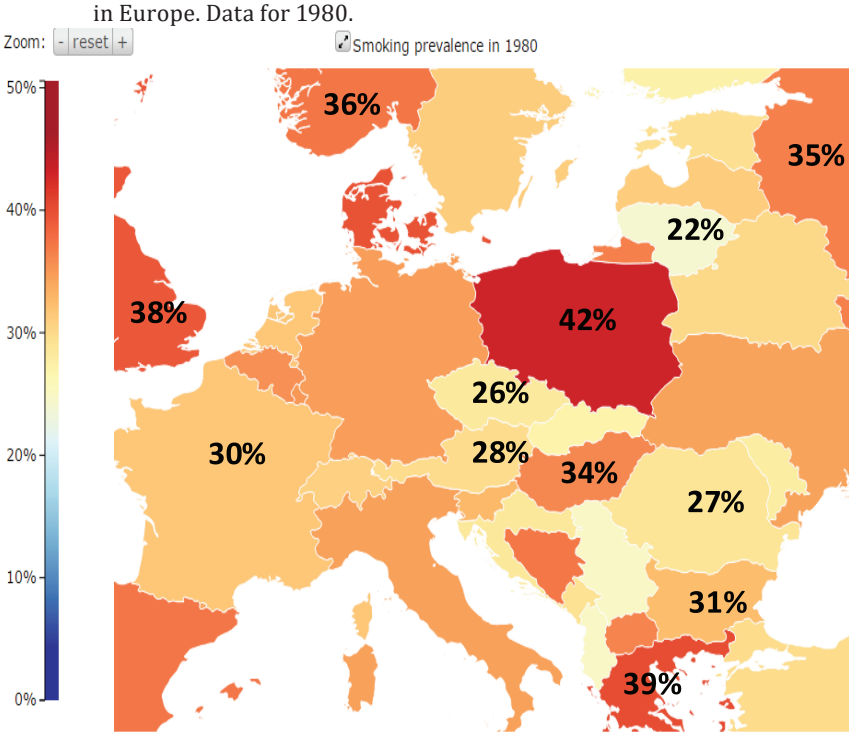
Historical background – Health challenges in Poland after World War II[1]

One of the main challenges of the newly established communist Polish People's Republic after World War II was the catastrophic health state of its population. Fifteen percent of newborns did not survive the first year of life, and life expectancy stood at about 50 years [2]. This was largely due to the high rates of infectious diseases in the war-torn country. Overcoming this challenge became the priority of the state. Poland's health policy was geared towards the eradication of infectious diseases. A centralised health system was introduced, where infectious diseases and the health of children and women became priorities, in line with the Soviet Semashko model.[2] All these changes brought about a rapid improvement in population health. Epidemics of tuberculosis and other infectious diseases, including childhood diseases, were brought under control. Infant mortality declined from 109 deaths per 1000 births in 1950 just drop to 30 per 1000 in 1970. Between 1950 and 1960 life expectancy increased almost by 9 years. By 1960, public health indicators in Poland came close to those in Western Europe: the average life expectancy in Britain was 72 and in Poland 71 [2].

However, at the same time, tobacco and alcohol consumption levels in Poland saw a rapid, linear increase [4]. Throughout the period of communist rule, these products maintained the position of strategic commodities for the state-owned economy[3]. Annual tobacco consumption increased from about 20 billion cigarettes before World War II to approximately 100 billion in the 1980s, making Poland one of the countries with the highest cigarette consumption in Europe (Fig. 1).

Smoking patterns for both sexes (age-standarised) in Europe. Data for 1980.



Per capita tobacco consumption in Poland,1923-1991

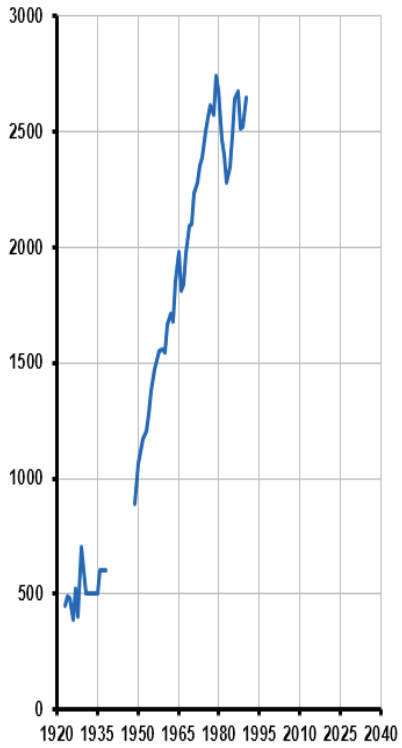


Figure 1. Smoking patterns for both sexes (age-standarised) in Europe (data for 1980) and per capita tobacco consumption in Poland, 1923-1991
Source: Institutefor Health Metrics and Evaluation, 2014; Source: PolishOffice for General Statistics, 2012

Similarly, annual alcohol consumption increased from about 3 litres per person in 1950 to almost 9 litres in the 1980s [2, 5-8]. Unlike infectious diseases, the health impact of smoking and alcohol on the health of the population was generally not attributed great importance by the authorities [2, 9-11]. This was despite the Semashko doctrine placing the whole responsibility for public health on the state.

[1] This paper is partly based on the following reports – 1, 2, 3.
[2] The Semashko model of centralised healthcare system was introduced in the USSR and, after World War II, in all the satellite state of Soviet Bloc.
[3] In another socialist state Mao Tse Tung, the leader of the Chinese revolution, pledged to provide the working class jobs, housing, and... tobacco.

The dramatic increase in premature mortality in Central and Eastern Europe.

In result, from the 1960s the improving trends in public health were suddenly reversed. An increase in premature mortality among young and middle-aged adults began, first in the 1960s and 1970s among men, and in the following decades also among women. This phenomenon is illustrated by Figure 2, which shows that from the mid-1960s the life expectancy of Polish males aged 20+ began to decrease.[4]

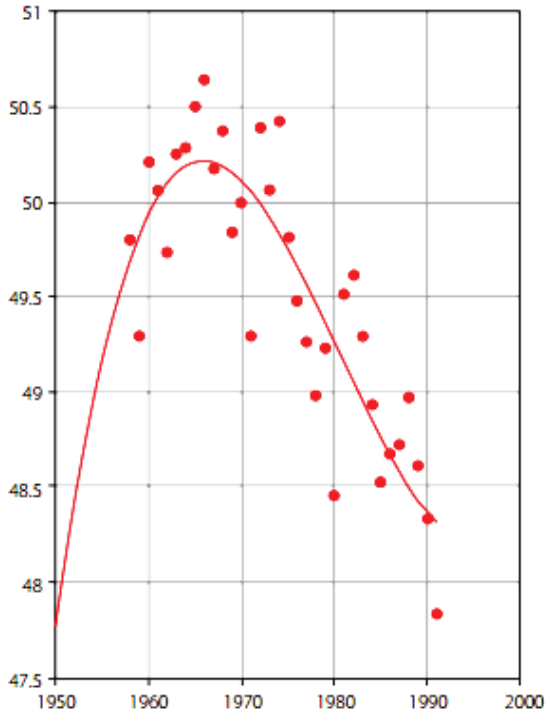


Figure 2. Life expectancy in men aged 20+ in Poland, 1958-1991 (2)

The most important contributor to this decline were lifestyle-related illnesses, primarily linked with smoking and alcohol consumption [2, 8, 12-13] a similar "natural experiment", in which population were exposed to, a rapid growth of cigarette and alcohol consumption, was also taking place in other Eastern European countries, for example in Hungary, leading to similar health outcomes. By the late 1980s, heart attacks and lung cancer (a disease almost exclusive to smokers) in Poland and Hungary reached the highest levels ever recorded in the world [8, 13-16].

In Poland, the public's awareness of this health catastrophe was fragmentary. More than half of all Poles believed that smoking was not harmful to health. While public health experts continued to sound the alarm about the exploding smoking epidemic, they failed to make themselves heard in the public debate [6]. For example, the influential report entitled *Experience and the Future*, prepared by independent experts for the oppositionist Solidarity movement in the early 1980s, in which Poland's health problems featured prominently, did not include a single word pointing to smoking as one of the key causes underlying the nation's health collapse. In an witness seminar conducted in 2016, Józef Kozioł, the Deputy Prime Minister of Poland in the 1980s, remembered that while his government was concerned about the high vodka consumption levels, and attempted to regulate alcohol, the question of harmfulness of smoking cigarettes was rarely, if at all, discussed at government meetings [17-18]. The trade union movement, including the new self-governing union Solidarity, and its leader Lech Wałesa personally, believed that cigarette prices should be kept low and that was the government's duty to guarantee to the working classes access to cheap tobacco. Solidarity threatened a nationwide strike when the government announced cigarette price increases in 1981 [17-19].

Meanwhile, premature mortality figures among the middle-aged, as well as cardiovascular morbidity (mainly heart attacks), lung cancer, liver cirrhosis, and sudden death from external causes (accidents, injuries, poisonings, etc.) reached record levels in Poland [10, 20]. This epidemic of "man-made diseases" (diseases and deaths resulting directly or indirectly from human activities) remained one of Poland's most significant challenges until the collapse of the communist authorities in the late 1980s [2]. According to World Health

[4] At the same time, mortality decreased among infants and children maintaining a consistently good European standard.

Organization (WHO) estimates, in 1990 the chances of a Polish 15-year old boy living to the age of 60 were lower than those of his peers in China, Latin America, or India [14, 21].

Political and economic change – Democracy is healthier

In 1989 many experts believed that the health situation in Poland was going to deteriorate further [3]. As communism was collapsing, it was replaced in the early 1990s by anxiety about the future, the impoverishment of society and the appearance of the previously non-existent phenomenon of unemployment. All these developments seemed to foreshadow severe consequences for public health. Forecasts threatened serious increases in infant mortality and child mortality. The increase in premature death among young adults and the middle-aged in the years 1988-1991 appeared to justify those concerns [22-26]. The opening up of the Polish market, the takeover of the tobacco industry by transnational tobacco corporations (TTCs), and the launch of cutting-edge marketing techniques to sell unhealthy products such as cigarettes – all these factors seemed to indicate that smoking rates were only going to increase further. The tobacco industry set itself the ambitious task of bringing about a 10-20% increase in total cigarette sales in Poland in the 1990s [27].

However, it soon became clear that the collapse of authoritarian communism meant not just the liberalisation of markets and the entry of TTCs, but also the awakening of a vibrant health advocacy movement. A social movement promoting better health, and warning about the health risks of smoking, had been operating in Poland since the early 1960s. However, these groups failed to engage in modern public health campaigning and did not have a significant impact on society [18, 28-30]. It was only after the democratisation of the political system, including the introduction of free elections and a multiparty parliament, free mass media, alongside Poland's preparations for accession to the European Union, that the right conditions for the establishment of an efficient health advocacy movement were created [31].

Role of the third sector – birth of civil society and international collaboration in health

Health advocates exploited the new avenues of action opened to them by the advent of democracy, free civil society, and independent media. Within this political situation, numerous new civil society groups pursuing various social goals sprung up. One of these organisations was the Health Promotion Foundation (Fundacja „Promocja Zdrowia"), founded in 1991. Its guiding purpose was to bring about a parliamentary tobacco control law that would help tackle Poland's smoking epidemic [1, 17-19, 32]. Later, the Foundation became a crucial actor co-ordinating broader tobacco control activity in Poland, as well as in other countries of Central and Eastern Europe.

Within its programme, the Foundation:

- established, supported, organised 'movements for health without smoking';
- planned, organised, and disseminated educational programmes and trainings 'Smoking or Health';
- planned, held, and supported social anti-tobacco campaigns;
- arranged, twice every year, special events supporting quitting smoking – the WHO No Tobacco Day on 31 May, and the Great Polish Smoke out in mid-November;
- developed and organised training of doctors and nurses in smoking cessation;
- supported scientific research projects;
- organised scientific conferences and seminars, and sent delegates to such events;
- collaborated with national and international organisations, such as UICC, the WHO, or various higher education institutions.

One of the key achievements of the Health Promotion Foundation was the creation of a broad civic movement with the goal of eradicating tobacco-related diseases. This movement was strongly tied with the medical community. A particularly significant role was played by oncologists, concerned about the lung cancer epidemic developing in Poland. In the early 1990s, cardiologists also became actively engaged in this movement, led by the then director of the cardiology institute in Warsaw, professor Zygmunt Sadowski, as well as doctor Stanisław Grzonkowski, later a parliamentarian and the chairman of the health committee of the Polish Sejm [1, 33]. Within a short time, the movement expanded to various institutions and fields of activity. Its breadth and diversity were a key factor in the successful realisation of the tobacco control programme in Poland. The composition of the movement is illustrated by Figure 3.

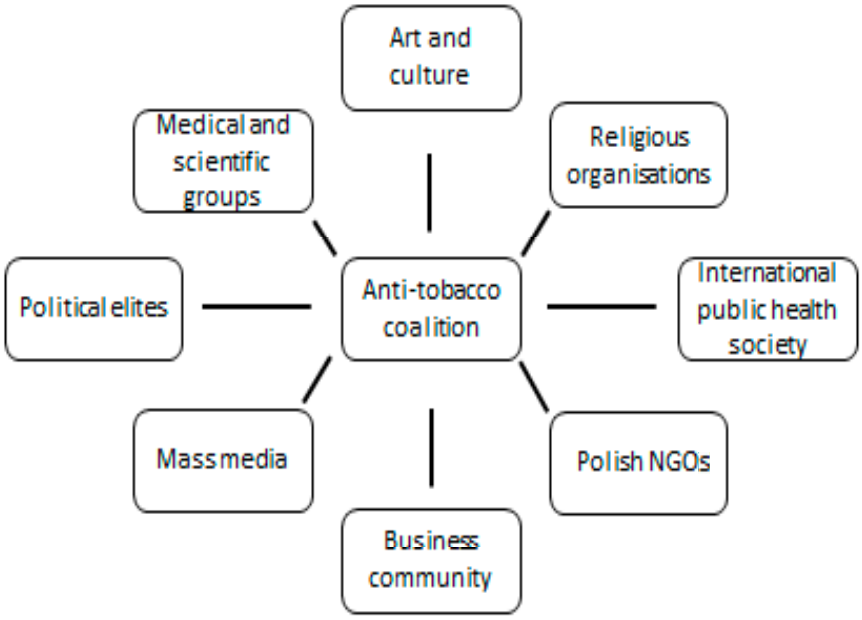


Figure 3. Polish anti-tobacco coalition in 1990s
Source: Zatoński M. PhD thesis. Tobacco control in Poland under communist rule and in the post-communist period. (in preparation)

An essential element of the anti-tobacco campaign was the growing quantification of how serious a health problem smoking represents, and determining the possibilities for its solution. It was decided that both of these activities should be science- and evidence-based. Already in the 1980s, a series of descriptive and analytical epidemiological studies were launched [5, 8, 20, 34-40]. At that same time, Poland also became a country of special interest for the WHO and international medical organisations [4]. Many eminent health researchers from Western countries – Europe, the USA, Australia and Canada – such as Peter Boyle, Neil Collishaw, Richard Doll, Nigel Gray, Tony McMichael, Richard Peto, Judith Watt, Alexander Walker,Walter Willett, became involved in the preparation of a public health programme dedicated to the control of tobacco - related diseases in Poland [7, 28, 42].

One of the most important milestones was the preparation of a roadmap for tobacco control in Poland and other Eastern European countries. As the democratic changes were unfolding in much of the region, a conference entitled "New Europe without Tobacco" was held in Poland on 27-29 November 1990. The conference was organised by Polish health organisations (the Polish Anti-tobacco Society, the Polish Medical Society, the Oncology and Cardiology Society, etc.) in cooperation with the UICC (Union Internationale Contre le Cancer), the American Cancer Society (ACS) and the WHO. The conference's honorary patron was Lech Wałęsa, chairman of Solidarity, who issued a written declaration of support to its participants. Likewise, former US President Jimmy Carter, the US Surgeon General and Senator Edward Kennedy sent letters expressing their backing for anti-tobacco activities in Poland. The Kazimierz Conference was the first meeting of health advocates from Eastern Europe with their Western European, North America and Australian colleagues, aiming to share examples of best practice from countries with more advanced tobacco control provisions [1, 37, 41, 43-44].

The conference's message was mainly addressed to the political leaders of Central and Eastern Europe. It concluded with the Kazimierz Resolution, a roadmap setting out a strategy for reducing the health consequences of smoking in Eastern Europe. The participants of the conference included health advocates from Poland, but also key politicians (members of the Sejm and the Senate, the Ministry of Health, including the Chairman of the Chamber of Medicine, representatives of Cardiology, Oncology, Lung Diseases, social organizations, nurses, etc.), which meant that the tobacco control roadmap reached a wide group of key actors and decision-makers. The Resolution pointed out that the primary way of reducing the health consequences of smoking in a democratic system is through appropriate legislative action. The conference in Kazimierz also created the basis for cooperation in this area between the countries of Central and Eastern Europe, and in the following years, Poland became one of the hubs for co-ordinating work in this field [1].

For Polish health advocates, the conference in Kazimierz marked the start of work on a parliamentary legislative act aimed at limiting the health consequences of smoking. At the same time, the Resolution was an appeal to the new democratic governments of Eastern Europe to eliminate as quickly as possible the differences in health that existed between them and Western Europe through comprehensive public health policy.

All the actions suggested by the Resolution were implemented in Poland in the next years. They constituted the core of the Polish Anti-Tobacco Law that was adopted by Poland's Parliament at the end of 1995.

Role of the state and legislation – The Polish Anti-Tobacco Law

Following the conference in Kazimierz, health advocates in Poland were equipped with the necessary instruments to launch their campaign against tobacco-related diseases. The main banner under which this intervention was implemented was the issue of malignant tumours resulting from smoking. In the early 1990s, these tumours accounted for almost half of all cancer cases in middle-aged men in Poland (aged 35-54). Lung cancer was identified as the main area for intervention, as a disease whose morbidity rate was growing particularly rapidly, and one whose victims typically died within just five years of diagnosis. Also, lung cancer was the only tumour site where a significant decrease in incidence had been observed in several countries (the United Kingdom, USA and Finland).

In 1989, the upper legislative body of the Polish parliament, the Senate, was the only fully democratically elected political institution in Poland. A high percentage of senators were physicians (representatives of a profession with considerable social prestige). The natural decision of the health advocates was to attempt to initiate legislative action in the Senate. Shortly after the conference in Kazimierz, a working group associated with the Health Promotion Foundation developed the first version of the Anti-Tobacco Law and its justification. The pro-health arguments presented were well documented scientifically: smoking was pinpointed as one of the leading causes of Poland's dramatic levels of premature mortality. The draft bill, based on WHO standards[5] [45], proposed a comprehensive set of laws that would help reduce cigarette consumption. This met with the approval of several key politicians. In 1991, a group of senators was formed (led by Dr. Maciej Krzanowski of Cieszyn) in order to prepare legislative initiatives in this area. Shortly after, the bill was submitted to the Senate.

The draft bill triggered tremendously strong opposition from the tobacco lobby. Politicians in the newly democratic Poland for the first time encountered the activities of a very well-organised interest group prepared to use any means to block the legislation. The debate in parliament was very quickly made public, with the mass media picking it up as an issue of great societal interest. The health of Poles and the destructive effects of tobacco smoke became the subject of widespread debate for many years to come. Since the health arguments could not be disputed (which does not mean that efforts were not made to undermine them), the tobacco industry attempted to direct the discussion to the question of whether a parliamentary act – a mere "piece of paper" – could improve the health of the nation. The tobacco industry questioned the effectiveness of a ban on advertising, health warnings, economic regulation, education – and all regulations in general [31]. The industry's leaders proposed that the area to be focused on should be smoking among children. They also called for freedom of speech and warned parliamentarians that introduction of the proposed restrictions would have a devastating effect on the development of the Polish economy.

Initially, the media and the public were sceptical about whether anti-tobacco regulations were needed. However, the health advocates' consistency in pointing to the catastrophic levels of health among the adult population in Poland, and tobacco's key contribution to them, eventually led to increased public support for tobacco control measures. During the last months of the debate, the opponents of the law, with their support eroding away, focused on the ban on cigarette advertising [46]. Maintaining the right to advertise cigarettes became the most crucial point in the discussion and the point of possible compromise. Meanwhile, international advisers, such as the WHO, suggested that the ban on advertising was actually the most important element of all the provisions included in the bill. Another issue of contention was the formation of a special fund dedicated to health promotion proposed by the bill. This was vehemently opposed by the liberal politicians in charge of state finances, who did not want the tobacco tax revenue to come with any strings attached.

Generally, however, support for the law steadily grew among the general public and politicians, regardless of their political orientation. Changes in public awareness of smoking harm were observed and the public debate increasingly focused on the mounting health costs of smoking cigarettes [22]. The example of other countries, where the image of smoking was progressively deteriorating, provided a strong point of reference to the Polish health advocates and had a significant impact on public opinion. This gradual change of attitudes did not go unnoticed by representatives of the political parties.

Taking advantage of the instability of the political situation in a country with an emerging democracy (the "short life" of successive governments and parliaments) and using targeted lobbying measures, the tobacco lobby tried to prevent the enactment of the law, or at least delay its passage till as late as possible. However, the work on the bill in the years 1990-1995 continued, regardless of which party had the upper hand in parliament.

[5] The WHO call Polish anti tobacco law 1995 year „example for world"

The leaders of the successive groups promoting this work were Dr Maciej Krzanowski, a liberal, Dr Jerzy Matyjek of the Christian-National Union and – in the last phase of the legislative work – Dr Seweryn Jurgielaniec from the Democratic Left Alliance. On November 9th, 1995, the Sejm passed the bill with an enormous 90 percent majority of votes from all the political parties [1, 33] (Fig. 4).

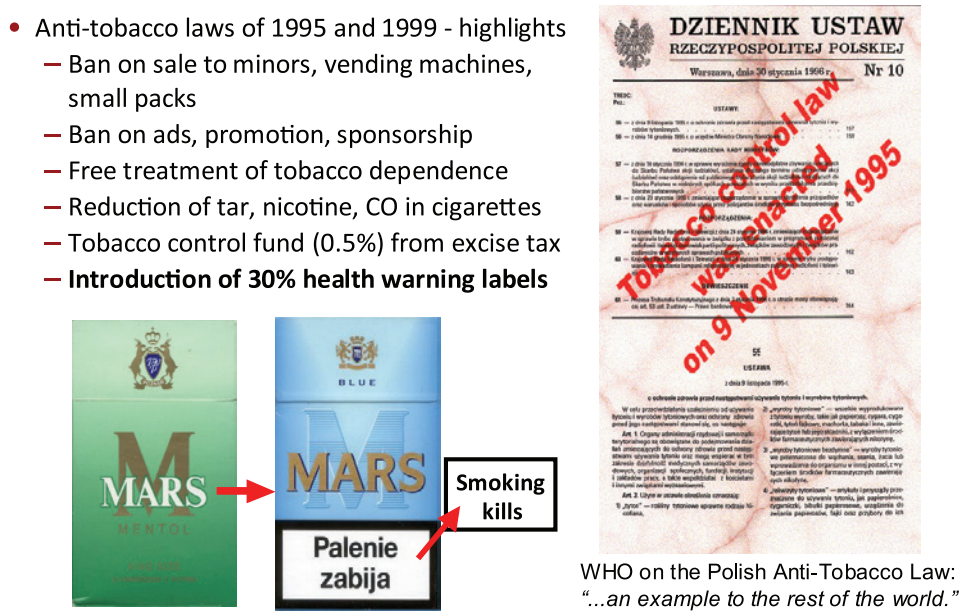


Figure 4. The Polish Anti-Tobacco Law
Source: Zatoński M. PhD thesis. Tobacco control in Poland under communist rule and in the post-communist period. (in preparation)

The law was put into force despite a veto by the outgoing president, Lech Wałęsa, as it was signed by the newly elected president, Aleksander Kwaśniewski (a key role in this process was played by the Sejm deputy Jerzy Szmajdziński).

The Anti-Tobacco Law included all the elements that could be implemented in line with the WHO's Gold Standard, apart from a complete ban on tobacco advertising [45]. Amongst other provisions, the legislation effectively regulated the protection of non-smokers (including in the workplace) from tobacco smoke, and introduced the world's largest health warning labels on cigarette packs at the time [46]. The law required the government to prepare annual programmes to reduce the health consequences of cigarette smoking. A report on the implementation of the programmes was presented each year in parliament [1, 17-19, 32-33, 47-48].

The introduction of these legal regulations went ahead without any major obstacles, although there were some minor technical problems with implementation. The lack of separate, well-ventilated smoking rooms in many workplaces led the government to give a 5-year extension to employers to meet the conditions set out in the Law. As a result, some workplaces did not become smoke-free until early 2001. However, in the majority of cases, cigarette smoke disappeared from workplaces very quickly, especially in privately run companies, and smoking became possible only in specially designated areas.

After winning the battle against a full ban on advertising, the tobacco lobby immediately took very aggressive action against the large health warning labels on cigarette packs, arguing that this solution was incompatible with EU regulations and that it would hinder Poland's accession to the EU [31]. The tobacco industry also (not unjustly) saw such large warnings, which Poland introduced as the first country in Europe, as a dangerous precedent [46]. In fact, a few years later, the European Parliament, citing the Polish example, began work on introducing even larger health warnings in the European Union [1, 31, 33, 46].

Lobbying to prevent cigarette packs being printed with such large format health warnings was launched in the Polish parliament on an unprecedented scale. Health advocates were surprised to learn that the tobacco industry was represented in the work of the parliamentary committee by highly esteemed academics, lawyers, and prominent, highly respected celebrities. In the opinion of many political commentators, the extent and aggressiveness of the lobbying on this issue had no equal in the first decade of parliamentary democracy in Poland [1]. The attack launched, during a *vacatio legis,* on the already adopted Anti-Tobacco Law once again gave health advocates the opportunity to address the public opinion about the problem of the catastrophic health of

adult Poles resulting from smoking cigarettes. The tobacco lobby, undaunted by successive defeats, attempted to amend the provisions of the bill three times. During the last of these attempts, a few months before the elections, those taking part in the parliamentary debate almost came to blows.

The health advocates' struggle was closely monitored by the media – the more so since it was played out during the run-up to parliamentary elections. Due to the saliency of the arguments used and the high profile of the debate, lead author of this work was included by one of Poland's monthly magazines among the 100 most influential people in Poland in 1998. The battle waged in Poland did not go unnoticed by the international media [49].

Despite tremendous efforts and expenditure, on April 11th, 1997 the tobacco lobby eventually lost the battle to change the health warnings on cigarette packs (although this time the bill's supporters in parliament had only a small majority: 148 in favour, 122 against, and 100 abstentions). The Member of Parliament Seweryn Jurgielaniec played a key role when, just before the start of the vote, he persuaded his party colleagues in the parliamentary chamber to enact this important law for public health [1].

After two and a half years of negotiations, from the middle of 1998, health warning labels in Poland covered 30% of the two larger sides of cigarette packs and for some years were the largest in the world[4] (in early 2001, larger warnings were introduced in Canada) [1]. Following Poland's accession to the European Union in 2004, health warnings became even larger and today cover 30 and 40% of the pack in line with the EU regulations, which were originally based on the Polish example [1, 31, 33, 46].

In 1998, the newly elected Parliament returned to the issue of cigarette advertising, alarmed by further scientific studies indicating that children, especially girls, were having increasingly early contact with cigarettes, and growing public concern about the aggressive advertising of tobacco companies, which, as most Poles noticed, was primarily aimed at the youth. There was fairly widespread agreement that there was a direct link between these two phenomena – aggressive advertising of cigarettes and the increasing prevalence of smoking among children – and that putting a stop to this phenomenon required a complete ban on tobacco advertising. This time, the drafting of the bill was quickly accomplished by Parliament (thanks to the activities of deputies Andrzej Wojtyła, the former Minister of Health, Stanisław Grzonkowski and Ewa Sikorska-Trela, heading the Parliamentary Health Committee), and in October 1999 a total ban on tobacco advertising in Poland was enacted. This ban, one of the first of its kind in Europe, was adopted by a large majority of Sejm deputies from across the aisle (374 in favour, 11 against, and 12 abstentions). Furthermore, a provision was introduced for 0.5% of tobacco excise duty to be set aside to finance programmes reducing the health effects of smoking (although with the exception of the year 2000, this provision was never implemented). At the beginning of December 2000, cigarette advertising disappeared from all billboards in Poland; since December 2001, tobacco advertising has been completely banned in the press [1, 33].

Health education – The Great Polish SmokeOut

Work on the bill, and the Parliamentary debate and mass media reports accompanying it, changed people's attitudes towards smoking. International research seems to indicate that, in the second half of the 1990s, the anti-tobacco advocacy in Poland ranked among the best-conducted health advocacy campaigns in Europe [6, 50] and the Polish Anti-Tobacco Law was considered one of the most progressive tobacco control laws in the world. For this reason, Polish health advocates and politicians were co-initiators of the WHO's first health convention in the world – the FCTC [45].

If one had to define a single health promotion action that had the most significant impact on health literacy among Poles, and their understanding of the magnitude of smoking harm, a strong contender for this title would be the Great Polish SmokeOut, inspired by the international SmokeOut campaigns, initiated by the American Cancer Society. The Polish edition was modified, adapted to the Polish cultural context, and conducted entirely by Polish civil society. Together with the WHO World No Tobacco Day, organised since the 1980s, it became one of the pillars of health education in Poland. The SmokeOut took place every year, on the third Thursday of November, and was strongly supported by the Health Promotion Foundation. For many years it was also organised in neighbouring Lithuania. Its main media sponsors were public radio and television and the largest Polish daily *Gazeta Wyborcza*. Support also came from other media. From the year 2000 onwards, it also increasingly involved local communities, with the participation of local media. Within just a few years, the SmokeOut became the largest regularly conducted public health campaign in Poland [51].

Annual surveys conducted to evaluate the effects of the campaign indicated that 80-90% of Poles heard about it. Thanks to this initiative, many smokers became motivated to reduce their smoking or quit altogether:

- every year 20-30% of smokers tried to reduce their smoking,
- every year approximately 1 million smokers tried to quit smoking,
- every year 200,000 to 400,000 people claimed that they quit smoking for good because of the campaign.

It can be estimated that over a dozen or so years the Great Polish SmokeOut campaign helped almost 5 million smokers quit. The significance of the campaign for the health of Poles can hardly be overestimated [1, 17-19, 32, 47, 51]. The reason for its popularity can be sought in a competition organised by the Health Promotion Foundation, which accompanied it every year. Any Pole who quit smoking during the calendar year preceding the SmokeOut could take part. The main prize was a week's holiday in Rome and a private audience with the "Polish" Pope John Paul II for a group of participants who declared they had quit smoking and whose names were picked in a prize draw. The support of the Catholic Church for the SmokeOut was crucial. From the beginning of the 1990s to the end of his life, the Honorary Chairman of the SmokeOut Organizing Committee was the Primate of Poland, Cardinal Józef Glemp, who played a key role in the success of the campaign [51, 1]

Every year, the organizers of the competition received 20-40 thousand competition forms, which were often accompanied by letters [1, 20, 32]. The lasting popularity of the competition was confirmed by the fact that in its 10th year (in the year 2000) more than 40,000 competition forms were sent in. Altogether between 1992 and 2000, the organisers received over 300 thousand entry cards / letters. The campaign and competition consistently attracted the attention of journalists and the public. Every year, as the campaign was held, thousands of articles relating to it were published in the mass media. Electronic media presented clips, guides, discussions and reports. Traditionally, the competition and the trip to Rome were reported by Poland's State Television channel TVP.

Treating addiction – role of health professionals, cytisine, and telemedicine

One of the most important tasks of the Health Promotion Foundation after the introduction of the Polish Anti-Tobacco Law was building a better system of tobacco addiction treatment in Poland. The Health Promotion Foundation conducted trainings and workshops for medical doctors, nurses, and other healthcare professionals. In collaboration with various institutions, the Foundation trained thousands of healthcare professionals in smoking cessation methods. The Foundation conducted special motivational actions for medical personnel, encouraging healthcare workers to quit smoking. This capacity building effort quickly bore results. The healthcare system became increasingly free from smoking, and more engaged in the anti-smoking activity. The Foundation also spearheaded the creation of the Tobacco Addiction Diagnosis and Treatment Consensus, a set of guidelines developed and disseminated by leading medical associations in Poland. A total of 150 thousand copies of the Consensus, via Medical Chambers, reached doctors in Poland [52,53].

From its very creation, the Foundation also researched the development and dissemination of smoking cessation drugs in Poland. Amongst others, the Foundation introduced and popularised nicotine replacement therapy in Poland. In the late 1990s, bupropion was introduced on the Polish market, followed by varenicline in the early 2000s. In the last several years all the drugs used to treat tobacco addiction were available on the Polish market.

The Foundation's contribution was crucial in ensuring that cytisine – a natural smoking cessation drug, a low efficacy partial agonist of alpha 4 beta 2 acetylcholine receptors in the brain – remained available on the Polish market [54]. While cytisine was available in Poland from the early 1970s, its use in treating tobacco addiction was marginal. In the 2000s, the Foundation launched a study on the effectiveness of cytisine as a smoking cessation drug. Based on this, in 2011/12 *The New England Journal of Medicine* published a report on its effectiveness (over 3 times higher than placebo) and safety. Soon after, cytisine became available over the counter. In 2016, the sale of cytisine in Poland reached almost 1 million packets (complete treatment cycles) (Fig. 5) [54].

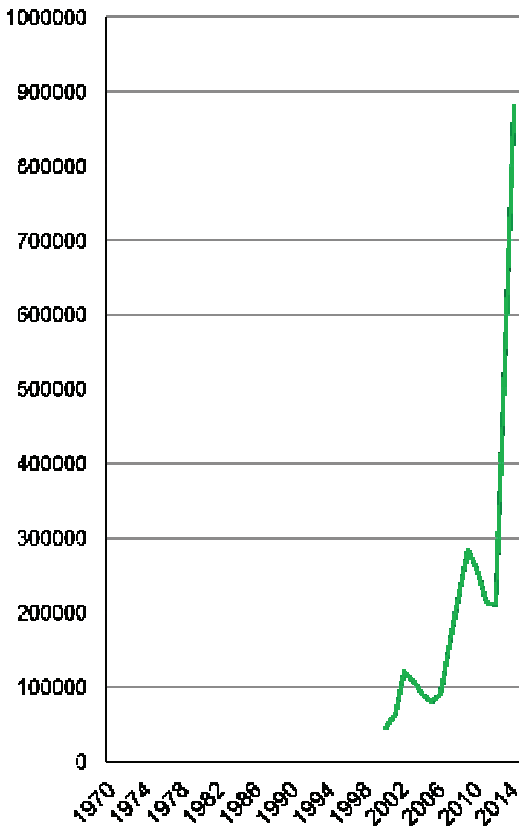


Figure 5. Cytisine sale in Poland (54)

Poland became one of the first countries where cytisine was used on a mass scale to quit smoking (today 12% of those attempting to quit in Poland use cytisine), and part of the reason for the persisting decline in smoking in the country [54]. The Foundation continues its work on documenting the safety and effectiveness of cytisine and actively participates in its dissemination on a population scale.

Recently, the Foundation became involved mainly in building tobacco addiction diagnostics and treatment mechanisms in hospital settings. A key challenge is the introduction of telemedicine, particularly in view of the approaching tobacco endgame, where most of the smokers, while declaring the willingness to quit (60-80%) [44], are deeply addicted, and have undertaken multiple quit attempts.

Unfortunately, most smokers in Poland still do not have access to comprehensive tobacco addiction treatment programmes, especially counselling. It is important to remember that most quit attempts end in failure – evidence-based addiction treatment methods, including digital and electronic aids, can help increase the chance of success, especially when initiated by medical doctors. The development of telemedicine tools supporting doctors and patients in smoking cessation can be particularly beneficial [55].

Legacy of tobacco control efforts in Poland

Those diverse actions conducted by the Foundation in collaboration with a broad array of partners paved the way for a rapid change in attitudes towards smoking and health. Health became an important, if not the most important value for the Polish society. A good illustration of this is the recycling of a slogan promoted by the tobacco industry in the 1990s – "I smoke because by like it" – to promote physical activity in the 2000s – "I run because I like it" (see Fig. 6).

"I smoke because I like it" campaign, 1995 "I run because I like it" campaign, 2012

Figure 6. Cultural shift – changing attitudes to health

Health became a subject of debate in a variety of contexts: from the Parliamentary chamber, through pages of newspapers and educational institutions, to local and religious events. The Catholic Church played an important role in eliminating the phenomenon of smoking, especially at the community level; the subject of the harmfulness of tobacco was brought up for example on the occasion created by premarital meetings required by the Church. School also became a place for warning about the effects of smoking and for instilling health-promoting behaviour, and campaigns promoting a smoke-free lifestyle were addressed not only to pupils, but also teachers and parents. Research evaluating the 'anti-tobacco climate' in European countries in the late 1990s showed that Poles were the staunchest supporters of anti-tobacco legislation out of all the European nations [50, 56].

Under conditions of democracy and market economy, health has gained a unique aspirational status among Poles. The growing popularity of healthy lifestyles could not be reconciled with smoking. People shifted to better diets, with higher consumption of fruits and vegetables, following the example set by the Mediterranean cuisine. Poles also began to take up various sports. Especially the better-educated Poles, more and more familiar with life in other countries, witnessed the decreasing tolerance towards polluting the air with tobacco smoke in many western states. In some circles, non-smoking became the fashion. Quitting smoking, now a socially desirable idea, became popular as a New Year's resolution [51, 1].

In the early 1990s, at the same time as the Polish civil society was mobilising and preparing tools and resources for its campaign against smoking-related diseases, quite unexpectedly the first signs of health improvement among Poles appeared. Despite the gloomy predictions of politicians and scientists, these changes proceeded at a rapid pace. The changes in tobacco consumption, smoking frequency and mortality rates in Poland for men and women in age group 35-54 years are presented in Figure 7.

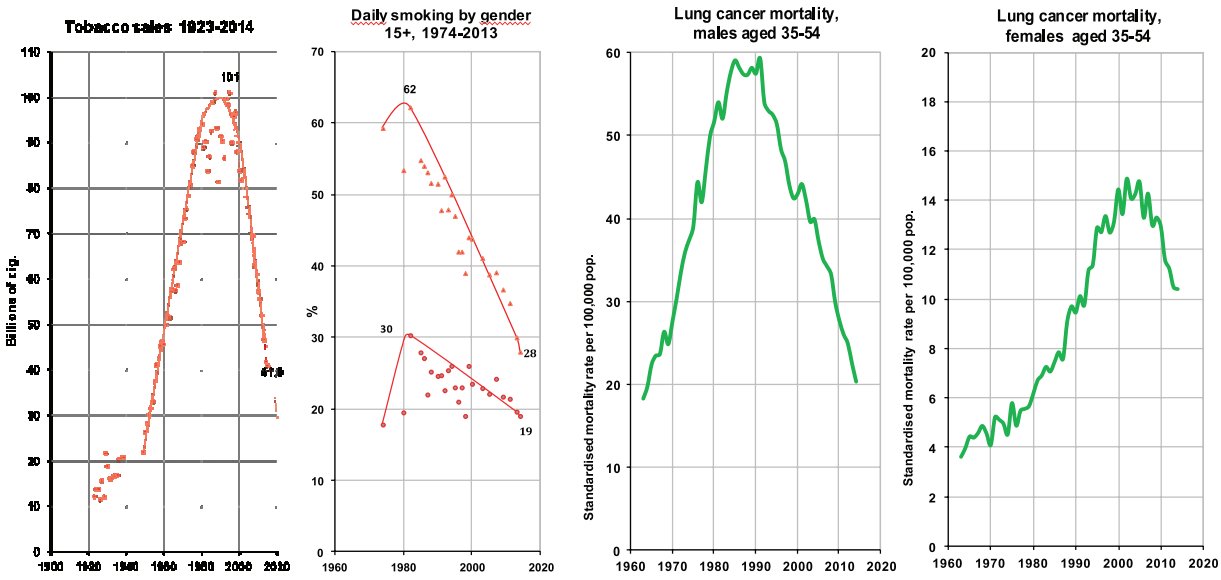


Figure 7. Cigarette sales and smoking in Poland vs. lung cancer mortality, male and females in Poland, per capita (32)

Another good illustration of the progress in Poland are the changes in lung cancer time trends in men and women in comparison to Hungary (Fig. 8).

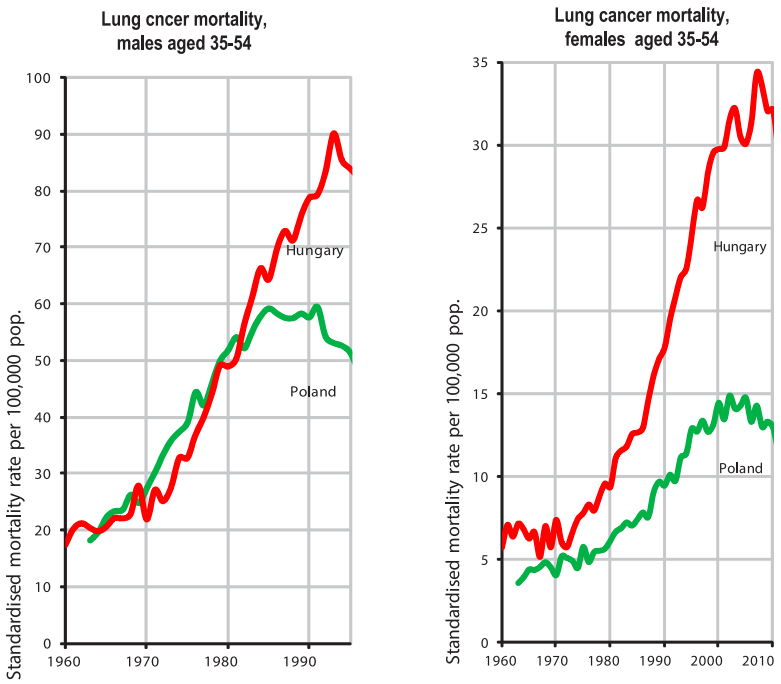


Figure 8. Lung cancer mortality rates in Poland and Hungary, men and women, 35-54

In the years 1960-90, lung cancer mortality rates sharply increased in men in both countries at a similar pace. After the 1990s, these trends diverged. Thus, we have witnessed a sustainable lung cancer decline in Poland – in men from 1990 and in women from 2000 (see Fig. 7). In Hungary, lung cancer mortality rates continued to increase in both men and women for next 10-20 years and reached one of the highest levels ever recorded in the world.

Summary and recommendations

In the late 1980s, Poland recorded the highest per capita sales of cigarettes in the world. This resulted in one of the highest levels of lung cancer. From 1990, the sale of cigarettes began to decline, and since then it fell by 60%, from about 100bn cigarettes per annum in the early 1990s to around 40bn in 2015. A similar drop was registered in smoking prevalence among men, from 65% to 25%, and in women from 30% to 18%. Lung cancer rates in men between the ages of 34 and 54 hit a peak in 1990, and among women in the early 2000s, followed in the subsequent years by a rapid decrease, in some age groups by over a half (see Fig. 7). Accordingly, the decrease in frequency of smoking within the Polish population also led to a significant drop in other tobacco-related diseases [8, 29, 42], with the largest decline in the number of cases reported in cardiovascular diseases, primarily heart attacks [57-59]. The risk attributed to smoking in this disease is 30%[6] [6, 60].

Throughout the 1990s, one of the fastest health gains in the world was observed in Poland (Fig. 9).

[6] Whereas, for example, epidemiological estimates for England between 1990 and 2010 show that half of the decrease in ischaemic heart disease are a result of the decreases in smoking (Simon Capewell).

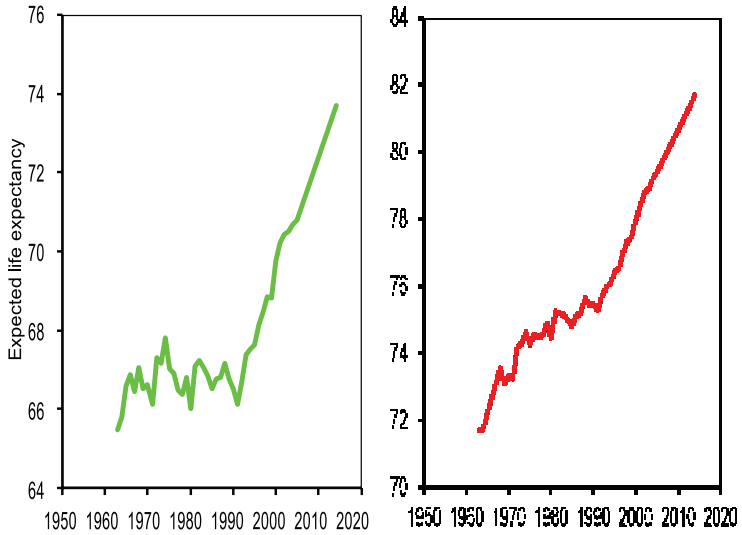


Figure 9. Life expectancy in Poland, 1965-2014

Undoubtedly, one of the main reasons for this, although not the only one, was a sharp decrease in the frequency of smoking. A study published in the Lancet in May 2017 showed that between 1990 and 2015 the decline in smoking frequency among adult populations in Poland was one of the fastest in Europe [26, 33, 61]. The annual decrease in smoking frequency at that time was 1.7% for men and 0.9% for women.

The positive trend in smoking cessation is set to continue in Poland. Opinion polls show that Poles themselves do not want to smoke, and 60% of smokers want to quit [44]. In addition, the trend is similar among children. For example, in the group of 13-15 year-olds daily smoking has halved in the last decade and is under 10% among both boys and girls [62, 63]. Still, the road ahead to the eradication of lung cancer among smokers is still a long one, with more than 8 million Poles smoking and about 40 thousand dying every year prematurely due to tobacco-related diseases [43].

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DEMOGRAPHIC DATA AS RISK FACTORS FOR ACTIVE TUBERCULOSIS

DANE DEMOGRAFICZNE JAKO CZYNNIKI RYZYKA AKTYWNEJ POSTACI GRUŹLICY PŁUC

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Authors' contribution
Wkład autorów:
A. Study design/planning
zaplanowanie badań
B. Data collection/entry
zebranie danych
C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
interpretacja danych
E. Preparation of manuscript
przygotowanie artykułu
F. Literature analysis/search
wyszukiwanie i analiza literatury
G. Funds collection
zebranie funduszy

Summary

Background. The incidence of pulmonary tuberculosis is dependent on many factors, not just health but also demographics. The primary objective of the study was to identify and evaluate selected risk factors for active tuberculosis in patients treated in the former specialist clinic in the eastern part of Lublin Province and to compare them with the ones researched by other authors.

Material and methods. The work was retrospective as it concerns the analysis of the data drawn from the records of 100 patients with active tuberculosis. The information on the examined patients included the following parameters: sex, age, place of residence and marital status.

Results. The majority of the studied population were male (69.0%), among whom the highest proportion concerned the fourth age group, i.e. 51-60 years old (mean 36.3%). As for sex and place of residence of the patients, the proportion of the infected men living in the country was twice as high (68.7%) when compared to women (31.3%). However, there were no differences with regard to the subpopulation percentage of women (67.8%) and men (66.7%). In turn, considering the sex and marital status of the examined persons, we found that the highest proportion of men were bachelors – 39.1%, while the percentage of married persons was similar among men (56, 5%) and women (58.1%).

Conclusions. The analysis of the data shows that in the studied area pulmonary tuberculosis is most common among married men aged 51-60 years living in the country.

Keywords: pulmonary tuberculosis, epidemiology, risk factors, male, female

Streszczenie

Wprowadzenie. Zapadalność na gruźlicę płuc zależy od wielu czynników, nie tylko zdrowotnych, lecz również wskaźników demograficznych. Celem pracy była identyfikacja i ocena wybranych czynników ryzyka gruźlicy prątkującej w populacji chorych leczonych w specjalistycznym ośrodku lecznictwa zamkniętego we wschodniej części województwa lubelskiego oraz porównanie ich z wynikami badań innych autorów.

Materiał i metody. Praca miała charakter retrospektywny i była oparta na analizie danych pochodzących z historii chorób 100 pacjentów z aktywną postacią gruźlicy płuc. Zakres zbieranych danych obejmował następujące parametry: płeć, wiek, miejsce zamieszkania oraz stan cywilny badanych chorych.

Wyniki. W badanej populacji większość stanowili mężczyźni (69,0%), wśród których najwyższy odsetek odnotowano w czwartej grupie wieku, tj. 51- 60 lat (36,3%). Biorąc pod uwagę płeć i miejsca zamieszkania badanych osób, to aż dwukrotnie wyższy był odsetek mężczyzn zamieszkałych na wsi (68,7%) w porównaniu z kobietami (31,3%). Jednak nie ma różnic w udziałach badanych w subpopulacji kobiet (67,8%) i mężczyzn (66,7%). Z kolei uwzględniając płeć i stan cywilny badanych stwierdzono, że w badanej populacji dowiedziono, że największy udział mieli tu mężczyźni zaliczeni do kategorii stanu cywilnego (kawaler) 39,1%, natomiast zbliżone były udziały osób będących w związku małżeńskim, zarówno wśród mężczyzn (56,5%), jak i kobiet (58,1%).

Wnioski. Z analizy uzyskanych danych wynika, że gruźlica płuc na terenie objętym badaniami występuje najczęściej u mężczyzn w grupie wieku 51-60 lat, mieszkających na wsi i pozostających w związku małżeńskim.

Tables: 3
Figures: 1
References: 21
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Słowa kluczowe: gruźlica płuc, epidemiologia, czynniki ryzyka, mężczyźni, kobiety

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Introduction

The WHO report published in October 2014 announced that, in the year 2013, there were about 9.0 million people infected with tuberculosis (TB) in the world. Further, the number of patients was higher than in 2012 (8.6 million). The situation can be related, among other things, to fuller data provided by several countries, including Nigeria, a country with a high population and high incidence of the disease, which influenced the global epidemiological situation of tuberculosis. In most regions of the world, the numbers for tuberculosis are slowly decreasing, and its mortality rate has declined. In the 2014 WHO report, experts announced that, at the end of 2013, the death rate for tuberculosis globally was lower by 45% when compared to 1990, and the number of patients decreased by 41%. However, although the tuberculosis mortality indicator in industrialised European countries is lower, as it is 1 in 100,000, in Poland it still amounts to 1.6.

Most cases of tuberculosis were detected in Asia (56%) and Africa (29%). The countries with the highest number of diagnosed patients are India (2.0-2.3m), China (0.9-1.1m) and Nigeria (340-880th). Further, the highest incidence rates of TB have been found in southern Africa, where a high proportion of the population is infected with HIV. In Lesotho, Swaziland and South Africa, 1 in 100 persons dies of tuberculosis each year (the incidence being 1000/100000). The lowest rates are reported in the affluent countries of Europe as well as Canada, the United States of America, Australia and New Zealand (<10/100 000). In Poland, 7250 cases of tuberculosis were registered in 2013, 292 fewer than in the previous year and 2243 fewer than ten years earlier. The incidence of the disease in all forms in 2013 amounted to 18.8 / 100 thousand population. Poland has already recorded a low morbidity (<20/100 000) in the last few years, yet it is still higher than the EU average and that of the European Economic Area (EEA) – 12.7 / 100.000. 18 EU countries and the EEA report fewer than 10 new cases per 100 000 population.

The incidence of tuberculosis varies, but the highest rates occur among people in older age groups. The mean age of patients was 53.5 years (new cases), and the highest incidence estimate (33.7 / 100.000) was found in people aged 65 and older.

As in the previous years, the incidence of TB in men in 2013 was higher than in women (26.8 vs. 11.4 / 100,000); with the highest gender difference in the age group 55-59 – 55.5 vs. 13.3 / 100 000 respectively. The year 2013 was the fourth consecutive one in which the morbidity among urban dwellers was higher compared to the one in the population living in the country (20.0 vs. 17.1 / 100.000).

The available data indicate that there have been significant differences in the incidence of tuberculosis in Poland in all provinces over the last years. The highest registered in 2013 was visible in Lublin Province – 27,4; Holy Cross – 24,3 and Silesia –23,9; whereas the lowest in Greater Poland Province – 9,9; Podlaskie –12,5 and Subcarpathia – 13,1 / 100 000 [11,12].

Aim of the work

The study aimed at identifying and evaluating selected risk factors for tuberculosis in patients treated in the former specialist clinic in the eastern part of Lublin Province and to compare them with the research results by other authors.

Material and methods

The study is retrospective as it was based on the analysis of selected features from patients' records with active lung tuberculosis. The study involved a group of 100 patients living in Biała Podlaska county in Lublin Province who were hospitalised in the years 2011-2013 in the former specialised medical centre in the eastern part of the province. The majority of the respondents were men (69%), as the proportion of women amounted to 31%. The patients' age ranged between 23 and 84 years. The data collected comprised the following characteristics: sex, age, place of residence and the marital status. To standardise the received data, a research tool was developed in the form of a self-constructed survey (a research protocol), which served as an information database with the view to transferring data to calculate the final findings.

Results

Sex

Basing on the collected data, we found that among the 100 examined persons involved in the study who were hospitalised due to pulmonary tuberculosis 69% were male. Women accounted for 31% of the study population – Figure 1.

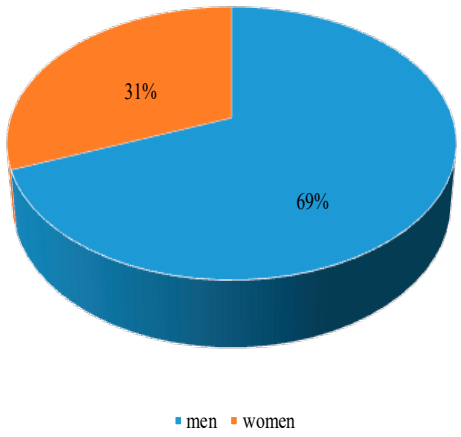

Figure 1. Surveyed persons by sex

Similar results were obtained in the research conducted by other authors. In the sample from Holy Cross Province, men were the dominant group as well – 62%, while women accounted for 38% of the total population [1]. Thus, it might confirm that being male was one of the identified risk factors for active tuberculosis.

Age

The age of the examined patient population was given in ten-year intervals, as shown in Table 1. It was found that the largest group who suffered from TB concerned 51-60 year-olds, accounting for 37.0% of the study population. Similar results were presented in studies carried out in the Holy Cross Province, where 26.19% of the respondents were aged 51-60 [1]. The proportion of the remaining age groups in the studied population was as follows: 23.0% were aged 41-50; 12% – 31-40; 11.0% – 61-70; 8% – 20-30; 7.0% – 71-80, and 2.0% – 81-90.

Table 1. Surveyed persons by sex and age group

Age range		Sex		Total
		women	men	
20-30	N	2	6	8
	% Line	25.0	75.0	100.0
	% Column	6.5	8.6	8.0
31-40	N	3	9	12
	% Line	25.0	75.0	100.0
	% Column	9.6	13.0	12.0
41-50	N	10	13	23
	% Line	43.5	56.5	100.0
	% Column	32.2	18.8	23.0
51-60	N	12	25	37
	% Line	32.4	67.6	100.0
	% Column	38.7	36.3	37.0
61-70	N	2	9	11
	% Line	18.2	81.8	100.0
	% Column	6.5	13.1	11.0
≥ 71	N	2	7	9
	% Line	22.2	77.8	100.0
	% Column	6.5	10.2	9.0
Total	N	31	69	100
	% Line	31.0	69.0	100.0
	% Column	100.0	100.0	100.0

It is worth noting here that a gradual shift in the lung tuberculosis age towards older categories has been observed over the years, as in 1957 most patients were younger, below 40 years of age [2], whereas presently they are predominantly older. The studies conducted in Poland by other authors have also shown that 64% of the patients suffering from tuberculosis are over 45 years of age [3,4]. Our research, as well as the results from

the Holy Cross Province, confirm the observed phenomenon that a higher share of patients with pulmonary tuberculosis presently is visible in older age categories (Table 1).

As for the gender of the surveyed persons, the largest group were men aged 51-60 (25%). Also in the study conducted in the Holy Cross Province, men aged 51-60 years (23.81%) predominated. In the subpopulation of women in our studies, the most numerous categories were those in the age groups 51-60 (38.7%) and 41-50 (32.2%). In turn, in the survey conducted in the Holy Cross Province, the most numerous group of TB patients were aged 71-80 years [1].

Considering the above, we can state that the factor which may be considered as having a potential influence on the occurrence of active *M. tuberculosis* is being male, whereas among females it is age in the group of 51-60 years.

Place of residence

Another investigated factor was the place of residence. The collected data showed that the dominant group of patients were rural residents, who constituted 67% of the population. The patients in the cities accounted for one third of the respondents. The obtained results are presented in Table 2.

Table 2. Surveyed persons by gender and place of residence

Place of residence		Sex		Total
		women	men	
Countryside	N	21	46	67
	% Line	31.3	68.7	100.0
	% Column	67.8	66.7	67.0
City	N	10	23	33
	% Line	30.3	69.7	100.0
	% Column	32.2	33.3	33.0
Total	N	31	69	100
	% Line	31.0	69.0	100.0
	% Column	100.0	100.0	100.0

Similar results were reported by authors researching the issue in other studies. The data gathered in the Holy Cross Province showed that 55% of the patients lived in the country and 33% of the residents in cities [1]. Thus, the place of residence can also be considered as a factor predisposing to tuberculosis.

The analysis of the structure by gender was further supplemented by the data on place of residence (Table 2).

Taking both factors into account, we show that both among male and female residents living in cities and the country were more than twice as likely to be men than women – 68.7% and 69.7% respectively. However, there were no such differences in the subpopulations of women and men. Women living in rural areas accounted for 67.8% of this group, whereas the inhabitants of the city constituted 32.2%. Very similar shares occurred among men – 66.7% and 33.3% respectively. A good point of reference for the findings is the work carried out in the Holy Cross Province whose authors gained similar results. Taking into account the structure of sex and place of residence, they found that, as in our study, it was men who are more likely to be infected in the Holy Cross Province, especially those who live in rural areas (33.3%), as well as those living in cities (26.2%), than women living in the country (21.43%) and city (16.67%) [1].

Marital status

Another factor that characterised the study group of the patients hospitalised for pulmonary tuberculosis was their marital status. More than half of those surveyed were married (57.0%). This may mean that marital status constituted the highest risk in acquiring active lung tuberculosis in the study population, whereas being single could be considered as a risk factor because they too accounted for 29.0% of the patients. The structure of the patients' civil status is presented in Table 3.

Table 3. Surveyed persons by gender and marital status

Marital status		Sex		Total
		women	men	
Married	N	18	39	57
	% Line	31.5	68.5	100.0
	% Column	58.1	56.5	57.0
Single	N	7	22	29
	% Line	24.1	75.9	100.0
	% Column	22.5	31.9	29.0
Widowed	N	5	6	11
	% Line	45.5	54.5	100.0
	% Column	16.1	8.7	11.0
Divorced	N	1	2	3
	% Line	33.3	66.7	100.0
	% Column	3.3	2.9	3.0
Total	N	31	69	100
	% Line	31.0	69.0	100.0
	% Column	100.0	100.0	100.0

Slightly different results were obtained in the research conducted in the Holy Cross Province. Tuberculosis was predominantly diagnosed in the unmarried (both men and women), while those in marital relationships were the second most abundant group.

Sex and marital status data show that the largest group was married men who accounted for 56.5% of the studied population and bachelors – 22% of the male population. The opposite results were gained in the research conducted in the Holy Cross Province, where the largest group of respondents with tuberculosis were single men 33.3%, with the married ones accounting for 11.91% [1]. Taking into account the above, we can state that the highest risk of acquiring active lung tuberculosis in our research concerns married man, while in the study conducted in the Holy Cross Province – single men. The research conducted in Masovia Province showed that married men amounted to 40.0% of the studied male population; however, the majority of the patients were divorced, widowed or single. These studies suggest that single persons are somehow more likely to suffer from tuberculosis than married people [5]. In one Polish study from 2007, being single was found to be conducive to lung tuberculosis [4]. This is confirmed by the results of the study conducted in Estonia, where being single was one of the crucial factors contributing to tuberculosis infection and disease [6]. The studies conducted in Greater Poland Province show that half of the patients with tuberculosis were married [7]. Then comes the research conducted in Russia in which single men were a dominant group in those infected with tuberculosis [8]. On the other hand, Asian studies point to the opposite phenomenon, where tuberculosis is often encountered in multiple families [9].

As for the most numerous infected groups in our study, it was married women who follow men, i.e. 18.0% of respondents, and those who are single (7.0%).

Discussion

Tuberculosis (TB) morbidity and mortality rates have been reduced globally due to the efforts to improve access to medical services, early diagnosis and treatment of active tuberculosis. Despite the decrease of new cases to 9.6 million and deaths to 1.1 million in 2014 in relation to the previous years, these results are still considered high. One of the new priority directions promoted by the WHO is to detect latent infections in specific high-risk groups who may develop an active disease. Identifying the highest risk groups in the population, improving economic and social conditions as well as introducing effective preventive treatment can significantly reduce the incidence rates, especially in regions with low and middle-incomes. Accordingly, research in this direction is particularly recommended [13].

Further, numerous studies have shown a link between tuberculosis incidence and life expectancy, including homosexuality, criminality, age and sex, marital status and the connection between civilisation diseases such as diabetes [14] and HIV infection [15]. Also, increased morbidity among immigrants from the countries with high rates of incidence is commonly investigated [16]. Given the geographical location of Lublin Province, one may consider the site as an additional cause of the highest rates of morbidity. Next, the impact of socio-economic conditions on tuberculosis morbidity is widely scrutinised, especially in countries with high rates of morbidity, in combination with such factors as income, education and smoking [17].

Among the selected and hospitalised patients in the former specialist clinic in Lublin Province, men were the dominant sex, accounting for 69% of the study population. Numerous other surveys conducted in Poland show that men are more likely to have tuberculosis than women [10]. The results of our research confirm this phenomenon. The prevalence of men in the population of diagnosed and treated patients with tuberculosis is typical of modern societies in the countries with similar levels of development as Poland [1] and developing countries with high rates of morbidity. The data coming from 29 studies in 14 countries all over the world have also shown a higher incidence of tuberculosis in men than women, which sometimes doubles the average rate. Access to the health system, alcohol abuse, cigarette smoking, HIV incidence, homelessness, contact with other sick people at work are factors where differences are particularly evident in the age group 45-64 [18]. Gender susceptibility is also considered.

As for rural communities, the incidence of tuberculosis has always been lower ever since the data on TB were collected. For the first time, it changed in 2010, when the urban population cases started to prevail [1]. In our population, the trend towards higher tuberculosis morbidity in rural residents was higher (67%), which might suggest that this new epidemiological trend is not yet evident.

Different factors predisposing factors for tuberculosis have been identified in the literature. These include unemployment, loneliness, homelessness, prison record, age and weight [10]. The age that predisposes tuberculosis is the range 45-54 years, whereas in our research – 51-60 years (37% of the study population).

Accordingly, it might be said that there is a gradual shift in the age of patients infected with tuberculosis, where the ageing of the population with diagnosed pulmonary tuberculosis could be considered as a positive phenomenon indicating a decreasing transmission of the disease in society [8]. Global studies suggest that the age range of people with tuberculosis is partly due to the average lifespan of a particular country population. For example, in African countries, it ranges from 25 to 44 (75% of the population), while in the United States people in the sixties account for 35% of those infected.

Presently, tuberculosis studies are being conducted in the elderly, taking into account epidemiological data, risk factors, appropriate diagnostic programmes, as well as possible preventive and therapeutic strategies [21].

Further, numerous studies indicate that the higher the risk of tuberculosis, the more likely it is that the person turns out to be single. Tuberculosis and staying single have also been stressed in the studies conducted in Russia and Denmark. The disease was more common in men who were divorced and single. Among the men in the age range 55-64 years admitted to one of the Danish sanatoria, divorced people amounted to almost 40% of the group, whereas in the whole population of patients there were only 5% of such persons. In total, 60% of the male tuberculosis patients were single, while around 20% of the whole population were unmarried [8]. In our population, 20% of the persons were single, which might suggest that this particular factor is essential in the tuberculosis occurrence.

Research findings show that patients with active TB suffering from alcoholism, homelessness, unemployment, loneliness or AIDS should be provided with social care and support, and the best way to identify such patients is interviewing [19]. It may also be suggested that extended interviews concerning demographic data, being single, social conditions and economically determined living standards as well as data on the coexistence of certain diseases such as diabetes, hypertension, renal disease and cancer should be explored. They could help to create a model of appropriate measurement tools for those suffering from tuberculosis. These, in turn, could help to improve the condition of the infected and enable them to recover, ultimately preventing the disease [20].

Conclusions

From the collected data in the study, the following conclusions could be drawn:

1. 1. Among active tuberculosis patients, as in other populations, the majority are male, which should lead to further studies identifying men at the highest risk of being infected with tuberculosis.
2. 2. Active tuberculosis patients are most likely to be in the age groups of 51-60 and 41-50 years, with a similar proportion of men and women. It would be sensible to conduct screening in people in these age groups, especially in those with additional illnesses, or living in difficult social and economic conditions.
3. 3. There is a trend of higher morbidity among the rural population, with a similar proportion of the rural population among men and women.
4. 4. The highest risk of active lung tuberculosis in the study population turned out to be marital status, which may result from a family transmission, whereas being single can be considered as a factor that increases the risk of becoming infected, as indicated in the literature.

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TUBERCULOSIS IN POLISH ZOOS AS HEALTH RISK FOR HUMANS

GRUŹLICA W POLSKICH OGRODACH ZOOLOGICZNYCH W ASPEKCIE ZDROWIA PUBLICZNEGO

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Wkład autorów:
A. Study design/planning
zaplanowanie badań
B. Data collection/entry
zebranie danych
C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
interpretacja danych
E. Preparation of manuscript
przygotowanie artykułu
F. Literature analysis/search
wyszukiwanie i analiza literatury
G. Funds collection
zebranie funduszy

Summary

Introduction. Tuberculosis is an infectious disease of humans and animals caused by the organism of the *Mycobacterium tuberculosis complex* (MTBC). It is one of the most widespread infectious diseases occurring in zoos. Taking into account the number of visitors to these sites, tuberculosis remains a major public health problem.
Material and methods. The study material consisted of lymph nodes, and internal organs collected *post mortem* from five zoo animals suspected of tuberculosis: antelope, two tapirs, alpaca and bison. The animals came from the zoos in Gdańsk, Wrocław and Chorzów. The microbiological analysis of 5 MTBC strains was performed to determine the molecular relationships among them.
Results. Five strains were isolated in the microbiological examination, 3 of which were identified as *Mycobacterium bovis* and 2 – as *Mycobacterium caprae*. 3 spoligotypes, i.e. SB1912, SB0856, SB2416, were obtained by spoligotyping. To confirm the transmission of tuberculosis in the studied animal population, the MIRU-VNTR method was applied. The unique patterns were assigned to 3 strains and the other 2 of the same pattern were assigned to one cluster, which would indicate the transmission of tuberculosis among animals.
Conclusions. The obtained results exclude the transmission of tuberculosis between zoos.

Keywords: zoonosis, *Mycobacterium tuberculosis complex*, tuberculosis, public health, transmission

Streszczenie

Wprowadzenie. Gruźlica jest zakaźną chorobą ludzi i zwierząt, którą powodują prątki wchodzące w skład kompleksu *Mycobacterium tuberculosis* (MTBC). Jest jedną z najbardziej rozpowszechnionych chorób zakaźnych występujących w zoo. Biorąc pod uwagę liczbę odwiedzających te miejsca, gruźlica stanowi niebezpieczeństwo dla zdrowia publicznego.
Materiał i metody. Materiał do badań stanowiły węzły chłonne i narządy wewnętrzne pobrane *post mortem* od pięciu zwierząt z zoo podejrzanych o gruźlicę: antylopy, dwóch tapirów anta, alpaki i żubra. Zwierzęta pochodziły z zoo w Gdańsku, Wrocławiu i Chorzowie. W pracy poddano analizie mikrobiologicznej 5 szczepów MTBC i określono pokrewieństwo molekularne pomiędzy nimi.
Wyniki. W wyniku badania mikrobiologicznego wyizolowano 5 szczepów, 3 zidentyfikowano jako M. bovis a 2 jako M. caprae. Metodą spoligotyping uzyskano 3 spoligotypy (SB1912, SB0856, SB2416). Do potwierdzenia zjawiska transmisji gruźlicy w badanej populacji zwierząt, zastosowano metodę MIRU-VNTR. Wzory unikalne przyporządkowano 3 szczepom, a pozostałe 2 szczepy o takich samych wzorach zostały przydzielone do wspólnego klasteru świadczącego o zaistniałej transmisji prątków gruźlicy pomiędzy zwierzętami.
Wnioski. Uzyskane wyniki pozwoliły wykluczyć transmisję gruźlicy między ogrodami zoologicznymi.

Tables: 2
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Introduction

Tuberculosis (TB) is an infectious disease of people and animals caused by mycobacteria of the Mycobacterium tuberculosis complex (MTBC) [1]. Currently, the MTBC consists of 11 species of mycobacteria which, in addition to the *Mycobacterium bovis* BCG vaccine strain, are pathogens for humans and animals. The last described species of the MTBC – *Mycobacterium suricatte*, is the etiologic agent in meerkats (*Suricata suricatta*) [2]. In Poland, tuberculosis is primarily caused by bovine bacilli: *Mycobacterium bovis* and *Mycobacterium caprae* [3], as well as *Mycobacterium tuberculosis*, the causative agent of human TB [5]. According to the World Health Organization (WHO) classification, bovine tuberculosis is classified as a direct zoonosis – a direct transmission of the infectious agent from the infected vertebrate (animal) to the man, a sensitive vertebrate species, without intermediate hosts [6]. Due to the direction of the transmission of the infectious agent, bovine tuberculosis can be classified into any zoonotic type [7]. Anthroponosis occurs when the transmission of the disease spreads from the animal to human, but zooanthroponosis cases, when the human is the source of the disease, are also known [5].

Tuberculosis is also one of the most widespread infectious diseases among zoo animals [8, 9]. With the number of people visiting these places, this disease poses a significant threat to public health. Tuberculosis is primarily infectious (air passages) [10]. Inhalant mycobacteria get into the lungs, where as a result of the defence mechanism, the infection is reduced, and tuberculomas typical of tuberculosis are produced in which latent bacteria can survive for many years (the comatous status).

The epidemiological situation of TB in Poland

The incidence of tuberculosis in Poland has remained at a similar level since 2000. In 2016, 6444 people became infected with all forms of tuberculosis, which is 16.8 per 100 000 population (the incidence in Western Europe is less than 10 per 100,000). 103 cases of the disease have been reported in children up to 14 years of age and 76 cases in young persons aged 15-19. The highest incidence of tuberculosis in all forms was found in men in Silesia (37 per 100 000) and the lowest in women in Greater Poland Province (5.5 per 1000 000). The tuberculosis mortality rates for Poland are currently around 1.4 per 100,000. In 2014, tuberculosis was the cause of 532 deaths. The most important task of new tuberculosis control programmes is primarily its early detection [11] and the application of an appropriate anti-tuberculosis treatment [12].

What presently impedes implementing tuberculosis control programmes around the world are the phenomenon of drug resistance and the lack of new anti-tuberculosis drugs [13]. It is worth noting that the latest drug of the so-called first-line, i.e. rifampicin, was included in therapy nearly half a century ago, in 1965. Drug-resistant tuberculosis, especially its variations MDR-TB (multidrug-resistant) and XDR-TB (extensively drug-resistant), is a highly lethal disease. As revealed at the meeting of the Task Force Meeting on XDR TB in 2008, mortality in TB patients was about 20%, in MDR-TB patients - 30%, and in tuberculosis patients XDR-TB - 60%.

The DNA fingerprinting techniques of *M. tuberculosis*, the causative agent of tuberculosis, have shown that in areas where the disease rate is high, the selected genotypes of mycobacteria dominate, which proves that the conditions for their spread are favourable. In 1995, genetically highly conserved *M. tuberculosis* strains were described and named Beijing. *Mycobacterium tuberculosis* of the Beijing genotype show some specific characteristics that facilitate their rapid spread in the world.

Beijing genotype strain of *Mycobacterium tuberculosis*is the most significant and most dangerous molecular family [14]. In the study conducted in 1995, approximately 80% of the strains isolated from East Asian patients (mainly in Beijing) exhibited the same DNA pattern. Soon, these strains were found in the USA, and then in Europe. Presently, Beijing strains are isolated from patients on all continents [15]. Although they have different patterns of resistance, which is highly resistant, can be found in many regions of the world. In Poland, the disease has been reported for years, mainly among immigrants [10]. In Ukraine, Beijing genotype strain of *Mycobacterium tuberculosis* (spoligotype 265) was isolated from the monkey (unpublished data). Taking into account only the last two centuries, it must be stated that tuberculosis has been responsible for the death of nearly 1 billion people [16].

Aim of the work

The study aimed to illustrate the use of the spoligotyping and MIRU-VNTR methods in the genetic correlations of MTBC strains isolated from 5 wild animals that were found in three Polish zoos and to identify potential transmission chains.

Material and methods

The study material was lymph nodes and internal organs collected *post mortem* (n = 5) from zoo animals: antelope (*Kobus ellipsiprymnus defassa*) (n = 1), tapir anta(*Tapirus terrestris*) (n = 2), alpaca (*Vicugna pacos*) (n = 1) and bison (*Bison bonasus*) (n = 1) suspected of tuberculosis infection. The animals came from 3 zoos, located in the following provinces: Pomerania (1 Kob Deffasa / the zoo in Gdańsk), Lower Silesia (2 tapirs anta / the zoo in Wrocław) and Silesia (1 alpaca /the Silesian zoo in Chorzów) .

The tissue materials from the animals were subjected to an anatomopathological examination to determine the presence of tuberculous lesions, and then microbiological diagnostics consisting of the following distinct stages: culture on solid media, identification of isolated strains of mycobacteria, and a molecular analysis of *Mycobacterium* strains.

The strains were grown on Stonebrink's solid medium. The medium was prepared in the Laboratory of Nutrition in the National Veterinary Research Institute in Puławy. The confirmation of MTBC was done using immunochromatographic assay to detect MPT64 protein fraction secreted by MTBC cells during culture – MGIT TBC® Identification Test. Genotypic identification was performed by GenoType MTBC®, and genetic typing was established using two methods: spoligotyping and MIRU-VNTR [17, 18].

Results

Anatomopathological changes typical of bovine tuberculosis have been observed in the antelope and one tapir in the form of lesions. They were located in the bronchial lymph nodes. Besides, a developed form of tuberculosis was diagnosed (Table 1). The tubercles found in the lymph nodes were 1 to 5 mm in size. Further, the changes in the lungs were characteristic of serous pneumonia.

Table 1. Results of anatomopathological examinations

No.	Animals species	Clinical material taken for examination	Anatomopathological changes
1.	Antelope (*Kobus ellipsiprymnus defassa*)	Bronchial nodules, lungs	Bronchial nodules, lungs.+
2.	Tapir (*Tapirus terrestris*)	Bronchial nodules, lungs	Bronchial nodules, lungs.+
3.	Tapir (*Tapirus terrestris*)	Bronchial nodules, lungs	-
4.	Alpaca (*Vicugna pacos*)	Bronchial nodules, lungs	-
5.	Bison (*Bison bonasus*)	Retropharyngeal, bronchial, mediastinal nodes	-

The tissue material was collected from all the tested animals and from each collected sample a microbial culture was obtained. Five strains of tuberculosis were isolated in the Stonebrink solid medium. All colonies were similar in appearance – they were white, morphologically indicating a bovine bacilli growth.

Among the analysed strains, 3 were identified as *M. bovis,* and 2 as *M. caprae*. Using spoligotyping, 3 types (SB1912, SB0856, SB2416) were obtained. The spiligotypes SB1912 and SB0856 are common patterns on the European continent. According to the signatures provided in the SpolDB4 database, their former names are CAP 1600 and BOV 820. The third spoligotype isolated from the antelope from Gdansk was not previously registered in international databases. To confirm the transmission of tuberculosis in the studied animal population, the MIRU-VNTR method was used. The unique patterns were assigned to 3 strains and the other 2 with the same pattern were assigned to one cluster that shows the transmission of tuberculosis bacilli among animals (Table 2).

Table 2. Molecular characteristics of strains

Year of isolation	Animals species, zoo location	spoligotype	MIRU-VNTR
2009	antelope (Gdańsk) tapir (Wrocław) tapir (Wrocław)	SB2416* SB1912 (CAP 1600) SB1912 (CAP 1600)	462542255221136 344551556413332 344551556413332
2010	alpaca (Chorzów)	SB0856 (BOV 820)	422522255421192
2013	bison (Warszawa)	SB1912 (CAP 1600)	344651557423632

* – the pattern registered in the www.Mbovis.org database by the authors of the work

Discussion

The results of the study indicate that tuberculosis caused by bovine mycobacteria is present in animals living in zoos in Poland. The disease poses a major threat to many animal species and, at the same time, contributes to substantial economic losses as it is identified in valuable and rare species [8]. Direct contact between the animals and the public and a large number of visitors poses significant risks to the transmission of the disease to humans. The ability to eliminate the disease through treatment is possible only in a few animal species. In 2011, Polish vets attempted to treat giraffes with active TB [19]. However, after two months of anti-tuberculosis treatment, the animal was euthanised due to its deteriorating health. In fact, most animals are eliminated when infected with the disease. The treatment of tuberculosis in animals, not isolated from visitors, is a controversial issue in terms of public health and the exposure of the staff, including the vet who administers medication every day.

The cooperation with the Polish zoos has shown that suspicious cases of this dangerous zoonosis are often not reported. The study material taken from the animals suspected of tuberculosis is commonly examined only to identify anatomopathological changes that would indicate the disease. It should be noted that such anatomopathological changes in animals should differentiate between *Rhodococcus equi*, *Trueperella* (*Arcanobacterium*) *pyogenes*, as well as MOTT (Mycobacteria other than tuberculosis) [20, 21]. The following study concerns small light yellow nodules, sometimes with abscesses in the retropharyngeal,.and under-jaw nodes, from which *M. avium* complex, *Mycobacterium*: *chelonae*, *terrae*, *phlei*, *forruitum*, *Rhodococcus equi* and *Trueperella pyogenes* were isolated.

Veterinary practitioners regard tapirs to be the indicator species that may help diagnose bovine mycobacterium infection [22, 23]. The conducted research showed that the tapirs described in the work did not have a tuberculin skin test done before being transferred to the Silesian zoo. The molecular analysis of the material obtained from these animals showed that the isolated strains were *M. caprae* CAP 1600 and had identical molecular patterns as those resulting from the MIRU method. Thus, it can be assumed that the disease transmission occurred between the two individuals. According to a study by Erler et al., *M. caprae* spoligotype CAP 1600 is a strain that is often isolated from animals in the European continent [24]. In their research, the authors carried out a molecular analysis using the polyculture to examine 79 strains isolated from cattle, humans and wild animals in 5 countries in Central Europe. All the strains isolated from 79 animals had the same spoligotype as the above-described tapirs, i.e. *M. caprae* CAP 1600.

The work also confirmed a case of tuberculosis in the antelope from the Gdańsk zoo. The strain isolated from the antelope material was identified as a *M. bovis* with a spoligotype that was not previously registered in the international SpolDB4 database or in the veterinary register www.Mbovis.org [25]. The case was incidental, although this zoonosis was also found in the Arabian oryx (*Oryx leucoryx*) in 1994 in the same zoo [26].

In 2010, tuberculosis was identified in 6 antelopes and 3 giraffes in the Silesian zoo [19, 27]. The molecular analysis allowed for determining the genetic pattern of the strain isolated from alpaca, which was identical to the MIRU pattern of the strain isolated from one of the three giraffes [19]. That might indicate a common source of infection of all these animals in the Silesian institution.

There is insufficient information on sick zoo animals, their infectious diseases and unreported cases, which makes an epidemiological inquiry challenging to conduct. Consequently, the source of tuberculosis infection is also less likely to be identified.

This can be confirmed by the case of tuberculosis found in a 29-year-old female bison in the Warsaw zoo. The MIRU pattern of the isolated mycobacterium strain was identical as the ones isolated from the bison in the Bison Breeding Center in Smardzewice (unpublished data). According to Zoological Information Management System (ZIMS), the female was born in the Warsaw zoo, where she remained until her death. The source of infection in bison in Smardzewice might have been one of the females which joined the herd from the Silesian zoo in Chorzów, where she had stayed for 7 years. It cannot be ruled out however that the isolated *M. caprae* was present in those two Polish zoos, i.e. in Warsaw and Chorzów.

When tuberculosis is diagnosed in animals, a very thorough disinfection of all the cages and grounds in which the infected animals stayed should be administered. Also, the personnel who had contact with the sick individuals should be examined and undergo the tuberculin test, preferably in correlation with the T-SPOT.TB test [29]. In some cases, a pulmonary x-ray should be performed and an interview conducted regarding subfebrile conditions, cough, or sudden weight loss.

Conclusions

1. The occurrence of bovine tuberculosis in zoos indicates that there is a need for greater control, both through active and passive monitoring of the animals.
2. Tuberculosis is a direct threat to human health.

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UROLITHIASIS IN CHILDREN – A HEALTH PROBLEM OF CIVILIZATION

KAMICA UKŁADU MOCZOWEGO U DZIECI – PROBLEM CYWILIZACYJNY

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Wkład autorów:
A. Study design/planning
zaplanowanie badań
B. Data collection/entry
zebranie danych
C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
interpretacja danych
E. Preparation of manuscript
przygotowanie artykułu
F. Literature analysis/search
wyszukiwanie i analiza literatury
G. Funds collection
zebranie funduszy

Summary

In the past 25 years, the incidence of urolithiasis in the paediatric population increased two-fold. The reasons for the increased morbidity are not completely clear, but it is believed that many different factors impact this situation including bad eating habits, salty diets, inadequate fluid intake, obesity, hypertension, environmental pollution or uncontrolled multivitamin intake. At the same time, improving diagnostics quality and its availability contributed to an increase in the detection of urolithiasis. The paediatric population is subject to high risk of disease recurrence; therefore, it is essential to choose a method of treatment that provides a stone removal in a minimally invasive but effective way. Over 80% of bladder stones are evacuated spontaneously and do not require surgical intervention. The remaining ones need conservative or surgical treatment. A choice of the most appropriate method depends on many factors. The procedures of surgical treatment of urolithiasis in children include ESWL, URSL, RIRS, PCNL and pyelolithotomy using a laparoscopic or open technique. Urolithiasis in children is a severe interdisciplinary problem because of its more common prevalence. Its formation requires a thorough recognition, proper treatment by a nephrologist and the use of efficient, effective and minimally invasive surgical procedure.

Keywords: urolithiasis, children, ESWL, URSL

Streszczenie

W ciągu ostatnich 25 lat częstość występowania kamicy układu moczowego w populacji dziecięcej wzrosła dwukrotnie. Przyczyny zwiększonej zachorowalności nie są do końca wyjaśnione, ale uważa się, że mają na to wpływ różne czynniki: nieprawidłowe nawyki żywieniowe, dieta z dużą zawartością soli, niedostateczna podaż płynów, otyłość, nadciśnienie tętnicze, zanieczyszczenie środowiska oraz niekontrolowana podaż preparatów wielowitaminowych. Jednocześnie poprawa jakości i dostępności diagnostyki przyczyniły się do wzrostu wykrywalności kamicy. Populacja dziecięca narażona jest na wysokie ryzyko nawrotu choroby, dlatego zasadnicze znaczenie dla dzieci ma wybór takiej metody leczenia, która umożliwiłaby usunięcie złogów w sposób jak najmniej inwazyjny i jednoczenie skuteczny. Ponad 80% złogów wydalanych jest samoistnie i nie wymaga interwencji. Pozostałe złogi wymagają leczenia zachowawczego lub chirurgicznego. Wybór najwłaściwszej metody leczenia zależy od wielu czynników. Procedury zabiegowego leczenia kamicy u dzieci to ESWL, URSL, RIRS, PCNL oraz pielolitotomia techniką laparoskopową lub otwartą. Kamica układu moczowego u dzieci ze względu na coraz powszechniejsze występowanie jest poważnym interdyscyplinarnym problemem. Wymaga wnikliwego poznania przyczyn jej powstania, prowadzenia przez nefrologa i zastosowania skutecznego, efektywnego i jak najmniej inwazyjnego leczenia zabiegowego.

Słowa kluczowe: kamica układu moczowego, dzieci, ESWL, URSL

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Introduction

In the past 25 years, the incidence of urolithiasis in the paediatric population increased two-fold [1]. The reasons for the increase if its morbidity are not completely clear, but it is believed that many different factors influenced the situation including bad eating habits, inappropriate diet, especially a salty one, products high in animal protein, inadequate fluid intake, obesity, hypertension. Environmental pollution, a fast pace of living, uncontrolled multivitamin intake and uncontrolled dietary supplement intake increase the risk of metabolic disorders leading to stone formation [2]. At the same time, improving diagnostic quality and diagnostics availability, as well as more frequent ultrasound (US) examinations in diagnosing abdominal pain, have contributed to an increase in detection of urolithiasis. [3]

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Aim of the study

The following article aims to present the current state of knowledge on urolithiasis in paediatric population.

Urolithiasis may affect patients of all ages. Scientific publications inform about a case of a 4-days-old infant with nephrolithiasis; however, the average age when this disease is diagnosed in the paediatric population is about 7-8 years [3]

The prevalence of urolithiasis in such young children usually involves metabolic disorders which are genetically predisposed. Evacuation of bladder stones from the urinary tract (spontaneous or surgical) does not finish a treatment process. The doctors should ensure that the condition in which a new crystallisation nucleus on which a stone develops does not happen again. It is not always possible to do that; therefore, there are some recurrences, mainly in children with metabolic disorders (7-50% cases) [4].

Urolithiasis occurs familially, as about 50-60% of children have got a medical history. In retrospective studies, Naseri and Vandervoort confirm that a family history of different types of urolithiasis amount to as many as over 62.7% cases [5].

Pathomechanism of stone formation

There are numerous mechanisms of stone formation. The crystallisation of urine occurs when a crystalline nucleus appears, which causes supersaturation or deficit of crystallisation inhibitors.

The supersaturation factors usually include calcium, oxalates, uric acid, magnesium ammonium phosphates, cystine, a small urine volume or changes of urine pH [6]. As a result, small crystals develop in urine which increase and aggregate, leading to stone formation. This process may be stopped by crystallisation inhibitors, among which the most important are pyrophosphates, glycosaminoglycans, magnesium chlorides, citrates, nephrocalcin, osteopontin and Tamm-Horsfall protein. These inhibitors preclude aggregation of crystallisation nucleus and adhesion to urothelium. Also, a factor that seems relevant in inhibition of crystallisation is increased diuresis [7].

Among metabolic disorders predisposing nephrolithiasis are hypercalciuria, hyperoxaluria, hyperphosphaturia, hyperuricosuria, hypomagnesuria, cystinuria, hypocitraturia.

Hypercalciuria turns out to be the most common in children, as it is the cause of 60% of urolithiasis cases. In laboratory tests, the amount of calcium excreted in the urine exceeds 4mg/kg/24 hours (0,1mmol/kg/24 hours). Three types of hypercalciuria can be distinguished: absorptive, renal and resorptive. In absorptive hypercalciuria, an increased calcium absorption takes place in the digestive tract and thereby increasing calcium concentration in blood and excreted urine. In renal hypercalciuria, the disorder is caused by a decreased calcium re-absorption in the renal tubule. If metabolic symptoms occur in a child under 10 years old, it impairs treatment response, and the prognosis is not good [1].

Another important cause of crystallisation in the urinary system are infections. Among the bacteria contributing to stone formation are Proteus spp., Klebsiella spp., Pseudomonas spp. The bacteria producing enzymes degrade urine components and change urine pH. Proteus spp. producing urease causes the precipitation of phosphate stones, whereas Klebsiella spp. and Pseudomonas spp. produce struvite stones. Bacteria may become a crystallisation nucleus. The urinary tract infections occur in about 50% of the patients with urolithiasis, and in small children (under 5 years old) the incidence of such cases is about 62% [8].

The pH of urine is critical in stone formation. The acidic pH of urine causes a precipitation of uric acid stones and cystine stones, and the alkaline pH leads to the crystallisation of phosphates.

The development of genetics has contributed to the identification of mutations responsible for metabolic disorders in patients with urolithiasis. These include the following: X-linked diseases – Dent disease, Lowe syndrome and autosomal recessive diseases – Bartter syndrome type I, II, III, V, hypomagnesemia with hypercalciuria and nephrocalcinosis.

Furthermore, stone formation in the urinary tract is also caused by long-term immobilisation (causing increased calcium resorption from bone), hyperparathyroid, sarcoidosis as the cause of hypercalciuria, myeloproliferative diseases, i.e. hyperuricosuria, long-term use of loop diuretics, corticosteroids, an overdose of vitamin D and long-term parenteral nutrition of premature newborns leading to hyperoxaluria.

Stones develop in the urinary tract because of urinary reflux disorders in particular segments of the urinary system. Thus, defects and diseases causing urinary retention result in the crystallisation process. The most common abnormalities include hydronephrosis, ureterovesical stenosis, urethral stenosis and bladder disorders. In these cases, the method of choice is surgical treatment consisting in the removal of the cause of urinary reflux disorder.

The cause of stone formation has to be determined in each child so that the primary condition is cured and any further stone formation in the urinary tract is prevented [9].

Symptoms

Urolithiasis in children is most often diagnosed during the diagnostics of abdominal pain or a routine ultrasound examination. The most common sign of urolithiasis is a pain. Typical attacks of renal colic occur in $^1/_3$ of older children, but in younger children abdominal pains are difficult to diagnose [10]. They are of different nature and non-specific enough. The symptoms include the following: nausea, vomiting, loss of appetite, dysuric symptoms, frequent urination, frequent recurrent urinary tract infections, pyuria, bacteriuria, microhematuria, whereas in infants – one can observe latericeous sediment on nappy and a small body weight gain [11].

There is also a big group of patients, i.e. 15-25%, mainly younger children, in whom there are not any symptoms of nephrolithiasis. [12]

Diagnostics

If urolithiasis is suspected, diagnostics should start from a very detailed medical history with particular regard to recent diseases, medicines and/or dietary supplements, eating habits, amount of fluid intake and positive family history.

Laboratory tests include urinalysis, ionogram, uric acid, parameters of renal function, metabolites of vitamin D3, PTH (parathormone), 24-h urine collection to determine calcium concentration, calcium/creatinine ratio, cystine/creatinine ratio and oxalate/creatinine ratio.

These tests aim to determine the type of lithiasis and how the conditions leading to crystallisation nucleus can be corrected.

Another method of choice in diagnosing the condition is imaging, an ultrasound. It provides much information about the stone localisation and its size and shows any anatomical anomalies in the urinary system. It also indicates whether the stone is the cause of urinary reflux disorder or not. Radiography is not as accurate as ultrasound and exposes the patients to ionising radiation; however, it shows the majority of stones. (Fig.1)

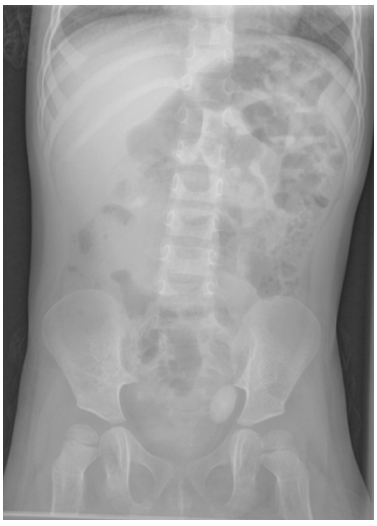

Figure 1. Large stone in the left ureter; an X-ray

To choose an appropriate method of an invasive treatment, one needs to extend diagnostic imaging and perform the following examinations: urography, computed tomography and renoscintigraphy, mainly in staghorn lithiasis.

Treatment

The paediatric population is subject to a high risk of the disease recurrence; therefore, it is vital to choose such a method of treatment that provides the stone removal in minimally invasive and efficient way. Over 80% of stones are evacuated spontaneously and do not require surgical intervention [12] (Fig.2).

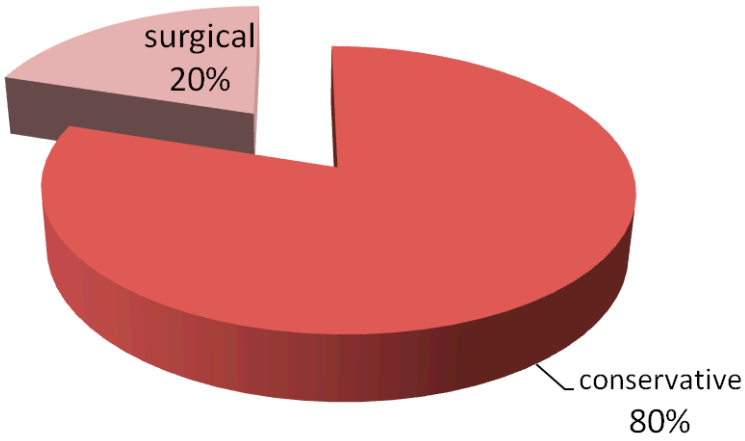

Figure 2. Methods of urolithiasis treatment

The remaining ones need conservative treatment or surgical treatment. The choice of the most appropriate method of treatment depends on many factors, i.e., the location, size and stone composition, the age of the patient, anatomical conditions, grade of urinary reflux disorder, recurrent urinary tract infections [13].

The conservative treatment of urolithiasis and recurrence prevention consist in creating such conditions which prevent the crystallisation process and an increase of crystals. It may be obtained by the pH of urine modification, increase in diuresis, decrease in intake or intestinal absorption of the substrate, increase in the content of crystallization inhibitors.

In all patients, regardless of urolithiasis type, a low electrolyte liquid intake during the treatment is recommended so that the specific gravity of urine would not exceed 1015 and a diuresis would be over 1 ml/kg/hour. It considerably decreases the risk of crystallisation of calcium oxalate, calcium phosphate and uric acid [14].

It is also recommended to limit sodium in a diet to 100 mmol/day and animal protein intake as well as to increase fruit and vegetable intake in a diet, which are a natural source of citrates [15].

Further, antibacterial prophylaxis is used in patients with urolithiasis. To remove stones, or cause a spontaneous stone evacuation and obtain proper urolithiasis risk indicators, one needs to take nitrofurantoin 1-2 mg/kg of body weight in a single nocturnal dose or trimethoprim in the dose of 1mg/kg/day.

To relieve the pain, diastolic agents facilitating spontaneous stone evacuation are applied [9].

The presence of stone in the urinary system does not mean a surgical treatment. [16]. It is considered that about 60-70% of stones are evacuated spontaneously. The stones that do not cause retention of urine, of smaller diameter as 4 - 6 mm, should be observed and treated only conservatively. Besides, it was observed that stone composition has a relevant influence on spontaneous evacuation. Calcium phosphate stones were spontaneously evacuated in 78% of the patients, whereas 91% of the calcium oxalate stones required surgical treatment. The cystine and struvite stones usually require a surgical procedure because of their stability and big sizes [16].

Surgical treatment

The procedures of surgical treatment of urolithiasis in children are the same as in adults. They include ESWL, URSL, RIRS, PCNL and pyelolithotomy either using a laparoscopic or an open technique.

ESWL

Extracorporeal shock wave lithotripsy (ESWL) is a non-invasive treatment that uses an acoustic pulse. The lithotripters are divided into electrohydraulic, piezoelectric and electromagnetic – depending on the mechanism of a shockwave. The shockwave is focused directly on the stone under X-ray or ultrasound control. ESWL is a method of choice in the treatment of stones with a diameter ≤ 15 mm located in the upper urinary tract. [17] The efficiency of the discussed method varies from 68% to 92% depending on the health centre [18]. Extracorporeal lithotripsy as monotherapy is a relatively more efficient method in the paediatric population than in adults because of stones softness, their smaller sizes, the smaller volume of patients' tissues during the shockwave transmission and amore magnificent facility in the spontaneous evacuation of crushed stones. [19] The complications after the ESWL include bleeding from the urinary system, bruising, hematoma of the renal

parenchyma and renal colic[18]. Other complications such as worsening of the kidney function or hypertension have not been observed [20], which may mean that ESWL can be considered as a safe procedure. It is worth noting that this procedure requires a general anaesthesia at any time. Therefore, if the probability of failure is high, an alternative method of treatment should be considered that would facilitate stone evacuation even after one anaesthesia.

PCNL

Percutaneous nephrolithotomy (PCNL) is a minimally-invasive procedure which is performed in general anaesthesia and using antibiotic therapy. Using radiological or ultrasound guidance, it perforates percutaneously a renal calyx, then a nephroscope is introduced, and the stones are crushed. To defragment stones, pneumatic, ultrasonographic or laser (Ho: YAG) lithotripters may be used.

The most common complications related to this procedure are fever, urosepsis and intensive bleeding requiring a blood transfusion. However, the authors from different health centres show that a risk of blood transfusion is minimal [19]. The efficiency of PCNL as monotherapy varies from 87% to 98.5% [21]. To increase the effectiveness of this method, the so-called "sandwich therapy is implemented in many health centres. After the PCNL procedure, ESWL may additionally be used. This way of treatment may attain better efficiency, even 100% [22]. However, PCNL is a technique requiring extensive experience and it is a good alternative for surgical treatment.

URSL

Ureteroscopic lithotripsy (URSL) is a procedure of ureteroscopy extending up to the pyeloureteral junction. With the use of miniature semiflexible and flexible ureteroscopes, it is possible to perform ureteroscopy of the renal pelvis and secondary renal calyces and crush stones by a lithotripter (RIRS procedure) (Fig 3).

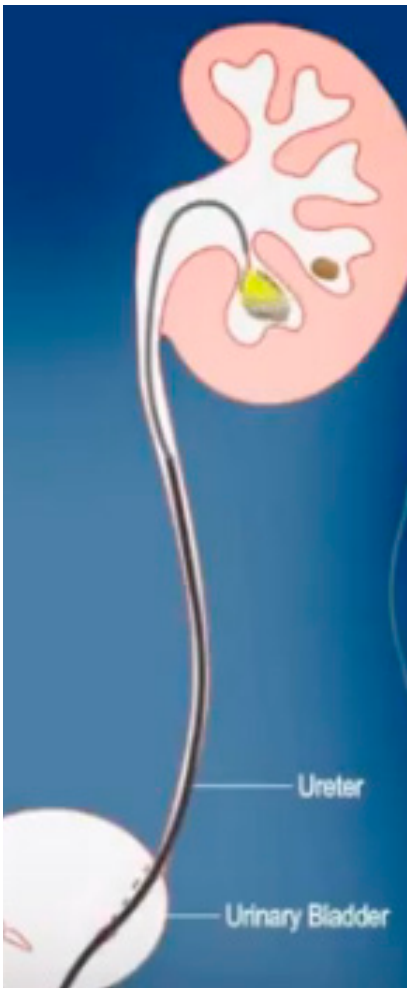

Figure 3. Retrograde intrarenal surgery (RIRS)

Corcoran et al. received 88% of efficiency after a single method using Ho: YAG lithotripters in a group of 47 children with stones located in the upper part of the urinary system [23]. Among the complications related to URSL, one can mention the following: ischaemia, stenosis, ureteral perforation and vesicoureteral reflux. However, the difficulty risk is inconsiderable, about 2 – 4% [24].

URSL is commonly used in the health centres where the authors work with the efficiency rate about 95%.

From January 2013 to February 2016, 164 URSL procedures were performed in patients aged from 6 months to 17 years old, the mean age being 10.5 years. The mean duration of procedure was 13.4 min. The smallest child weighed 6 kg. A pneumatic probe was most often used during lithotripsy, and the crushed stones were located mainly in a distal part of the ureter (69%) (Fig 4, 5).

Figure 4. Stones in the ureters

Figure 5. Stone in the ureteral orifice

In 94.7% of the patients, an outstanding result was achieved.

Pyelolithotomy is an open or laparoscopic method, which is rarely used due to the significant development of minimally invasive techniques. The primary indication for an open surgery is staghorn lithiasis including the renal pelvis and at least three groups of calyces. During a single procedure, all stones may be removed from the kidney without renal parenchymal damage. The number of pyelolithotomy cases has decreased radically [25]; however, open surgery still plays a significant role in the treatment of urolithiasis in children. About 1-5.4% of patients with urolithiasis still require surgical procedure with appropriate medical equipment and good teams of experienced specialists in different health centres in the world [25]. Open surgery is indicated in cases of anatomical anomalies coexisting with urolithiasis, i.e., sub-pelvic stenosis, or when the use of PCNL or ESWL is difficult or impossible.

The authors have developed and described a new alternative method to a classical open surgery. By combining pyelolithotomy and endoscopy, concrements may be removed, which clears the diseased kidney without causing parenchymal damage during each procedure. The method is safe for children, does not require a blood transfusion, and helps maintain the kidney function. This procedure is dedicated to complicated cases of staghorn urolithiasis [26] (Fig 6).

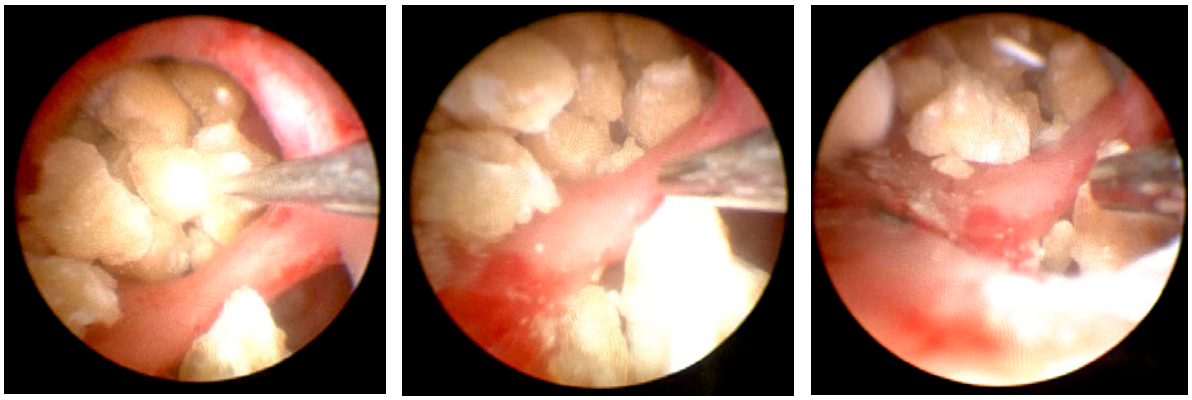

Figure 6. Stones in the pelvis and calyces kidney

Conclusion

Urolithiasis in children is a severe interdisciplinary problem because of a more common prevalence. It requires a thorough recognition of how it is formed, a proper treatment by a nephrologist and the use of efficient, effective and minimally invasive surgical procedures.

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A RARE CLINICAL CASE OF AN ADVANCED PENILE CANCER IN A 52 YEAR-OLD MAN

RZADKIE STADIUM PRZYPADKU ZAAWANSOWANEGO RAKA PRĄCIA U 52-LETNIEGO MĘŻCZYZNY

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Summary

The following case study presents a rare advanced penile cancer in a 52 year-old man. The diagnosis of penile cancer is not especially common. Patient with squamous cell carcinoma, which is the most prevalent type of penile cancer, undergo surgical treatment. The first part of the therapy covers a radical penectomy, and the second one – radical pelvic lymphadenectomy. Despite such a drastic surgical procedure, there was a need of further oncological treatment including an adjuvant chemotherapy. Unfortunately, the patient did not continue his treatment. Such advanced stages of penile cancer are very uncommon because of patients being aware of any changes in the genitourinary area. In the early stages of the disease, an isolated resection of penile change or a partial penectomy is usually a sufficient consideration. In such cases, overall survival rates are high. However, more advanced stages typically require a more radical treatment and a systemic approach including chemotherapy and radiotherapy. Then, the results of treatment and prognosis for the patients are not as good as in case of patients with early diagnosed problems.

Keywords: penile neoplasms, carcinoma, squamous cell, lymph node excision

Streszczenie

Poniższe studium przypadku przedstawia rzadkiego zaawansowanego raka prącia u 52-letniego mężczyzny. Rozpoznanie raka prącia nie jest szczególnie powszechne. Pacjent z rakiem płaskonabłonkowym, który jest najczęściej występującym rakiem prącia, przechodzi leczenie chirurgiczne. Pierwsza część terapii obejmuje radykalną penektomię, a druga radykalną limfadenektomię miednicy. Pomimo tak drastycznej procedury chirurgicznej, konieczne było dalsze leczenie onkologiczne, w tym chemioterapia adjuwantowa. Niestety, pacjent nie kontynuował leczenia. Takie zaawansowane stadium raka prącia jest bardzo rzadkie, ponieważ pacjenci są świadomi jakichkolwiek zmian w obszarze moczowo-płciowym. We wczesnych stadiach choroby zwykle wystarczająca jest resekcja zmiany prącia lub częściowa penektomia. W takich przypadkach ogólne wskaźniki przeżycia są wysokie. Jednak bardziej zaawansowane stadia wymagają zazwyczaj bardziej radykalnego leczenia i podejścia systemowego, w tym chemioterapii i radioterapii. Wyniki leczenia i rokowania dla tych pacjentów nie są tak dobre, jak w przypadku pacjentów z wczesną diagnozą.

Słowa kluczowe: nowotwory prącia, rak, płaskonabłonkowy, wycięcie węzłów chłonnych

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Figures: 6
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Introduction

Penile cancer is not a particularly common malignancy. Both in Europe and North America it occurs in fewer than 1 per 100 000 males a year. In India it is 3, in Brazil 8,3 and in some African countries such as Uganda it reaches more than 10 [1]. Penile cancer is common in the regions with a high prevalence of human papillomavirus (HPV) [2]. Its incidence increases with patients' age, and reaches its peak in the sixth decade of life, though it can occur in any age.

There are risk factors that are well established. Those include phimosis, chronic penile inflammation, e.g. balanoposthitis, lichen sclerosus, Sporalene and UVA phototherapy for various dermatological conditions such as psoriasis, smoking, HPV type 16 and 18 infections. What is interesting is that neonatal circumcision decreases the risk of getting a penile cancer. Therefore, Israeli Jews have the lowest incidence of this illness in the world. However, adult circumcision does not reduce risk of PC [3].

More than 95% cases of penile neoplasm are Squamous cell carcinoma (SCC) accounts, and the rest are caused mostly by basaloid carcinoma and melanoma. There are many mixed forms of SCC, including the warty-basaloid

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form (50-60% of mixed penile SCC), usual-verrucous (hybrid), usual-warty, usual-basaloid or usual-papillary and other rarer combinations. Some lesions can be sporadically associated with SCC, e.g. a cutaneous horn of the penis, bowenoid papulosis of the penis, lichen sclerosus. Some lesions that are premalignant and up to one-third can transform in SCC- Intraepithelial neoplasia G3, GIant condylomata, erythroplasia of Queyrat, Bowen's disease and Paget's disease [4,5,6,7].

Most cases of penile neoplasms are localised and treated at an early stage. An advanced form of the disease is visible only in about 5% cases of penile cancer.

The standard procedures that should be administered to the patient with advanced penile cancer T4 and positive lymph nodes at least N1 require a systemic approach. Neoadjuvant chemotherapy is performed before surgery. As an alternative, a palliative radiotherapy is an option. The operation covers total penectomy with perineal urethrostomy. The treatment of metastases in lymph nodes requires a systematic approach as well. Radical inguinal lymphadenectomy or even pelvic lymphadenectomy is an essential part of the procedure. It is usually postponed and performed as a 2nd part of the surgical treatment due to possible complications, e.g. healing of the wound and lymph leakage. Adjuvant chemotherapy in patients with positive nodules pN2 and pN3 is recommended. Adjuvant chemotherapy for pN1 nodules is currently in the phase of clinical trials.

Case description

A 52-year-old male patient came to the urology outpatient unit on 26th September 2014 with a lesion that covered the skin of the whole penis, scrotum and lower part of the abdomen skin. According to the patient, it appeared 3 to 4 months earlier.

Figure 1. Penis with sizeable disintegrating tumour approximately 10cm diameter

To evaluate the stage of the disease, the patient underwent a CT scan and screening panel for determining sexually transmitted infections. There was also performed a TRU-CUT biopsy of lymph nodes and penile specimen for a histopathologic test.

The abdomen and pelvis CT scan was done on 1st October 2014. Although MRI would be a better option to evaluate the stage of disease, CT was performed because of notably better availability. It showed that both the retroperitoneal, peritoneal lymph nodes and pelvic_lymph nodes were not enlarged. However, the inguinal lymph nodes were enlarged bilaterally – the right side dimensions up to 35x22 millimetres and the left side up to 34x29mm. There were no more radiological signs of metastases both in the bone structures and parenchymal organs.

Also, the STD panel was negative.

The histopathologic result of TRU-CUT biopsy was available on 16th October 2014, and it showed that bilateral inguinal lymph nodes are occupied by metastases of squamous cell carcinoma.

The treatment of the patient was divided into two parts. The first part aimed at performing radical penectomy, and the second one was reserved for radical pelvic lymphadenectomy that includes inguinal, iliac, obturatoral, sacral lymph nodes up to the bifurcation of the aorta. Although neoadjuvant chemotherapy was an option [8,9,10] of the treatment, it was not administered to the patient because of its long-term availability and the surgical procedures could not be delayed.

A radical penectomy with bilateral orchiectomy was performed on 21st October 2014. Both tests were removed because of the risk of infiltration to achieve a clean oncological margin. The urethra was prepared carefully up to the healthy part, and then it was implanted into crotch as urostoma.

Figure 2. Penis with a sizeable disintegrating tumour before the first part of treatment

Figure 3. During the corpora cavernosa resection

Figure 4. After the radical penile resection with prepared urethra

Figure 5. Urethra implanted into the crotch as urostoma

The histopathologic result of the 1st part of the treatment showed an 11-cm tumour of squamous cell carcinoma. The penis, its corpus cavernosum and scrotum with subcutaneous tissue were infiltrated by the tumour. Both tests were not covered by the carcinoma infiltration. The edges of incision were free of carcinoma cells.

Figure 6. Overall view of the first part of surgical treatment.

As indicated above, after 5 weeks there was performed the 2nd part of surgical treatment which covered radical pelvic lymphadenectomy that included inguinal, iliac, obturatoral, sacral lymph nodes up to the bifurcation of the aorta. After such extensive lymphadenectomy, there were expected complications such as skin necrosis above the inguinal canals and prolonged lymphatic leakage. To contraindicate these complications, we had to take some actions. Firstly, a part of the sartorius muscle was transplanted into the empty area of the inguinal canal after lymphadenectomy, and additionally, Spongostan material was placed to fulfil the space. Despite those measures, there was a prolonged lymphatic leakage that lasted for 45 days.

The histopathologic result of the 2nd part of the treatment showed that bilateral inguinal lymph nodes are occupied by metastases of squamous cell carcinoma. The right-sided iliac nodes were also occupied by metastases of squamous cell carcinoma. The remaining lymph nodes (left-sided iliac, obturatoral, sacral) were free of metastases.

After the whole surgical treatment, the patient was directed to a further oncologic therapy – adjuvant chemotherapy. However, he did not undergo the treatment because of personal reasons. Further, he did not appear for the surveillance, and no imaging scans were performed after the surgical procedure.

Conclusions

Although penile cancer is not a particularly common disease, its diagnosis is relatively easy. Male patients are aware of changes in the genitourinary area and usually come early to the urologic ambulatory. Hence most cases of penile cancer are diagnosed at early stages and can be treated radically. For all of those cases, an isolated resection of penile change or partial penectomy is usually a sufficient consideration. Histologically, penile cancer is very homogeneous and more than 95% of all cases concern squamous cell carcinoma. This feature simplifies proceeding both in treatment and follows-up. The outcomes of the treatment and prognosis at early stages are excellent. It is different with an advanced penile cancer. As presented above, it is very scarce and requires a systematic approach. Surgical treatment is not enough, and adjuvant chemotherapy is often needed. Even after combined treatment, a routine follow-up is necessary because of a high risk of recurrence of neoplastic process and progression of distant metastases. Moreover, outcomes are not as good. The median overall survival for the men at that stage was 86.5 months and the 5-year OS rate was 70.6%, for localised disease –77.9%, regional metastases – 58.2%, and for distant metastases – 16.7% [11].

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ORIGINAL PAPER
ORYGINALNY ARTYKUŁ NAUKOWY

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PART II. PHYSICAL ACTIVITY OF SOCIAL AND PROFESSIONAL GROUPS
DZIAŁ II. AKTYWNOŚĆ FIZYCZNA GRUP SPOŁECZNYCH I ZAWODOWYCH

ROLE OF PHYSICAL ACTIVITY IN THE LIFESTYLE OF FRENCH NURSES

AKTYWNOŚĆ FIZYCZNA W STYLU ŻYCIA PIELĘGNIAREK WE FRANCJI

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C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
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E. Preparation of manuscript
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Summary

Background. Physical activity is a crucial component of a healthy lifestyle. Thus, it should be diagnosed in students as future elites, especially those in medical faculties, i.e. medical and nursing departments. The aim of the present research is knowledge about the level of physical activity of nurses, including the factors that determine it.
Material and methods. The research was carried out in 2017 and involved 279 nurses aged 21-30 (mean 23.5 ± 2.4 years) from the Medical Education Centre in Niort, France. The physical activity was assessed using the International Physical Activity Questionnaire (IPAQ) - long version, supplemented with additional questions.
Results. Most nurses (75.4%) demonstrated a high level of physical activity or a moderate one – 18.9%. Only in some persons (5.7%), it could be described as low. The total level of physical activity was 6573.0 MET / min-week, and the dominant activity related to work or studying, i.e. 2823.2 MET, which amounted to 43.0% of the total activity. The place of origin – the city, as well as the year of study, the second and third year, turned out to be decisive factors significantly affecting the higher level of physical activity in nurses.
Conclusions. Nurses exhibit a high PA (physical activity) level and a correct BMI index, which proves that their lifestyle can be considered as healthy.

Keywords: nurses, physical activity, IPAQ, France

Streszczenie

Wprowadzenie. Aktywność fizyczna postrzegana jest jako bardzo ważna składowa zdrowego stylu życia. Należy ją diagnozować wśród studentów jako przyszłych elit, w tym szczególnie na kierunkach medycznych tj. lekarskim i pielęgniarskim. Celem podjętych badań jest poznanie poziomu aktywności fizycznej pielęgniarek, w tym czynników ją warunkujących.
Materiał i metody. W badaniach przeprowadzonych w 2017 r. wzięło udział 279 pielęgniarek z Ośrodka Kształcenia Medycznego w Niort we Francji w przedziale wieku 21-30 lat, przy średniej wieku 23,5±2,4 lat. Oceny aktywności fizycznej dokonano Międzynarodowym Kwestionariuszem Aktywności Fizycznej (IPAQ) w wersji długiej, uzupełnionego o dodatkowe pytania.
Wyniki. Większość pielęgniarek (75,4%) cechuje wysoki poziom aktywności fizycznej, przy 18,9% poziomu umiarkowanego i tylko 5,7% niskiego. Całkowity poziom aktywności fizycznej wyniósł 6573,0 MET/min-tydz., a dominującym obszarem była aktywność w pracy/nauce – 2823,2 MET, która stanowi 43,0%. Wśród czynników istotnie warunkujących wyższy poziom aktywności fizycznej pielęgniarek, wykazano z miejscem pochodzenia - miasto, rokiem studiów - drugi i trzeci i prawidłowym wskaźnikiem BMI.
Wnioski. Pielęgniarki cechuje wysoki poziom aktywności fizycznej i prawidłowy wskaźnik BMI, co wystawia pozytywną ocenę ich stylu życia i dobrze świadczy o procesie dydaktycznym w trakcie studiów.

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Słowa kluczowe: pielęgniarki, aktywność fizyczna, IPAQ, Francja

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Introduction

It is widely accepted that physical activity plays a crucial role in a healthy lifestyle. That is why, it is worth looking at its levels in different social and professional groups, preferably using the same assessment method, which allows for comparing the achieved PA results. The International Physical Activity Questionnaire [1] has already been recognized in the literature concerning PA because, with its help, much research has been carried out in students coming from various countries, for example, Croatia [2], Ukraine [3], Germany [4], Portugal [5], Estonia [6], the Visegrad countries [7], and Poland [8,9,10,11].

Conducting studies in medical science students is of particular importance as they may be seen as future promoters of a healthy lifestyle [12,13,14,15,16,17,18].

Thus, the research on the physical activity in nurses should also find its place in the literature referring to the IPAQ questionnaire application and results [19, 20, 21]. A closer look at physical activity in nurses from different countries might expand the knowledge about this challenging profession.

Material and methods

The following paper aims to acquire knowledge on the physical activity in nurses from the Medical Education Centre in Niort, France, and the factors that determine it.

Altogether, 298 nurses were examined in June and November 2017, but 279 answer sheets were used in the analysis, due to the lack of competence in the remaining individuals (9 persons). The nurses' age was 21-30 years, the mean being 23.5 ± 2.4 years. The students represented all three years of study: year I (37.5%), year II (33.0%), and year III (18.6%). Most of them came from rural backgrounds – 55.6%, and 44.4% from urban areas. Further, the majority would stay in student dormitories or rented accommodation, whereas the remaining ones in family homes, i.e. 62.5%, and 37.5% respectively. 81.7% would participate in organised sports activities and, accordingly, demonstrate higher or moderate physical fitness (75.3% and 23.3% respectively). Only 4 persons (1.4% of the tested group) would exhibit a low level. As for the amount of leisure time, the majority would see it as sufficient (53.1%), 44.4% – as insufficient, and 2.5% complained of its lack (table 1).

Table 1. Characteristics of the students

Place of residence		
City	Countrywide	
44.4%	55.6%	
Place of residence while studying		
Family Home	Dormitory/hostel/rented accommodation	
37.5%	62.5%	
Year of study		
First	Second	Third
48.4%	33.0%	18.6%
Amount of leisure time		
Sufficient amount	Insufficient amount	Lack
53.1%	44.4%	2.5%
Self-assessment of physical fitness		
High	Moderate	Low
75.3%	23.3%	1.4%
BMI		
Correct weight	Overweight	
70.5%	29.5%	
Participation in organised sports activities		
Yes	No	
18.3%	81.7%	

A diagnostic survey using a questionnaire technique – the International Physical Activity Questionnaire (IPAQ-L) was applied as a test method and the study itself was conducted by trained academic teachers. The research sheet was supplemented with additional questions regarding age, place of origin, year of study, amount of free time, self-assessment of physical fitness, place of residence, height and weight, participation in organised sports activities as well as the performed work.

Results

Level of physical activity and its domains

The total level of physical activity was 6573.0 MET / min-week. The dominant area of activity in nurses is activity related to studying/work – 2823.2 MET, which amounted to 43.0%. Transportation physical activity, housework and in sports would share similar values, i.e. 17.0%, 19.8%, 20.3% respectively (Figure 1).

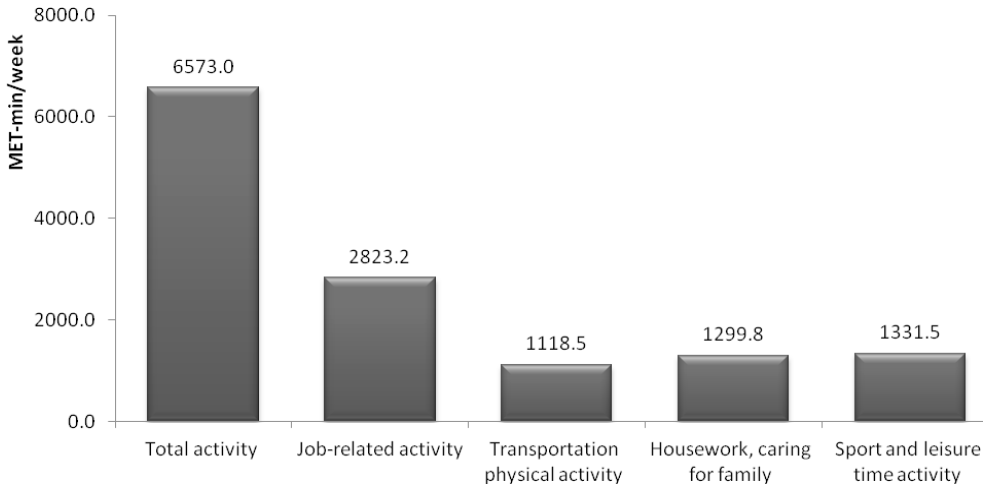


Figure 1. Total physical activity and its domains

Clearly, the majority of respondents demonstrated high (75.4%), or moderate (18.9%) activity. Only 5.7% would be classified as those with low PA level (Figure 2).

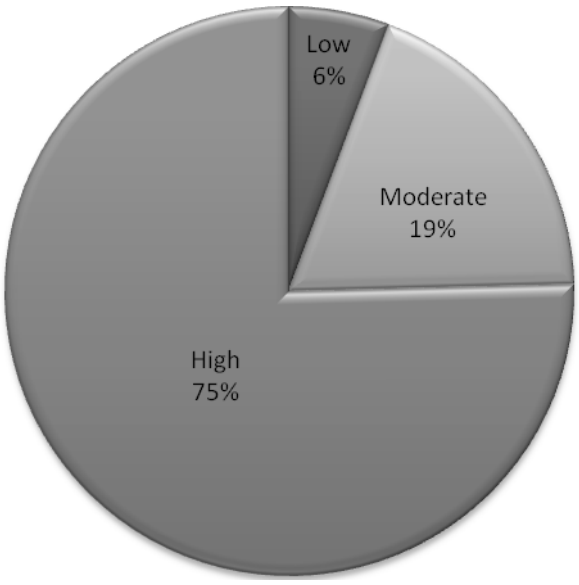
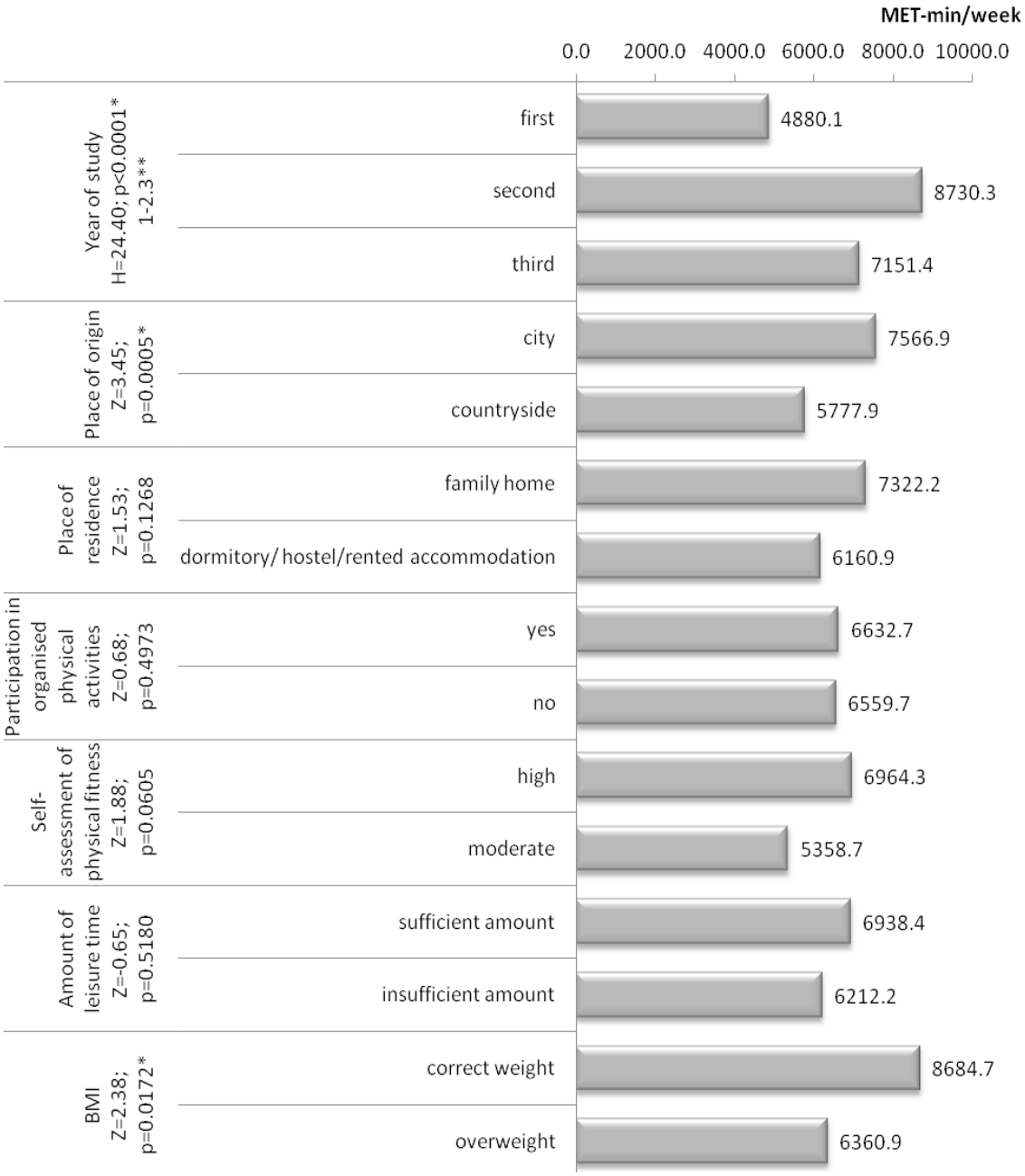


Figure 2. Levels of physical activity

Factors determining the level of physical activity.

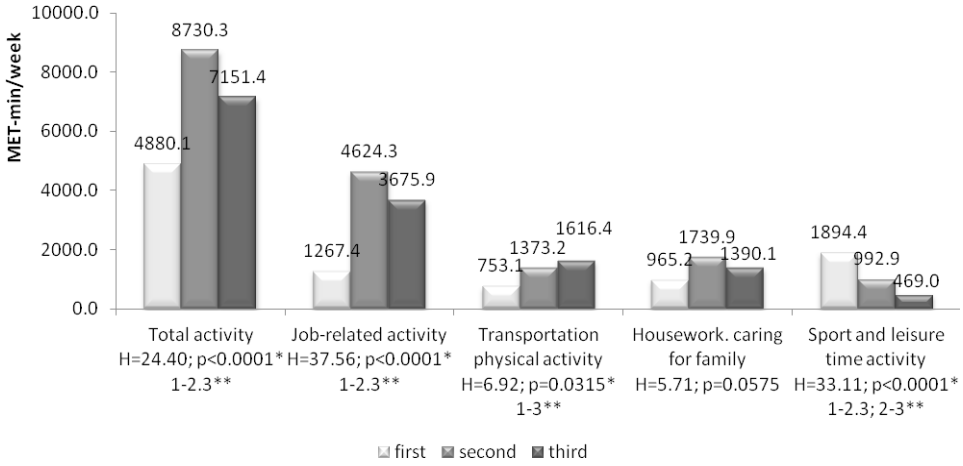
While looking for significant relationships between variables and physical activity, the following factors were taken into account: place of residence, year of study, place of origin, amount of leisure time, self-assessment of physical fitness, BMI and participation in sports activities. As for the factors determining a higher level of total physical activity, a significant relationship was found between the place of origin, i.e. the city, the year of study (the second or third year) and the correct BMI value (Figure 3).



* -significant variation at p <0.05;
** - variables between which statistically significant differences occur;
H-value of Kruskal-Wallis test; Z- value of Mann-Witney U test

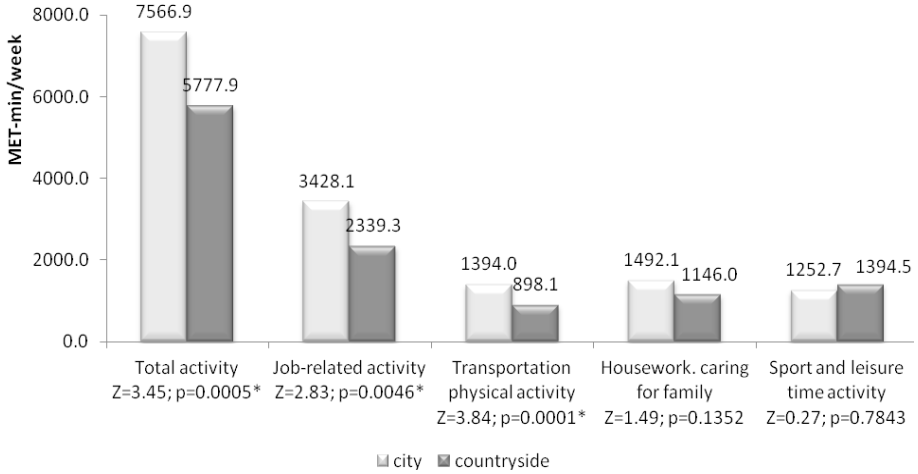
Figure 3. Total physical activity and selected determinants

Once the variables significantly affecting the total level of physical activity were identified, a more detailed analysis was conducted with regard to the PA domains (Figure 4-6).



* -a significant variation at p <0.05;
** - variables between which statistically significant differences occur;
H - value of Kruskal-Wallis test

Figure 4. Total physical activity and its domains with regard to the year of study



* -a significant variation at p <0.05;
Z-value of the Mann-Whitney U test

Figure 5. Total physical activity and its domains with regard to the place of origin

* - significant variation at p <0.05;
Z - value of the Mann-Whitney U test

Figure 6. Total physical activity and its domains with regard to BMI

Physical activity and its domains with regard to the year of study.

The first-year students demonstrated the lowest activity (4880.1 MET) when compared to those in the second and third year (8730.3 MET and 7111.4 MET respectively). Such important unfavourable differences in the younger females were also demonstrated in their activity related to work and transportation. On the other hand, in the area of sports activity, younger students were significantly more active (Figure 4).

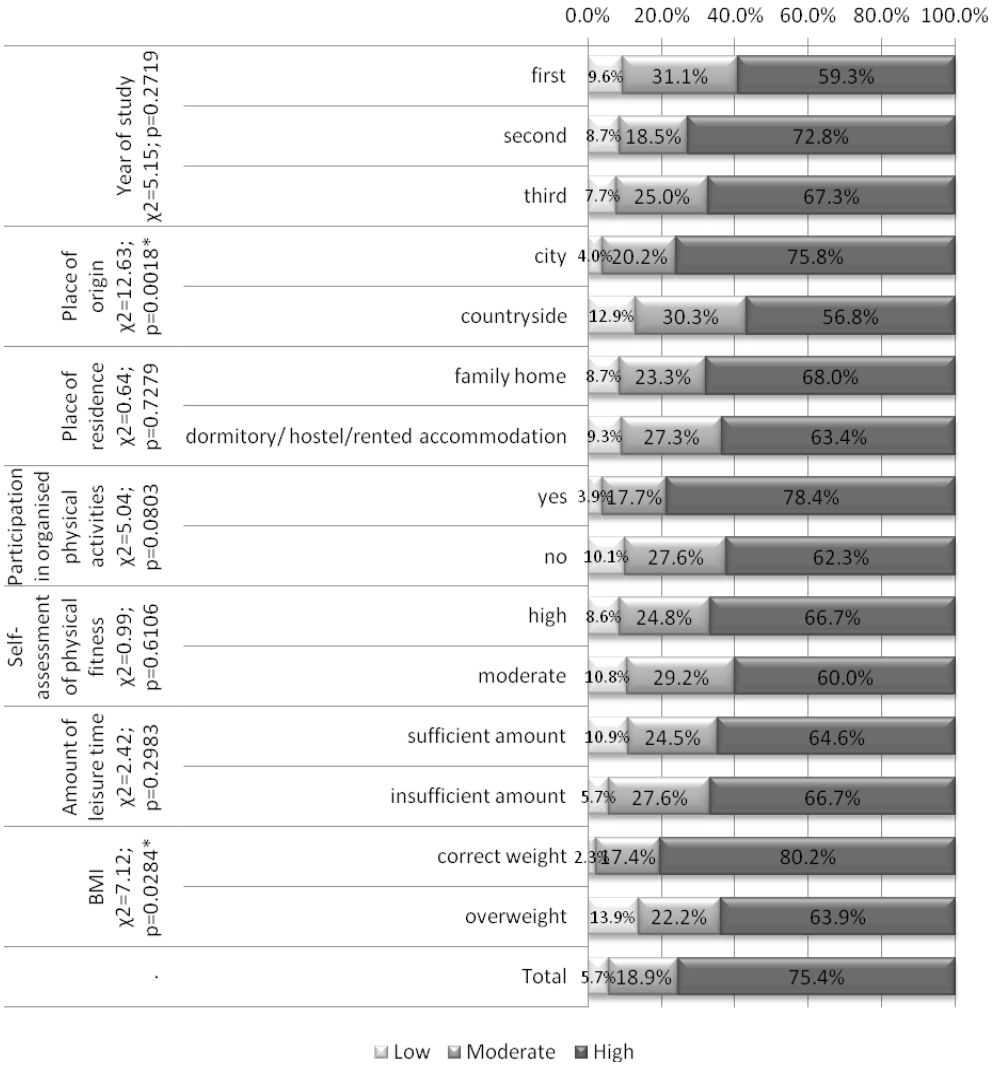
Physical activity and its domains with regard to the place of origin.

Significantly higher values in total physical activity in the examined respondents were demonstrated in the students coming from cities (7566.9 MET), when compared to those from the countryside (5777.9 MET), with p=0.0005, as well as in the job-related and transportation domains, with better results also visible in the respondents coming from urban areas (Figure 5).

Physical activity and its domains with regard to the BMI index.

Significantly higher total physical activity was exhibited in the students with the correct BMI (8684.7 MET), when compared to the overweight persons (6560.9 MET), i.e. p=0.0172, as well as in job-related, transportation and housework physical activities. No such differences were visible in the domain of sports (Figure 6).

The analysed variables were also related to the three levels of physical activity: high, moderate, and low. As a result of the computation, a significant dependence was found again between the place of origin and the BMI index, with better results demonstrated by those coming from the city and having correct BMI (Figure 7).



* - significant variation at p <0.05;

X ^{2}- value of Pearson's Chi- square test

Figure 7. Activity level in the examined students and selected features

Discussion

The advantage of evaluating physical activity using IPAQ is the ability to compare the achieved results in the persons representing particular social and professional groups in different countries.

Similar studies in students are conducted in various countries [2,3,4,5,6,7,8,9,10,11], including persons in medical faculties [12,13,14,15,16]. However, as far nurses are concerned, they have been examined far less frequently [19, 20, 21].

It should be stated that, generally, the French nurses' evaluation concerning their physical activity was positive, which may result from their high awareness gained during the studies and knowledge about the role of physical activity in a healthy lifestyle. Similarly, a high physical activity was demonstrated in Polish nurses, who were also assessed with the IPAQ questionnaire [19.2].

The above hypothesis may be confirmed by the fact that the majority of the analysed factors such as the available leisure time, self-assessment of physical fitness, participation in organised sports activities, do not significantly affect greater physical activity.

What was positive about the examined nurses was their participation in a variety of organised sports activities, a correct BMI index and high self-assessment of physical fitness, which can only prove the beneficial evaluation of their active lifestyle. What was somewhat surprising was the lack of a significant relationship between high self-assessment of physical fitness and the level of physical activity, which is shown in other works as well. A higher PA level in students in later years of study seems a favourable phenomenon, which is unusual for other courses [7,8].

The fact that nurses exhibit a proper lifestyle is confirmed by the numbers, as 75.0% of them meet the recommendations concerning a high level of physical activity, and only a few persons demonstrate a low level. The two-fold analysis of the factors determining a higher level of activity confirmed the relationship between the place of origin (city, village) and the BMI index. It might result from the respondents' greater awareness of how significant physical activity is. Higher physical activity in people with the correct BMI index, when compared to their overweight friends, may indicate that the previously expressed opinion, i.e. that it is greater awareness, including caring for one's figure, that contributes to greater physical activity, is true.

It should be noted, however, that the high PA level visible in nurses in Poland [19,20] may be associated with an unfavourable health condition manifesting itself by ailments in the lower part of the spine.

Conclusions

The favourable data on the lifestyle of the examined French nurses should be welcome, especially those concerning their high PA level as well as the correct BMI. Such a positive evaluation of their lifestyle with regard to the role of physical activity is a good sign for the educational process in college and, at the same time, might become a good prognosis factor for the decisive role that nurses may play in promoting physical activity in their professional life.

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ORIGINAL PAPER
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PHYSICAL EDUCATION IN GEDIMINAS TECHNICAL UNIVERSITY IN VILNIUS

WYCHOWANIE FIZYCZNE NA WILEŃSKIM UNIWERSYTECIE TECHNICZNYM IM. GIEDYMINA

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Authors' contribution
Wkład autorów:
A. Study design/planning
zaplanowanie badań
B. Data collection/entry
zebranie danych
C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
interpretacja danych
E. Preparation of manuscript
przygotowanie artykułu
F. Literature analysis/search
wyszukiwanie i analiza literatury
G. Funds collection
zebranie funduszy

Summary

Background. The following study examines the physical education system in Vilnius Gediminas Technical University (VGTU) and its students' health condition. The purpose of the research was to analyse and determine the students' health condition in the years 2008–2013 and their attitudes to elective physical education courses.
Material and methods. The study involved students of the first-degree studies of the VGTU (1st-4th year). The research was conducted in the academic years 2005-2013 and comprised students who chose optional physical education courses and all the first year undergraduates.
Results. The studies showed that about 60% of the VGTU students were healthy with boys demonstrating better health indicators than girls. The most common disorders encountered in the students concerned the visual, cardiovascular and motor systems, which significantly affected their physical activity.
Conclusions. Disorders of the motor system might impact the choice of optional physical education courses the most. An assumption was made that such choice could foster student aspirations in reducing this condition. However, the proposed solution required more thorough research as a well-organised and appropriate physical education programme which might motivate more interest in PA and ultimately help solve problems related to the Lithuanian students' health.

Keywords: students, choices, health, health disorders

Streszczenie

Wprowadzenie. Obiektem badania był system wychowania fizycznego na Wileńskim Uniwersytecie Technicznym im. Giedymina w Wilnie (WUTG) oraz stan zdrowia studentów. Celem badań była analiza i uogólnienie stanu zdrowia studentów w latach 2008–2013 oraz ich stosunek do sylabusów fakultatywnych wychowania fizycznego.
Materiał i metody. Badane osoby: studenci studiów dziennych I stopnia WUTG (I-IV rok). Badania przeprowadzono w latach akademickich 2005-2013. Badania objęły studentów, którzy wybrali fakultatywne sylabusy na kierunku wychowania fizycznego i wszystkich studentów pierwszego roku dziennych studiów pierwszego stopnia.
Wyniki. Badania wykazały, że na WTUG studiuje około 60% zdrowych studentów, i że chłopcy w porównaniu do dziewcząt wyróżniają się lepszymi wskaźnikami zdrowia. Wśród studentów dominują zaburzenia systemu wzroku, układu sercowo-krążeniowego, ruchowo-opornego, które istotnie wpływają na czynności fizyczne.
Wnioski. Zaburzenia systemu ruchowo-opornego mogą mieć największy wpływ na decyzję wyboru modułów sylabusów wychowania fizycznego. Wybór ten może sprzyjać aspiracjom studentów w redukowaniu tego zaburzenia. To założenie wymaga dokładniejszych badań. Dobrze zorganizowany i kierunkowo przygotowany program wychowania fizycznego, motywujący do aktywności fizycznej studentów może sprzyjać rozwiązaniu problemów związanych ze zdrowiem studentów na Litwie.

Tables: 0
Figures: 6
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Słowa kluczowe: studenci, wybór, zdrowie, zaburzenia zdrowia

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Introduction

A society health condition depends on a multitude of internal factors (personal qualities) and external ones (the environment). All these factors that affect the society as a whole, as well as the individual, determine social health. On this basis, one could distinguish three components of a healthy lifestyle: 1) physical health – optimal functioning of the body; 2) mental health – one's self-awareness of their own personality as a whole in which mental and physical functions harmonise; 3) social health – historically formed norms as a whole which positively affect the society in general and each individual [1].

Researchers perceive these components of a healthy lifestyle as closely intertwined and affecting the state's management systems at the social, economic and political levels. The effectiveness of the public health management is a prerequisite for efficient government's work [2, 3]. Improving the health condition of children and young people is a priority in striving for a healthier society. Students are the most active members of any community and, at the same time, the basis of the state's future. Accordingly, proper student health is an essential element in preparing future qualified professionals. Unfortunately, many researchers underline that the health condition of children and adolescents is continually deteriorating [4, 5]. Students can be classified as a group living an extreme lifestyle associated with increased risk for health problems [6]. Consequently, the time when they acquire knowledge becomes a dangerous and challenging period for young people, which additionally affects their psychomotor, social and personal development, which in turn determines later development of their personalities in the subsequent stages of life [7].

In turn, acquiring the specific characteristics needed in any profession is strictly defined. The process of developing and shaping these properties results from the adaptation of the organism to the process of in which professional skills are acquired. This may indicate that students' education should be comprehensive and that physical activity is essential. Thus, building a system of values through physical activity should not only be pragmatic and momentary. It should also become a moral and intellectual tool that provides the basis of social values. Occupational requirements are adapted to the concept of psychomotor competence: a complex of specific motor, mental and mental abilities in particular occupations or life situations [8]. The social, physical and psychological development of young people in Lithuania differs from that of young people living in other countries. This is caused by the following factors: social environment, economic conditions, occupational and psychomotor skills. It is therefore essential to establish indicators determining health status and criteria for students in Vilnius Gediminas Technical University (VGTU).

Material and methods

The research material of the study comprised the VGTU physical education system and its students' health condition. The study aimed to analyse and present students' health condition in the years 2008-2013 and its relation to the additional physical education courses. It was hoped that the information about the health of the academic youth would help to optimise the management of their physical activity classes and form a basis for improvement of the youth's physical condition itself. The study was to identify, summarise and compare the results of consistent research [5, 7, 9].

The examined persons were the first-degree students of the VGTU (1st-4th year). The research was conducted in the academic years 2005-2013. The study covered students who chose additional elective PA courses as well as all the first year undergraduates.

As a research method, case studies (documentation, questionnaire) were conducted, which identified motives, attitudes and attitudes towards educational issues. The students' health condition was assessed by examining the certificates issued by the Lithuanian healthcare institutions (no. 027 / A; no. 046 / A; no. 086 / A). The students were differentiated following the nature of the health disorders of particular systems (visual, motor, cardio-circulatory, respiratory, gastrointestinal, nervous, endocrine and other health disorders) as well as by the severity of the disorders [10]:

The main group (the healthy persons) showed minor health disorders (low-level disorders that do not affect their performance). Students were able to follow the programme of physical education successfully.

The next group, i.e. the preparatory one, showed minor health disorders. The students were physically poorly developed and poorly physically prepared (after severe illnesses or temporarily unable to participate in PE classes). They would engage in physical activity, as indicated in their study programme, provided that such physical activity did not impair their health and would help them to improve its condition. They would not do some exercises and limit others. These students could participate in general physical exercise sessions or do self-training at home after consulting a specialist.

The third group, i.e. the special one, comprised those students with permanent or temporary mild health disorders. They would be involved in individualised physical exercise as they attended a unique programme of

physical education, and a part of that course was conducted by a specialist in kinesis therapy (sports holidays, leisure trips, etc.).

Finally, there was a group exempted from physical education classes. It concerned all the students who were unable to participate in physical training, as they suffered from chronic illness (sub-compensatory stage), had morphological disorders (complicate daily activities: complications of the cardiovascular system, kidneys, lungs and other systems), and severely sick patients at decompensation stage). The students could do physical activity only in healthcare institutions under the supervision of kinesis therapists.

Summing up, taking into account the characteristics of the groups together and the particular health disorders, it is worth mentioning that the group characterised as the one with disorders significantly affecting the physical activities included the special group (the third one) and the one exempted from physical education comprised those and those exempted from PA.

The indicators of the study are expressed in absolute and percentage values. The significant differences between the calculated indices were measured using the chi-quadrant ($\chi 2$) using a 2x2 table. In determining the reliability of the indicators, the criterion $p < 0.05$ was assumed. Pearson's linear correlation coefficient (Pearson) was calculated to determine the relationship between the variables.

Results

While assessing the change in the pattern of students with health disorders significantly affecting physical activity in the years 2005 - 2013 (Fig. 1) significant differences were not established.

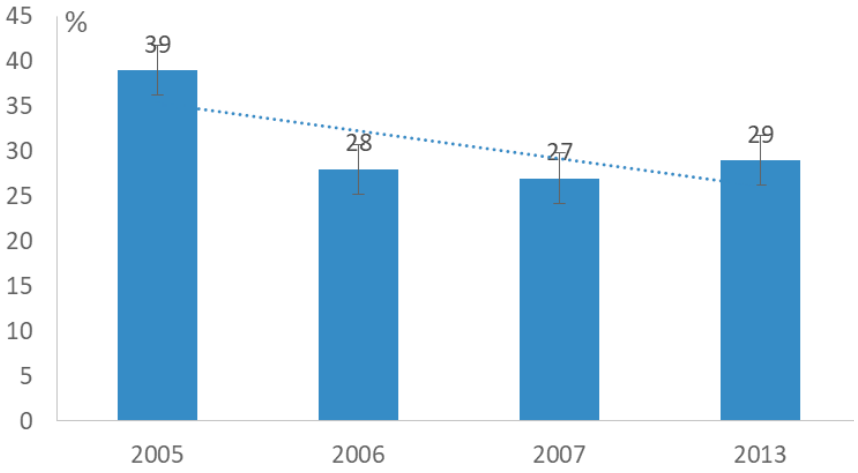

Figure 1. Students with health disorders significantly affecting their physical activity

31% of the VGTU students belonged to this group. However, there were significantly more girls who represented the special group and those who were exempted from physical education (on average 41%) than boys (on average 26%) (Fig. 2).

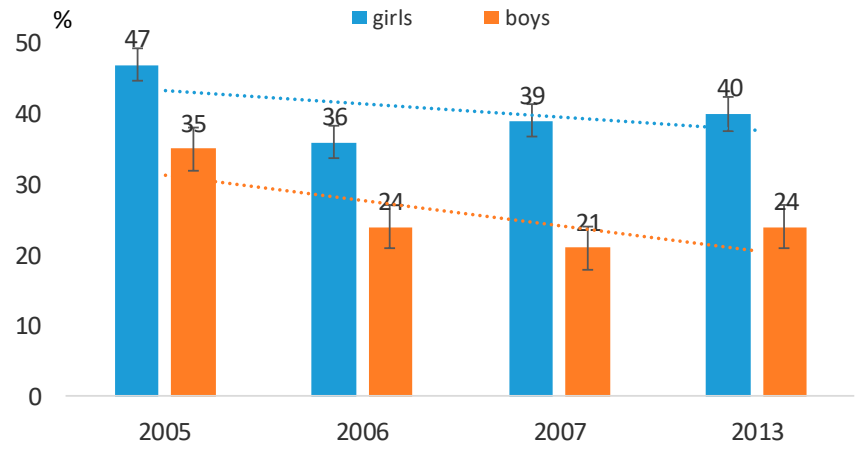

Figure 2. Students with health disorders significantly affecting physical activity by gender

Although there was a visible tendency of health improvement in students, it was not significant. While assessing the patterns of health disorders affecting physical activity, similar trends were identified both in girls and boys (fig. 3, 4).

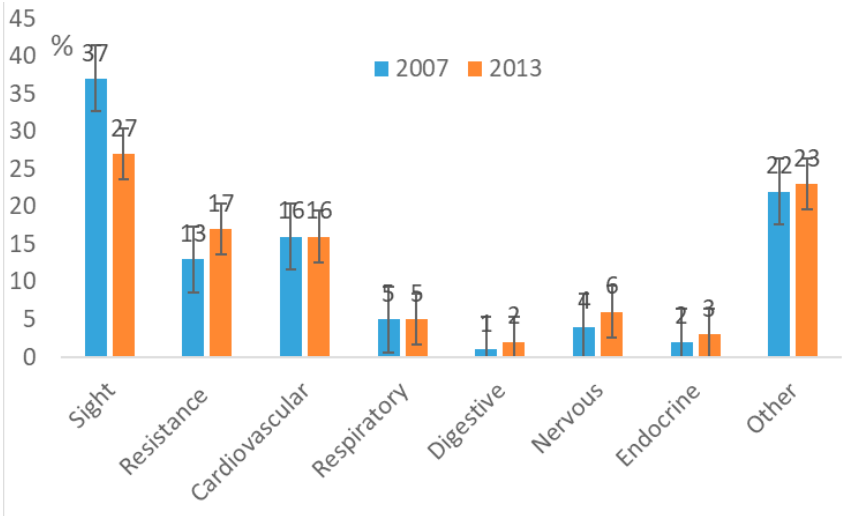

Figure 3. Physical disorders affecting students (girls) in the special group and those exempted from physical education

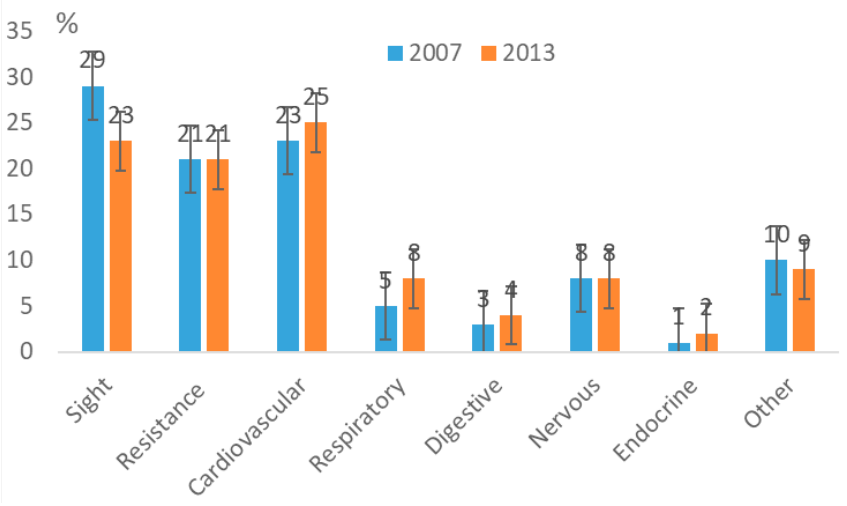

Figure 4. Health disorders affecting students (boys) in the special group and those exempted from physical education

Several health disorders that significantly influenced physical activity in students were identified in the analysed in the period, i.e. 2007-2013. Physical, visual and cardiovascular disorders affected the amount of FA most. However, the patterns and dynamics of these complications in girls and boys were different. It was found that visual disorders were significantly more common in girls (Fig. 5).

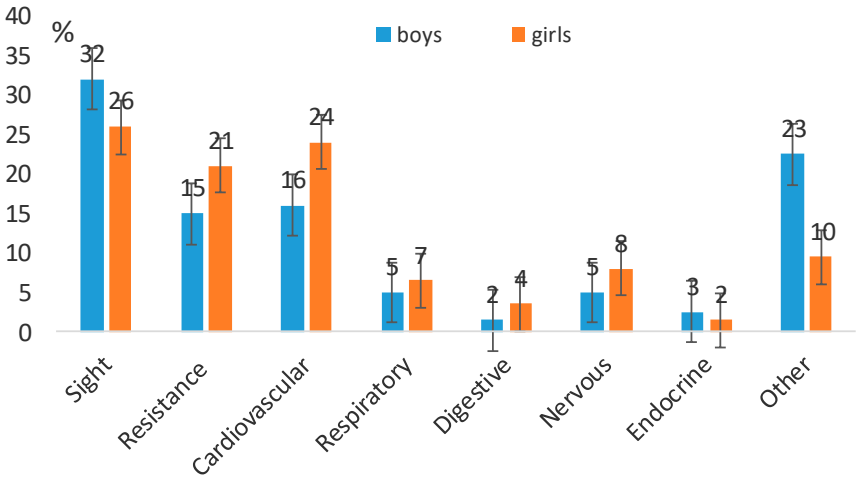

Figure 5. Health disorders in students (boys and girls) in the special group and those exempted from physical education in the years 2007-2013

Still, the sight problems related to the visual system in girls tended to decrease during the study period. Boys, when compared to girls, had more severe health disorders associated with the motor and cardiovascular systems. While evaluating the health indicators of boys who chose additional courses of physical education, it was found that the students with motor disorder tended to do more physical education classes.

Further, it was discovered that the courses of physical education were chosen by 709 students (9% of the undergraduate full-time students) in the academic year 2013/14. Taking into account the fact that the training at this level covers eight semesters, it was likely that up to four thousand students at the first-degree level would be enrolled in FA classes, which accounted for about 55% of the university students.

While comparing the students' health condition at university faculties and the quantitative indicators of those who chose optional courses of physical education, it was noted that students with better health indicators were more active in opting for additional physical education courses ($r = 0.6819$; $p < 0.05$) (Fig. 6).

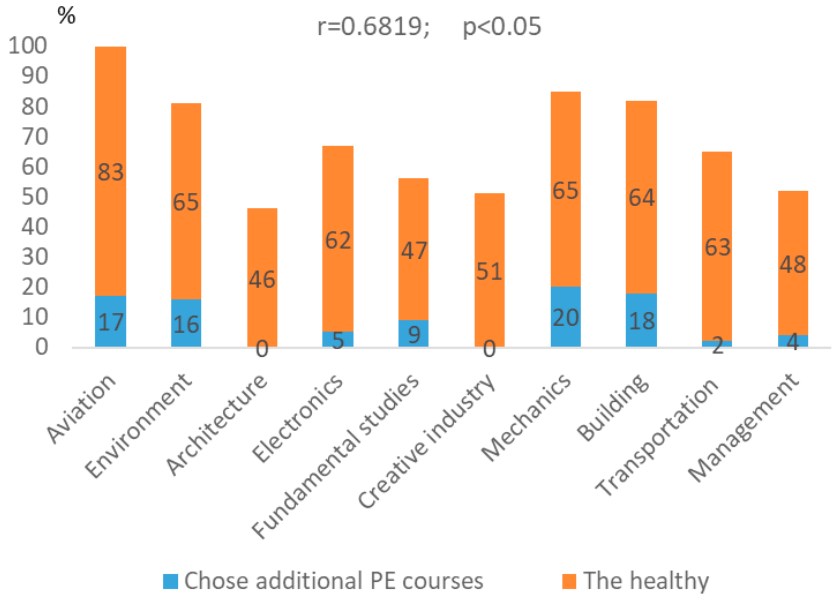

Figure 6. Healthy students' indicators and those who chose additional courses of physical education

Thus, it could be assumed that students with inferior health indicators tended to avoid physical education classes, and the university arrangements were conducive to the process. However, prove or disprove this assumption, more accurate research is needed.

Discussion

The health examination of Lithuanian students conducted from the year 1952 and continued until 1987 [11, 12] showed that their health condition was critical. Systematic studies reported that additional physical activity could significantly improve the health and well-being of Lithuanian students [13]. Later studies also showed worrying results, as they indicated an increase in the number of girls and boys suffering from ill health in schools [14]. The following research showed that a significant increase in the number of students exempted from physical education was visible between 1995 and 2005 and that the overall physical condition of Lithuanian students deteriorated [15]. Other studies indicated that girls' health outcomes were worse than the boys' ones [16]. However, the other authors' findings pointed to the fact that girls' lifestyle and attitudes to health were more conducive to preserving health than boys', although their health condition was less satisfactory [17].

The processes of health deterioration in the Lithuanian youth described above could have been caused by the decline in the health of school children [18]. The research done by the author confirms the fact that the Lithuanian youth's health condition and health-related behaviours were dynamic. In all, the health condition of the Lithuanian society tended to deteriorate, especially in its youth. The process had been long and the negative factors should be corrected at various levels of social life (state institutions, private organisations, families, individuals). As regards the formation of healthy lifestyles in the Lithuanian population, it turns out that physical activity should be promoted, as only 17.2% of the Lithuanian university provide students with a sufficient amount of physical activity [19].

Suitably chosen and diversified physical activity forms (in their intensity, volume, specificity of movement), constitutes a prerequisite in restoring physical activity in students, enhancing health and increasing exercise capacity in the physical and mental health areas [20]. Physical self-education is also of great importance in the field of physical activity [21]. Students' health and physical condition are mainly dependent on physical education. Health-related behaviours acquired at an early age may significantly impact the subsequent life events [22, 23].

Conclusions

The study showed that about 60% of students in VGTU were healthy and that the boys' health indicators were better when compared to girls. The most common disorders in students included the ones of visual, cardiovascular and motor system systems, which significantly affected physical activity. The disorders in the motor system might impact the choice of additional physical education courses most, and this opportunity may make students take measures to reduce the harmful health condition. This premise needs to be further researched. A well-designed physical education programme may motivate students to get involved in more physical activity and consequently help to solve health-related problems in the Lithuanian students.

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DIFFERENCES IN MOTOR SKILLS IN GIRLS ENGAGED IN RHYTHMIC GYMNASTICS AND MODERN DANCE

RÓŻNICE W UMIEJĘTNOŚCIACH MOTORYCZNYCH U DZIEWCZĄT TRENUJĄCYCH GIMNASTYKĘ RYTMICZNĄ I TANIEC NOWOCZESNY

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Authors' contribution
Wkład autorów:
A. Study design/planning
zaplanowanie badań
B. Data collection/entry
zebranie danych
C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
interpretacja danych
E. Preparation of manuscript
przygotowanie artykułu
F. Literature analysis/search
wyszukiwanie i analiza literatury
G. Funds collection
zebranie funduszy

Summary

Background. The following study attempts to compare the motor skills of younger school-aged female children (7-9 and 9-11) who attended rhythmic gymnastics classes and those who participated in modern dance classes.
Material and methods. The study involved 30 girls aged 7-9 and 35 aged 9-11 who attended rhythmic gymnastics, as well as 36 female children aged 7-9 and 40 aged 9-11 doing modern dance. Sixteen tests of motor skills were conducted to assess the coordination of the whole body, lower-limb explosive strength, lower-limb flexibility, repetitive bodily movement and its frequency. The multivariate analysis of variance (MANOVA) was applied for determining quantitive differences between the two groups of girls.
Results. The results of the research showed a significant difference in most motor variables at the level of statistical significance of P=0.05 between the two categories of examinees, especially in the older age group (9-11), showcasing better results in the girls engaged in rhythmic gymnastics.
Conclusions. The findings may help to understand the specific requirements concerning girls' competing in rhythmic gymnastics, as well as their everyday training process, which is considerably more demanding than that of modern dance performers, which may however ultimately result in higher-quality motor skills, especially of coordination, static balance and flexibility.

Keywords: motor skills, physical fitness, rhythmic gymnastics, modern dance, young girls

Streszczenie

Wprowadzenie. Poniższe badanie porównuje umiejętności motorycznych młodszych dziewcząt w wieku szkolnym (7-9 i 9-11 lat), które uczęszczały na zajęcia z gimnastyki artystycznej i tańca nowoczesnego.
Materiał i metody. W badaniu wzięło udział 30 dziewcząt w wieku 7-9 lat i 35 w wieku 9-11 lat, które uczyły się gimnastyki artystycznej oraz 36 dziewcząt w wieku 7-9 lat i 40 w wieku 9-11 lat, które zajmowały się tańcem współczesnym. Przeprowadzono szesnaście testów umiejętności motorycznych, aby ocenić koordynację całego ciała, siłę wybuchową dolnych kończyn oraz ich elastyczność, powtarzalne ruchy ciała i ich częstotliwość. Zastosowano wielowymiarową analizę wariancji (MANOVA) do określenia różnic ilościowych między dwiema grupami dziewcząt.
Wyniki. Wyniki badań wskazały na istotną różnicę w większości zmiennych motorycznych na poziomie istotności statystycznej P = 0,05 pomiędzy dwiema kategoriami badanych, szczególnie w starszej grupie wiekowej (9-11), wykazujących lepsze wyniki u dziewcząt zajmujących się gimnastyką rytmiczną.
Wnioski. Wyniki badań mogą pomóc w zrozumieniu specyficznych wymagań dotyczących rywalizacji dziewcząt w gimnastyce rytmicznej, a także ich codziennego treningu, który jest znacznie bardziej wymagający niż w przypadku ćwiczących taniec współczesny, co z kolei może ostatecznie skutkować lepszymi umiejętnościami motorycznymi, zwłaszcza koordynacji, równowagi statycznej i elastyczności.

Tables: 2
Figures: 0
References: 28
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Słowa kluczowe: zdolności motoryczne, sprawność fizyczna, gimnastyka rytmiczna, taniec nowoczesny, młode dziewczęta

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Introduction

Numerous studies have focused on morphological and physiological characteristics of successful performance [1,2] and talent detection [3,4] in various sports. Blanksby et al. [5] underlined that the success of any talent identification and development programme depends on a clear understanding of the specific performance requirements in the particular sport. Information on these requirements, based on a variety of morphological, physiological, and physical fitness measurements, is useful in any sport, including modern dance as well as rhythmic gymnastics, a highly specialized discipline that involves the use of 5 hand apparatuses (hoop, rope, ball, clubs, and ribbon) [6].

For instance, it has been shown that dance classes in the cross-country skiers training process in the youth aged 12-15, both genders, have a positive effect on the development of speed and agility, as well as on the mobility of joints, muscles, and lateral bending of the spine [7]. Thus, introducing dance to the curricula at the young age leads to better development of children's motor abilities.

The physical demands imposed on rhythmic gymnasts and modern dancers by choreographers and performance schedules make their physical fitness just as important to them as skill development [8]. Rhythmic gymnastics represents a mixture of gymnastics, ballet and movements to the sounds of music while using suitable props. As for the girls practising this sport, it helps them to entice and develops motor and coordination skills, grace, creativity and musicality. Moreover, it enables them to build their natural flexibility and strengthen the muscles of the entire body. Because it affects proper muscular development and posture in a very favourable manner, it concurrently represents an excellent basis for the further practice of any other sport. Elite rhythmic gymnasts should have an appropriate physique, maintain low body fat, and acquire specific physical abilities (i.e. flexibility, explosive strength, coordination, balance) to achieve satisfactory performance [9,10].

Furthermore, successful performance in rhythmic gymnastics requires years of practice and training that starts at the early age of 6 years and continues until adolescence [6]. Therefore, athletes reach a high competitive level and train intensively, stressing their cardiovascular and musculoskeletal systems during the developmental period [11]. On the other hand, during this time, growth involves changes in the body size, as well as in different physiological characteristics, motor skills and abilities.

Owing to its rhythm design, esthetic values, and movement of the entire body to music at a certain tempo, modern dance contributes to the development of many motor skills and abilities. Since modern dance is also a competitive sport in which a dancer strives to reach perfection in performance and, consequently, achieve superb results, there is a need for a planned and defined elaboration of the training process and its implementation [12]. As in most sports, dance fitness depends on the individuals' ability to work under aerobic [13,14] and anaerobic [15] conditions, as well as on their capacity to develop high levels of muscle tension, i.e. muscle strength [16,17]. Joint mobility/muscle flexibility [18] and body composition [19,20] are also vital aspects of dance fitness. However, no single fitness measurement can predict success in the discipline, as they vary markedly depending on numerous parameters including age, sex and level of performance [21].

The purpose of this study is to compare the motor skills of younger school-aged girls (7-9 and 9-11) who attend rhythmic gymnastics classes and those shown by the girls doing courses of modern dance.

Material and methods

The subsample of examinees practising rhythmic gymnastics comprised 30 girls aged 7-9, as well as 35 girls aged 9-11, whereas the subsample of examinees doing modern dancing consisted of 36 girls aged 7-9 and 40 girls aged 9-11, as defined according to the decimal value of years.

Measuring motor skills in girls, i.e. motor skills testing, was conducted following the standardisation of motor skills tests [22]. A selection of tests was made according to the performed structural and motor analysis of common activities in rhythmic gymnastics and modern dance, which in the authors' view, represent motor skills predominantly contributing to achievements in the respective sports. 15 motor skills tests were selected to assess coordination, agility, lower-limb explosive strength, flexibility and balance.

All the collected data were analysed using a descriptive statistical procedure. Regarding each motor variable, arithmetic mean (AM), standard deviation (SD), minimum (MIN) and maximum (MAX) result values were calculated. To determine quantitative differences between the systems of motor variables of the two groups of examinees, particularly concerning both age groups, the multivariate analysis of variance (MANOVA) was applied, whereas for determining differences among each motor variable, the univariate analysis of variance (ANOVA) was applied. A smaller level of statistical inference being $p=0.05$ was defined as the criterion of statistical significance.

Results and discussion

Table 1. shows the analysis of differences in motor variables between the group of girls practising rhythmic gymnastics and the one doing modern dance, aged 7-9. The results of multivariate analysis of variance showed statistically significant differences of the entire system of motor variables between the two examined groups existing only at the level of statistical significance of P=0.04.

Table 1. Analysis of differences of motor variables between the two groups of girls aged 7-9

VARIABLES	Gr	AM	SD	f	p
Obstacle course backwards (s)	**1** 2	**18.68** 23.93	4.55 8.43	4.59	0.04
Threading and skipping (s)	1 **2**	18.07 **16.40**	2.54 3.7	2.03	0.16
Standing broad jump (cm)	1 **2**	122.88 **148.69**	24.03 15.28	11.27	0.00
Triple jump (cm)	1 **2**	289.22 **380.19**	114.76 15.41	73.97	0.00
Left leg front raise (°)	**1** 2	**128.62** 106.54	17.17 13.75	14.12	0.00
Right leg front raise (°)	**1** 2	**134.63** 110.77	18.80 15.39	13.54	0.00
Left leg lateral lift (°)	**1** 2	**127.06** 86.92	18.13 10.90	48.54	0.00
Right leg lateral lift (°)	**1** 2	**125.63** 81.92	17.20 12.34	59.02	0.00
Left leg rear raise (°)	**1** 2	**81.63** 46.46	22.56 19.83	27.24	0.00
Right leg rear raise (°)	**1** 2	**86.94** 49.38	22.60 12.92	28.26	0.00
Deep forward bend while seated straddled (cm)	**1** 2	**53.97** 52.29	6.04 7.48	0.45	0.51
Side stepping (freq)	1 **2**	11.13 **14.31**	2.22 2.25	14.58	0.00
T-test (s)	1 2	16.54 16.76	2.21 1.53	0.09	0.76
Sit-ups in 60s (freq)	1 **2**	27.38 **32.23**	11.67 6.91	1.75	0.20
Flamingo (freq)	**1** 2	**14.42** 18.91	6.30 6.01	3.05	0.09
	F = 10.61	**P = 0.04**			

Gr – groups of examinees: 1) rhythmic gymnasts 2) modern dancers		f – f-test for univariate analysis of variance
		p – level of statistical significance for f
		F – F-test for multivariate analysis of variance
AM – arithmetic mean		P – level of statistical significance for F
SD – standard deviation		

The results obtained from the coordination assessment test in the backwards polygon test indicate that the motor skill is more significantly developed in the examinees practising rhythmic gymnastics compared to the those doing modern dance. With constant work done in each training session, this motor skill can be significantly improved and developed in both groups' athletes.

The results of the analysed differences in pliability test assessment in the examined sample show that there are statistically significant differences between the two groups of examinees with better results achieved by the girls doing rhythmic gymnastics. Particular attention should be paid to this motor skill in the training process since it is of particular importance for performing movements of larger amplitudes entailing all bodily segments

of esthetic significance both in rhythmic gymnastics and modern dances. Specific requirements for particular difficulty elements within the competition rulebook according to which choreographies are prepared involve performing all movements, predominately jumps, expressive elements, pliability and movability elements, turns, etc. with large amplitude. Accordingly, a significant portion of time is devoted to developing this necessary motor skill in the training process, which in turn involves all bodily segments.

The results of the tests concerning lower-limb explosive strength assessment are significantly better in girls practising modern dancing compared to those doing rhythmic gymnastics at the level of statistical significance with the value p=0.05. The activities requirements in the two groups of examinees are similar, as choreographies have been composed of a large number of jumps and skips. For satisfactory performance of the abovementioned and many other explosive elements, possibly the prevailing factor in the physical preparation of rhythmic gymnasts and dancers is the constant work on developing explosive strength of all bodily segments, and most of all, lower limbs.

The results of the tests assessing repetitive trunk strength, agility and balance indicate that, statistically, there is no big difference among them when comparing the two groups of examinees. The findings indicate an almost equal development of the given motor skills in both groups. Rhythmic gymnastics and modern dance requirements abound in the elements of body weight such as static movements, guided movements, frequently large amplitudes, movements performed with fast body movement in the area where it is required to develop all forms of strength in order to achieve their high-quality performance, as well as balance required for satisfactory performance of bodyweight balance elements.

Table 2. presents an analysis of differences in motors variables between the group of girls practising rhythmic gymnastics and the team doing modern dancing, aged 9-11. The results of the multivariate analysis of variance in this age indicate statistically significant differences of the entire system of motor variables between the examined groups at the level of statistical significance being P=0.00.

Table 2. Analysis of differences of motor variables between two groups of girls aged 9-11

VARIABLES	Gr	AM	SD	f	p
Obstacle course backwards (s)	**1** 2	**16.22** 18.07	4.17 5.69	2.27	0.14
Threading and skipping (s)	1 **2**	15.94 **15.16**	3.26 3.03	1.11	0.30
Standing broad jump (cm)	1 **2**	145.97 **158.67**	16.47 16.09	10.89	0.00
Triple jump (cm)	1 **2**	426.03 **432.83**	52.75 55.44	2.39	0.15
Left leg front raise (°)	**1** 2	**133.90** 111.63	13.65 15.40	40.51	0.00
Right leg front raise (°)	**1** 2	**139.97** 116.33	12.81 16.38	43.54	0.00
Left leg lateral lift (°)	**1** 2	**135.31** 85.65	11.65 10.12	380.78	0.00
Right leg lateral lift (°)	**1** 2	**135.45** 86.87	12.54 8.26	409.78	0.00
Left leg rear raise (°)	**1** 2	**87.97** 55.46	11.95 13.28	114.96	0.00
Right leg rear raise (°)	**1** 2	**85.62** 55.41	11.20 12.53	112.05	0.00
Deep forward bend while seated straddled (cm)	**1** 2	**63.00** 57.94	7.43 9.23	6.18	0.01
Side stepping (freq)	1 **2**	12.72 **15.83**	0.92 1.94	65.62	0.00
T-test (s)	**1** 2	**14.09** 14.71	4.87 4.73	1.92	0.17
Sit-ups in 60s (freq)	1 2	37.21 37.20	7.23 9.72	0.00	0.99
Flamingo (freq)	**1** 2	**9.52** 16.23	5.21 7.06	19.15	0.00

F = 49.11 P = 0.00

The results of the univariate analysis of variance (ANOVA) clearly indicate that there is a statistically significant difference between the examinees concerning most variables assessing motor skills at the high level of statistical significance being p=0.01.

Having analysed the results of the arithmetic mean values of each motor variable, we identified better results in favour of the examinees practising rhythmic gymnastics, hereby indicating that in the motor skills assessment tests, rhythmic gymnasts presented better development level of the given skills.

Generally speaking, the majority of motor variables showed a difference at the high level of statistical inference even though it is not discernible when one aspect of statistical inference is considered in the younger group of examinees. The majority of motor variables showed a difference at the high level of statistical inference. The multivariate F distribution and F test (univariate analysis of variance) revealed a far more significant, and thus higher degree of difference between the examinees within the older age group as opposed to the younger one. This may only lead to a conclusion that the girls practising rhythmic gymnastics and dancing for a longer period (longer dancing experience of the older age group compared to the younger age group– AS – 3.43 regarding 2.27 years of age) develop motor skills typical of the sport at a significant proportion, which was also found by some other researchers examining similar population [7,23,24].

Conclusions

Having observed motor strengths of the both analysed age groups, we may conclude that the girls practising rhythmic gymnastics are statistically significantly different quantitatively speaking from the girls doing modern dancing, in most cases, at the high level of statistical inference. This difference is reflected in better coordination development, balance and, most of all, the flexibility of lower limbs in rhythmic gymnasts, i.e. explosive strength, and agility in modern dancers. Such a difference is particularly noticeable in the age group where the examinees have been doing both types of activities for a more extended period, on average, and thus significantly improved their skills due to being involved in rhythmic gymnastics.

Apart from the contribution to motor ability development, rhythmic gymnastics and dance activity affect the psyche as they impact intellectual abilities, functional abilities, improve health and help to form various social values, enhance artistic creativeness. Finally, they may have an application in sports training, recreation and physical education lectures [25].

A recreational artistic and rhythmic gymnastics is associated with muscle hypertrophy and enhanced bone mineral density in prepubertal girls. Participation in rhythmic gymnastics could thus become a stimulus that elicits an osteogenic response in prepubertal girls [26].

The results of fourteen studies point to consistent effects across a range of different populations and settings that suggest that recreational dance can improve cardiovascular fitness and bone health in children and young people. It can also contribute to preventing or reducing obesity. Further, there is some limited evidence which suggests that dance participation may improve self-perception of one's body image and reduce anxiety. Other evidence suggests that involvement in dance may have some positive outcomes on one's physical and psychosocial well-being [27].

In spite of the increased recognition of the importance of dance in health care, it is still infrequently equated with exercise. Dance can be as beneficial as jogging along a track, biking, swimming, or running on the treadmill. The exercise benefits of dance include increased flexibility, increase in muscle strength and tone, better endurance, cardiovascular conditioning, balance and spatial awareness, and a general feeling of well-being [28]. Modern dance is characterised by much incessant movement, by hopping, lateral movement and swift, accurate moves, balance and flexibility elements, repetitive movements such as hip drips, figure eights, circles, and shimmies, which can put the lower back and hip joints and ligaments through a full range of motion that increases the muscle tone and improves posture, thereby aiding in the prevention of lower back problems. Dance also helps the older brain form new interconnections and to work faster as well as increases the temporal and prefrontal brain activity [28].

If we want an optimum development of children and a solid ground for further practising sports and recreational activities, as well as a lifestyle with well-developed anthropological abilities and skills (that are needed later for schooling, studies, workplace and everyday life), it is required to provide multi-layered and varied motor stimulants. In other words, it is extremely vital to provide children with a daily high-quality physical activity that has been well thought over. Accordingly, one of the quality activities at preschool and younger age is rhythmic gymnastics and modern dance, especially for the female population.

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REVIEW PAPER
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THE CURRENT STATE OF REHABILITATION OF UKRAINIAN CITIZENS

OBECNY STAN REHABILITACJI LECZNICZEJ OBYWATELI UKRAINY

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Authors' contribution
Wkład autorów:
A. Study design/planning
zaplanowanie badań
B. Data collection/entry
zebranie danych
C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
interpretacja danych
E. Preparation of manuscript
przygotowanie artykułu
F. Literature analysis/search
wyszukiwanie i analiza literatury
G. Funds collection
zebranie funduszy

Summary

The system of rehabilitation in Ukraine is ineffective presently, because it does not follow any international experience and most physicians and instructors involved in physical therapy do not possess updated knowledge about functional anatomy and the principles of restoration of functions. All measures referred to "rehabilitation" are in fact only a sum of actions, "ritual" in their character: the use of medicine that has no effect on the restoration of functions; physical exercises without specified, time-limited rehabilitation goals; the patient's "physical activity" in the stages of rehabilitation, which, in fact, repeats the actions of the previous stage; cyclic iteration of the above-mentioned step-by-step actions without real prospects for further recovery. Further, there is lack of specialists in rehabilitation in Ukraine, which has only now started to actively create a modern system of rehabilitation. Since August 2016, the National Classification of Occupations has given new names to professions, including: a doctor of physical and rehabilitation medicine, an ergotherapist and a physical therapist. The current regulatory framework is being reorganized so as to create jobs in health care facilities for specialists in medical and physical rehabilitation. Finally, the Ministry of Healthcare of Ukraine initiated the implementation of the International Classification of Functioning, Disability and Health in the Ukrainian rehabilitation.

Keywords: rehabilitation, Ukraine, disability, training of rehabilitation specialists, reformation of the rehabilitation system

Streszczenie

Obecny system rehabilitacji na Ukrainie nie jest doskonały i mało efektywny, ponieważ nie korzysta z doświadczenia międzynarodowego, a lekarze i fizjoterapeuci, instruktorzy gimnastyki leczniczej w większości faktycznie nie posiadają nowoczesnej wiedzy z zakresu anatomii funkcjonalnej i zasad odnowy funkcjonalnej. Wszystkie środki zwane „rehabilitacją" faktycznie mają charakter „rytualny": stosowanie leków, które nie mają żadnego wpływu na odnowę funkcjonalną; ćwiczenia fizyczne bez kształtowania szczególnych, ograniczonych czasowo celów rehabilitacyjnych; „przesunięcie" pacjenta „w etapach" rehabilitacji, które w rzeczywistości powtarzają działania z poprzedniego etapu; cykliczne powtarzanie poprzez wykorzystanie wspomnianego działania z faktycznym brakiem perspektywy odnowy. Na Ukrainie brakuje specjalistów od rehabilitacji. Obecnie Ukraina zaczęła aktywnie tworzyć nowoczesny system rehabilitacji. Od sierpnia 2016 w krajowej klasyfikacji zawodów pojawiły się nowe nazwy zawodów, takie jak „lekarz medycyny fizykalnej i rehabilitacji", „ergoterapeuta" i „fizjoterapeuta", reorganizuje się obecne ramy regulacyjne, odbywają się aktywne szkolenia nowych pracowników w zakresie rehabilitacji, wprowadza się Międzynarodową Klasyfikację Funkcjonowania, Ograniczenia Działalności i Zdrowia.

Słowa kluczowe: rehabilitacja, Ukraina, niepełnosprawność, szkolenie specjalistów rehabilitacyjnych, reforma systemu rehabilitacji

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Introduction

The main goal of social development in every country is to maintain high level of citizens` health and to prevent the development of diseases and disabilities. It is because health is of paramount importance, as indicated in the system of universal values. Accordingly, human health is considered an important indicator and it holds the first position in the indices of social development of any country in the world.

Aim of the work

To study the current state of rehabilitation in Ukraine and to present the directions of its` reformation.

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Brief description of the status of knowledge

There are about 3 million people with disabilities and 12 million retirees and patients with chronic diseases in Ukraine. Cardiovascular and cerebrovascular diseases are the cause of almost two thirds of all deaths and one third of the disabilities. There are about 107,000 strokes, 50,000 cases of myocardial infarction, and 4,000 acquired heart defects registered annually in Ukraine and more than 3,500 newborn children with congenital heart disease. The mortality rate for cerebrovascular diseases has increased by 18.2% for the past 15 years and currently affects 223.1 people per 100 000 population [1].

Besides, there is an increasing number of diseases that cause a decrease of life expectancy, higher mortality, disability, traumatic injuries as well as deterioration of working conditions or living in ecologically harmful areas. All these are objective factors that require taking decisive and extraordinary steps aimed at keeping public health. Therefore, the implementation of complex medical rehabilitation measures to support the quality of life of patients with chronic disease or with post-traumatic illnesses, disabled people, children with disabilities, elderly people are of paramount importance.

The military conflict in the Donbass region significantly complicated the situation of proper health provision. According to different sources, about 50 000 of Ukrainian soldiers are involved in the armed conflict in the east of Ukraine today, and about 9000 military serviceman since the beginning of the Anti-Terrorist Operation (in 2014) have been injured [2]. Almost 98% of soldiers "may require highly qualified psychological help", as suggested by the international estimates and numerous studies [3,4,5].

Psychologists consider that in case of inadequate treatment, post-military symptoms do not just return – they tend to intensify. Soldiers who experienced the horrors of war often suffer from insomnia, lack of emotions or irritability. In order help them adapt to normal and peaceful life, such patients have to undergo specialized treatment. Psychologists note that, after having suffered terrible events, people do not want to contact with others because, in their opinion, time will cure everything. They usually keep everything inside themselves. In this way, as doctors indicate, military actions are decreasing the level of psychological health and the need to treat such persons is increasing day to day [2].

Having in mind the fact that 90% of patients need medical rehabilitation, it seems strange that the problem of establishment and running a thorough system of medical rehabilitation during the last 20 years has not been noticed in the medical field. In fact, it was mentioned only in programmes of social, labour and professional rehabilitation of the disabled in the context of providing them with medical products. At the same time, the main direction of medical rehabilitation is to restore the patients` health, which should appear right after emergency treatment as its consequent stage.

Particular attention needs to be paid to organizing a medical rehabilitation system in rural areas.

Why the system of rehabilitation is ineffective in Ukraine presently? During the past 20 years, the world has fundamentally changed the idea of how human function should be restored after damage. These changes have not been implemented into the medical practice in Ukraine. The national rehabilitation system does not follow the principles of setting goals and an individual approach to each patient. Most physicians and instructors involved in physical therapy do not possess updated knowledge about functional anatomy and the principles of restoration of functions [6,7,8]. The absence of the system has resulted in a stereotype of the need for "periodic hospitalization" that substitutes for "rehabilitation", during which only drug therapy is conducted. This ensures the existence of a large number of stationary beds that require material and medical resources and, accordingly, doctors` employment, which proves that they are needed. All measures called "rehabilitation" are in fact only of "ritual" character: the use of medicine that has no effect on the restoration of functions; use of physical exercises without the formation of specific, time-limited rehabilitation goals; "movement" of the patient in the stages of rehabilitation, which, in fact, repeats the actions of the previous stage; cyclic iteration of the above-mentioned step-by-step actions without real prospects of further recovery [8,9].

Understanding of the term "disability" in Ukraine does not correspond to the modern internationally agreed understanding of the concept as limitations of life and its functioning. Such was the conclusion issued by the World Health Organization mission, who came to investigate the problem in December 2015 [10]. The mission visited a number of medical institutions and centres of social protection in Kyiv to understand the system of rehabilitation assistance, social aspects of rehabilitation and the living conditions of people with disabilities in the country.

In addition, the World Health Organization mission for rehabilitation stated in its report that rehabilitation services in Ukraine are traditionally provided in the resort environment, while the legislation of rehabilitation in Ukraine is fragmented and divided in coordination between different authorized ministries and organizations. In addition, the WHO experts came to the conclusion that Ukrainian rehabilitation staff and personnel do not follow appropriately the International and European standards [10].

It means that the human being is not at the centre of the rehabilitation process. If a person with spinal injury needs to be rehabilitated, then it has to be understood that he/she is likely to be paralyzed, have problems with the coordination and disorders of cardiovascular, respiratory, digestive and other systems. Then, such a person needs help that does not necessarily relate to the type of disease, but functional disorders. The patient must learn not only to move, but also to eat, dress and so on. Can a doctor do this? Definitely not, as it requires different specialists.

Professor V. Stebliuk, the chairman of Rehabilitation Committee of ATO Victims of the Ukrainian Association of Physical and Rehabilitation Medicine, noted that there was no such medical specialty as "medical rehabilitation" in Ukraine [8]. According to the provided information, the available specialties correspond to the needs of departments and research_institutes, as approved of by the Ministry of Health. However, this particular medical specialty does not exist. As Professor V. Stebliuk further added, this was the reason why physiotherapists, neurologists, traumatologists and all relevant specialties should be involved in rehabilitation. Specialists in physical rehabilitation were taught in the direction of training "physical education and sport" at pedagogical universities or universities of sports and physical education. However, they could not work at departments of medical institutions as the official requirement for running such institutions does not require such experts. Consequently, as the personal documents of these professionals indicate, they would work as massage nurses.

The issue of providing rehabilitation and specialists in Ukraine began to be raised in 2005, when the legal act "About Rehabilitation of the Disabled" was adopted. At the time of its adoption, the law was rather progressive, as it proposed an integral legal and regulatory mechanism for regulating relations and processes in the field of rehabilitation of the disabled.

In April 2015, the Committee of Health Care at Verkhovna Rada of Ukraine created a Coordination Council for Rehabilitation under the chairmanship of People's Deputy Iryna Sysojenko [9]. The main aim of the Council was to write a project of law on rehabilitation, which would ensure effective rehabilitation not only for the disabled, but also for everyone else who needs it.

The project was criticized as it was considered as non-reformist and one that duplicates solutions already approved by the current law about "rehabilitation of the disabled", which are presented in a different order or partially changed. In addition, the principles of work and responsibilities of the multidisciplinary team in medical and rehabilitation institutions were not prescribed in it.

Another group of authors recently proposed an alternative law project [8]. It states that the organization of the rehabilitation process should rely on other than post-Soviet principles, on modern ones:

- the International Classification of Functioning (in spite of the Medical International Classification of Diseases, does not determine the presence of the disease, but the entire range of consequences that this disease causes, as well as the presence or absence of a person's real opportunities to serve themselves);
- new specialties, which are currently absent in Ukraine: doctor of physical and rehabilitation medicine, physical therapist, ergotherapist, etc.;
- the rule that the key participant in the rehabilitation process is the patient;
- the statement that rehabilitation should be carried out by a multidisciplinary team;
- the fact that it is necessary to change public administration in the field of health care, etc.

To understand the scope of the issue, one should know that there are 25,000 physical therapists and 9,000 ergotherapists in Canada with its population of 35 million, whereas there are 160 physical therapists in Ukraine and two ergotherapists certified abroad [9,10].

Thus, if one asks whether there are physiotherapists in Ukraine, the answer is positive. However, these are doctors who prescribe some medications or_natural medicine in the treatment of patients, whereas abroad, these are specialists who are engaged in the restoration of patients' movements.

In order to reform the system of rehabilitation medicine in Ukraine, a proper length of time should be allocated as the process will last longer than a year or two. It is understood by Andriy Turchyn, the Deputy Chief Doctor of Outpatient and Diagnostic Assistance to the Kyiv Regional Clinical Hospital [10]. In addition, legislative resolution of rehabilitation issues also requires a separate solution. "First, there should be a legislative framework: the definition of protocols for rehabilitation of patients with those or other diseases, injuries, operations. The training of specialists should also be considered but not before the system of training is established. Also, the material base seems crucial. The rehabilitation department should be equipped accordingly ", – he remarks. By using modern techniques, patients may become functional in the first days after surgical interventions. Therefore, obsolete approaches to rehabilitation should be changed so that patients are more likely to adapt to social life after serious injuries or illnesses.

Ukraine has started to create a modern system of rehabilitation actively [8,10]. Since August 2016, the National Classification of Occupations has given new names to professions, including: a doctor of physical and rehabilitation medicine, an ergotherapist and a physical therapist. In November 2016, the Ministry of Healthcare

has already approved of the qualifications for these professions. The current regulatory framework is being reorganized so as to create jobs in health care facilities for specialists in medical and physical rehabilitation. The Ministry of Healthcare of Ukraine initiated the implementation of the International Classification of Functioning, Disability and Health in the Ukrainian rehabilitation. The current legislation is based on the so-called International Classification for Patient Safety. It was proposed in 1989, but was not approved by the World Health Organization. Since 2001, there is an international classification of the functioning, disability and health in the world, on which the system of rehabilitation is under construction. On December 15, 2016, Uliana Suprun, the Minister of Health, signed a separate mandate for the implementation of this classification. The WHO representatives will conduct trainings on the classification for Ukrainian specialists. At the first stage, they will inform them about the system and the way it is used.

Already, nine scientific research institutions, 11 specialized departments in higher undergraduate education institutions and 3 departments in postgraduate education institutions in Ukraine [2] are engaged in the development of scientific programmes, rehabilitation protocols, and methodological guidelines for rehabilitation institutions.

To facilitate the reforms of the system of rehabilitation in Ukraine, the Ministry of Healthcare plans to rebuild some healthcare facilities in rehabilitation structures and implement rehabilitation centres throughout the country so that the reform has a systemic effect. In fact, modern rehabilitation centres have already been set up in Kyiv, Lviv, Rivne and other regions; these centres employ qualified medical and physical rehabilitation specialists and have proper facilities designs with appropriate wide corridors, doors, equipped shower cabins, equipment, etc. [11,12,13].

Particular attention is now paid to rehabilitating ATO soldiers. Nowadays, the state provides disabled warriors with dentures. As it is reported, modern prosthesis costs about 20 thousand euro, and the Ukrainian government is ready to pay such money [2]. Experienced prosthetics and orthopedists from the UK are ready to introduce Ukrainian doctors into innovative prosthetic technologies. British specialists have developed prosthesis that can change disabled people's life by providing maximum of comfort. These people will be able to walk more quickly, and will have an opportunity to climb and descend stairs. At present, the best that an artificial knee joints in Ukraine can offer is maintaining a person's balance so that it allows him/her to keep own weight. However, it is a huge drawback, because it does not prevent a person from falling if a mistake is made – said D. Boender, the producer of the knee joint Very Good Knee, which today is sold by the British Orthomobility Ltd. According to him, the joint produced by him allows the person to keep a proper position, until he/she makes a step. When the patient rests on the other leg, the joint of the supporting leg becomes flexible, which makes taking the next step easy [2].

Ukraine is beginning to actively engage in new approaches to rehabilitation now, and it is hoped that once it is introduced it is going to enhance the quality of life of the disabled.

Conclusions

1. The System of Rehabilitation is ineffective in Ukraine.
2. It is absolutely necessary to provide reformation of Rehabilitation System according to the International standards.
3. The most important expected results of the reform on the rehabilitation system in Ukraine include:
   – increasing the life expectancy and quality of life in the population;
   – reducing the number of cases of complications caused by diseases;
   – reducing the number of cases of disability and mortality;
   – reducing the level of primary outflow of disability (first of all patients of working age) as a result of complications.

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ORIGINAL PAPER
ORYGINALNY ARTYKUŁ NAUKOWY

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PART III. OTHER
DZIAŁ III. INNE

POLISH ADAPTATION OF INTERPERSONAL SUPPORT EVALUATION LIST, A VERSION FOR STUDENTS (ISEL-48V.COLL.: INTERPERSONAL SUPPORT EVALUATION LIST, COLLEGE VERSION)

POLSKA ADAPTACJA INTERPERSONALNEJ SKALI WSPARCIA SPOŁECZNEGO, WERSJA DLA STUDENTÓW (ISEL-48V.COLL.: INTERPERSONAL SUPPORT EVALUATION LIST, VERSION COLLEGE)

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Wkład autorów:
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Summary

Background. The objective of the study was the adaptation and evaluation of the psychometric properties of the Interpersonal Social Support Scale version for students (ISEL-48v.Coll.: Interpersonal Support Evaluation List College Version).
Material and methods. The validation of the instrument was performed according to methodological standards, and statistical validation covered the assessment of criterion and construct validity, and reliability of the scale. The study was conducted with the use of the test-retest method, and a package of research instruments was applied, including, apart from the ISEL-48v.Coll., the PSS-14, HADS and SOC-29. The validation sample covered a group of 167 nursing students for the test and 115 for the retest.
Results. Reliability of the ISEL-48 v. Coll. as evaluated by Cronbach's alpha was 0.88, and for the subscales, it ranged from 0.82 to 0.69. The stability of results determined by the correlation in test-retest analysis ranged within 0.76 – 0.61 ($p<0.001$ and $p<0.01$).
Conclusions. The analysis of results shows that the adopted ISEL-48v.Coll. is an instrument possessing satisfying psychometric properties.

Keywords: scale adaptation, social support, Interpersonal Support Evaluation List, version for students

Streszczenie

Wprowadzenie. Celem badań było przeprowadzenie procedury adaptacji i oceny właściwości psychometrycznych Interpersonalnej Skali Wsparcia Społecznego w wersji dla studentów (ISEL-48v.Coll.: Interpersonal Support Evaluation List College version).
Materiał i metody. Adaptacja lingwistyczna skali została przeprowadzona zgodnie z obowiązującymi standardami metodologicznymi, a walidacja statystyczna poprzez określenie trafności kryterialnej, teoretycznej i rzetelności. W badaniu wykorzystano metodę test-retest i zastosowano pakiet narzędzi badawczych oprócz ISEL-48v.Coll. również PSS-14, HADS, SOC-29. Próba walidacyjna obejmowała grupę 167 studentów dla testu i 115 dla retestu.
Wyniki. Rzetelność ISEL-48 v.Coll. oceniana współczynnikiem alfa Cronbacha wynosiła 0.88 a dla podskal waha się od 0.82 do 0.69. Stałość wyników określona współczynnikiem korelacji w badaniu test-retest przyjmowała wartości od 0.76 do 0.61 ($p<0.001$ and $p<0.01$).
Wnioski. Analiza wyników wskazuje iż zaadaptowana ISEL-48v.Coll jest narzędziem o zadowalających właściwościach psychometrycznych.

Słowa kluczowe: adaptacja skali, wsparcie społeczne, Interpersonalna Skala Wsparcia Społecznego, wersja dla studentów

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Introduction

Studies on students in the eastern part of Europe including Poland show that they are upset, indicate low social support and have a weak sense of outer-containment. These features distinguish the group from the population of students in Western Europe [1,2,3,4,5,6,7].

The objective of the following research is to present the results of the adaptation procedure and the assessment of primary psychometric properties of ISEL-48v.Coll.: Interpersonal Support Evaluation List, College Version, by evaluating the reliability (internal compliance, absolute consistency) and validity (criteria).

Social support – theoretical assumptions ISEL-48 v.Coll.

The theoretical assumption determining social support and underpinning the development of ISEL-48 v.Coll. indicates a moderating role of social support in stressful events and depression symptoms as well as physical health disorders. While developing the questionnaire, the team of authors of the Interpersonal Support Evaluation List, College Version, concentrated on measuring social and appraisal support by examining

– self-esteem support
– belonging support
– tangible support [8,9,10,11].

On formulating the assumptions of appraisal support, Cohen (1983) referred to the opinions of Lazarus, who suggests two most crucial aspects in the occurrence of stress reaction. They include the original assessment of the stressor (the cognitive aspect) and relating it to available resources of coping (the assessing element). In the both listed areas, the appraisal support is treated as the external resource which has an impact on the student who gets to know the stressor and assesses how it might be dealt with. Social support helps people to redefine the situation as less stressful although it is also burdened with the social assessment. The other limit to the appraisal support is the comparison of experiences and social values represented by supporters to the persons whom they support [12].

Self-esteem support has a positive impact on the person's comfort as it helps to assess potential stressors and emotional mechanisms that find their source in personal situational judgments and related feelings. At the same time, people with a low level of self-esteem support show a lack of control over events of the surrounding reality (personal helplessness) and a conviction of paucity of competencies to control stressful life events (universal helplessness) [12].

Belonging support causes an increase in resistance to a stressor thanks to the mechanism of relationship with the group, which has an overall positive impact on one's mood and health. The model assumes that there is an optimal level of belonging sense that determines health and welfare and, in case of health deterioration, belonging support may increase individual assessment with a positive health effect. As a result, in the case an individual has no opportunity to satisfy the needs (e.g. biological – nutrition), stress is perceptible. However, it can be decreased by belonging support and sense of solidarity with others (members of a support net) [12]. Tangible support refers to situations when the balance in social and economic dimensions is disturbed because of sudden fortuitous events, disease, the process of ageing or loss of income. The literature knows several research cases whose results presented the factors determining the impact of tangible support and its significance in aiding individuals in the case of natural disasters. In mass events, financial help or assistance in healthcare and other essential things such as medicines, drinking water or shelter are adequate, but the recipient of the support must be considered in terms of the extent of the aid. Financial support received by the persons in need may contribute to more a favourable assessment of one' own difficult situation [12].

Characteristics of Interpersonal Support Evaluation List, College Version – ISEL-48v.Coll.

The tool ISEL-48v.Coll. was published in 1984 by Sheldon Cohen and Harry M. Hoberman [12]. ISEL-48v. Coll. is the extension of 40- item tool ISEL-40 v. GP designed for the total population [13-15].

The Polish scale version, constructed after receiving the permission of its author (S. Cohen), is a four-level scale. The respondents could assess each statement in the following categories: False – 0; Probably false – 1; Probably true – 2; True – 3.

To obtain reliable results, half of the questions were negative in content, which requires recording data while calculating the value of social support; that is the sum of values of the scale positions. The total result of the scale ranges from 0 to 144; if the numerical value is bigger, it indicates that the respondents perceive greater accessibility of social support. The questionnaire can be used both in individual and group research. The time needed for answering the questions is between 5 and 8 minutes.

Material and methods

Adaptation and validation procedure ISEL-48 v. Coll.

In the first stage of the procedure, the tool was translated into the Polish language by a person knowing English perfectly.

After developing a culturally appropriate tool's version, some further changes were made during the linguistic consultation process. The changes were of idiomatic character and served to improve the communication in the way statements are recorded on the scale.

The next stage was to perform a reverse translation, i.e. the tool translated into Polish was brought back into English by another qualified translator, and both versions were compared.

The project used such research tools as ISEL-48v.Coll, HADS, PSS-14; SOC-29, which allow assessing the reliability of the scale using the method of test-retest. The criterion validity and consistency of the scale were tested as well [16].

The Bioethical Commission functioning in the Lublin Medical University issued a positive opinion on the adaptive and validation/ ng procedure ISEL-48v.Coll. and gave it number KE-0254/7/2009.

The participation in the research was voluntary and anonymous, and the results were available online on individual profiles with reserved access on the website www.badania.umlub.pl after logging in with a unique number (login).

The statistical analysis was conducted with Statistica 9.0 PL programme, an advanced version for Windows.

Characteristics of the validating sample

The validating studies of Scale ISEL – 48v.Coll. were conducted in 2012 among students of the first year undergraduate nursing studies in the Medical University of Lublin. The research concerned estimating the reliability of the technique called test-retest and involved two stages. The first phase was performed on 9th October 2012 in a group of 167 students. The other one was conducted 4 weeks later, i.e. on 6th November 2012, but this time the answers were provided by 115 students.

The mean age of the respondents both in the first and the other group was slightly above 19 years (19.22 – 19.30), with standard deviation ± 0,98, which indicates that variation within the groups was moderate.

Results

The overall values of perceived social support in the respondents ranged from 24 to 144, within the scale values of 0-144. The most obvious social support in students was visible in relation to the material dimension as it is commonly considered as the most tangible and quickest to achieve.

Because of increasing the number of levels from two to four in each of the scale positions, the results cannot be compared to the original scale ISEL – 48v.Coll. The most considerable variation in the results was obtained in the area of appraisal support and belonging support (SD: 7.02 and 6.74) (Table 1).

Table 1. Descriptive statistics, test statistics of the Polish version of scale ISEL-48v.Coll. for N=167

Scale ISEL	Positions	Average	Standard deviation	Min.	Max.	Bias	Curtosis
T-ISEL-v.12 Coll.	12	35.58	4.49	4.00	36.0	-0.64	0.03
B-ISEL-v.12 Coll.	12	33.18	6.74	3.00	36.0	-0.33	-0.52
A-ISEL-v.12 Coll.	12	35.16	7.02	3.00	36.0	-0.88	0.51
S-ISEL-v.12 Coll	12	30.41	5.02	4.00	34.0	-0.21	-0.48
ISEL-48v .Coll.	48	140.28	18.57	24.00	144.0	-0.59	0.42

Abbreviations:
ISEL-48v. Coll. – availability of social support for students; range: 0-144
T-ISEL-12v. Coll.- availability of tangible social support for students; range: 0-36
A-ISEL-12v. Coll.- availability of appraisal social support for students; range: 0-36
B-ISEL-12v. Coll.- availability of belonging social support for students; range: 0-36
S-ISEL-12v. Coll.- availability of self-esteem social support for students; range: 0-36

To assess the reliability of the test-retest method, the authors repeated the study after a four-week interval. The results showed a satisfying stability of how the availability of social support was perceived by the students. The stability coefficient for the scale was 0.76 and for the particular subscales ranged from 0.61 (S-ISEL-12v.Coll.) to 0.72 (A-ISEL-12v.Coll.). It must be noticed that the analysis of the Polish version of ISEL-48v.Coll. indicates the

highest stability for the total result of the scale. In the psychometric validation of the original version of the scale ISEL – 48v.Coll., the coefficient of the results stability was not used (Table 2.).

Table 2. Analysis of reliability of subscales – T-ISEL-12v.Coll., B-ISEL-12v.Coll., A-ISEL-12v.Coll., S-ISEL-12v.Coll.

No.	Scale position T-ISEL-12v. Coll.-	Scale average after deleting positions	Scale variance after deleting positions	Correlation of position with scale	Squared multiple correlation	Cronbach's alpha after deleting positions
1.	T-ISEL-12v.Coll. 1	34.92	28.39	0.36	0.29	0.70
2.	T-ISEL-12v.Coll. 10	35.16	26.58	0.40	0.38	0.69
3.	T-ISEL-12v.Coll. 11	35.15	26.54	0.39	0.31	0.69
4.	T-ISEL-12v.Coll. 18	34.60	30.55	0.18	0.47	0.72
5.	T-ISEL-12v.Coll. 19	34.84	29.80	0.20	0.42	0.71
6.	T-ISEL-12v.Coll. 2	35.28	27.96	0.28	0.32	0.70
7.	T-ISEL-12v.Coll. 29	34.87	28.40	0.34	0.33	0.70
8.	T-ISEL-12v.Coll. 30	35.41	27.02	0.31	0.17	0.70
9.	T-ISEL-12v.Coll. 31	35.25	26.13	0.50	0.44	0.67
10.	T-ISEL-12v.Coll. 35	35.14	27.95	0.30	0.21	0.70
11.	T-ISEL-12v.Coll. 36	35.18	25.71	0.40	0.29	0.69
12.	T-ISEL-12v.Coll. 44	35.00	24.79	0.50	0.36	0.67
No.	**Scale position B-ISEL-12v. Coll**	**Scale average after deleting positions**	**Scale variance after deleting positions**	**Correlation of position with scale**	**Squared multiple correlation**	**Cronbach's alpha after deleting positions**
1.	B-ISEL-12v.Coll. 12	30.73	39.60	0.43	0.23	0.72
2.	B-ISEL-12v.Coll. 3	32.51	39.63	0.31	0.14	0.74
3.	B-ISEL-12v.Coll. 8	31.16	38.23	0.42	0.27	0.72
4.	B-ISEL-12v.Coll. 9	31.93	39.66	0.18	0.07	0.76
5.	B-ISEL-12v.Coll. 20	31.20	38.00	0.44	0.24	0.72
6.	B-ISEL-12v.Coll. 24	31.00	41.19	0.19	0.11	0.75
7.	B-ISEL-12v.Coll. 28	30.68	43.62	0.03	0.09	0.76
8.	B-ISEL-12v.Coll. 32	31.20	37.83	0.48	0.37	0.72
9.	B-ISEL-12v.Coll. 37	31.04	38.45	0.40	0.22	0.73
10.	B-ISEL-12v.Coll. 40	31.67	34.90	0.56	0.36	0.70
11.	B-ISEL-12v.Coll. 45	31.89	34.84	0.60	0.40	0.70
12.	B-ISEL-12v.Coll. 46	31.24	36.66	0.61	0.45	0.70
No.	**Scale position A-ISEL-12v. Coll.-**	**Scale average after deleting positions**	**Scale variance after deleting positions**	**Correlation of position with scale**	**Squared multiple correlation**	**Cronbach's alpha after deleting positions**
1.	A-ISEL-12v.Coll. 7	33.77	43.39	0.57	0.48	0.80
2.	A-ISEL-12v.Coll. 13	35.01	39.99	0.51	0.49	0.80
3.	A-ISEL-12v.Coll. 14	34.30	41.02	0.54	0.43	0.80
4.	A-ISEL-12v.Coll. 16	34.02	41.70	0.51	0.32	0.80
5.	A-ISEL-12v.Coll. 21	34.77	40.94	0.45	0.35	0.81
6.	A-ISEL-12v.Coll. 23	35.09	41.97	0.35	0.27	0.82
7.	A-ISEL-12v.Coll. 25	33.99	42.20	0.54	0.44	0.80
8.	A-ISEL-12v.Coll. 27	34.72	43.42	0.29	0.16	0.82
9.	A-ISEL-12v.Coll. 33	34.11	42.82	0.44	0.35	0.81
10.	A-ISEL-12v.Coll. 39	34.16	41.41	0.55	0.47	0.80
11.	A-ISEL-12v.Coll. 4	33.65	44.81	0.48	0.40	0.80
12.	A-ISEL-12v.Coll. 41	34.01	41.42	0.63	0.53	0.79
No.	**Scale position S-ISEL-12v. Coll.-**	**Scale average after deleting positions**	**Scale variance after deleting positions**	**Correlation of position with scale**	**Squared multiple correlation**	**Cronbach's alpha after deleting positions**
1.	S-ISEL-12v.Coll. 5	27.61	23.97	0.14	0.16	0.69
2.	S-ISEL-12v.Coll. 15	29.31	24.60	-0.03	0.16	0.72

3.	S-ISEL-12v.Coll. 17	28.49	18.76	0.56	0.38	0.62
4.	S-ISEL-12v.Coll. 22	29.36	24.56	-0.02	0.07	0.71
5.	S-ISEL-12v.Coll. 26	28.72	22.35	0.24	0.14	0.68
6.	S-ISEL-12v.Coll. 34	27.92	21.73	0.35	0.19	0.66
7.	S-ISEL-12v.Coll. 38	28.72	19.96	0.50	0.42	0.64
8.	S-ISEL-12v.Coll. 42	28.35	19.78	0.52	0.43	0.64
9.	S-ISEL-12v.Coll. 43	28.28	20.44	0.36	0.34	0.66
10.	S-ISEL-12v.Coll. 47	28.63	20.58	0.33	0.17	0.67
11.	S-ISEL-12v.Coll. 48	28.41	18.51	0.62	0.53	0.61
12.	S-ISEL-12v.Coll. 6	27.89	23.60	0.17	0.15	0.69

Abbreviations:
T-ISEL-12v. Coll.- availability of tangible social support for students
B-ISEL-12v. Coll.- availability of belonging social support for students
A-ISEL-12v. Coll.- availability of appraisal social support for students
S-ISEL-12v. Coll.- availability of self-esteem social support for students

The analysis of the questionnaire positions conducted with the assumption that the four factors must be isolated resulted in 36.12% of common variation.

Criterion validity

The overall result for the scale ISEL-48v.Coll. reflecting how social support availability is perceived correlates with each of the criteria on the statistically significant level. However, it shows the highest negative correlation with depression (r =-0.49; p<0. 001), and positive correlation with the sense of resourcefulness (a component of life orientation) (r =0.43; p<0.001). The criterion validity of the original version of ISEL-48v.Coll. was presented on the basis of positive correlation with the criterion of supportive social behaviours (r =0.46, p<0.001) and negative correlation with anxiety (r =-0.52 and r =-0.64, p<0.01).

Cohen's studies also concerned determining the criterion validity of the scale ISEL-48v.Coll. through the correlation of social support with depression. The results, as expected, indicate a negative correlation (r = -0.22 and r = -0.47, p<0.05) [11] (Table 3).

Table 3. Correlations (r – coefficient of Spearman's range correlation) between the total score of ISEL-48v.Coll., total scores of subscales and anxiety, depression, stress and life orientation.

Scale	PSS- stress	HADS-anxiety	HADS-depression	SOC-sense of intelligibility	SOC- sense of resourcefulness	SOC- sense of meaningfulness
ISEL-48v.Coll.	-0.45*	-0.33*	-0.49*	0.31*	0.43*	0.40*
T-ISEL-12v.Coll.	-0.33*	-0.025*	-0.33*	0.18*	0.28*	0.26*
A-ISEL-12v.Coll.	-0.27*	-0.23*	-0.38*	0.20*	0.25*	0.23*
B-ISEL-12v.Coll.	-0.37*	-0.26*	-0.41*	0.26*	0.36*	0.36*
S-ISEL-12v.Coll.	-0.51*	-0.32*	-0.44*	0.34*	0.50*	0.44*

*p<0,05
Abbreviations:
ISEL-48v. Coll. – availability of social support for students
T-ISEL-12v. Coll.- availability of tangible social support for students
A-ISEL-12v. Coll.- availability of appraisal social support for students
B-ISEL-12v. Coll.- availability of belonging social support for students
S-ISEL-12v. Coll.- availability of self-esteem social support for students

Discussion

The procedure of defining psychometric characteristics of the scale ISEL-48v.Coll. by its author, S. Cohen, was presented together with the presentation of the authors' results of the study. The research sample assessing the reliability of the test-retest method was dominated by women, which is not representative of the student population. At the same time, however, S. Cohen conducted an assessment of psychometric characteristics of the scale ISEL-v.Coll. on the sample of 70 students from the University of Oregon, where again women were in the majority [8,12].

The coefficients of correlation between the overall result of the scale and the results of the subscales ranging between 0.75 to 0.83 were obtained in the Greek adaptation of ISEL-48v.Coll. This also indicates a better internal-consistency of the tool with regard to the characteristics presented by the author of the scale and it is comparable with the results achieved in the Polish version of the tool [17].

The scale was also evaluated for its validity and reliability by other researchers. E. Dalistamati et al. [17] published the Greek dichotomous version of ISEL – 48v.Coll., and their results can be recognised as comparable to the version presented in the above research. The Cronbach's alpha reliability coefficient for the whole scale amounted to 0.89, with the stability in the test-retest method of 0.67; the lowest coefficient characterising the subscale S-ISEL-12v.Coll. was 0.45, and for T-ISEL-12v.Coll. – 0.63 [17]. More satisfying values for Cronbach's alpha were shown for A-ISEL-12v.Coll. – 0,75 and B-ISEL-12v.Coll. – 0.84, which confirms the trend of Cronbach's alpha coefficient in the Polish adaptation of the tool by D. Zarzycka. The criterion validity assessed by the correlation of the overall results and subscales in relation to anxiety, depression and life events, indicates the statistically significant correlations on the level $p<0.001$, which is convergent with the correlation's results achieved in the presented project [14].

On the other hand, Brookings and Bolton [18] did a confirmatory factor analysis confirming the usefulness of the scale ISEL-48v.Coll. in assessing social support availability, which fits the four-factor data, i.e. subscales. The indicator RMSEA for the factor models ranged from 0.05 to 0.07, which shows quite a fine fitting to the empirical data [18]. High correlations between subscales could suggest the possibility of using the one-dimensional scale, which is recommended by other researchers [19]. However, on such occasion, the loss of unique appraisingly-valuing information, wherein the smallest orthogonal subscales are the carriers, must be assumed. Therefore, the recommendation to use the overall result of ISEL-48v.Coll. together with the subscales results was formulated.

Conclusions

1. The Scale ISEL-48v.Coll. has satisfying reliability indicators both for the subscales and the complete tool. Hence, the tool should be used in empirical studies.
2. The stability of the results assessed in a 4-week interval was satisfying.
3. The criterion validity of the tool is consistent with the accepted standards in other validating studies.

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SEROLOGICAL RESEARCH TOWARDS LYME BORRELIOSIS IN HUNTERS AND FORESTRY WORKERS IN SELECTED AREAS OF POLAND AND UKRAINE

BADANIA SEROLOGICZNE W KIERUNKU BORELIOZY Z LYME WŚRÓD MYŚLIWYCH I PRACOWNIKÓW LEŚNICTWA W WYBRANYCH OBSZARACH POLSKI I UKRAINY

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C. Data analysis/statistics
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D. Data interpretation
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przygotowanie artykułu
F. Literature analysis/search
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zebranie funduszy

Summary

Background. The study aimed to analyse the prevalence of antibodies to specific *Borrelia burgdorferi* antigens in hunters from the area of Lublin Province (Poland) and forestry workers from the vicinity of Ternopil (Ukraine).
Material and methods. The study group included 240 hunters, members of the hunting clubs in Lublin Province (Poland), aged 23-80 and 339 forestry workers employed in the 5 forest districts subordinated to the Ternopil Regional Administration of Forestry and Hunting, aged 18-76. All persons were given anti-*B. burgdorferi* IgM/IgG antibodies (ELISA test and Western blot).
Results. Positive anti-*B. burgdorferi* IgM/IgG results were found in 21.7% of the hunters and 31.9% of the forestry workers. The occurrence of positive results in anti-*B. burgdorferi* antibodies depends significantly ($p<0.02$) on the area of the tested persons from Ukraine and was higher in the Berezhany district – 48.2% and the Buchach district – 47.5%.
Conclusions. Because of the high exposure to tick bites and the possibility of *B. burgdorferi* infection, it is justified and desirable to strive to implement a full two-step diagnostic approach to Lyme disease in forestry workers in Ukraine. Further, it is particularly vital to undertake extensive educational and diagnostic activities, especially in the Berezhany and Buchach districts. Finally, it would be beneficial to implement systemic solutions in this regard also in hunters due to the ever-increasing number of this professional group each year.

Keywords: foresters, hunters, Borrelia burgdorferi, Poland, Ukraine

Streszczenie

Cel pracy. Celem pracy była analiza częstości występowania przeciwciał dla specyficznych antygenów *Borrelia burgdorferi* wśród myśliwych z terenu woj. lubelskiego (Polska) i pracowników leśnictwa z okolic Tarnopola (Ukraina).
Materiał i metody. Grupa badana obejmowała: 240 myśliwych zrzeszonych w kołach łowieckich na terenie województwa lubelskiego (Polska) w wieku 23-80 oraz 339 pracowników leśnictwa zatrudnionych w 5 nadleśnictwach podległych The Ternopil Regional Administration of Forestry and Hunting w wieku 18-76. U wszystkich osób wykonano oznaczenia przeciwciał IgM/IgG anty-*B. burgdorferi* (test ELISA i Western blot).
Wyniki. Dodatnie wyniki IgM/IgG anty-*B. burgdorferi* stwierdzono u 21.7% myśliwych i 31.9% pracowników leśnictwa. Przeciwciała IgG częściej ($p<0.0001$) stwierdzano u leśników z Ukrainy. Występowanie wyników dodatnich w zakresie przeciwciał anty-*B. burgdorferi* zależy istotnie ($p<0.02$) od rejonu z którego pochodzili badani z Ukrainy i był wyższy w okręgu Berezhany – 48.2% i okręgu Buchach – 47.5%.
Wnioski. Z racji na duże narażenie na pokłucia przez kleszcze i możliwość zakażenia *B. burgdorferi* uzasadnione i celowe jest dążenie do wdrożenia w Ukrainie obowiązku pełnej, dwuetapowej diagnostyki w kierunku boreliozy z Lyme u pracowników leśnictwa. Szczególnie ważne wydaje się podjęcie szeroko zakrojonych działań edukacyjnych i diagnostycznych szczególnie w rejonach Berezhany i Buchach. Korzystne byłoby wdrożenie systemowych rozwiązań w tym zakresie również wśród myśliwych z racji na z roku na rok rosnącą liczbę osób zajmujących się łowiectwem.

Słowa kluczowe: leśnicy, myśliwi, Borrelia burgdorferi, Polska, Ukraina

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Introduction

The primary vectors of *Borrelia burgdorferi* sensu lato spirochetes (*B. burgdorferi* s.l.) in Europe are larvae, nymphs and adult ticks *Ixodes ricinus* and *Dermacentor reticulatus* [1] feeding, depending on their developmental phase, mainly on various wildlife vertebrates [2]. The research did not show the relationship between B. *burgdorferi* s.l. and specific reservoir species [1]. The spirochetes are usually found in vertebrate organisms such as: small mammals (mice, goats, rabbits, rats, hamsters, rabbits, hedgehogs, squirrels, dormice, garden dormice), game (roe deer, deer, fallow deer), birds (blackbirds, trushes, guillemots, gulls, auks, wrens, pheasants, cormorants) as well as reptiles (lizards). Man is an incidental host for an infected nymph or adult tick [1,3,4,5].

The border area of Eastern Poland and Western Ukraine is similar in its natural surroundings. The area is characterised by mixed forests with rich lining, which provides a favourable habitat for ticks. The spread of infected ticks *B. burgdorferi* s.l. ranges from 6% - 15% in Poland and affects both rural and urban areas [1]. In western Ukraine, *B. burgdorferi* s.l spirochetes were identified in 14.2% - 17.2% of the adult ticks *Ixodes scapularis* [6,7]. Other authors suggest that the incidence of tick infections may be as high as 25% [8]. The Ternopil region, located in the western part of Ukraine, is an endemic area of Lyme disease. Habitats of the tick *Ixodes ricinus* were found in 57 settlements of the 15 districts in the vicinity of Ternopil [9].

Forestry workers, loggers and hunters working in these forest areas are prone to frequent tick bites and therefore ticks diseases, including Lyme borreliosis [10]. When that happens, the illness can significantly hinder or even prevent professional activity of the infected persons. Bacteria induce the degradation of extracellular matrix (ECM), activate enzymes (elastase, laminase), merge with fibronectin, integrins, proteoglycans (decorin), which as a result enables their survival in extracellular structures and generates diverse clinical manifestations of infection [11].

The study aimed to analyse the prevalence of antibodies for specific *Borrelia burgdorferi* antigens in hunters from the area of Lublin Province (Poland) and forestry workers from the vicinity of Ternopil (Ukraine). Because of their professional activity and hobbies, these persons are particularly prone to be bitten by ticks. The Polish hunters and the Ukrainian forestry workers (in contrast to the Polish foresters) are not covered by regular preventive and diagnostic measures that show be taken due to their exposure to *B. burgdorferi*.

Material and methods

Study group

The study group included:

- 240 hunters, members of the hunting clubs in Lublin Province (Poland), aged 23-80 (mean 52, SD 11.6), including 212 men (88.3%) and 28 women (11.7%);
- 339 forest workers employed in the 5 forest districts subordinated to the Ternopil Regional Administration of Forestry and Hunting: Berezhany (56), Ternopil (64), Chortkiv (65), Buchach (61), Kremenets (93) in the Ternopil region. The tested persons were aged 18-76 (mean 42, SD 11.2), including 337 men (99.4%) and 2 women (0.6%).

The blood samples were taken between 2014 and 2015.

Serological tests

In all persons, anti-*B. burgdorferi* IgM/IgG antibodies were marked using the ELISA test (anti-Borrelia ELISA IgM; anti-Borrelia plus VlsE ELISA IgG, Euroimmun, Germany) as the screening assay. The results obtained are interpreted following the manufacturer's instructions. The results above 22 relative units/ml (RU/ml) were interpreted as positive, below 16 RU/ml as negative, and those between 16 - 22 RU/ml as borderline.

The positive and borderline results obtained by the ELISA test were confirmed by Western blot (Wb) (anti-Borrelia Euroline-WB IgM/IgG, Euroimmun, Germany). Test strips showed *B. afzelii* antigens (p83, p41, p39/BmpA, p31/OspA, p30, p25/OspC, p21, p19, p17/DbpA) and a recombinant VlsE antigen. The test strips reading and the results interpretation were done following the manufacturer's instructions using the EuroLinescan software (Euroimmun, Germany).

The research was approved by the Bioethics Committee of the Medical University of Lublin (No. KE-0254/177/2014) and Bioethics Committee of I. Ya. Horbachevsky Ternopil State Medical University (No 30, dated 01/09/2015).

The results of the study were then statistically analysed using the Statistica v. 10 programme. In all examined cases, the significance level $p < 0.05$ was assumed.

Results

Positive anti-*B.* b*urgdorferi* IgM results were found in 2.1% of the hunters and 1.5% of the forestry workers. The presence of both anti-*B. burgdorferi* IgM/IgG was detected in 0.4% of the hunters and 3% of the forestry workers. The number of anti-*B. burgdorfer*i IgG was significantly higher in the Polish foresters ($p<0.0001$) (19.2% of the hunters; 27.4% of the foresters). The detailed results are given in Table 1.

The occurrence of positive results with regard to anti-*B. burgdorferi* antibodies depended significantly ($p<0.02$) on the area of the tested persons from Ukraine and was higher in the Berezhany district – 48.2% and the Buchach district – 47.5%. The detailed data are provided in Table 2.

The IgM and IgG antibodies for specific *B. burgdorferi* antigen proteins were detected by Western blot with different frequencies. The results are presented in Table 3.

IgG antibodies to some *B. burgdorferi* antigens were significantly more common in the Ukrainian forestry workers than in the Polish hunters: p21 ($p<0.0004$), p30 ($p<0.00001$), p31 ($p<0.05$), p39 ($p<0.00008$), VlsE ($p<0.0002$).

The patients in the Berezhany district (Ukraine) were more likely ($p<0.0004$) than those in the other districts to have anti-p19 *B. burgdorferi* IgG antibodies (10 persons, 17.9%), anti-p25 ($p<0.008$, 16 persons, 28.6%), anti-p39 ($p<0.004$, 12 persons, 21.4%), anti-VlsE ($p<0.05$) (18 persons, 32.1%).

In the Buchach district (Ukraine), anti-p25 *B. burgdorferi* IgG was encountered more often ($p<0.008$) in 22 persons (36.0%), anti-p39 ($p<0.004$) in 17 persons (27.9%), and anti-VlsE $p<0.05$ in 26 persons (42.6%).

Table 1. Anti-*B. burgdorferi* IgM/IgG antibodies in the tested hunters from Lublin Province (Poland) and the forestry workers from the vicinity of Ternopil (Ukraine)

The tested group	Anti-B. burgdorferi antibodies							Total
	IgM- IgG-	IgM+	IgM+/-	IgM+ IgG+	IgM+/- IgG+	IgG+/-	IgG+	
Hunters (PL)	163 (67,9)	5 (2.1)	5 (2.1)	1 (0.4)	2 (0.8)	18 (7.5)	46 (19.2)	240 (100)
Forestry workers (UA)	219 (64.6)	5 (1.5)	5 (1.5)	10 (3.0)	7 (2.1)	-	93 (27.4)	339(100)

PL – Poland UA - Ukraine
the value in brackets is given in percent (%)
- a negative result
-/+ a borderline result
+ a positive result

Table 2. Anti-*B. burgdorferi* IgM/IgG antibodies in the forestry workers from Ukraine by the areas from which the tested persons came

Forestry workers (UA)	Anti-B. *burgdorferi* antibodies							Total
	IgM- IgG-	IgM+	IgM+/-	IgM+ IgG+	IgM+/- IgG+	IgG+/-	IgG+	
1	28(50.0)	0(0)	1(1.8)	5(8.9)	1(1.8)	-	21(37.5)	56(16.5)
2	44(68.7)	2(3.1)	1(1.6)	0(0)	1(1.6)	-	16(25.0)	64(18.9)
3	48(73.8)	0(0)	0(0)	1(1.5)	1(1.5)	-	15(23.1)	65(19.2)
4	31(50.8)	1(1.6)	1(1.6)	3(4.9)	0(0)	-	25(41.0)	61(18.0)
5	68(73.1)	2(2.1)	2(2.1)	1(1.1)	4(4.3)	-	16(17.2)	93(27.4)
Overall	219 (64.6)	5 (1.5)	5 (1.5)	10 (3.0)	7 (2.1)	-	93 (27.4)	339(100)

UA – Ukraine, 1-Berezhany, 2-Ternopil, 3-Chortkiv, 4-Buchach, 5- Kremenets
the value in brackets is given in percent (%)
- a negative result
-/+ a borderline result
+ a positive result

Table 3. IgM and IgG antibodies identified by Western blot for specific *B. burgdorferi* antigenic proteins in the group of hunters from Poland and forestry workers from Ukraine

Antibody class	Country	*B. burgdorferi* antigenic proteins								
		p17	p19	p21	p25	p30	p31	p39	p83	VlsE
IgM	PL (hunters)	-	-	-	6 (2.5)	-	-	-	-	-
	UA (forestry workers)	2 (0.6)	-	-	10 (2.9)	-	4 (1.2)	-	-	-
IgG	PL (hunters)	36 (15.0)	25 (10.4)	5 (2.1)	13 (5.4)	13 (5.4)	16 (6.7)	19 (7.9)	24 (10.0)	31 (13.0)
	UA (forestry workers)	52 (15.3)	26 (7.7)	34 (10.0)	22 (6.5)	67 (19.8)	44 (13.0)	62 (18.3)	48 (14.2)	93 (27.4)

PL – Poland, UA - Ukraine
the value in brackets is given in percent (%)

Discussion

The ticks infestation in a given area can be estimated from the prevalence of *B. burgdorferi* antibodies in the blood of the residents or workers in a given region [12]. In European countries, anti-*B. burgdorferi* IgM/IgG antibodies were reported in forestry workers (woodcutters, foresters, hunters) with different frequencies depending on the country and geographic region: in France 14.1 – 20.2%; in Italy 5.4 – 23.2; in Germany 8 – 43%; in the Netherlands 19.3%; in Slovenia 23.8%; in Romania 9.4%; in Turkey 10.9; in Hungary 37% [13] and in Austria 7% – 42% [10]. In Poland, antibodies for specific antigens of *B. burgdorferi* s.l. were found in forestry workers with deferent frequencies depending on the region of the country: 32.7% (in Kujawsko-Pomorskie Province) [14], 47.9% [15] – 55% (Lublin Province) [16], whereas in the area of Polesie and Forest-Steppe of Ukraine 30.4 – 50.0% [17]. While forestry workers in Poland are well-monitored for the risk of *B. burgdorferi* infection and Lyme disease, there are no such procedures provided for this occupational group in Ukraine. There are also no uniform Lyme diagnostic recommendations. However, according to The Order of the Minister of Health of Ukraine, N133 of 19.07.1995, Lyme disease was classified into the group of particularly dangerous infections.

In the conducted two-stage studies (ELISA tests, Western blot), the anti-B. *burgdorferi* IgM/IgG antibodies were found in 31.9% of the forestry workers from the vicinity of Ternopil (Ukraine). The occurrence of positive anti-*B. burgdorferi* results depends significantly on the Ukrainian region from which the tested persons came. Higher positive results were in Berezhany district (48.2%) and Buchach district (47.5%).

The group of the Polish people who are not adequately protected against tick-borne diseases are hunters, who are mainly exposed to frequent tick-bites and the risk of Lyme borreliosis when undertaking activities related to hunting and wildlife conservation. In the conducted studies, the anti *B. burgdorferi* IgM/IgG were present in 21.7% of the hunters from Lublin Province (Poland). The results show that seroprevalence in this group is significantly higher than in those who are not exposed to ticks (7.1% – 12.5% of the blood donors) [13, 18], and similar to that obtained for farmers from Lublin Province (27.3% [19], and 28% [16]) of those professionally exposed to Lyme disease. The obtained data indicate that these particular groups of people from both countries should be provided with meticulous care for the diagnosis and prevention of Lyme disease.

The diagnosis of Lyme borreliosis is based on three criteria: the individual's ticks bite history, clinical manifestations of the disease and serological tests (ELISA tests and Western blot) indicating the presence of the specific anti-*B. burgdorferi* IgM/IgG antibodies [20]. While evaluating and interpreting the results of the serological tests, both the antibody class for the specific *B. burgdorferi* antigenic proteins and the type of bacterial antigen for which these antibodies are produced are significant. Outer surface proteins (Osp) play an important role in the immune response to the infection because they are highly immunogenic, and anti-OspC (p25), OspA (p31), and OspB antibodies can destroy *B. burgdorferi* spirochetes [21].

The EUCALB (European Union Concerted Action on Lyme Borreliosis) programme demonstrated that the following *B. burgdorfer*i s.l. antigenic proteins: OspC and p41 for IgM and p83/100, p58, p41, p39, OspC, DbpA (p17) are useful in Western blot testing for IgG. It is essential that the diagnostic criteria take into account the immune response to the antigens of the most common strains in the area. In Europe, it is Western blot tests with *B. afzelii* antigens (the PKo strain) that are recommended [22]. In these tests, recombinant *B. burgdorferi*

antigens are most useful: p100, p58, p41i, VlsE, OspC, DbpA [23]. The diagnostic significance of OspC decreases with the progress of the immune response and an increased production of IgG antibodies to other spirochete antigen proteins [24, 25].

In forest workers, B. *burgdorferi* anti-DbpA IgG (65%) and anti-OspC (35%) were identified [16]. The studies have confirmed the diagnostic role of p17 (DbpA), p19, p25, p39, VlsE antigens in the assessment of late manifestation of *B. burgdorferi* infection.

Conclusions

Because of the high exposure to tick bites and the possibility of *B. burgdorfer*i infection, it is justified and desirable to strive for the implementation of a full two-step diagnostic approach to Lyme disease in forestry workers in Ukraine. It is particularly vital to undertake wide-ranging educational and diagnostic activities among Ukrainian foresters, especially in the Berezhany and Buchach districts. Further, it would also be beneficial to implement systemic solutions for hunters in this area due to the ever-increasing number of this professional group each year.

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EFFICIENCY OF BIOFLAVONOID QUERCETIN AND RNA-CONTAINING DRUG SODIUM NUCLEINAT IN COMPLEX TREATMENT OF PATIENTS WITH MYOCARDIAL INFARCTION AND FUNCTIONAL LIVER DISORDERS

SKUTECZNOŚĆ KWARTECYNY I NUKLEINATU SODU ZAWIERAJĄCYCH RNA SODU W KOMPLEKSOWYM LECZENIU PACJENTÓW Z ZABURZENIAMI MIOKARDIALNYMI I ZABURZENIIAMI FUNKCJONALNYMI WĄTROBY

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Summary

Background. The study has shown that functional liver disorders develop in patients with MI, which requires correction.
Material and methods. The study involved 149 patients with acute MI. All examinations were repeated several times on the 1, 14 and 28 day of the treatment.
Results. The patients with functional liver disorders have a higher incidence of epistenocardial pericarditis, arrhythmia and systolic dysfunction. They are characterised by highly activated lipid peroxidation and immunological disorders. A combined therapy with quercetin resulted in improving hemodynamics and reducing the manifestations of liver dysfunction. RNA-containing drug significantly improved the immune status and reduced signs of immuno-inflammatory syndromes.
Conclusions. 1.In patients with MI and functional liver disorders, the primary pathological process is characterised by significant violations of systolic and diastolic function of the heart, more frequent development of complications, activation of lipid peroxidation and secondary immunodeficiency. 2. The inclusion of bioflavonoid quercetin in the treatment of patients with MI helps to restore the antioxidant defence system, improve myocardial contractile function and reduce clinical laboratory manifestations of cytolytic and cholestatic syndromes in patients due to antioxidant and membrane stabilizing properties of the drug. 3. The usage of the RNA-containing drug Nuclex improves immune reactivity, reduces symptoms of expressed mesenchymal-inflammatory and necro-resorptive syndromes in patients with MI and functional liver disorders.

Keywords: myocardial infarction, liver function, lipid peroxidation, quercetin, sodium nucleinat

Streszczenie

Cel pracy. Badanie wykazało, że zaburzenia funkcji wątroby występują u pacjentów z MI, co wymaga korekty.
Materiał i metody. W badaniu wzięło udział 149 pacjentów z ostrym MI, u których powtórzono wszystkie badania w 1, 14 i 28 dniu leczenia.
Wyniki. U pacjentów z funkcjonalnymi zaburzeniami czynności wątroby często występuje epistenokardialne zapalenie osierdzia, arytmia i dysfunkcja skurczowej. Obserwuje się też wysoki poziom peroksydacji lipidów i zaburzenia immunologiczne. Połączona terapia z kwercetyną spowodowała poprawę hemodynamiki i zmniejszenie objawów dysfunkcji wątroby. Leki zawierające RNA znacząco poprawiły status immunologiczny i zmniejszały objawy zespołów immunomodulacyjnych.
Wnioski. 1.W przypadku pacjentów po zawale serca i z zaburzeniami czynności wątroby, pierwotny proces patologiczny charakteryzuje się upośledzeniem funkcji skurczowej i rozkurczowej serca, częstszym rozwojem powikłań, aktywacją peroksydacji lipidów i wtórnym niedoborem odporności. 2. Włączenie kwercetyny w proces leczenia pacjentów z MI pomaga przywrócić system odporności antyoksydacyjnej, poprawić funkcję kurczliwości mięśnia sercowego i zmniejszyć kliniczne objawy laboratoryjne zespołów cytolitycznych i cholestatycznych, co wynika z właściwości przeciwutleniających leku stabilizujące błonę. 3. Stosowanie leku Nuclex zawierającego RNA poprawia reaktywność immunologiczną, zmniejsza objawy zespołów mezenchymalnych i zapalnych oraz nekroreorpcyjnych u pacjentów z MI i tych z funkcjonalnymi zaburzeniami czynności wątroby.

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Słowa kluczowe: zawał mięśnia sercowego, czynność wątroby, peroksydacja lipidów, kwercetyna, nukleinat sodu

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Introduction

Presently, the research efforts are focused on studying the basic mechanisms of developing and forecasting myocardial infarction (MI) in combination with co-morbid pathology, as well as optimizing treatment by differential therapeutic techniques that can limit the zone of necrosis, reduce the development of complications and improve the quality of life of patients after MI [1,2,6]. Due to extensive implementation in clinical practice of medical (thrombolytic therapy) and surgical methods of coronary revascularisation (percutaneous transluminal coronary angioplasty, coronary artery bypass surgery), mortality and frequency of chronic heart failure in the early period of MI have been reduced, and prognosis has improved. However, patients, who have been admitted later than 6 hours from the start of development of acute coronary syndrome or because of other reasons such as the presence of co-morbidity together with contraindications to fibrinolytic therapy, receive standard pharmacotherapy of MI, and their total mortality rate remains rather high (over 20%) [3,16].

It is known that reduced cardiac output due to systolic dysfunction of the left ventricle (LV) in MI leads to hypoperfusion and hypoxia of all organs and systems, including the liver. Our previous studies have shown that in MI functional liver disorders are manifested by cytolytic, cholestatic syndromes and impaired synthetic function of the liver, which need correction [8,14]. Hypoxia is known to activate lipid peroxidation, which is an alternative donor of active forms of oxygen in these conditions. However, these active radicals can induce a damaging effect on the cell membrane, exacerbate the disease, promote activation of an inflammatory immune response and hypercoagulation [5,9,10].

Objective

The following work aimed to improve the existing treatment programmes of MI by a differentiated approach to the therapy, depending on the presence or absence of functional liver disorders.

Material and methods

The study was conducted in the Cardiology Department of Ternopil University hospital in the years 2012-2016 and included 149 patients with acute MI. On the first day of hospitalisation, physical examination, determination of cardiac biomarkers, lipidograme, coagulograme, electrocardiography in the conventional 12 leads were performed. Intracardial hemodynamics was assessed by echocardiography in B-mode on Aloka SSD – 2000 (USA) on 3, 5, 10, 15 and 20 day of the research. End diastolic volume (EDV) and end systolic volume (ESV) of LV, ejection fraction (EF) by Simpson method were defined. The active indexes of lipid peroxidation (LPO) and antioxidant system (AOS) were evaluated by the results of the plasma malondialdehyde (MDA) content of a coloured complex in photocolorimetry that were formed by the interaction of MDA with thiobarbituric acid in an acidic medium [13]; the concentration of SH-groups of blood in the reaction of n-mercurbenzol sodium, the activity of superoxide dismutase (SOD) in erythrocytes (KF 1.15.1.1) as the degree of inhibition restored nitrotetrazolio blue, the activity of catalase (CT) in erythrocytes (KF 1.11.1.6) – by the photocolorimetric method by the intensity of coloured complex formed during the interaction of hydrogen peroxide (H2O2) molibdate ammonium [7]. The immune system was studied according to the level of CD 3 , CD 4 , CD 8 , CD 16 , CD 22 by immune-enzyme analysis using specific monoclonal antibodies produced by "Sorbent" LTD, Russia. The content of serum immunoglobulins A, G, M was determined by Manchini (radial diffusion in the gel). The functional status of the liver was evaluated according to the results of clinical and biochemical examinations (bilirubin, total protein, cholesterol, lipid fractions, prothrombin, alanin amino transferase (ALT), aspartic amino transferase (AST), gamma glutamiltransferase (GGT), alkaline phosphatase (AP), and the ultrasound examination of the liver.

The research was done in compliance with the Convention on Human Rights and Biomedicine by the European Council, Helsinki Declaration, and the recommendations of Bioethical Committee of National Academy of Medical Science of Ukraine.

STATISTICA (StatSoft, USA, v 6.0) was used for statistical analysis: the non-parametric statistics Wilcoxon T-criteria test for comparison of dependent values in two groups, and the Spearman's rank correlation to establish the existence and strength of relationships between different values. Statistically significant differences were considered at $p<0,05$. The quantities were presented as the mean value of standard errors (M±M).

All investigations were repeated on the 14^{th} and 28^{th} day. The study group involved patients with a verified diagnosis of acute MI following the recommendations of the European Society of Cardiology (2010). The exclusion criteria included chronic liver diseases, viral hepatitis, alcohol abuse history, prolonged intake of hepatotoxic drugs, cancer, severe acute left ventricular failure (IV functional class by Killip), and cardiac decompensation.

The mean age of the examined persons was 59.9±7.6 years: 37 (24.8%) at the age of 45 years, 53 (35.5%) 46 - 65 years old, and 59 (39.7%) patients over 65 years. The group consisted of 110 men (73.8 %) and 39 (26.2 %) women. The most significant risk factors visible in patients were hypertension – in 103 persons (69.5%), hypercholesterolemia – in 69 (5.4%), diabetes mellitus and obesity in equal proportion 29 (19.5 %) patients. 84.6% of the women were in postmenopausal period. Finally, 29.8 % of the patients (43.6 % men) smoked for 5 and more years.

Most patients (89 – 59.75%) had STEMI, 24 (16.2%) – NSTEMI, whereas 36 patients (24.2 %) had repeated MI.

Depending on the identified functional liver disorders, the patients were divided into 2 groups. The main study group included 107 persons with acute MI and functional liver disorders. The control group consisted of 42 patients with severe MI but without functional liver disorders. In both groups, the patients were comparable in age, sex, and size, localisation and clinical course of MI. Also, depending on the method of treatment, each group consisted of three subgroups. The patients of the first subgroup received standard therapy, including direct anticoagulants, antiplatelet agents, beta-blockers, ACE inhibitors, nitrates and statins. The second subgroup additionally received bioflavonoid quercetin (Corvitin) 500 mg IV within 10 days [4,11].

The complex treatment of patients of the third subgroup consisted of immunomodulatory and antioxidant product RNA (Nuclex) 1.5 g a day for 20 days. Biological properties of exogenous RNA, in particular, stimulation of cell metabolism, reparative processes, activating the synthesis of endogenous nucleic acids, macroergic compounds, specific proteins and enzymes, increasing the ability of cells to mitosis, immunomodulatory and anti-inflammatory effect, are beneficial in MI [15].

The anti-inflammatory activity of RNA is implemented by inhibition of metabolism of free arachidonic acid, thereby providing membrane stabilisation and endothelium protective actions, including suspension of atherosclerotic plaques' destabilisation. Also, the RNA-containing drug regulates the activity of NO-synthase through the inhibition in cardiomyocytes and increase in the bloodstream and, as a consequence, induces constitutive nitric oxide synthesis, and provides antioxidant, anti-ischemic, antiplatelet, hematopoietic effects. The cardioprotective properties of RNA contribute to the improvement of the coronary and systemic circulation, systolic and diastolic LV function, increased the electrical stability of the myocardium, resulting in reduced mortality, an incidence of arrhythmias, post-infarction angina, the severity of heart failure.

The fibrinolytic therapy was not conducted in patients of the main and control groups.

Results and discussion

Uncomplicated MI was observed in 17 (40%) patients of the control group. Patients with functional liver disorders had various complications of the primary disease (84 patients – 78.5 %). Epistenocardical pericarditis was significantly more often found in patients with functional liver disorders than in the control group (42 (39.3%) vs. 8 (19 %)). The disturbance of rhythm or conduction, such as paroxysmal tachyarrhythmias, transient atrioventricular blockade and polymorphic extrasystoles, were also more frequently encountered in patients of the main group and significantly less in patients without functional liver disorders, i.e. 38 (35.5%) vs. 9 (21.4%). Also, aneurysm of the left ventricule was diagnosed in 17 (15.9%) patients of the main group and 4 (9.5%) patients of the control group. Acute heart failure was present in patients of both groups; however, Killip classes I and II were observed significantly more often in patients in the control group, whereas class III was significantly more often diagnosed in patients of the main group. It was found that pericarditis epistenocardica occurred more often in persons who were aged 45-65 years (in 24 (17.8%) of the patients), whereas the aneurysm of the LV and arrhythmias were significantly more prevalent in persons of older age categories, respectively (in 7 (5.3%) and 19 (13.4%) patients).

Simultaneously, patients of both groups had a disturbance of systolic and diastolic function of the LV. More significant reduction of EF (42.12±1.13 %) and more pronounced remodelling of LV in the acute phase of MI were observed in patients of the main group compared with the control (EF – 48.23±1,16 %). In particular, LV EDD was 5.62±0,21 sm in the main group and 4.71±0,24 sm in the control ($p<0,05$). Diastolic dysfunction was characterised by changes of isovolumic relaxation time (IVRT) in the main (63.23 ± 0,41 ms) and control groups (68.12 ± 0,36 ms) and deceleration time of early diastolic mitral flow (DT) 178.11 ± 0,54 ms vs. 182.43 ± 0,37 ms.

After standard treatment of patients of the control group, significant improvement of hemodynamic parameters, in particular, increased EF, decreased LV EDD, increased IVRT, and decreased DT, were diagnosed in comparison with the patients who had functional liver disorders ($p<0,05$).

However, in patients of the main group after standard therapy, there was no significant recovery of systolic and diastolic function. Using quercetin or sodium nucleinate (RNA) have provided more rapid normalisation of indices of systolic and diastolic functions of the heart, which was significantly improved during the 28

days of treatment in the main and in the control group. The linear dimensions of the heart cavities did not change dramatically, but positive dynamics of EF, LV EDD, IVRT and DT in comparison with initial indices were improved due to remodelling and restoration of the functional state of the areas of ischemia and hibernation of the myocardium (Table.1).

Table 1. Dynamics of systolic and diastolic cardiac functions in patients with MI during the proposed treatment programme (M±m)

Indices	No.	Before treatment	Standard treatment	Corvitin	Nuclex
LV EDD, sm	1	5.62±0.21	5.84±0.07	5.23±0.18	5.24±0.03
	2	4.71±0.08	5.58±0.14	5.53±0.12	5.43±0.32
E/A	1	1.35±0.03	1.03±0.04	1.31±0.03	1.51±0.04
	2	1.41±0.03	1.19±0.05	1.38±0.07	1.58±0.09
IVRT, ms	1	63.23±0.41	68.13±2.10*	73.13±1.11*	73.49±1.26*
	2	68.12±0.36	73.21±1.26*	79.27±1.33*	78.17±2.13*
DT, ms	1	178.11±0.54	164.26±4.66*	214.22±4.23*	192.28±4.02*
	2	182.43±0.37	184.62±4.35*	213.65±4.21*	198.22±3.65*
EF,%	1	42.12±1.13	43.28±0.23	49.68±0.32*	52.38±0.12*
	2	48.23±1.16	48.76±1.36	51.62±1.62*	51.67±1.16*
OV, ml	1	47.14±0.79	49.26±2.29	51.43±1.20*	52.03±0.82*
	2	52.88±1.62	59.26±2.15*	59.68±1.56*	59.95±1.25*

1. 1.2 – MI with respective indices in patients with and without functional liver disorders;
2. underlined indices significantly differed from respective ones in the control group ($p<0.05$);
3. *- indices significantly differed from respective in patients who received standard treatment.

Changes in laboratory parameters in MI patients with or without functional liver disorders, depending on the methods of treatment are presented in Table 2. The significant difference between all studied parameters in patients of the main and control groups was found in the initial state.

Table 2. Dynamics of laboratory indices of liver functional state in patients with MI during the proposed treatment programme (M±m)

Indices	Day of treat-ment		Standard treat-ment	Corvitin	Nuclex	P_1	P_2
Bilirubin, mmol/l	1 day день	1	24.61±1.1*	23.64±1.23*	24.3±1.22*	p>0.05	p>0.05
		2	17.51±0.2	17.93±4.43	17.7±2.33	p>0.05	p>0.05
	14 day	1	23.58±1.3*	20.26±1.52*	18.96±1.44*	p<0.05	p<0.05
		2	16.24±0.3	17.7±3.24	16.5±2.32	p>0.05	p>0.05
	28 day	1	20.12±0.2*	18.51±2.12	17.83±1.42	p<0.05	p<0.05
		2	16.52±0.2	16.23±2.13	16.23±3.32	p>0.05	p>0.05
ALT, mkmol/l	1 day	1	0.89±0.04*	0.91±0.02*	0.92±0.05*	p>0.05	p>0.05
		2	0.49±0.03	0.54±0.03	0.58±0.03	p>0.05	p>0.05
	14 day	1	0.86±0.02*	0.78±0.04*	0.76±0.05*	p<0.05	p<0.05
		2	0.43±0.02	0.57±0.03	0.68±0.03	p>0.05	p>0.05
	28 day	1	0.79±0.03*	0.69±0.03	0.69±0.04	p<0.05	p<0.05
		2	0.42±0.04	0.56±0.04	0.68±0.05	p>0.05	p>0.05
		2	0.58±0.03	0.67±0.03	0.64± 0.03	p>0.05	p>0.05
GGT, U/L	1 day	1	80.45±5.34*	81.23±3.23*	82.65±3.59*	p>0.05	p>0.05
		2	34.12±3.23	32.24±2.54	39.17±2.12	p>0.05	p>0.05
	14 day	1	112.23±4.45*	88.96±4.12*	78.43±2.43*	p<0.05	p<0.05
		2	36.12±4.23	34.23±3.12	35.52±2.15	p>0.05	p>0.05
	28 day	1	105.23±3.23*	43.11±2.43	42.18±2.31	p<0.05	p<0.05
		2	37.32±2.34	35.23±2.32	42.42±3.14	p>0.05	p>0.05

AP, U/l	1 day	1	2.16±0.12*	2.18±0.38*	2.51±0.08*	p>0.05	p>0.05
		2	1.21±0.21	1.06±0.07	1.14±0.05	p>0.05	p>0.05
	14 day	1	2.45±0.21*	1.12±0.05	1.09±0.06	p<0.05	p<0.05
		2	1.31±0.33	1.10±0.07	1.07±0.06	p>0.05	p>0.05
	28 day	1	2.24±0.02*	1.09±0.04	1.08±0.07	p<0.05	p<0.05
		2	1.12±0.03	1.01±0.05	1.04±0.08	p>0.05	p>0.05
Cholesterol, mmol/l	1 day	1	5.64±0.76*	5.76±0.67*	5.76±1.01*	p>0.05	p>0.05
		2	3.45±1.21	3.58±0.76	3.65±0.65	p>0.05	p>0.05
	14 day	1	4.32±0.43	4.32±0.14	4.54±0.74	p>0.05	p>0.05
		2	3.56±0.16	3.74±0.69	3.13±0.65	p>0.05	p>0.05
	28 day	1	4.23±0.32	4.24±0.38	4.13±0.68	p>0.05	p>0.05
		2	3.24±0.24	3.48±0.85	3.26±0.54	p>0.05	p>0.05
LDL, mmol/l	1 day	1	3.87±0.06*	3.41±0.07*	3.42±0.06*	p>0.05	p>0.05
		2	2.54±0.06	2.49±0.05	2.45±0.05	p>0.05	p>0.05
	14 day	1	3.67±0.07*	3.06±0.05	2.73±0.06	p>0.05	p>0.05
		2	2.12±0.05	3.42±0.05	2.32±0.04	p>0.05	p>0.05
	28 day	1	3.45±0.06*	2.65±0.04	2.37±0.04	p<0.05	p<0.05
		2	2.24±0.08	3.12±0.06	2.45±0.06	p>0.05	p>0.05

Note: 1.2 - respective data in patients with or without functional liver disorders
• underlined parameters are significantly different from similar indices on 1 day of treatment (p<0.05)
• p1 – significance of indices between patients who received standard treatment and with Nuclex;
• p2 - significance of indices between patients who received standard treatment and with Corvitin;
• * - significance between indices of the main and control groups (p<0.05)

Functional liver disorders in patients with IM at the beginning of treatment were manifested, primarily, by the presence of cytolysis syndrome, which is associated with damage to membranes and internal hepatic cholestasis. In addition, patients of the main group had significantly more often dyslipidemia, which was manifested by hypercholesterolemia and increase of atherogenic fractions of lipoproteins (LP). A moderate decrease in total protein level in this group of patients showed a violation of the synthetic function of the liver.

Initially, the patients of the main group had more profound inhibition of T-cell and greater activation of B part of the immune system, immune response on modified treatment compared with the patients of the control group. These patients had a significant decrease in total T lymphocytes, T-helpers, T-suppressors and T-killers, the increased level of B-lymphocytes, immunoglobulins A, M, G, and increasing concentrations of CIC. The obtained changes of immunograme indicated the development of secondary immunodeficiency on the background of functional liver disorders in these patients.

At the same time, patients with acute MI and functional liver disorders initially had significantly higher activation of POL because of depression of the antioxidant system, manifested by a decreased level of ceruloplasmin and sulfhydryl groups compared with the same parameters in the control group. The obtained data have an essential role in the development and progression of pathological changes in the liver and significantly affect the course of MI [12].

It was noted during the observations that the usage of quercetin (Corvitin) had a favourable influence on the course of MI, by decreasing complications, compared with the group of patients, who received standard therapy. In patients with MI and functional liver disorders after two weeks of complex treatment with the inclusion of quercetin, frequency epistenocardical pericarditis was decreased by 33.2 %, symptoms of heart failure by 63.9 %, the development of early post-infarct angina 22.2%.

The frequency of rhythm and conduction disturbances significantly decreased in patients of the main group treated with quercetin. In particular, the frequency of sinus tachycardia on the 28 day, decreased by 63.9%, conduction disturbances by 16.7%, ventricular extrasystole by 41.7%, and supraventricular premature beats by 52.8% less compared to the original data.

On comparing the effectiveness of the standard treatment and the proposed modified (using Nuclex and Corvitin) in patients of the main and control groups, it was revealed that normalisation of cytolytic and

cholestatic syndromes was achieved in the group of the patients receiving combined therapy for 14 days. At the same time, the hepatoprotective effect was not achieved in patients receiving standard treatment. A significant difference between the indices of cholestasis, cytolysis and dyslipidemia was preserved.

The proposed treatment, including RNA containing drug, leads to a significant increase in T-part of immune system: the level of CD3 lymphocytes increased to 35.2 ± 1,2%, CD8 killers to 16.4 ± 0.21% and CD16 suppressors – up to 12.2 ± 0,2%, decreased the number of cells CD22 12.41 ± 0.12% and the CIC in 178.32 ± 2.43. In general, it was proven that there was a restoration of immune reactivity in patients with MI and impaired liver function.

In the group of patients receiving comprehensive treatment with the addition of antioxidant quercetin, a significant improvement of immunological parameters was shown at the end of treatment; however, compared with the group treated with the RNA containing drug, a significant difference remained. Thus, in patients with MI with impaired liver function after the treatment with quercetin signs of immunodeficiency were observed, such as inhibition of T-system lymphocytes (32.12 ± 0.17%), increased activity B lymphocytes (13.63 ± 0.32%) and a high concentration of immunoglobulins and CIC (267.21 ± 0.26 U).

The various antioxidant efficiency of the proposed methods of treatment was found. After the course of treatment including RNA drug, the level of monovoltine was significantly decreased, but remained above average, suggesting the predominance of the activity of peroxidation processes over the protective capabilities of the antioxidant system (ceruloplasmin 392.2 ± 2.3 mg/l). However, in the main group additionally treated with quercetin, the level of malondialdehyde significantly decreased to 4.43 ± 1.23 mg/ml, compared with patients receiving standard therapy or treatment with Nuclex. The significantly increased activity of endogenous antioxidant enzymes, particularly ceruloplasmin, glutathione, catalase and superoxide dismutase, was observed in the group treated with quercetin.

Having analysed the results of our research, we may conclude that functional liver disorders significantly affect the course of acute MI, which was accompanied by a significant frequent quantity of complications. These patients had a severe disturbance in antioxidant defence system and activation of lipid peroxidation. Depression of cellular immunity was observed in all patients; however, in patients with liver disorders, it was significantly more pronounced. The standard treatment was effective only in patients MI without functional liver disorders. Thus, for patients with IM and violations of the functional state of the liver, standard therapy was not effective enough, which was the justification for the differential inclusion of drugs Nuclex or Corvitin in the programme of the standard therapy, depending on the prevalence of immunological changes or activation of POL processes.

Conclusions

1. In patients with MI and functional liver disorders, the main pathological process is characterised by significant violations of systolic and diastolic function of the heart, more frequent development of complications, activation of lipid peroxidation and secondary immunodeficiency.
2. The inclusion of bioflavonoid quercetin in the treatment of patients with MI helps to restore the antioxidant defence system, improve myocardial contractile function and reduce clinical laboratory manifestations of cytolytic and cholestatic syndromes in patients due to antioxidant and membrane stabilising properties of the drug.
3. The usage of RNA-containing drug Nuclex improves immune reactivity, reduces symptoms of expressed mesenchymal-inflammatory and necro-resorptive syndromes in patients with MI and functional liver disorders.

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PRACTICAL APPLICATION OF THE GEOGRAPHIC RESEARCH OF A FAMILY: A CASE STUDY

PRAKTYCZNE ZASTOSOWANIE BADAŃ GENOGRAFICZNYCH: STUDIUM PRZYPADKU RODZINY

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Authors' contribution
Wkład autorów:
A. Study design/planning
zaplanowanie badań
B. Data collection/entry
zebranie danych
C. Data analysis/statistics
dane – analiza i statystyki
D. Data interpretation
interpretacja danych
E. Preparation of manuscript
przygotowanie artykułu
F. Literature analysis/search
wyszukiwanie i analiza literatury
G. Funds collection
zebranie funduszy

Summary

Background. A combined genetic and geographic analysis facilitates the discovery of one's ethnic background by studying the closest ancestors and those who lived thousands of years ago. The following article describes a practical application of doing geographic research on a person's history. The objective of the study is to demonstrate the capacity of genetic and geographic analysis in the identification of the ethnic background of one of the article's co-authors.

Material and methods. A combined analysis of genetic alleles and geographic location was performed. A buccal smear from the inside of the cheek was done for a further study that was performed in Medical Genomix laboratory, USA. The material was collected at Mother and Child laboratory, Kyiv.

Results. The genetic profile of the examined person was presented. The available alleles, detected by markers, are specific enough to a particular historical group (nation), which enables determining the percentage of ancestors of an individual under study in a particular region.

Conclusions. Combined genetic and geographic research may serve both as a source of information on the ethnic origin of a particular person and as a tool while studying some places and geographic locations.

Keywords: genetic alleles, geographic analysis, the Genographic Project

Streszczenie

Wprowadzenie. Połączona analiza genetyczna i geograficzna ułatwia odkrycie etnicznego pochodzenia najbliższych przodków i tych, którzy żyli tysiące lat temu. Poniższy artykuł opisuje praktyczne zastosowanie badań genograficznych w prześledzeniu historii rodziny. Celem badania jest wykazanie zdolności połączonych badań genetycznych i geograficznych w identyfikacji pochodzenia etnicznego jednego z współautorów artykułu.

Materiał i metody. Przeprowadzono połączoną analizę alleli genetycznych i położenia geograficznego współautorki artykułu. Pobrano wymaz z wnętrza policzka w celu dalszego badania materiału genetycznego, które przeprowadzono w laboratorium medycznym Genomix w USA. Materiał pobrano w Laboratorium Matki i Dziecka w Kijowie.

Wyniki. Przedstawiono profil genetyczny badanej osoby. Aby zidentyfikować allele, użyto markerów, które są na tyle specyficzne dla danej grupy osób, że umożliwiają określenie dalekiego i etnicznego pochodzenia przodków badanej jednostki w danym regionie.

Wnioski. Połączenie badań genetycznych i geograficznych może służyć zarówno uzyskaniu informacji o pochodzeniu etnicznym osoby, jak i narzędzie do badań miejsc i lokalizacji geograficznych.

Słowa kluczowe: allele genetyczne, analiza geograficzna, projekt genograficzny

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Introduction

Who were our ancestors? Where do we come from? Most people can track their family tree only 3-4 generations back. A genetic analysis is expected to provide a proper answer to the above and similar questions.

Since 2005, a major international Genographic Project has been realised [1, 2], It has studied mitochondrial and Y-chromosome DNA variability among populations of different Earth zones for the purpose of composing a detailed genetic atlas of peoples of the world. The project is funded by the American Geographical Society, with the budget exceeding $40 million. The project procedure involves collecting genetic material, by giving preference to the natives of a particular region. By now, 12 years after the project started, about 700 thousand DNA samples have been collected, and 11 GP centres are working permanently throughout the world.

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The human DNA is 99.9 percent identical to all people. The remaining 0.1 percent is the source of individual differences. It is due to a random DNA change (mutation) that occurred at a functional DNA site. This modification is passed on to the descendants. By comparing specific DNA sites (marker genes) in different population groups, one can use the data for an ethnic identification of a particular person.

If a population group migrates or lives in geographic isolation, there is no genetic exchange with another group, and each of these groups acquires a peculiar set of mutations. If a human possesses a set of mutations typical of a particular nation, this may be the evidence of his/her belonging to a specific nation. Genetic mutations are not only the index of family belonging, but they also inform about one's ethnic community. Thus, the study of variations and their occurrence enables discerning separate branches of the human family tree.

Further, combined genetic and geographic analysis makes it possible for a person to discover belonging to an ethnic group of his/her nearest ancestors and those who lived thousands of years ago. The objective of the study of the following paper is to demonstrate the capacity of genetic and geographic research in the identification of Kseniya Oliynyk's ethnic origin, the co-author of the article. What urged the authors to do the research was the death of several of her family ancestors in the world wars and lack of information about their origin.

Material and methods

A combined genetic alleles and geographic location analysis was done. Kseniya Oliynyk's genetic sample was taken; a buccal smear from the inside of the cheek for further study that was performed in the DNA Tribes laboratory, USA [3]. The material was collected at Mother and Child laboratory, Kyiv. The amplification of DNA was performed by polymerase chain reaction [4, 5]. The Biometra TAdvanced thermal cycler [6] was used as well as Oligonucleotide Selection Program [7], a computer programme for selection of oligonucleotide primers for polymerase chain reactions.

Results

The genetic and geographic research consisted of 4 parts: A, B, C, D. Part A: Autosomal STR Profile: the genetic profile of a person includes the values of 26 genetic markers distributed throughout autosomal chromosomes. At each locus, the person has two values: one allele inherited from the father and the other one inherited from the mother, which together constitute a total of 52 dimensions that are used to compute geographic ancestry. 175 genetic markers of 23 chromosome pairs are used to determine the percentage of each group in the human genome. The available alleles, detected by these markers, are specific enough to a particular historical group (nation/population), which makes it possible to determine the percentage of ancestors of the studied individual with regard to the regions they come from.

Part B: Native Population Match: These results list one's Top 20 matches in a database of 964 native populations that have experienced minimal movement and admixture in modern history, i.e. approximately the last 500 years). DNA matches do not necessarily suggest a recent family ancestor from each listed country but can express the genetic traces of more ancient relationships between populations through shared origins, migrations, and long-term trade contacts in each part of the world. For people with mixed ancestry, DNA matches can also identify communities where similar mixes have taken place (such as native populations located near former trade and migration routes between continents).

Part C: Global Population Match: These results list one's Top 20 matches in the database of 1,255 global populations, including native peoples as well as modern communities that have mixed and / or migrated around the world within the past 500 years. Matches with diasporic populations can express genetic material shared with one or more of the ancestral source populations for that modern ethnic group. For instance, DNA matches in Latin America can show European, Native American, and / or related African ancestry shared with these current populations. For people of mixed descent, these matches can also indicate the populations where similar mixes have taken place.

Part D: The World Region Match: Ancestry from each part of the world is most clearly expressed by one's regional DNA match scores in Part D. This comprehensive world region analysis complements more limited Part B – C comparisons to individual samples in a person's database (typically composed of 100-200 people each). Each of these world regions is a genetic cluster that is a product of long-term patterns of migration and settlements over several millennia. This part of the study deals with ancestors who lived a few thousand years ago. Besides, it contains a "triangular" graph with a percentage ratio of each historical group in the genome of a researched individual, thus presenting the picture of his/her geographic origin: Europe (Northern, Southern), Middle East, Indian subcontinent (India, Pakistan, Sri Lanka), Eastern Asian group (Japan, China, Mongolia, Korea) South-eastern group (Philippines, Malaysia, Australia, Oceania), African group (Nigeria, Congo etc.)

Part A. Allele analysis:

Locus	Allele 1	Allele 2
D3S1358	15	18
vWA	14	16
D16S539	10	12
CSF1PO	10	12
TPOX	10	11
D8S1179	10	15
D21S11	29	30.2
D18S51	15	16
D2S441	11	14
D19S433	14	
TH01	9	9.3
FGA	22	23
D22S1045	17	
D5S818	11	12
D13S317	8	11
D7S820	10	
SE33	28.2	29.2
D10S1248	14	15
D1S1656	12	19.3
D12S391	22	
D2S1338	23	24
LPL	10	12
F13B	6	8
F13A01	3.2	6
Penta D	11	12
Penta C	13	14
Penta E	7	14

Figure 1. Part A. Allele analysis

The family's alleles are shared by people in the following regions:

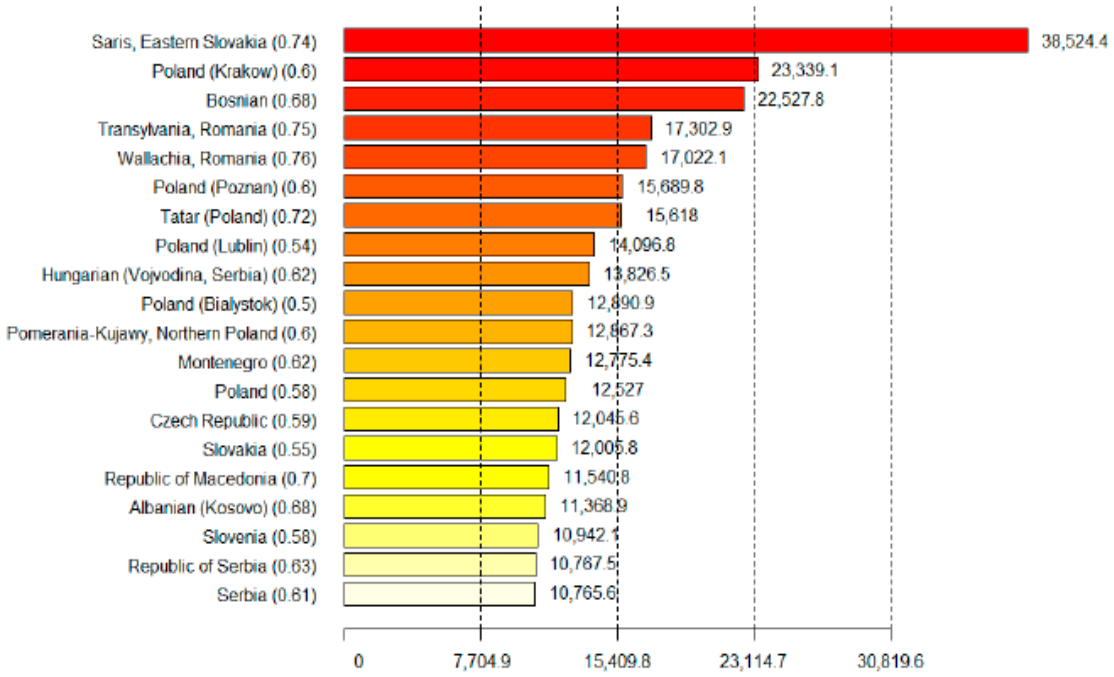

Figure 2. Regions in which Part A. alleles are shared

The figures on the right indicate how likely the person's chances are to belong to the group in a particular locality as opposed to some others. Thus, the figure 38524 means that the examined person is 38524 times more likely to be Slovak than any other nationality. Besides, in the town of Šariš, this gene is found in 74% of the residents. As for the ancestors who lived 500 years ago, the analysis reads as follows:

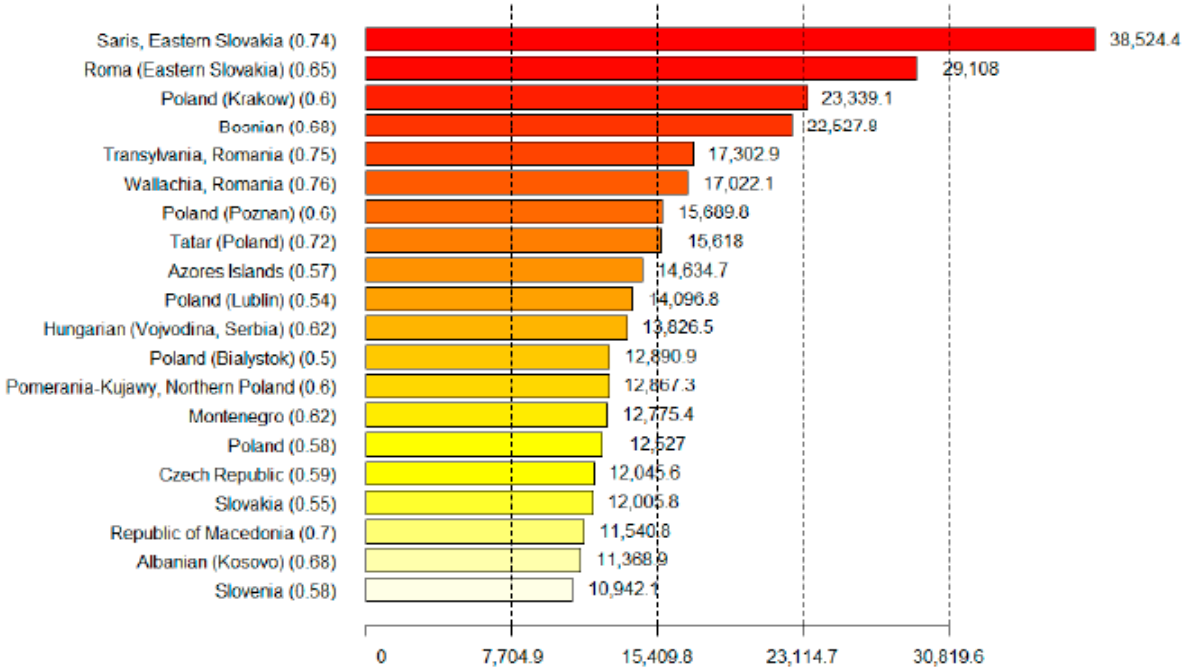

Figure 3. Results list of the global population investigation

This part of the research confirms the previously discussed data: Kseniya's relatives came mainly from Slovakia, Poland and Balkans. Graphically, the results can be mapped as follows:

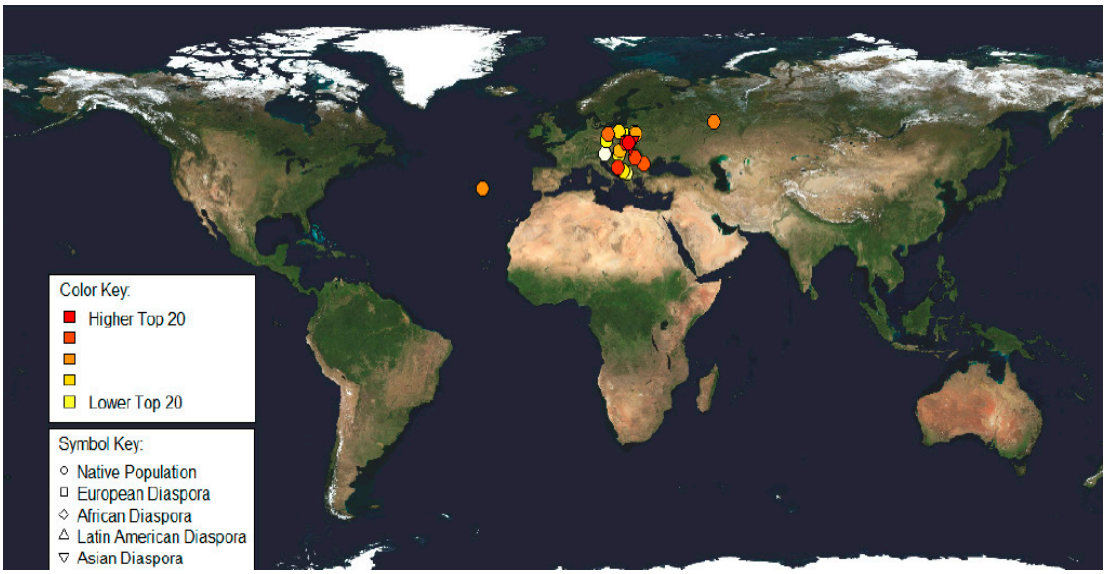

Figure 4. Map indicating the research results of the family's global ancestry

One finding turned out to be especially surprising. One ancestor came from the Azores but there was no information on it in the family archive.

The data on the remote ancestors who lived a few thousand years ago can be mapped as follows:

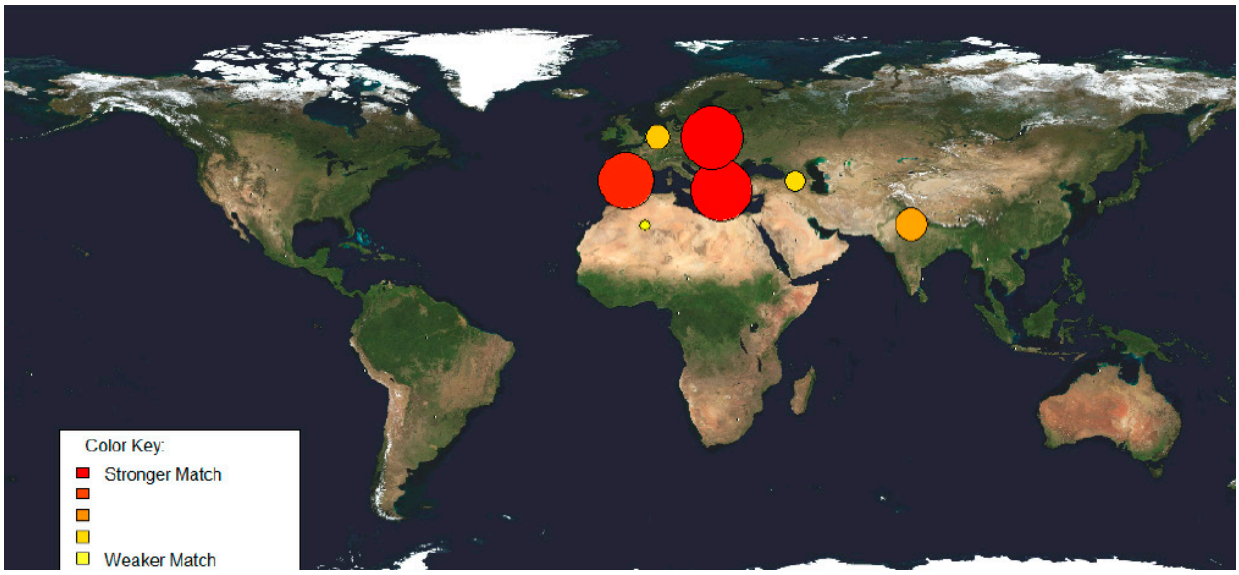

Figure 5. Map presenting the results of the family's ancestry location

Discussion

To determine the role of the research in the national identity of Kseniya Oliynyk's forefathers, we present information on the nationality of her ancestors four generations back:

Pole	**Romanian**	**Ukrainian? Russian?**	**German**	**Pole**	**Pole**	**Russian**	**Russian**
father	mother	father	mother	father	mother	father	mother
grandmother		grandfather		grandmother		grandfather	
father				mother			

What is most amazing in the findings is the lack of Russian and Ukrainian alleles in the investigated case, which is probably because Kseniya Oliynyk's mother's father was born in the woodland village of Budogoshch, Novgorod Region, Russia. However, it turned out that in the 18th century the village had been settled by refugees from Polish town Bydgoszcz. The village inhabitants must have lived in isolation, without mixing with the peasants from the surrounding communities. This may account for the presence of northern Polish genes in the analysis. Another great-grandfather was born in Dnipropetrovsk Region. He had been missing in action, and Kseniya's father never saw him. Besides, little was known about his family. It appeared that the inhabitants of the district in which he lived had resettled from Serbia in the 19th century. This was less surprising as one of the largest Serbian communities in Ukraine today lives in Dnipropetrovsk Region. This accounts for numerous traces of Serbs, Montenegrins and Bosnians in the area. All the other data confirmed the information that was found in the family archive, except for the one concerning the ancestor coming from the Azores. Who he was and whether he represented mother or father line in the family remains unclear. Besides, Kseniya shared a small number of genes with Slovak gypsies. The alleles from India and Mesopotamia were found in parts C and D. Therefrom, the gypsies must have come to Europe from these territories. Besides, some African genes were found in the remote ancestors. They were found in most persons and are very stable.

Conclusion

As the presented analysis shows, genetic and geographic research may serve both as a source of information on the ethnic origin of a particular person and a tool in doing some historical study of certain geographic places and localities.

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