

ORIGINAL PAPER

EXERCISE IN PREVENTION OF CARDIOVASCULAR DISEASES, AS SEEN IN POPULATION AGED 40+

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Aim: The aim of the article is to highlight the level of education regarding exercise in the population aged 40+, and the amount of money spent on exercise by this population. **Design:** A quantitative descriptive study. **Methods:** The level of education regarding exercise was ascertained with the help of data obtained by a non-standardized questionnaire. The research set consisted of 1992 respondents aged 40 years and over in the Czech Republic. **Results:** Data analysis indicated that 52.9% patients had received education regarding their physical activity at some point. Most respondents aged 40–49 years had not received any educational input. In addition, 34.5% respondents did not agree that regular exercise could have an influence on the developing of cardiovascular diseases. The sum most frequently spent on sports activities monthly was up to 500 CZK (78.3%). The respondents' answers also indicate that 66.8% walk for at least 30 minutes, five or more days a week. **Conclusion:** Our findings indicate a need to improve levels of education regarding exercise and the prevention of cardiovascular diseases.

Keywords: cardiovascular disease, economic factor, education, exercise, nurse, prevention.**Introduction**

Cardiovascular diseases not only have a major impact on quality of life, but also increase the costs of healthcare. They constitute one of the main causes of death (WHO, 2017). Although between 2003 and 2010, the number of hospitalized patients with this group of diseases decreased (health dg. I20 – I25), the mortality rate increased slightly in the Czech Republic. A total of 75,199 hospitalized patients registered in 2010 included 3,104 deaths. The average duration of hospitalization amounted to 6.5 days (ÚZIS, 2012). According to the data of the General Health Insurance Company (VZP), the average cost of hospitalization of a patient with acute myocardial infarction amounted to 117,096 CZK, with overall costs amounted to more than 1,370 million CZK (Tichý, 2013).

The European Union program known as “Health for Growth” is aimed at promoting health over the period

2014–2020. It is based on the interconnection between a healthy population and economic growth, and has the aim of reducing healthcare related costs. Emphasis is put on human capital, and on the use of innovative solutions to improve the status and sustainability of healthcare systems. The main idea behind the program is to make efforts to extend the period of healthy and active life. It is expected to have a positive impact on competitiveness and productivity of a given country. It involves promotion of health, prevention of diseases, and emphasis on the creation of a climate favourable to a healthy lifestyle (Margetidis, 2017). To underline the economic benefits of prevention, it should be noted that about 80% of the diseases that most heavily burden the healthcare budget are preventable. For example, in 2008, 2.5 million cases of sick leave due to illness were registered in the Czech Republic, two million of which were preventable. The related economic loss in GDP amounts to almost 150 billion CZK/year. If the amount of sick leave were reduced by five percent through efficient prevention, it would contribute 7.5 billion CZK/year to GDP, while the funds required for investment in primary prevention would only amount to 500–750 million CZK/year (Ministerstvo zdravotnictví České republiky, 2014).

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Regular and appropriate exercise constitutes an important means of preventing a broad range of diseases. Li and Siegrist (2012) made an analysis of cohort studies, demonstrating that active leisure reduced the risk of cardiovascular diseases by an average of 20–30%. They also emphasized the relationship between amount of exercise and the effect of exercise on human health. The positive impact of exercise was confirmed by Cheng et al. (2013), who emphasized the positive effect of regular and adequate exercise on the incidence of cardiovascular diseases. According to the authors, the influence was evident regardless of the individuals' age and gender. Based on an analysis of available studies, they conclude that exercise is an area that should be prioritized when promoting preventive activities, especially in the elderly.

Exercise also plays an essential role at the level of secondary and tertiary prevention. Appropriately chosen exercise facilitates weight loss and improves health (Slouka et al., 2018). Linke, Erbs, Hambrecht (2006) confirm that adequate exercise during rehabilitation contributes to a reduction in the morbidity and mortality of patients with coronary heart disease. That exercise is a strong predictor of mortality in persons with or without cardiovascular disease is also supported by the results of a study by Kokkinos et al. (2008), who found an association between exercise and mortality of male Afro-Americans ($n = 6,749$) and whites ($n = 8,911$). The assessed exercise categories were based on the maximum metabolic equivalents (MET) achieved.

Aim

The aim of the article is to ascertain and evaluate the level of health education regarding exercise in population 40+, and to describe and evaluate the amount of money spent on exercise by this population.

Methods

Design

A quantitative descriptive study.

Sample

The interviewers approached 2,306 randomly selected individuals. A total of 1,992 (86.4%) respondents agreed to participate in the research. The research set of people aged 40 years and above included 937 (47.0%) men and 1,055 (53.0%) women (Table 1). The size of the set was based on data from the Czech Statistical Bureau, valid for 31. 12. 2014. Regarding the age structure of the basic set, the data acquired can be considered representative for

individual groups of Czech citizens aged 40 years and above.

Table 1 Demographic data by respondents

Age categories	Men		Women	
	frequency	%	frequency	%
40–49 years	284	14.3	275	13.8
50–59 years	242	12.1	245	12.3
60–69 years	237	11.9	270	13.6
70–79 yearst	126	6.3	167	8.4
80 years and more	48	2.4	98	4.9
Region	frequency		%	
Prague	222		11.1	
Central Bohemia	239		12.0	
South Bohemia	119		6.0	
Plzeň	112		5.6	
Karlovy Vary	56		2.8	
Ustí	160		8.0	
Liberec	83		4.2	
Hradec Králové	112		5.6	
Pardubice	93		4.7	
Vysočina	96		4.8	
South Moravia	228		11.4	
Olomouc	126		6.3	
Zlín	114		5.7	
Moravia-Silesia	232		11.6	

Data collection

Quantitative research was implemented in order to ascertain the level of education regarding exercise, and the amount of money spent on exercise. The article presents partial data obtained by a non-standardized questionnaire. The questionnaire contained 62 closed-ended questions to map the level of education on cardiovascular diseases, as perceived by patients. The non-standardized questionnaire was created by a research team from the grant project. The questions were constructed on the basis of an in-depth analysis of the literature, and the experience of the research team. The final form of the non-standardized questionnaire was based on the results of pre-research. The research was anonymous, participation was voluntary, and the survey eschewed controversial ethical issues.

The investigation was conducted throughout the Czech Republic from April 1, 2016 by a network of professional interviewers from the Institute for the Study of Health and Life Style.

Data analysis

A statistical data analysis was made with use of the SASD program, version 1.4.12 and SPSS. The first degree of classification, and the contingency tables of selected indicators for the second degree of classification were processed. Within the first degree of classification, the absolute and relative

frequencies, as well as the mode, median, average, scatter, and standard deviation were calculated. For each characteristic, a calculation of the estimate of scatter and an estimate of standard deviation were made; the range and interval estimate of mean value was 0.05, and the interval estimate of scatter was 0.05. To calculate the level of dependence of the selected characteristics, the Walis, Spearman and correlation coefficient were calculated. Goodness-of-fit chi2 was also applied. Yates correction was applied in the event of an insufficient number of sightings. Finally, an independence test at the level of significance $\alpha = 0.05$; $\alpha = 0.01$; $\alpha = 0.001$ was calculated.

The study ascertained how much is spent by Czechs (according to age) per month in connection with the prevention and therapy of heart and vascular diseases, on a three-level scale: 0 to 500 CZK, 501 to 1,000 CZK, and over 1,000 CZK. The original statistically investigated scale consisted of six levels. In the course of further statistical processing, low

number of sightings in individual categories led to the re-categorization of the four highest ranges of financial expenditure into the single range of over 1,000 CZK.

Results

With regard to the ascertained level of education regarding exercise habits of Czechs aged 40 years and above, it seems essential that most respondents (71.5 %) be instructed by doctors on how to improve their health condition. Negative answers (i.e., no education) were given by 28.5%. The main educators were doctors (71.4 %) and nurses (25.4%). More than half (52.9%) of the respondents had been educated about their exercise habits at some point. The tested socio-demographic indicators showed a relationship between education regarding exercise and age, job and marital status. An overview of important relationships can be seen in Table 2.

Table 2 Summary of statistically significant connections

Relation	p	X ²	df
Education on exercise and age	< 0.01	29.166	12
Education on exercise and gender	< 0.05	10.222	3
Education on exercise and job	< 0.001	49.036	15
Education on exercise and marital status	< 0.01	30.253	12
Age and opinion on influence of regular exercise	< 0.001	69.841	16
Age and average monthly amounts spent on sports activities	< 0.001	105.394	9

p – level of significance; *X*² – chi square; *df* – degrees of freedom

The results ($p < 0.01$) imply that the youngest age groups (40–49 years) had largely not been educated about exercise. Those aged 60–69 years had been educated significantly more often in the previous six months. Women ($p < 0.05$), respondents who working as employees ($p < 0.001$), and single and married people ($p < 0.01$) reported not having received any education significantly more often.

Only 52.5% of respondents agreed fully or partially with the fact that regular exercise has an influence on the development of cardiovascular diseases. More than 1/3 of respondents (34.5%) expressed the opposite opinion, disagreeing either fully or partially with this statement. The remaining 12.1% chose the “don’t know” option. At the same time, a statistically significant association between age and respondents’ opinions regarding the influence that regular exercise has on the development of cardiovascular diseases was discovered. Those in the age group 40–49 years disagreed significantly more often that regular exercise has any influence on the cause of such diseases ($p < 0.001$). Those in higher age groups chose the “don’t know” option significantly more

often. It was also demonstrated that BMI index value increases with age ($p < 0.001$; $X^2 = 69.72$; $df = 20$); the most favourable status was found in the group of 40–49 years. The proportion of those with overweight and obesity rose with age (Table 3).

Within the context of prevention by means of changes in exercise, we wanted to establish how much money respondents spent on sports activities per month. Out of the total number of 1,992 respondents, 1,560 (78.3%) stated that their monthly expenditure on sports activities are below 500 CZK; 289 (14.5%) respondents reported spending in the range of 501 to 1,000 CZK, and 143 (7.2%) respondents reported average monthly spending on sports activities of over 1,000 CZK. The amounts spent on sports activities relate to the type of exercise performed by the respondents. Approximately 2/3 (66.8%) of respondents walk for a duration of at least 30 minutes, five or more days a week. A lower frequency was reported by 33.2% respondents. Respondents were also asked whether they did any other exercise, in addition to walking. More than half (61.3%) stated that they did not do any other sports

Table 3 BMI values in population 40+ (n = 1,992)

Age	BMI value						Sum
	under 18.4 underweight	18.5–24.9 ideal weight	25.0–29.9 overweight	30.0–34.9 slight obesity	35.0–39.9 medium obesity	above 40.0 morbid obesity	
40–49 years	6 (1,1 %)	227 (40,6 %)	236 (42,2 %)	63 (11,3 %)	14 (2,5 %)	13 (2,3 %)	559 (100 %)
50–59 years	2 (0,4 %)	157 (32,2 %)	219 (45,0 %)	87 (17,9 %)	17 (3,5 %)	5 (1,0 %)	487 (100 %)
60–69 years	1 (0,2 %)	134 (26,4 %)	233 (46,0 %)	99 (19,5 %)	30 (5,9 %)	10 (2,0 %)	507 (100 %)
70–79 years	0 (0,0 %)	69 (23,5 %)	134 (45,7 %)	63 (21,5 %)	18 (6,1 %)	9 (3,1 %)	293 (100 %)
80 years and more	1 (0,7 %)	33 (22,6 %)	70 (47,9 %)	32 (21,9 %)	8 (5,5 %)	2 (1,4 %)	146 (100 %)
Sum	10 (0,5 %)	620 (31,1 %)	892 (44,8 %)	344 (17,3 %)	87 (4,4 %)	39 (2,0 %)	1,992 (100 %)

activities, while 38.4% reported doing additional sports activities.

The data analysis suggests that, regardless of BMI value, most respondents aged 40 years and above spend up to 500 CZK on sports activities. Expenditure over 1,000 CZK is minimal. The distribution of expenditure in relation to age (see Table 4) shows that, out of the 559 respondents aged 40–49 years, 371 (66.4%) spend up to 500 CZK per month on sports activities; 124 (22.2%) spend 501 CZK to 1,000 CZK per month; and 64 (11.4%) spend more than 1,000 CZK. Of the 487 respondents aged 50–59 years, 367 (75.4 %) spend up to 500 CZK per month on average; 75 respondents (15.4%) spend from 501 to 1,000 CZK; and 45 (9.2%) spend more than 1,000 CZK. Among the 507 respondents aged 60–69 years, an average monthly amount up to 500 CZK is spent by 421 (83%) respondents, 501 to 1,000 CZK is spent by 63 (12.4%), and over 1,000 CZK is spent by 23 respondents (4.5%). Of the 293

respondents aged 70–79 years, 261 (89.1%) spend an average of 500 CZK on sports activities, 23 respondents (7.8%) spend between 501 CZK to 1,000 CZK, and nine respondents (3.1%) spend over 1,000 CZK. Among the 146 respondents aged 80 and above, 140 (95.9%) spend an average monthly sum of up to 500 CZK on sports activities, between 501 to 1,000 CZK is spent by four respondents (2.7%), and only two respondents (1.4%) spend over 1,000 CZK a month.

Research results at significance level $p < 0.001$ demonstrated a statistically significant connection between the respondents' age and the average monthly amount spent on the respondents' sports activities. The results show that younger age groups (up to 60 years) spend more on sports activities, while age groups over 60 groups spend less.

Table 4 Monthly amounts spent on sports activities in connection with age

Age	Monthly amounts spent			Sum
	below 500 CZK	501–1,000 CZK	above 1,000 CZK	
40–49 years	371 (66.4 %)	124 (22,2 %)	64 (11,4 %)	559 (100 %)
50–59 years	367 (75,4 %)	75 (15,4 %)	45 (9,2 %)	487 (100 %)
60–69 years	421 (83 %)	63 (12,4 %)	23 (4,5 %)	507 (100 %)
70–79 years	261 (89,1 %)	23 (7,8 %)	9 (3,1 %)	293 (100 %)
80 years and more	140 (95,9 %)	4 (2,7 %)	2 (1,4 %)	146 (100 %)
Sum	1,560 (78,3 %)	289 (14,5 %)	143 (7,2 %)	1,992 (100 %)

Discussion

Exercise is one of the non-pharmacological procedures recently focused on in the treatment and prevention of cardiovascular diseases (Doležel, Jarošová, 2015). Many studies clearly demonstrate its

importance in the prevention of cardiovascular diseases, as well as in the treatment of existing ones (Myers et al., 2002; Franco et al., 2005). Education should therefore repeatedly inform patients of the importance and positive impact of constantly

increased adequate exercise, in accordance with patients' capabilities and opportunities (Fait, Vráblík, Češka, 2008; U.S. Department of Health and Human Services, 2008). The importance of education in this area, which should include a thorough analysis of current lifestyle, including exercise, is also highlighted by Vilánková et al. (2010).

The data acquired indicate the failings of education that should be aimed at improving health. Of those respondents aged 40 years and above, more than 28.5% claimed not to have received education. Important feedback for nurses is that they were reported as educators by only 25.4% respondents. Wood et al. (2004) emphasize the important role of education in the context of prevention of cardiovascular diseases. They highlight the importance of professional intervention in the elimination of influenceable factors. They also mention the possibility of multidisciplinary teams led by nurses, focusing on cardiovascular prevention. The positive impact of adequately implemented education in the area of cardiovascular prevention is also supported by studies by Eriksson, Westborg and Elliasson (2006), Gil-Guillén et al. (2015).

It is significant that 52.9% respondents report having been educated regarding exercise. This may be one reason why only 52.5% respondents are aware of the relationship between cardiovascular diseases and irregular exercise. The connection is, to some degree, reflected in the fact that respondents in the age group 40–49 years more frequently disagree with the influence of regular exercise on cardiovascular diseases. It may also be partially based on the fact that people from this age group do not yet suffer from so many diseases, and, therefore, do not come into contact with healthcare workers as often as older people. Interesting findings related to the importance of exercise for cardiacs are offered by Eriksson, Franks and Eliasson (2009), who worked with 151 middle-aged men and women between 2003–2006. At the beginning of their study, respondents were asked which method they would prefer if exercise brought positive effects comparable with drug treatment; and if exercise were available on prescription while drug treatment were free. Exercise was the first choice of most respondents in both cases. So what is the situation in terms of the Czech population? What would Czech cardiacs choose, and what impact might such findings have on the education provided about exercise?

The second area focused on was the amount of money spent on sports activities. It was discovered that 66.8% respondents walk for at least 30 minutes, for five or more days a week. Meanwhile, only

38.4% do other additional sports activities. Alarming results regarding exercise are also presented by Hamrik et al. (2014), whose study aimed to describe the prevalence of exercise and sedentary behaviour in Czech adults, i.e., individuals aged 18–90 years (n = 1,753; 48.4% men). Regardless of age and gender, low levels of exercise were reported by 32.3% respondents, while slightly higher levels of exercise were registered by 21.3% respondents. More than 60% adults in all age categories were considered “sedentary” in their study, with the highest level of sedentary behaviour found in those over 65 years. An increased need for education in the area of adequate exercise, and programs supporting regular exercise for seniors is also suggested by the results of the pilot study published by Kisvetrová and Valášková (2014). Based on analysis of data acquired from 112 respondents aged 60 years and above, they confirm the relationship between sports activities in younger age and engagement in regular exercise at higher ages. However, they also mention the factor of “health condition” that led to reduced regular exercise in 28.1% respondents.

Health condition can constitute a factor that is strongly reflected in the issue of the average amount spent by the respondents on sports activities per month. According to our findings, the lowest financial range, i.e. monthly amounts up to 500 CZK, prevail in all age categories. The level of these amounts may be influenced also by contributions offered by a number of health insurance companies within bonus programs for their clients in the form of discounts on selected exercise activities. For example, VZP (2017a) co-finances contributions to exercise for those in the Robust Health Club. Contributions provide for regular exercise (i.e., season tickets and permanent passes), such as sports developing strength, coordination, flexibility, etc., to the amount of 500 CZK. Activities include aerobics, badminton, floorball, football, calanetics, swimming, spinning, pilates, circuit training, yoga, etc. A similar program is implemented by the ZPMV ČR (2017), and the VZP (2018). The Annual report of the VZP for 2017 shows a fall in the amount spent on the “Pillar of prevention of cardiovascular diseases” health program, from 183,106,000 CZK in 2016, to 140,769,000 CZK in 2017 (VZP, 2017b).

With respect to the need to increase the effectiveness of education, it is significant that younger age groups (up to 60 years) spend more on sports activities, while age groups over 60 groups spend less. According to Kisvetrová and Valášková (2014), those aged over 65 years have sedentary lifestyles more frequently. One reason why respondents over 60 years old spend less on sports activities may be due

to the income available to the individual age groups in the Czech Republic. The data of Czech Statistical Office (ČSÚ, 2018a) assessing the economic activity of Czechs in connection with age indicate that those over 55 considerably reduce their economic activities. At the time of data collection, the average wage amounted to 26,480 CZK (ČSÚ, 2018b), while the average old age pension amounted to 11,475 CZK (ČSÚ, 2018c), less than half of the former figure.

Conclusion

Exercise is an important factor affecting the development and therapy of cardiovascular diseases. In spite of its importance, it receives relatively low emphasis in patient health education, according to our findings. Data analysis shows that more than half the respondents aged 40 years and above had received education about physical exercise at some point. Those aged 40–50 years are significantly less well-educated in this area. In our opinion the quality and level of education regarding physical activity may also be related to the finding that one third of respondents disagreed with the statement that regular physical activity can have a positive impact regarding the development of cardiovascular diseases. Our findings can serve as feedback for doctors and nurses, as they highlight the weaknesses of the education provided in this area. At the same time, they indicate that financial circumstances are one of the factors that, to some degree, influences the choice of exercise or sports activities of the target population.

Ethical aspects and conflict of interest

Conflict of interest none declared. Authors state that the research was conducted according to ethical standards. Ethical committee approval was obtained from Ethical committee of Faculty of Health and Social Studies, University of South Bohemia in České Budějovice.

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Author contribution

Concept and design (VT, LŠ), data analysis and interpretation (ICH, RP, VO), writing the manuscript (VO, RP, ICH), critical revision of the manuscript (VT, LŠ), finalization of the manuscript (VO, RP).

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