

The level of health education in the Polish population

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Abstract

Background: The study assessed factors influencing awareness of Poles concerning lifestyle factors that affect development of obesity, type 2 diabetes and cardiovascular diseases (CVD).

Methods: A questionnaire survey covering awareness of lifestyle factors performed by general practitioners in 37,557 unselected patients.

Results: 96.1% of respondents believed that lifestyle has an impact on the occurrence of CVDs, especially: tobacco smoking (91.4%), excessive intake of fat (81.3%), alcohol (67.5%), salt (64.9%), and stress (64.9%). 79.0% respondents believed the smoking cessation, 77.5% weight loss and 66.8% healthy diet are most important to prevent diseases. Additionally, the belief in the need for an early weight reduction decreased with increasing BMI (82.9% with normal weight vs. 77.5% overweight and 70.4% obese). The most common source of health education was a physician (75.8%), the mass media, such as television and the press (62.0% and 64.8%, respectively), less often were educational materials (37.8%) and books (20.3%), the Internet (3.8%) and radio (0.8%). Younger respondents presented a higher level of awareness about all analysed aspects of healthy lifestyle. The multiple regression analysis revealed that low education level and rural residence are the most important factors decreasing awareness of the lifestyle effect on health.

Conclusions: 1. The level of knowledge about non-pharmacological methods of preventing lifestyle diseases in the Polish population is high except of the role of physical activity and daily vegetables consumption. This, however, has no impact on reducing the percentage of overweight and obese people and on increasing the tendency to pursue lifestyle changes. 2. Frustrating is the fact that more than one fifth of the study population is unaware that excessive weight reduction prevents development of cardiovascular diseases. Moreover, the convince to early weight decreases with increasing BMI. 3. The highest level of the knowledge among younger subjects reflect improvement of health education in Polish population. 4. In addition to education performed by physician the main sources of patients knowledge are television and the press with the growing role of the Internet among younger. 5. Further health education programs are necessary, which should include not only activities that increase the level of health education and health awareness, but also aspects such as changes in beliefs, sense of self-efficacy and social support.

Key words

lifestyle, education, obesity, type-2 diabetes, cardiovascular diseases

INTRODUCTION

Lifestyle has a significant impact on health of the population [1] and, primarily, on the prevalence of CVD, the main cause of death in the developed countries [2]. Low physical activity, diet, alcohol, tobacco and stress contribute significantly to the obesity, type 2 diabetes and CVD development and to the shortening of an individual's life span and a reduction in the quality of life [3, 4].

Test results of the WOBASZ, a national multicenter health survey of the Polish population conducted in 2003–2005, showed that 33.8% of adult Poles are overweight and 21.8% are obese. Visceral obesity was found in 28.3% of men and 40.4% of women, and the diagnostic criteria for metabolic syndrome were met by 23% of the former and 20% of the latter [5, 6]. The prevalence of hypertension in the WOBASZ survey was 36%, and as many as 70% of the population with dyslipidaemia [7, 8]. Another important risk factor for CVD is tobacco smoking. According to the WOBASZ data, 42%

of men and 25% of women in Poland are smokers [9]. Based on these data it can be concluded that diseases associated with lifestyle represent an important public health problem in Poland.

It should be emphasized that the diseases whose etiology is associated with an inappropriate lifestyle present a major burden on healthcare budgets nowadays. It has been shown that costs of medical treatment increase in proportion to body mass index (BMI): in grade I obesity is 25% higher than for normal weight people, in grade II obesity – 50%, and in grade III obesity – 100% [10]. Data from New Zealand, Canada and the United States show that the costs associated with the treatment of obesity-related complications account for between 2.0 and 7.8% of the healthcare budget [11, 12, 13]. This is why health promotion and the early induction of healthy behaviour patterns is important from the viewpoint of the entire society as this reduces the need for costly revascularization procedures including, inter alia, angioplasty, stenting and coronary artery bypass grafting.

A healthy lifestyle should include balanced energy diet, reduction of saturated fats, simple carbohydrates and salt and adequate dietary fibre, polyunsaturated fatty acids and antioxidants intake, regular aerobic physical activity

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(30–60 minutes at 75% of the maximum heart rate at least 5 times a week) and only moderate alcohol consumption. Proper nutrition and physical activity prevent obesity and, consequently, avoid of type 2 diabetes and CAD development [14]. Such a healthy lifestyle can not only contribute to extended life expectancy, but it can also improve the quality of life [15, 16]. Despite the benefits resulting from the implementation of lifestyle changes, health promotion activities are among the most difficult tasks, because they do not produce rapid results and are, to a large extent, dependent on the motivation of the people to whom they are addressed. One of the elements of both health promotion and disease prevention is health education aimed at increasing awareness and shaping healthy lifestyle patterns. In order to increase the effectiveness of health education programs and to design appropriate programs which are in line with the needs of the society, these needs must first be investigated and recognized. This is in accordance with current sight on health promotion. However, the lack of knowledge of lifestyle role in the civilisation diseases development in Polish population makes preparation of proper health educational programs impossible. It should be emphasized that effective health education is the main health promotion attitude. Therefore, the aim of this study has been to assess the awareness of Polish society with regard to lifestyle factors that affect population diseases such as obesity, type 2 diabetes and CVD, and the sources of this knowledge.

MATERIALS AND METHODS

In this epidemiological survey 37,557 patients (54% women) were interviewed nationwide by 1,231 general practitioner in 2009. Polish doctors participating in the study were recruited by medical representatives, and each of them conducted questionnaire interviews with a group of 30–60 consecutive patients referring to the outpatient clinic for various reasons. The only inclusion criterion was the patient referral to general practitioner. The exclusion criteria included dementia, deafness and active psychiatric disorders. This questionnaire based survey did not fulfil the criterion of a medical experiment and thus did not require bioethical committee approval. Characteristics of the surveyed population are summarized in Tables 1 and 2.

In all subjects anthropometric measurements were performed (body mass, height, waist circumference), and a questionnaire-based interview was conducted. The questionnaire was consisted of several dichotomous and multiple choice questions. Candidate question items were generated around 2 elements about healthy lifestyle knowledge and their sources. The initial question items were tested in interviews with ten patients and then modified. In the survey this part of questioner was completed by the doctor during interview of the patient.

The questionnaire consisted of three parts containing, respectively, questions concerning demographic data (gender, age, urbanization classification, education and employment status), health (the actual reason according to ICD-10 code which brought the patient to the doctor, the occurrence of chronic diseases such as diabetes, hypertension, CVD and dyslipidaemia), and physical activity levels (sedentary, irregular or regular during weekend, moderate 3-times a week, daily, amateur sport). In the third part of the interview,

comprising closed-ended questions, respondents were asked whether they had heard about how to lead a healthy lifestyle and what the source of this information was (physician, journals, television, books, Internet, educational materials); what lifestyle factors influence the occurrence of CVD (smoking, excessive alcohol consumption, high salt intake, the lack of regular physical activity, stress in work and at home, low vegetables and fruit intake and high fat diet); when a person should quit cigarette smoking, to consider the weight reduction, when it is time to make modifications to one's diet, such as reducing the fat and salt intake, introducing daily fruits and vegetables consumption (before diseases development, after diagnosis with hypertension, after myocardial infarction, after stroke).

Data analysis

The requisition of data was entered automatically with the proper form (Microsoft Office Access). The percentage of missing data was less than 3.0% and those entries were not removed from the analysis as there were missing at random.

Nutritional status was assessed on the basis of BMI according to WHO criteria [17]. Visceral obesity was diagnosed by measuring waist circumference according to the ATP III criteria for Caucasians (≥ 88 cm for women and 102 cm for men) [18].

The physical activity level was assessed according to self-reported data. While the prevalence of diabetes, hypertension, CVDs and dyslipidaemia were estimated on the basis of medical history.

Statistical analysis. Statistical analysis was performed using the STATISTICA 8.0 PL software package.

An analysis was performed of respondents' age structure, gender, place of residence, education and employment status, as well as of the reasons why they came to see the doctor.

The data collected with regard to lifestyle and the source of information concerning lifestyle and the need for its modification were analyzed according to sex, age, place of residence, education, and the above-mentioned comorbidities.

Values of variables were presented as percentages and mean values with standard deviations (SD). Separate groups were compared using the chi-square test and chi-square test for trend and T test. The odds ratios were calculated based on multiple backward logistic regression analysis. A $p < 0.05$ was considered as statistically significant.

RESULTS

Characteristics of the surveyed group. Response rate was calculated based on the number of send (45 000) and returned, fulfilled (37 557) questionnaires was 83.5%.

In surveyed group dominated middle-aged respondents (41–65 years) and urban dweller. The most common reasons to consult their physician were acute infectious diseases and previously diagnosed CVD (Tab. 1).

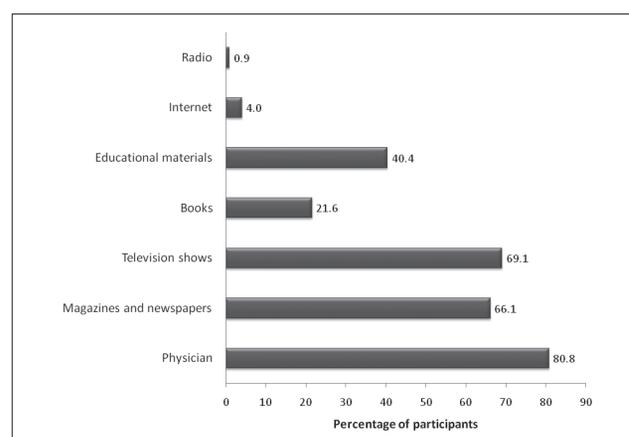
Overweight was significantly more frequent in men, while obesity and visceral obesity in women. 20.3% of respondents had already been diagnosed with diabetes 42.5% – with dyslipidaemia, and 73.8% – with at least one CVD. Women more frequently declared a sedentary lifestyle than men (Tab. 1).

Table 1. Characteristics of the surveyed group.

	All (N=37 557)	Men (N=17 276)	Women (N=20 281)	Men vs Women
Age [yrs]	56.6±11.7	56.9±11.6	56.4±11.8	Ns
18-40 yr [n/%]	4005 / 10.7	1814 / 10.5	2191 / 10.8	
41-65 yr [n/%]	24 449 / 65.1	10 780 / 62.4	13 669 / 67.4	p<0.001*
≥65 yr [n/%]	9103 / 24.2	4682 / 27.1	4421 / 21.8	
Place of residence [n/%]				p<0.001*
Rural areas	8687 / 23.1	3455 / 20.0	5232 / 25.8	
City with population <50,000	10 744 / 28.7	4924 / 29.5	5821 / 28.7	
City with population 50,000-200,000	9700 / 25.8	4751 / 27.5	4949 / 24.4	
City with population >200,000	8425 / 22.4	4146 / 24.0	4279 / 21.1	
Education [n/%]				p<0.001*
Primary	4402 / 11.8	1518 / 8.8	2884 / 14.3	
Vocational	12 642 / 33.7	6417 / 37.2	6225 / 30.7	
Secondary	14 308 / 38.1	6421 / 37.2	7887 / 38.9	
Higher	6165 / 16.4	2901 / 16.8	3264 / 16.1	
Labour activity [n/%]				p<0.001*
Professionally active	17 055 / 45.4	8121 / 47.0	8934 / 44.1	
Part time job	1075 / 2.9	415 / 2.4	660 / 3.3	
Unemployed	2002 / 5.3	847 / 4.9	1155 / 5.7	
Pensioner	5219 / 13.9	2298 / 13.3	2921 / 14.4	
Retired	12 175 / 32.5	5586 / 32.4	6589 / 32.5	
Physical activity [n/%]				p<0.001*
Sedentary life style	16 173 / 43.1	6098 / 35.3	10 075 / 49.7	
Irregular during weekend	9632 / 25.7	4785 / 27.7	4847 / 24.0	
Regular during weekend	2756 / 7.3	1415 / 8.2	1341 / 6.6	
Moderate exercise 3-times a week	4608 / 12.3	2420 / 14.0	2188 / 10.8	
Daily exercise	3961 / 10.5	2298 / 13.3	1663 / 8.2	
Amateur sport	413 / 1.1	259 / 1.5	139 / 0.7	
BMI [kg/m ² ±SD]	27.9±4.9	28.0±3.8	27.8±5.8	Ns
Overweight [n/%]	16 719 / 44.5	8934 / 51.7	7785 / 38.4	p<0.001
Obesity [n/%]	10 499 / 28.0	4592 / 26.6	5907 / 29.1	p<0.001
Visceral obesity [n/%]	20 087 / 53.9	8934 / 51.9	11 153 / 55.3	p<0.001
Diagnosed chronic diseases [n/%]				
Diabetes	7617 / 20.3	3196 / 18.5	4421 / 21.8	p<0.001
Coronary artery disease	10 348 / 27.6	5115 / 29.6	5233 / 25.8	p<0.001
Hypertension	25 113 / 66.9	11 868 / 68.7	13 245 / 65.3	p<0.001
Cerebrovascular diseases	2258 / 6.0	1047 / 6.1	1211 / 6.0	Ns
Dyslipidemia	15 979 / 42.5	7826 / 45.3	8153 / 40.2	p<0.001
Main causes for physician referral [n/%]				
Infection	11 225 / 29.9	4734 / 27.4	6491 / 32.0	Nc
Hypertension	8309 / 22.1	3887 / 22.5	4422 / 21.8	Nc
Coronary artery disease	3548 / 9.5	2108 / 12.2	1440 / 7.1	Nc
Osteoarthritis	2776 / 7.4	1417 / 8.2	1359 / 6.7	Nc
Diabetes	2490 / 6.6	847 / 4.9	1643 / 8.1	Nc
Neurologic diseases	1877 / 5.0	843 / 4.9	1034 / 5.1	Nc
Dyslipidemia	815 / 2.2	328 / 1.9	487 / 2.4	Nc
Others	6510 / 17.3	3108 / 18.0	3402 / 16.8	Nc

* χ^2 test for trend; Ns – not significant, Nc – not calculated

Knowledge about a healthy lifestyle and its impact on health. 93.8% of respondents had encountered information concerning the impact of lifestyle on health. The most common source of health education was a physician (75.8%), followed by the mass media, such as television and the press (62.0% and 64.8%, respectively). Sources mentioned less often were educational materials (37.8%) and books (20.3%), and those cited least often were the Internet (3.8%) and radio (0.8%). When obtaining information about health, interpersonal communication and educational materials were of greater importance to people aged 40 years and more. While people under the age of 40 more often obtained this information from newspapers and magazines, television, books and the Internet (Fig. 1).

**Figure 1.** Sources of information about healthy lifestyle.

96.1% of respondents believed that lifestyle has an impact on the occurrence and course of CVD. In their opinion the most important risk factors were cigarette smoking (91.4%) and a high fat intake (83.1%). 67.5% of respondents identified also excessive alcohol consumption, 64.9% an excessive salt intake and 64.8% stress at the workplace and at home.

61.1% of respondents considered the lack of regular physical activity, and only 48.4% absence of fruits and vegetables in the daily diet as risk factors. Women more often than men believed that a high fat intake, the absence of daily fruits and vegetables consumption, and stress in the workplace and at home represent significant risk factors (Fig. 2). For each of

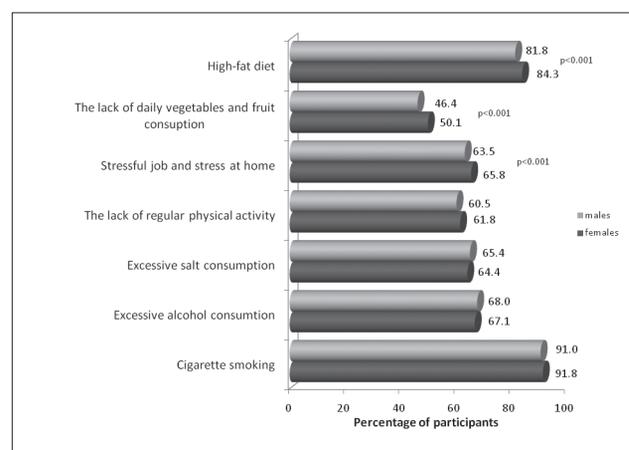
**Figure 2.** Opinions of males and females on the elements of life style with an impact on the occurrence and course of cardiovascular diseases. Statistical significance: χ^2 .

Table 2. When, in the opinion of survey participants, modifications of lifestyle should be implemented.

	Before health problems occur	After diagnosis with arterial hypertension	After myocardial infarction	After stroke
Smoking cessation [%]	79.0	8.4	11.5	1.1
Weight loss [%]	77.5	16.2	5.0	1.3
Diet with restriction of salt and animal fat but daily vegetables and fruit consumption [%]	66.8	8.9	22.9	1.4

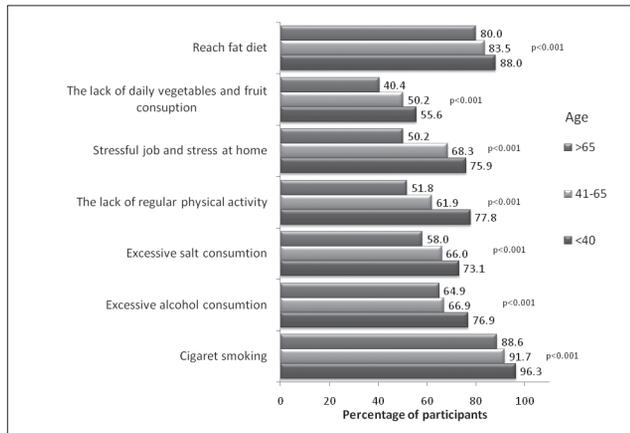


Figure 3. The influence of age on the opinions on the elements of life style with an impact on the occurrence and course of cardiovascular diseases. Statistical significance: chi² for trend.

the analyzed aspects younger respondents presented a higher level of awareness about a healthy lifestyle (Fig. 3).

The multiple regression analysis revealed that low education level and rural residence are the independent factors that decrease awareness of each analysed lifestyle factor affecting health problems. Males were less aware of the deteriorating role of reach fat diet on health, while the knowledge of its

significance was higher among overweight or obese and those with lipid disorders. People in economically productive age overestimated the role of stress. Patients with CAD were less aware of unfavorable effect of excessive alcohol consumption, lack of daily vegetables and fruit intake and regular exercise as well as stress. While, diabetics diminished the role of cigarette smoking and excessive alcohol consumption (Tab. 3).

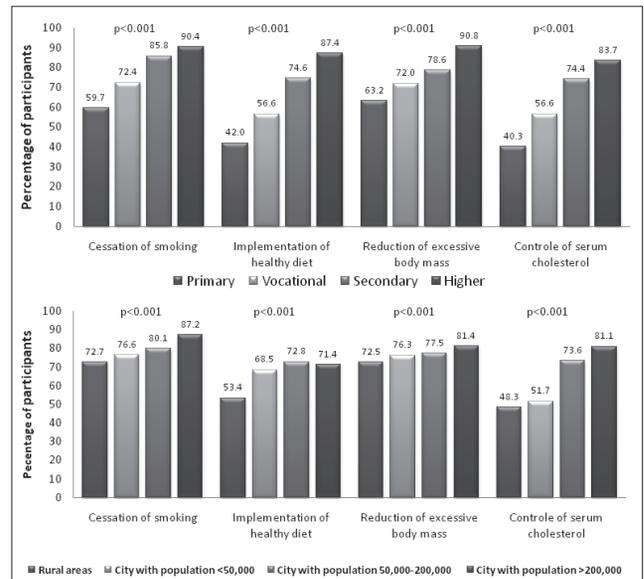


Figure 4. Opinions on the importance of methods for cardiovascular diseases prevention (cessation of smoking, implementation of low fat, low salt diet with daily consumption of vegetables and fruits, reduction of excessive body mass and periodic control of serum cholesterol) that should be implemented before the diseases occur in respect to education (upper panel) and the place of residence (lower panel) of respondents. Statistical significance: chi² for trend.

Respondents' attitude to making healthy lifestyle changes.

The most important modification to be made before the onset of health problems identified by respondents was smoking cessation (79.0%) (Tab. 2). Women showed a little more

Table 3. Associates of knowledge of lifestyle factors that affect health problems. Results of backward multivariate regression analysis: log ORs and their 95% CIs.

Independent Variables	Effect	Dependent Variable						
		Cigarette smoking	Excessive alcohol consumption	Excessive Salt consumption	Reach fat diet	Lack of daily vegetables and fruits consumption	Stressful job or stress at home	Lack of regular exercise
Gender	Male vs. female	-	-	-	0.72 (0.51-0.99)	-	-	-
Age group	<65 vs. ≥65 yrs	-	-	-	-	-	1.59 (1.15-2.19)	-
Residence	Rural vs. town	0.34 (0.22-0.54)	0.53 (0.38-0.72)	0.73 (0.53-1.00)	0.48 (0.33-0.69)	0.58 (0.42-0.79)	0.43 (0.31-0.59)	0.62 (0.46-0.84)
Education level	Primary or vocational vs. secondary or high	0.44 (0.27-0.72)	0.54 (0.41-0.71)	0.40 (0.31-0.53)	0.44 (0.31-0.63)	0.49 (0.37-0.64)	0.57 (0.43-0.76)	0.57 (0.43-0.74)
Nutrition status	Overweight or obesity vs. normal weight	-	-	-	1.90 (1.31-2.77)	-	-	-
Lipid disorders	Yes vs. No	-	-	-	1.46 (1.01-2.12)	-	-	-
Coronary artery disease	Yes vs. No	-	0.73 (0.54-1.00)	-	-	0.66 (0.49-0.89)	0.66 (0.49-0.97)	0.74 (0.55-1.00)
Diabetes	Yes vs. No	0.59 (0.36-0.96)	0.73 (0.53-1.00)	-	-	-	0.69 (0.49-0.97)	-

inclination to quitting smoking early (81.5% vs. 76.0%). People diagnosed with diabetes, CVD, and dyslipidemia were less convinced as to the importance of early cessation of smoking (73.7%, 73.8% and 77.3%, respectively). The need for this change of lifestyle increased with the education level and among a larger city dwellers (Fig. 4).

According to 66.8% of respondents, reduction of animal fats and salt intake, and regular daily fruits and vegetables consumption should be introduced early to prevent the onset of diseases (Tab. 2). Interestingly, a higher proportion of respondents (77.5%) believed that weight loss would prevent the disease occurrence (Tab. 2). Myocardial infarction was strongest motivator to modify one's diet (22.9%). In turn hypertension diagnosis strongly motivate respondents to try to weight loss (Table 2). On the other hand, those diagnosed with diseases such as dyslipidemia, CAD, diabetes and CVD displayed a lower tendency to make early changes in diet (64.7%, 63.0%, 58.5% and 55.7%, respectively). The least convinced to early weight reduction were people diagnosed with CAD (72.4%) and diabetes (69.5%). What is interesting, the belief in the need for an early weight reduction decreased with increasing BMI (82.9% with normal weight vs. 77.5% overweight and 70.4% obese, $p < 0.001$).

The opinion of women and men on the need for the modification of dietary habits and weight reduction, were similar. On the other hand, the merits of making such changes were more often indicated by those with higher education levels and by large cities dwellers (Fig. 4).

DISCUSSION

A major challenge for modern medicine are prevention of civilization diseases and health promotion. Health education, awareness-building and shaping the self-efficacy sense – are important elements of phase I and II in this strategies. As was mentioned, to enhance the effectiveness of such programs the identifications of needs and awareness of the society to whom they are to be addressed is important. These issues have been the subject of various studies since the 1990s. A study conducted in 1995 by Institute of Philosophy and Sociology of the Polish Academy of Sciences demonstrated that 83.1% of respondents accepted and considered reasonable the “Your health in your hands” slogan [19] which is at the basis of modern approaches to health promotion [20, 21]. The acceptance of this attitude is very important for the effects of health promotion programs. However, acceptance without knowledge and awareness, is not sufficient for society to really take matters involving their health into own hands.

The results of the present study show that despite the number of educational activities designed to increase knowledge and awareness about the impact of lifestyle on health undertaken in Poland in recent years, these activities are still of little effectiveness. Even though the number of people in the Polish population who have encountered information that lifestyle has an impact on health has increased by 15%, in comparison with the results of the WOBASZ survey conducted in 2003–2005 [22], there were still 6% of the population in our study who claimed they had never come into contact with health education. It is encouraging that for more than 75% of respondents the main source of health information were physicians, which proves their significant involvement in educational activities.

Similar results regarding the role of the physician in health education were obtained by Jackson et al. [23]. It should also be noted that the participants in this study who received information from doctor on the impact such lifestyle aspects as diet and physical activity have on their health, were more satisfied with the quality of medical care than those who did not receive their [23]. In our survey, other important sources of health education were also the mass media, such as television and newspapers (over 60% of respondents). While less frequently this source were educational materials and books, and the least often Internet (below 4% of responses). These results seem to indicate that information concerning health matters has been received by respondents “from the top” rather than being actively sought by them. Interestingly, the Internet was equally seldom declared to be the source of health information by those below and above 40 years of age. While, Jackson et al. [23] noted that the Internet was a source of health information for 25% of patients with CAD. This may suggest that people who are ill are more likely to seek this type of information. On the other hand, Reusch et al. [24] demonstrated that interactive health education provides more motivation for change than information derived from books.

It should be noted that in the population surveyed in our study 93.4% of respondents reported that they had encountered information concerning the impact of lifestyle on health, while the proportion of respondents who thought that lifestyle affects the occurrence and course of CVD was almost 3 percentage points higher. This suggests that some respondents in our study might have been unaware of the fact that they had acquired some knowledge about this problem at some point in the past. The percentage of people who think that lifestyle has an impact on health was over 25% higher in our survey than in a study conducted in rural areas in Poland [25]. We also noted that urban residents and people with higher education show a greater awareness of the impact of lifestyle on health. The multiple regression analyses confirmed these findings. The impact of education on their level of knowledge about health-related issues was also demonstrated in other studies [25, 26]. Recent studies have shown that parents' education has a significant impact on the lifestyle of their children, especially if their education level is also low [27].

The results of our study indicate that the educational activities with the greatest success in increasing public awareness have been those about the dangers of cigarette smoking. 91.4% of respondents considered smoking to be the most important lifestyle element affecting the occurrence and course of CVDs and, additionally, as many as 21.0% believed that one should quit smoking before the onset of a CVD. Contrary to expectations, this view was considerably less frequently presented by people diagnosed with diabetes and CVD. Epidemiological data show that the percentage of smokers in Polish society is decreasing [9, 28]. However, as was shown by studies conducted in the United States, any reduction in mortality rates achieved due to a decreased prevalence of smoking may be compensated by an increase of obesity [29].

Unfortunately, the results of our study have indicated that, despite an improved level of knowledge and awareness about the impact of lifestyle on health, 5 years after the WOBASZ survey the percentage of people who declare a low level of physical activity has increased from 50% [30] to 68.8% in our

survey. Similar data were reported in other countries [29, 31].

83.1% of respondents in our study, identified high fat consumption as an important element of lifestyle with a significant adverse impact on health. This percentage is more than twice as high as the figure reported in a study which evaluated the level of health awareness among young Poles [26]. It appears, however, that the knowledge level about the harmful effects of dietary fat on health does not subsequently result in reducing its consumption, as evidenced by both the percentage of obese people in the surveyed population and the results of studies showing that the proportion of energy supplied by fat in the diet of Poles ranges between 30 and 40% [26, 32, 33, 34]. This hypothesis is supported by the high awareness of negative effect of reach fat diet on health among overweight or obese and respondents with lipid disorders observed in our survey.

The majority of respondents also identified the following elements as important: excessive alcohol (67.5%), as well as salt intake (64.9%), and stress at the workplace and at home (64.8%). With regard to these factors, our patients also displayed a significantly higher knowledge level than the young Poles in the WOBASZ survey [26]. However, the percentage of people who believe that an excessive salt intake has an impact on health was over 10% lower than in a study conducted in rural areas in Poland [25].

Only 61.1% of respondents considered a lack of regular physical activity to be a risk factor. This is comparable to the results of the WOBASZ survey [26], and 14% lower than in another Polish study [26]. The lifestyle element considered by the population in our survey to be of the least importance when it comes to impact on health was daily fruits and vegetables consumption (48.4%). However, the percentage in our study was 20% higher than that found in the young Poles population [25]. Of interest we showed novel data concerning the lower awareness of the physical activity role and daily vegetables and fruit consumption among CAD respondents. Moreover, both diabetics and CAD subjects had lower knowledge about negative effects of excessive alcohol consumption.

66.8% of respondents in our survey believed that reduction of animal fats and salt intake, and daily fruits and vegetables consumption should be introduced before the onset of health problems. The event which was the strongest motivator to implement changes in diet was an occurrence of myocardial infarction. On the other hand, those diagnosed with dyslipidemia, CAD, diabetes and CVD displayed a lower tendency to make early changes in diet (64.7%, 63.0%, 58.5% and 55.7%, respectively). In relation to the opinion on the need for the modification of dietary habits and weight reduction, no difference between women and men was observed. On the other hand, the merits of making such changes were more often indicated by those with higher levels of education and by large cities dwellers.

Interestingly, a higher proportion of respondents (77.5%) believed that weight loss would prevent the occurrence of disease. However, most often the event which acts as a strong motivator to undertake attempts to weight loss is only the emergence of high blood pressure. Those least convinced as to the merits of an early weight reduction were people diagnosed with CAD (72.4%) and diabetes (69.5%). It should be emphasized that the belief in the need for an early weight reduction was inversely proportional to BMI (82.9% of those with normal weight vs. 77.5% of overweight and 70.4% of

obese respondents). These results are similar to our earlier observations which have demonstrated that the occurrence of obesity-related co-morbidities does not represent motivation to continue participation in a weight reduction program [35]. At the same time, Hansen et al. [36] observed that patients with impaired glucose tolerance were more likely to implement lifestyle changes. It should also be emphasized that, according to Jackson et al. [23], there is a significant association between satisfaction with the quality of health care and the disposition to make lifestyle changes. Moreover, as already mentioned, interactive health education is the type which is most effective as an incentive to implement changes [24]. The results obtained in our study, along with the analysis of literature, indicate the need for changes in the orientation of health care in our country towards a more interactive rather than just a prescriptive approach and towards an improvement in its quality. Such measures can improve the effectiveness of health education and, consequently – as shown by many studies [38, 39, 40] – result in improvements in the health of the Polish population and quality of life and – ultimately – in a reduction in health care expenditure.

The results of our study also point to the necessity to undertake educational activities promoting a healthy lifestyle as early as possible. Otherwise, if unfavourable behaviour becomes permanent over the years, the ingrained habits will impair the chance of practically applying the knowledge acquired, and often even a deterioration of health is not a strong enough motivator. Moreover, despite a satisfactory level of knowledge and awareness of health-related issues, we have not observed the expected improvement in the health of the Polish population, relative to earlier epidemiological studies. This indicates the need to also modify such determinants of behaviour of individual recipients of health education as beliefs, attitudes, skills and sense of self-efficacy. It should also be emphasized that changes in behaviour and lifestyle depend not only on knowledge, willingness and personal decisions, but remain strongly influenced by the behaviour of other people and social conditions of life [41].

The main limitation of the study is the method of data collection based on self-reported information concerning actual physical activity and the optimal time of lifestyle modifications that should be implemented because people usually present themselves in a better light. This limitation should not be applied to the self-reported knowledge data.

CONCLUSIONS

1. The level of knowledge about non-pharmacological methods of preventing lifestyle diseases in the Polish population is high except of the role of physical activity and daily vegetables consumption. This, however, has no impact on reducing the percentage of overweight and obese people and on increasing the tendency to pursue lifestyle changes.
2. Frustrating is the fact that more than one fifth of the study population is unaware that excessive weight reduction prevents development of cardiovascular diseases. Moreover, the convince to early weight decreases with increasing BMI.
3. The highest level of the knowledge among younger subjects reflect improvement of health education in Polish population.

4. In addition to education performed by physician the main sources of patients knowledge are television and the press with the growing role of the Internet among younger.
5. Further health education programs are necessary, which should include not only activities that increase the level of health education and health awareness, but also aspects such as changes in beliefs, sense of self-efficacy and social support.

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