

Analysis of nutritional behaviours and knowledge in overweight and obese adult individuals

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Abstract

Introduction. In the context of the growing problem of overweight and obesity in Poland, analysis of nutritional behaviours enables determining the major errors leading to overweight and obesity whereas the analyses of nutritional knowledge allows revealing their nutrition-related awareness.

Aim. The aim of the study was to analyse the nutritional behaviours and knowledge in overweight and obese adults using the authors' questionnaire.

Material and methods. The study population included overweight individuals with BMI (Body Mass Index) between 25 and 29.9 and obese individuals with BMI ≥ 30 . The research tool was an Internet questionnaire carried out in 2016. The respondents were included on a voluntary basis.

Results. The study findings demonstrate that the nutritional behaviours of overweight individuals are inconsistent with the medical recommendations. The major nutritional errors include irregular meals, too frequent intake of sweets and high-fat pork meat, too low intake of fresh vegetables, fish and its products. Overweight respondents also show low physical activity. The level of nutritional knowledge amongst overweight individuals does not differ from that among obese individuals yet is markedly higher, although still average, among women compared to men.

Conclusions. Low everyday physical activity and passive forms of leisure-time behaviours are conducive to adipose tissue accumulation whereas irrational nutritional behaviours prevent body weight reduction. Therefore, nutritional education is essential for changes in nutritional habits and lifestyle of overweight and obese individuals.

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Introduction

Obesity is a pathological condition of accumulation of excess adipose tissue leading to impaired functions of the human body, and thus to an increased risk of non-communicable chronic diseases (NCD). Obesity is the sixth major risk factor responsible for mortality worldwide [1]. It is considered the main NCD, which has reached epidemic proportions globally [1-7]. According to the WHO estimates, in 2016 1.9 billion adults were overweight, of these 650 million were obese; amongst children, 340 million children and adolescents aged 5-19 years and 41 million of those < 5 years of age were overweight or obese [8,9]. Numerous factors affect the development of obesity, including genetic (25-45%) [10], environmental (e.g. improper dietary patterns, lack of physical activity) [11], socioeconomic [12,13] and psychological [14,15]. Obesity is favoured by all factors decreasing the energy expenditure and those causing an increased energy intake [16,17]. Improper diets, including high-energy-density food, and low physical activity resulting from technological advances, contribute to overweight and obesity, yet are also the risk factors of NCD, e.g. type 2 diabetes, coronary artery disease, stroke, some cancers, articular degeneration, sleep and fertility disorders, psychological problems and many others [1,2,18-22]. Therefore, excessive body weight is an alarming signal that nutritional patterns and lifestyle should be changed as they carry numerous health-related risks and thus reduce the quality of life.

The available 2014 data have demonstrated that 68.2% of men and in 60.5% of women in Poland were overweight [23,24]. According to the WOBASZ II study, covering the years 2013-2014, carried out in a sample of 6164 Polish individuals above 20 years of age, overweight in the Polish population affects 43.2% of men and 30.5% of women while obesity affects 24.4% of men and 25% of women. Abdominal obesity in turn was noted in 32.2% of men and 45.7% of women while abdominal overweight in 27.2% and 21.7%, respectively. The epidemiological situation regarding the prevalence of obesity in Poland in the last decade has deteriorated especially in men, while the

situation regarding abdominal obesity has worsened in both genders, as compared to 2003-2005 [25].

Moreover, the PONS study, co-financed by the Polish-Norwegian Research Fund, has disclosed that metabolic syndrome is present in 34.3% of women and 49.9% of men [26]. In Poland and in other countries, an increasingly high incidence of overweight and obesity has been also demonstrated in children and adolescents (the number of obese individuals aged above 18 years tripled in various world regions in the last decade of the 20th century) [1,27]. Childhood obesity increases the likelihood of adulthood obesity and is strictly associated with the risk of cardiovascular disease and type 2 diabetes in adulthood [28,29]. In this context data the importance of consumptive lifestyle, availability of cheap, highly-processed food and hasty living, which adversely affect the nutritional habits in the society is emphasized. Therefore, nutrition-related awareness should be increased and proper nutrition strongly promoted in the society, including i.a. appropriate information provided on food labels, suitable advertisements of food products - especially those for children etc. [1,30]. The extent of nutritional knowledge of overweight and obese individuals is pivotal to determine their needs for nutritional knowledge. Furthermore, defining the dietary habits of overweight and obese individuals enables assessment of which aspects of nutrition they should particularly focus on [31].

Aim

The aim of the study was to analyse the dietary habits of overweight and obese adults and to determine the level of nutritional knowledge in this group regarding selected issues related to rational diets and physical activity.

Material and methods

The study was conducted in 2016 and included 100 individuals (50 women and 50 men), who completed an Internet questionnaire, which enabled reaching

higher numbers of respondents with the issues analysed, and increased the level of anonymity. Therefore, the information provided was more reliable. The individuals with declared BMI ranging from 25 to 29.9 were considered overweight while those with BMI ≥ 30 were considered obese. The age of male respondents was 20-65 years (33.3 years, on average) and of female individuals: 18-68 years (mean 31.9 years). The mean body weight of women was 82.2 kg (mean BMI was 29.9, ranging from 25 to 39). The mean body weight of men was 99.2 kg (mean BMI 31.1, ranging from 25.3 to 54.3). Moreover, 58% of women and 48% of men declared that they were overweight and the remaining respondents assessed themselves as obese.

The obtained data were statistically analysed using MS Excel 2007 and Statsoft Statistica 6.0 PL software packages. Pearson's χ^2 test and Pearson's r test were used to compare differences in qualitative variables between groups and $p < 0.05$ were considered statistically significant [32]. In the case of all the analysed relationships the values of χ^2 statistics were given in tables.

Results

The dietary behaviours of respondents were assessed using a questionnaire designed by the authors. The study group was analysed as a whole as well as divided into gender, overweight and obesity subgroups. The respondents answered the questions regarding the number of meals consumed daily, their regularity, intervals between meals, intake of snacks, fruit and vegetables, milk and its products, fish, meat, whole-grain products, fast-food and instant meals. Moreover, the questions concerned the intake of sweets and alcohol (beer) (Tables 1, 2).

The number of meals consumed daily was found to be significantly higher among women with obesity or overweight, as compared to men with these problems (62% vs. 52%; $p = 0.017$); furthermore, the adequate intervals between meals were more often pursued among women (80% vs. 66%; $p = 0.021$) and also the adequate intervals between the last meal and sleep were more often pursued among women (20%

vs. 10%; $p = 0.033$). The above regularity was not observed comparing the group with overweight and the group with obesity (regarding variables 'the number of meals': 53% vs. 57%; $p = 0.93$; 'adequate intervals between meals': 73% vs. 72%; $p = 0.6$; 'adequate intervals between the last meal and sleep': 17% vs. 13%; $p = 0.39$).

A statistically significant difference was demonstrated in the intake of whole-grain products between the overweight and the obese group: obese individuals consumed those products more often (32% vs. 45%; $p = 0.04$); otherwise, this difference was not statistically significant comparing women and men with obesity or overweight (40% vs. 36%; $p = 0.38$). The intake of instant meals was statistically significantly higher among male respondents, as compared to females (variable 'instant meals – never consumed' 60% women vs. 45% men; $p = 0.038$) and among obese individuals, as compared to those with overweight (variable 'instant meals – never consumed' 64% respondents with overweight vs. 45% respondents with obesity; $p = 0.019$). The frequency of alcohol consumption was statistically significantly higher among men than among women (variable 'alcohol – never consumed': 60% women vs. 20% men; $p = 0.0007$); however, the above difference was no longer statistically significant between the group with overweight and the one with obesity (respectively 47% vs. 45%; $p = 0.59$). The differences in intake of other products between male and female groups and between overweight versus obesity groups were not statistically significant.

Moreover, the respondents made the self-assessment of their physical activity and dietary habits (Tables 1, 2). Women declared spending statistically significantly less time for everyday physical activity than men (respectively 4% vs. 24%; $p = 0.028$), whereas the difference between overweight individuals and obese ones was not statistically significant (respectively 9% vs. 24%; $p = 0.057$). The differences in self-assessment of the pro-health value of own nutrition behaviours between women and men were not statistically significant ($p = 0.61$); the same was observed when comparing overweight vs. obese individuals ($p = 0.13$). Over 30% of overweight respondents assessed their nutrition behaviours as proper and 40% were not able to decide whether their dietary habits were appropriate.

Table 1.

Dietary habits among adults with overweight and obesity by gender

Dietary habits/behaviours	women		men		Statistic parameters	
	n=50		n=50		χ^2	p-value
	n	%	n	%		
Number of meals (4-5 meals)	31	62	26	52	4.298	0.017
Regularity of meals (yes)	19	38	15	30	3.512	0.16
Intervals between meals (minimum 3-4 hrs)	40	80	33	66	4.00	0.021
Interval between the last meal and sleep (minimum 3 hrs)	10	20	5	10	3.021	0.033
Snacks (no)	2	4	0	0	1.113	0.30
Fruit (every day)	24	49	24	49	0.503	0.60
Vegetables (every day)	14	28	16	32	3.33	0.452
Milk and its products (every day)	20	40	18	36	2.95	0.254
Fish and its products (2-3 times a week)	8	16	5	10	1.07	0.35
Pork meat (sporadically)	16	32	12	24	2.211	0.12
Whole-grain products (every day)	20	40	18	36	1.812	0.38
Fast-food (never)	21	42	12	24	3.413	0.08
Instant meals (never)	30	60	25	50	3.012	0.038
Sweets (never)	10	20	13	26	2.466	0.20
Alcohol – beer (never)	30	60	10	20	9.404	0.0007
Physical activity (yes)	2	4	12	24	4.276	0.028
Self-assessments of the diet (good)	14	28	10	20	0.481	0.61

Table 2.

Dietary habits among study respondents depending on the prevalence of overweight or obesity

Dietary habits/behaviours	overweight		obese		Statistic parameters	
	n=53		n=47		χ^2	p value
	n	%	n	%		
Number of meals (4-5 meals)	28	53	27	57	0.09	0.93
Regularity of meals (yes)	20	38	14	30	0.78	0.50
Intervals between meals (minimum 3-4 hrs)	39	73	34	72	0.512	0.60
Interval between the last meal and sleep (minimum 3 hrs)	9	17	6	13	2.00	0.39
Snacks (no)	0	0	2	4	3.73	0.25
Fruit (every day)	25	48	23	49	0.50	0.61
Vegetables (every day)	14	26	15	32	2.318	0.13
Milk and its products (every day)	20	38	11	24	3.752	0.09
Fish and its products (2-3 times a week)	5	9	4	8	3.60	0.70
Pork meat (sporadically)	15	29	8	17	5.21	0.077
Whole-grain products (every day)	17	32	21	45	6.16	0.04
Fast-food (never)	16	30	14	30	4.15	0.68
Instant meals (never)	34	64	21	45	7.99	0.019
Sweets (never)	16	30	15	32	3.88	0.69
Alcohol – beer (never)	25	47	21	45	0.60	0.59
Physical activity (yes)	5	9	11	24	1.23	0.057
Self-assessments of the diet (good)	17	32	13	28	2.015	0.13

In the questionnaire part devoted to the assessment of nutritional knowledge, the respondents answered the questions concerning the sources of diet-related knowledge, effects of physical activity on body weight, the most and least caloric products, effects of dietary calcium deficits, amounts of cholesterol in selected products, physiological effects of dietary fibre as well as the role of nutrition in the etiopathogenesis of the cardiovascular diseases and classification of BMI values. Their answers were scored (maximum score was 14) (Table 3). The mean results of women (10.14) demonstrated a satisfactory level of knowledge whereas the mean result of men (8.64) showed an average level of knowledge. The level of knowledge of female respondents was significantly higher, as compared to men (mean values: 10.14 vs. 8.64; $p=0.00068$); no such a statistically significant difference was observed when comparing overweight and obese respondents (9.21 vs. 9.6; $p=0.39$). A positive correlation ($r=0.33$; $p=0.0031$) was demonstrated between the knowledge about nutrition and nutritional behaviours. The higher the knowledge-related result, the higher the number of recommended dietary behaviours.

Discussion

Despite advances in knowledge regarding genetic conditions associated with obesity, the importance of behavioural patterns and environmental factors for the development of abnormally high body weight has not been questioned [7,33,34]. Our study findings demonstrated that the recommended number of 4-5 meals a day was consumed by only 62% of women and 52% of men with abnormally high body weight

(including only 53% of overweight and 57% of obese individuals); only 38% of women and 30% of men had regular meals. Moreover, 96% of women and all the study men (100%) had snacks between meals (sic!). Similar results were reported by L. Ostrowska et al. [35]; their study findings about nutritional patterns of overweight and obese individuals reveal that 62% of subjects consumed the recommended number of meals, and no significant gender-related differences were found. Different results were presented by E. Szczepańska and A. Brończyk-Puzoń [36] in the group of obese patients qualified for bariatric surgery; only 32% of patients consumed 4-5 meals a day (35% of women and 39% of men); only 36% had regular meals (35% of women and 39% of men) and only 22% (20% of women and 25% of men) did not have snacks between meals. Likewise, E. Mędręła-Kuder in the study encompassing 100 overweight and obese women have demonstrated that 61% had more than 3 meals a day and only 19% had regular meals [37]. Furthermore, M. Cymerys and E. Olek have observed that 48% of individuals with abdominal obesity had snacks. [38]. According to the findings reported by A. Grochowska et al. [39], the majority of overweight and obese male respondents had snacks (predominantly sweets, fine bakery products and fruit).

From the nutritional prophylaxis point of view, the intake of wholegrain products is beneficial. Our findings demonstrated that such products were consumed every day only by 40% of women and 36% of men (32% of overweight and 45% of obese individuals). Similar results were reported by E. Szczepańska and A. Brończyk-Puzoń [36]; wholegrain products were consumed daily only by 41% of study individuals qualified for bariatric surgery (42% of women versus 39% of men). Moreover, E. Stefańska et al.

Table 3.

The average number of points obtained in the nutritional knowledge test

Test score	Women	Men	χ^2	p-value
Mean value	10.14	8.64	9.04	0.00068
	Overweight	Obese		
Mean value	9.21	9.6	2.111	0.39
	Total			
Mean value	9.39			

[40] have found that the incidences of intake of wholegrain products at least once a day by obese individuals were even lower; health-promoting behavioural patterns were declared only by 32% of obese individuals (33% of women and 28% of men). According to W. Stelmach et al. [41] who studied obese individuals who entered retirement age, 21% of respondents reported eating brown bread (slightly more women than men – 22% vs. 21%).

The development of obesity is favoured by diets low in dairy products and fish while rich in meat. Our study disclosed that 40% of women and 36% of men (38% of overweight and 24% of obese individuals) had milk and dairy products. According to E. Szczepańska and A. Brończyk-Puzoń, only 36% of obese patients scheduled for bariatric surgery drank milk every day (more women than men) [36]. Similar results were reported by E. Lange et al.; in the group of overweight women and men, milk and milk drinks were consumed more frequently by women, as compared to men (50% and 33%, respectively) [42].

Researches focusing on the issues of dietary patterns have also been interested in the frequency of pork intake. In our study, pork meat was consumed by 32% of women and 24% of men (29% of overweight and 17% of obese individuals). According to E. Szczepańska and A. Brończyk-Puzoń [36], 68% of respondents had meat and/or cured meats every day while 23% 3-4 times a week. However, both women and men preferred poultry (90% vs. 53%). Likewise, the findings reported by W. Stelmach et al. in the group of obese individual who entered retirement age disclose that women preferred poultry and lean meat more frequently than men [41].

Analysis of our results demonstrated that only 16% of women and 10% of men consumed fish and fish products 2-3 times a week (9% of overweight and 8% of obese individuals). The above findings show that recommendations regarding fish intake for prevention of non-contagious chronic diseases, including coronary disease, are rarely followed [43]. Similar unfavourable patterns were reported by E. Stefańska et al. [40] in the group of obese individuals; only 34% of respondents had fish 1-2 times a week. Different results were presented by E. Szczepańska and

A. Brończyk-Puzoń [36]; 74% of patients included in their study had fish 1-2 times a week.

Furthermore, the intake of low-calorie vegetables, fruit and fibre has been found beneficial for prevention of obesity. In our study, 48% of overweight and 49% of obese respondents had fruit every day; only 26% of overweight and 32% of obese respondents had vegetables. These relatively low intakes of vegetables and fruit were confirmed by other authors, demonstrating significantly low intakes of vegetables and fruit in overweight and obese women and men [39,42,44,45]. Otherwise, E. Szczepańska and A. Brończyk-Puzoń [36] have demonstrated that 64% of obese patients qualified for bariatric surgery had vegetables and fruit every day.

Our study was also focused on the comparison of nutritional knowledge in the groups of overweight and obese individuals according to gender. The level of nutritional knowledge was found to be significantly higher in the group of women compared to men. The above observation raises the question regarding a correlation between nutritional knowledge and dietary behaviours. It is worth mentioning the results reported by E. Kostrzewa-Zabłocka et al., demonstrating that patients with higher levels of nutritional knowledge had lower values of BMI and WHR, as compared to those with lower levels of knowledge [46]. Similar results were reported by E. Malczyk et al. [47] and J. Gruszka et al. [45]. Many studies failed to show a correlation between the level of nutritional knowledge and dietary patterns both amongst adults [48,49] and young people [50]. In this context, the role of environmental factors determining the implementation of dietary recommendations should be emphasised [51].

Conclusions

The study findings revealed that the nutritional behaviours of excessive weight individuals markedly differ from dietary recommendations. The major dietary errors of overweight and obese individuals included irregular meals, too late consumption of the last meal before sleep, too high intake of sweets, fat pork meat

and snacks, too low intake of fruit and vegetables, fish and its products. The female respondents were found to eat more rationally and their level of nutrition-related knowledge was higher, as compared to male respondents. The individuals with overweight showed a low level of physical activity. In general, the dietary behaviours of respondents were assessed as unsatisfactory while their nutritional knowledge as average; therefore, despite a correlation found between the extent of nutritional knowledge and dietary behaviours, the level of knowledge did not translate into nutritional behaviours, which was also confirmed by other Polish studies [33,36,37,39,42,44,45,47-49,52,53].

The study results demonstrate that nutritional behaviours of overweight and obese respondents differ substantially from dietary recommendations. Nutrition-related awareness and knowledge enable proper dietary choices. However, the findings reveal that overweight and obese individuals have knowledge deficits, which should be dealt with. However, the knowledge itself is not a sufficient stimulus to observe dietary recommendations; overweight and obese individuals require additional motivation, e.g. regular visits to a dietician and it is also necessary to create broad environmental determinants conducive to adopting pro-health nutritional behaviours.

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