

EVALUATION OF SWEETS AND SWEETENED PRODUCTS CONSUMPTION BY RESIDENTS OF THE TARNOW REGION

Ocena spożycia słodyczy i produktów słodzonych przez mieszkańców regionu tarnowskiego

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SUMMARY

Background. Reducing sugar intake is important in the prevention and treatment of chronic non-communicable diseases such as obesity, diabetes, cardiovascular disease and cancer.

Objectives. The aim of the study was to assess the consumption of sweets and sweetened products by residents of the Tarnow region, and to try to link the frequency of their consumption with, among others, body mass index and occupational activity.

Material and methods. The study involved 303 people aged 18–63 years (mean: 26.8 ± 8.2), they were residents of the Tarnow region. A survey questionnaire was used to conduct the study, which included the original questions and selected questions of the KomPAN questionnaire. A significance level of $p < 0.05$ was adopted.

Results. Interpretation of the body mass index showed that the largest number of people – 47.9% ($n = 145$) had a normal value, but at the same time a significant percentage – 36.3% ($n = 110$) were overweight. The majority ($n = 173$; 57.1%) rated their physical activity at a moderate level. The majority of respondents admitted ($n = 252$; 83.2%) that they thought stress influenced them to consume more sweets and other sugar-containing products. Also according to the vast majority ($n = 267$; 88.1%), sweets and other sugar-containing products can be a mood enhancer. Most respondents ($n = 218$; 71.9%) sweeten their coffee and/or tea with at least one teaspoon of sugar (or honey). A significant percentage ($n = 163$; 53.8%) drink sweet hot drinks at least once a day. Fruit juices are consumed one to several times a week by 59.4% of respondents ($n = 180$). With the same frequency, sweets are consumed by more than half of the respondents ($n = 193$; 63.7%).

Conclusions. The body mass index of almost half of the subjects showed overweight or obesity, while at the same time nearly 1/3 of the subjects spent their leisure time passively. Eating habits related to the consumption of sweets and sweetened products were assessed at a moderate level. The frequency of consumption of sweets and sweetened products did not significantly depend on gender, financial situation, occupational status, nutritional knowledge and interpretation of the subjects' BMI index.

Key words: diet, sugar, sweet drinks, frequency of consumption.

STRESZCZENIE

Wstęp. Ograniczenie spożycia cukru jest istotne w profilaktyce i leczeniu przewlekłych chorób niezakaźnych, takich jak otyłość, cukrzyca, choroby sercowo-naczyniowe i nowotwory.

Cel pracy. Ocena spożycia słodyczy i produktów słodzonych przez mieszkańców regionu tarnowskiego oraz próba powiązania częstości ich spożycia m.in. z indeksem masy ciała oraz prowadzoną aktywnością zawodową.

Materiał i metody. W badaniach wzięło udział 303 osoby w wieku 18–63 lat (śr. $26,8 \pm 8,2$), byli to mieszkańcy regionu tarnowskiego. Do przeprowadzenia badań posłużono się kwestionariuszem ankiety, który zawierał pytania autorskie oraz wybrane pytania kwestionariusza KomPAN. Przyjęto poziom istotności $p < 0,05$.

Wyniki. Interpretacja wskaźnika masy ciała wykazała najwięcej osób – 47,9% ($n = 145$) miało wartość prawidłową, ale równocześnie znaczny odsetek – 36,3% ($n = 110$) cechował się nadwagą. Większość ($n = 173$; 57,1%) oceniła swoją aktywność ruchową na umiarkowanym poziomie. Większość badanych przyznała ($n = 252$; 83,2%), że ich zdaniem stres ma wpływ na to, że spożywają więcej słodyczy i innych produktów zawierających cukier. Również zdaniem zdecydowanej większości ($n = 267$; 88,1%) słodycze i inne produkty zawierające cukier mogą być czynnikiem poprawiającym nastrój. Większość ankietowanych ($n = 218$; 71,9%) sładzi kawę i/lub herbatę przynajmniej jedną łyżeczką cukru (lub miodu). Znaczny odsetek ($n = 163$; 53,8%) pije słodkie gorące napoje przynajmniej raz dziennie. Po soki owocowe jeden do kilku razy w tygodniu sięga 59,4% badanych ($n = 180$). Z tą samą częstością po słodycze sięga ponad połowa badanych ($n = 193$; 63,7%).

Wnioski. Wskaźnik masy ciała u prawie połowy badanych wykazywał nadwagę lub otyłość, a jednocześnie blisko 1/3 badanych biernie spędzała swój czas wolny. Nawyki żywieniowe związane ze spożyciem słodyczy i produktów słodzonych oceniono na umiarkowanym poziomie. Częstość spożywania słodyczy i produktów słodzonych nie zależała istotnie od płci, sytuacji finansowej, statusu zawodowego, wiedzy żywieniowej oraz interpretacji wskaźnika BMI badanych.

Słowa kluczowe: sposób żywienia, cukier, słodkie napoje, częstość spożywania.

BACKGROUND

Consumption of simple added sugars poses significant health risks. Added sugar is defined as sugar or syrup added in the food production process and that available at the table. Added sugar can be white and brown sugar, corn, maple and fructose syrup, sugar molasses, crystal dextrose and honey [1].

The consumption of added sugar has increased tremendously in recent years. U.S. studies show that carbonated and energy drinks are the largest source of it. This is followed by cereal desserts, fruit drinks, dairy desserts, candies, sweetened tea, sugar and honey [2].

European studies show that adolescents drink about 1,455 ml per day of various beverages, which amounts to about 380 kcal/day. Of this, 30.4% comes from sweetened beverages, 20.7% from milk sweets and 18.1% from fruit juices [3].

Evidence showing the adverse effects of added sugar on the occurrence of certain diseases has contributed to the development of guidelines limiting its consumption. According to the World Health Organization, sugar intake should be limited to 10% of total energy [4].

Reducing sugar intake is important in the prevention and treatment of chronic non-communicable diseases such as obesity, diabetes, cardiovascular disease and cancer [5].

OBJECTIVES

The purpose of this study was to assess the consumption of sweets and sweetened products by residents of the Tarnow region, and to try to link the frequency of their consumption with, among others, body mass index and occupational activity.

MATERIAL AND METHODS

The study used a diagnostic survey method with a survey questionnaire that included the original questions and selected questions from the KomPAN questionnaire examining the views and eating habits of people aged 16–65 [6].

In addition, questions were asked about sociodemographic data as well as about height and weight, from which the BMI was calculated and the result was interpreted [7].

The survey was conducted in May–April 2023, and 303 people aged 18–63 took part. The questionnaire in electronic form was posted on websites and online forums for residents of Tarnow and the region. Participation in the survey was voluntary, anonymity was ensured.

The data obtained were statistically analyzed using Microsoft Excel of Office 2016 and R software (v. 3.4.0). Quantitative variables were analyzed by counting the arithmetic mean and standard deviation (SD), while qualitative variables were analyzed by presenting the number and percentage of occurrences of each value. Linkage analysis for quantitative variables was performed using the χ^2 test. A significance level of $p < 0.05$ was adopted.

RESULTS

The study included 303 people aged 18–63 (mean 26.8 ± 8.2), most of whom ($n = 216$; 71.3%) were women. The study group was dominated by people with higher ($n = 128$; 42.2%) and secondary education ($n = 98$; 32.3%), economically active ($n = 120$; 39.6%) and studying/studying ($n = 102$; 33.7%). Most of the respondents were urban residents ($n = 244$; 80.5%) and rated their financial situation as average ($n = 229$; 75.6%) (Tab. 1).

Table 1. Characteristics of the study group

Sociodemographic variables	n	%
Gender		
Woman	216	71.3
Man	87	28.7
Education		
Primary	4	1.3
Vocational	73	24.1
Secondary	98	32.3
Higher	128	42.2
Occupational status		
Retirement/pension	4	1.3
Parental leave, unemployed, housekeeping	39	12.9
Casual work	38	12.5
Permanent employment	120	39.6
Pupil/student	102	33.7
Place of residence		
Rural	59	19.5
City of up to 100,000 residents	49	16.2
City of 101–500,000 residents	108	35.6
City of more than 500,000 residents	87	28.7
Financial status		
Below average	17	5.6
Average	229	75.6
Above average	57	18.8

Household situation		
We live very poorly – not even enough for basic needs	2	0.7
We live modestly – we have to be very economical on a daily basis	15	5.0
We live an average life – enough for everyday life, but we need to save for more serious purchases	109	36.0
We live well – enough for a lot without special saving	135	44.6
We live very well – we can afford certain luxuries	42	13.9

Respondents were asked to compare their health status to people of the same age. The majority ($n = 247$; 81.5%) indicated that their health status was the same as peers, 12.2% ($n = 37$) responded that it was worse, and the remaining 6.3% ($n = 19$) that it was better.

Based on the height and weight reported by the respondents, the BMI was calculated and it ranged from 16.9 to 37.1 (mean 24.8 ± 4.2). Interpretation of the body mass index showed, that most subjects – 47.9% ($n = 145$) had a normal value, but at the same time a significant percentage – 36.3% ($n = 110$) were overweight (Tab. 2).

Table 2. Interpretation of the respondents' BMI

BMI interpretation	n	%
15.1–17.4 – emaciation	4	1.3
17.5–18.5 – underweight	10	3.3
18.5–24.9 – normal value	145	47.9
25.0–29.9 – overweight	110	36.3
30.0–34.9 – grade I obesity	32	10.6
35.0–39.9 – grade II obesity	2	0.7

Respondents were asked how they rated their leisure-time physical activity. The majority ($n = 173$; 57.1%) rated their physical activity at a moderate level (walking, cycling, gymnastics, gardening or other light physical activity done 2–3 hours a week). Also, a large percentage ($n = 99$; 32.7%) rated their activity as low (predominantly sitting, watching TV, reading newspapers, books, light housework, walking 1–2 hours a week), and the rest of the respondents ($n = 31$; 10.2%) rated their activity as high (biking, running, working in the allotment or garden, and other sports recreational activities requiring physical exertion performed more than 3 hours a week).

The largest percentage of people ($n = 140$; 46.2%) rated their nutritional knowledge as sufficient, slightly less, 36.6% ($n = 111$) as good, consecutively 11.6% ($n = 35$) as bad, and the least, 5.6% ($n = 17$) as very good.

Slightly more people rated their diet well ($n = 205$; 67.7%), sufficiently – 23.8% ($n = 72$), very well – 5.0% ($n = 15$), insufficiently – 3.6% ($n = 11$).

The majority of respondents admitted ($n = 252$; 83.2%) that they believe stress influences them to consume more sweets and other sugar-containing products. Also according to the vast majority ($n = 267$; 88.1%), sweets and other sugar-containing products can be a mood enhancer. A similar percentage ($n = 248$; 81.8%) admitted that they are not always able to stop themselves from consuming sweets or other sugar-containing products when they have a sudden craving for them.

Questions were then asked about dietary habits regarding the consumption of selected products. It was revealed that the majority of respondents ($n = 218$; 71.9%) sweeten their coffee and/or tea with at least one teaspoon of sugar (or honey). A significant percentage ($n = 163$; 53.8%) drink sweet hot drinks at least once a day. Fruit juices are consumed one to several times a week by 59.4% of respondents ($n = 180$). With the same frequency, sweets are consumed by more than half of the respondents ($n = 193$; 63.7%). Less frequently, respondents reported consuming sweetened carbonated beverages, with most indi-

cating a frequency of up to 3 x per month ($n = 174$; 57.4%). The frequency of consumption of fermented beverages and/or dairy products was indicated by the majority of respondents as 1 to several times per week ($n = 170$; 56.1%). Most people consume energy drinks up to 3 times a month ($n = 203$; 67.0%). More than

half of respondents consume sweet cereal products once or several times a week ($n = 194$; 64.0%) (Tab. 3). The frequency of consumption of the products in the table did not significantly depend on gender, financial situation, occupational status, nutritional knowledge and interpretation of the BMI ($p > 0.05$).

Table 3. Frequency of consumption of sweet drinks, sweets and sweet cereal products

Variables	n	%
<i>Do you sweeten hot drinks, e.g. tea, cocoa, coffee?</i>		
<i>If you have a different habit of sweetening, for example, coffee and tea, please describe the sweetening of that beverage that you drink more of in a typical day.</i>		
No	85	28.1
Yes, I sweeten with one teaspoon of sugar (or honey)	137	45.2
Yes, I sweeten with two or more teaspoons of sugar (or honey)	62	20.5
Yes, I use sweeteners (low energy sweeteners)	19	6.3
<i>How often do you drink sweetened hot beverages such as tea, coffee, herbal or fruit infusions?</i>		
Never	69	22.8
1–3 times a month	16	5.3
Once a week	18	5.9
A few times a week	37	12.2
Once a day	57	18.8
A few times a day	106	35.0
<i>How often do you drink fruit juices?</i>		
Never	19	6.3
1–3 times a month	76	25.1
Once a week	76	25.1
A few times a week	104	34.4
Once a day	16	5.3
A few times a day	12	4.0
<i>How often do you consume sweets, such as candies, cookies, cakes, chocolate bars, muesli bars, other confectionery products?</i>		
Never	4	1.3
1–3 times a month	55	18.2
Once a week	62	20.5
A few times a week	131	43.2
Once a day	32	10.6
A few times a day	19	6.3
<i>How often do you drink sweetened carbonated or non-carbonated beverages like Coca-Cola, Pepsi, Sprite, Fanta, orangeade, lemonade?</i>		
Never	47	15.5
1–3 times a month	127	41.9
Once a week	64	21.1
A few times a week	49	16.2
Once a day	15	5.0
A few times a day	1	0.3
<i>How often do you consume fermented beverages and/or dairy products, such as flavored yogurts, vanilla cheese, ice cream?</i>		
Never	13	4.3
1–3 times a month	98	32.3
Once a week	78	25.7
A few times a week	92	30.4
Once a day	20	6.6
A few times a day	2	0.7
<i>How often do you drink energy drinks, such as 2 KC, Black Horse, Red Bull, Burn, Shot or others?</i>		
Never	119	39.3
1–3 times a month	84	27.7
Once a week	47	15.5
A few times a week	44	14.5
Once a day	7	2.3
A few times a day	2	0.7
<i>How often do you consume sweet cereal products in your daily meals (e.g., yeast breads, breakfast cereals)?</i>		
Never	14	4.6
1–3 times a month	77	25.4
Once a week	76	5.6
A few times a week	118	38.9
Once a day	17	5.6
A few times a day	1	0.3

DISCUSSION

Products containing carbohydrates and artificially sweetened are a common choice because they provide easily digestible energy and their taste appeals to consumers. In recent years, there has been considerable access to knowledge about the importance of carbohydrates in nutrition and their impact on human health. Results of epidemiological studies indicate that both the type and amount of carbohydrates consumed play a significant role in the etiology of many diseases associated with metabolic disorders, such as overweight and obesity, diabetes, atherosclerosis, cardiovascular disease, cancer and many others [8].

According to the recommendations, carbohydrates should cover 45–65% of dietary energy. This means that a person whose daily energy requirement is 2,000 kcal should consume 225 g to 325 g of carbohydrates [9]. What matters is not only the amount of carbohydrates consumed, but also the type of carbohydrate. White sugar, confectionery, juices, sweetened beverages are products with a high glycemic index. Residents of the Tarnow region were asked about the frequency of consumption of the above products in this survey.

According to the 2019 CBOS report “How healthy do Poles eat?” as many as 59.0% eat sweets and cakes at least several times a week [10]. These results are consistent with our results conducted among residents of the Tarnow region.

The nationwide report “Diabetes, obesity – consequences” shows that the percentages of people declaring that they consume sweetened carbonated drinks several times a day, every day, several times a week and several times a month are increasing. At the same time, the percentage of people consuming such drinks once a month, less often or not at all decreases from 63% to 56% [11]. Analysis of our research provided similar results in this regard – at most once a month, 57.4% of respondents drank carbonated drinks.

Studies show that the consumption of a group of energy drinks, with relatively high sugar content, is steadily increasing (by 2.5% in the period 2010–2020) [12]. Energy drinks are consumed by a significant group of teenagers. Nowak and Jesionkowski indicate, based on a survey of adolescents ($n = 2629$; age 12–20, mean 15 years), that 67% of them consumed energy drinks, 16% of them quite often [13]. Our research shows that in the 18–63 age group, the percentage of those who consumed energy drinks at least once a week was 33.0%.

Stress can be an important factor in increasing sugar intake. During stress, the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis are stimulated, and this causes the secretion of glucocorticosteroids, including cortisol (often called the stress hormone). Carbohydrates inhibit the activity of the hypothalamic-pituitary-adrenal axis, and more than that, they cause feelings of pleasure and activation of the reward system [14]. Eating tasty things causes the release of endorphins, which improve mood and relieve stress [15, 16]. As many as 83.2% of respondents admitted that stress influences them to eat more sweets and other sugar-containing products. A similar percentage (81.8%) admitted that they can't always stop themselves from consuming sweets or other sugar-containing products when they have a sudden craving for them.

Excessive consumption of carbohydrates causes them to be stored as triglycerides in adipose tissue, which, with low physical activity and a sedentary lifestyle, can lead to overweight and obesity and other disorders [17]. According to statistics

published in 2021 by the Central Statistical Office (CSO) in 2019, the percentage of overweight people in Poland has increased compared to previous years. In 2019, 57% of Polish adults had excess body weight (overweight or obesity), compared to just over 53% in 2014 [18]. The survey results indicate that the percentage of overweight and obese people in the Tarnow region (47.6%) is slightly lower than the national average. It is likely that this result was influenced by the method of data collection and the age cross-section of people who answered the questions electronically. Typically, people of school age and working age, whose average BMI is lower than that of older people, use the computer, internet more often, and the prevalence of overweight and obesity increases with the age of respondents. According to the CSO survey, in 2021, 57.6% of people aged 60–74 used the Internet, and 94.8% of 15–59 year olds [19].

An EU survey on sports and physical activity in the EU revealed that only one in two Europeans (54%) regularly exercise and play sports. The situation worsened sharply during the COVID-19 pandemic when half of Europeans reduced physical activity or stopped it altogether. More than half (65%) of the Poles who took part in the survey admitted that they never exercise or play sports; one in four also do not engage in any other non-sports physical activity, including cycling, dancing or doing yard or allotment work, for example; only 2% train regularly. This trend has increased in recent years – compared to surveys five years ago, the percentage of non-exercising Poles has increased by 9% [20]. An analysis of our research shows that nearly 60% of respondents rate their leisure-time activity as moderate, while 10.2% rate it as high. In comparison, in the WOBASZ study (2004–2014), the percentage of people who were physically active most days of the week decreased in women from 33% to 28%, and in men from 37% to 27% [21]. In contrast, the high percentage of women (55%) who are at most occasionally physically active in their leisure time did not change, while among men it increased from 50% to 57%. In contrast, a 2017 Eurostat study found that in Poland, recommendations for moderate-intensity exercise ≥ 30 min/day for 5 days a week (150 min/week) or intense exercise for 5 days a week (75 min/week) were followed by 18% of the population aged 15 and older [22].

Nowadays, access to food is virtually unlimited. Consumer choices are dictated by wallet size, personal preferences and lifestyle. At the same time, public awareness of proper nutrition and the need for adequate physical activity is increasing with access to the media.

CONCLUSIONS

The body mass index of nearly half of the respondents showed overweight or obesity, while at the same time nearly 1/3 of the subjects spent their leisure time passively. Eating habits related to the consumption of sweets and sweetened products were assessed at a moderate level, similar to national statistics. The frequency of consumption of sweets and sweetened products did not significantly depend on gender, financial situation, occupational status, nutritional knowledge and interpretation of the BMI index of the respondents.

It is recommended that public campaigns continue to raise public awareness of the health consequences of consuming sugar and sweetened products, as well as the importance of regularly undertaking health-promoting practices.

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