

DRINK CONSUMPTION BY CHILDREN AND YOUNG PEOPLE OF SCHOOL AGE SPOŻYCIE NAPOJÓW PRZEZ DZIECI I MŁODZIEŻ W WIEKU SZKOLNYM

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Authors' contribution

Wkład autorów:

A. Study design/planning
zaplanowanie badań

B. Data collection/entry
zebranie danych

C. Data analysis/statistics
dane – analiza i statystyki

D. Data interpretation
interpretacja danych

E. Preparation of manuscript
przygotowanie artykułu

F. Literature analysis/search
wyszukiwanie i analiza literatury

G. Funds collection
zebranie funduszy

Summary

Background. Early childhood is especially conducive to shaping nutritional patterns, the effects of which may be felt throughout life. Fluid intake is an important element of a balanced diet. Currently, the nutrition of children and adolescents is characterized by many mistakes. The aim of the study was to assess the amount of fluids consumed by school-age children and adolescents and to analyze the types of drinks chosen.

Material and methods. The research material consisted of data obtained from 2,986 children and adolescents 10 to 18 years of age attending selected schools in Poland that joined the e-PE program. It is an innovative tool that makes it easier for physical education teachers to work on-site and remotely. The diagnostic survey method, a questionnaire, was chosen to carry out the research.

Results. The recommended amount of drinks consumed per day was declared by 62.4% of the surveyed students. Unfortunately, 4% of young people do not drink the minimum amount of fluids in any form, and the values they provide are extremely low, which may pose a serious threat to life. Moreover, the level of consumption of energy drinks is worrying. Unfortunately, as many as 18.1% of young people prefer such drinks.

Conclusions. Proper fluid intake during the day applies to 2/3 of the respondents. The rest do not drink the recommended amount of drinks. The choice of the type of fluids is a positive signal. The respondents most often chose still water.

Keywords: sweet drinks, eating habits, adolescents, water, nutrition

Streszczenie

Wprowadzenie. Okres wczesnego dzieciństwa szczególnie sprzyja kształtowaniu modeli żywieniowych, których skutki mogą być odczuwane przez całe życie. Ważnym elementem zrównoważonej diety są spożywane płyny. Obecnie odżywianie populacji dzieci i młodzieży cechuje wiele błędów. Celem badania była ocena ilości spożywanych płynów przez dzieci i młodzież w wieku szkolnym oraz analiza rodzajów wybieranych napojów.

Materiał i metody. Materiał badawczy stanowiły dane uzyskane od 2986 dzieci i młodzieży w wieku od 10. do 18. roku życia uczęszczających do wybranych szkół w Polsce, które przystąpiły do programu e-WF. Jest to innowacyjne narzędzie ułatwiające nauczycielom przedmiotu wychowanie fizyczne pracę w trybie stacjonarnym i zdalnym. Do realizacji badań wybrano metodę sondażu diagnostycznego, kwestionariusz ankiety.

Wyniki. Zalecaną ilość napojów wypijanych w ciągu doby deklarowało 62,4% badanych uczniów. Niestety 4% młodych ludzi nie pije minimalnej ilości płynów pod żadną postacią, a podawane przez nich wartości są skrajnie niskie, co stanowić może poważne niebezpieczeństwo dla życia. Ponadto niepokojący jest poziom spożycia napojów energetyzujących. Niestety aż 18,1% młodych ludzi preferuje taki napój.

Wnioski. Prawidłowe dostarczenie płynów w ciągu dnia dotyczy 2/3 badanych. Reszta nie wypija zalecanej ilości napojów. Pozytywnym sygnałem jest wybór rodzaju płynów. Respondenci zdecydowanie najczęściej wybierali wodę niegazowaną.

Słowa kluczowe: słodkie napoje, nawyki żywieniowe, młodzież, woda, żywienie

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Introduction

One of the fundamental elements of a healthy lifestyle is proper nutrition. Eating behaviors combined with an appropriate dose of physical activity significantly determine the overall functioning of the body, especially during the period of its intensive growth and development, which occurs during childhood and adolescence [1]. Deficiencies in health-promoting behaviors are the main cause of the most common disorders – both in youth and later in life [2]. Therefore, a properly balanced diet, both in terms of quantity and quality, determines the achievement of optimal physical, intellectual and emotional growth and development not only during childhood and adolescence but at every stage of ontogenesis [3]. Many studies emphasize that children and adolescents are highly sensitive to all types of nutritional errors, especially nutrient deficiencies, the perpetuation of which predisposes one to the occurrence of many diet-related diseases in the future [4-6]. Inappropriate eating behavior in youth may cause permanent changes in the body, which are difficult or impossible to eliminate later in life [6]. The consequence may be the occurrence of diseases such as type 2 diabetes, circulatory system diseases and some cancers in the future [7]. Despite widespread prevention and nutritional education, numerous irregularities in the discussed subject are still observed. The phenomenon of overweight and obesity among children also concerns Poland, which, according to the WHO, ranks 8th in overweight children out of 34 countries participating in the study and 10th in obesity [8]. The main cause of this situation is excessive calorie consumption with low expenditure and insufficient physical activity [9].

The most common nutritional errors among children and adolescents include excessive consumption of animal fats, table salt and simple sugars, along with insufficient consumption of fish, fruit and vegetables, whole grain bread, as well as milk and its products. The above information proves that the current way of feeding children and adolescents is often incorrect. The reasons for this state of affairs can be attributed to, among others, environmental, cultural, demographic and economic factors.

When diagnosing overweight and obesity, in addition to measuring body weight, it is also important to analyze the diet, including the need for fluids. Water is necessary for life and constitutes the largest share in the composition of the human body. Therefore, drinking fluids is an important element of a balanced diet. Water is necessary, among others: in the process of digesting food, absorbing nutrients and excreting metabolic products. Therefore, adequate hydration of the body through the supply of fluids, including good quality water, is a very important element of a safe nutrition strategy in all age groups [10]. Its content in the human body changes with age [11]. The daily water requirement in children is estimated at 10-15% of their body weight and is 1,900-2,000 ml/day for girls aged 10-18, and 2,100-2,500 ml/day for boys (10-18 years of age). Insufficient fluid intake can quickly lead to dehydration, which causes serious health disorders. The sources of water in the diet are drinks and food products. Of these products, vegetables (up to 95%) and fruits (up to 87%) contain the most water [10].

It should be remembered that the demand for water depends not only on gender and age but also on body fat content, diet composition, ambient temperature, climate and physical activity [12].

Unfortunately, over the last few years, changes in the structure of fluid consumption have been observed among Polish youth – traditional drinks, e.g. tea and milk, are being replaced by modern products such as energy drinks, isotonic drinks and carbonated drinks. In connection with the above, the question of how young people satisfy their demand for water becomes important.

Aim of the work

The aim of the study was to assess the amount of fluids consumed by school-age children and adolescents and to analyze the types of drinks chosen.

Research problems:

1. How often and how much do school children and adolescents consume fluids during the day?
2. What kind of drinks are most often chosen by school children and adolescents?

Material and methods

The research material consisted of data obtained from 2,986 children and adolescents 10 to 18 years of age attending selected schools in Poland that joined the e-PE program. The research was conducted in selected schools from September to October 2022. Information on eating habits, including fluid consumption, is still collected on a continuous basis using the above-mentioned platform. It is an innovative tool that makes it easier for physical education teachers to work on-site and remotely. Its aim is to use modern tools in diagnosing fitness and endurance and monitoring the level of physical activity of children and adolescents. The e-PE platform provides free access to an extensive database of teaching materials for teachers. The project was held under the honorary patronage of the Polish Ministry of Education and Science and the Ministry of Sport.

The diagnostic survey method and survey technique were chosen to carry out the research. The tool was a self-authored questionnaire consisting of questions regarding the amount and type of fluids consumed by school children and adolescents. The questionnaire consisted of 22 questions regarding eating habits, regularity of meals, frequency and types of products consumed, assessment of the current diet, as well as the amount and type of fluids consumed. The questions in the survey were closed, open and semi-open, with a single choice option, and in the case of questions regarding examples of food product preferences – multiple choice options. For the purposes of this study, the results regarding hydration of school children and adolescents were used. The study used simple statistical analysis.

Results

As a result of the research conducted on the recommended amount of fluid intake, the following results were obtained. 2/3 of respondents (62.4%) care about proper daily hydration of the body, including 48.2% drinking 1.5-2 liters daily, the rest (14.2%) drinking more than 2 liters of fluids a day. Unfortunately, the rest did not fully meet the current recommendations regarding the amount of fluids consumed. In this group, as many as 33.5% of them satisfied their needs with only 0.5 to 1 liter during the day. What is disturbing is that over 4% of young people do not drink the minimum amount, and the values they present are extremely low and therefore dangerous to their health (Table 1).

Table 1. Fluid consumption in the study group

How often do school children and adolescents consume fluids during the day?		% of respondents
Question	Answer	
Amount of fluids consumed during the day	0.5-1 l	33.5
	1.5-2 l	48.2
	up to 0.5 l	4.1
	more than 2 l	14.2

The preferences for drinks, expressed by the most frequent declared consumption, were varied in the study group. In the question regarding the most common choice of liquids, the respondents had the opportunity to choose only five answers from among numerous options. The most frequently appearing variant was still water,

chosen by over 78% of children and adolescents. Unfortunately, the respondents chose sweetened tea in second place. This was popular with 62.7% of respondents. The study participants next selected processed fruit juices (55.8%). Then they mentioned other sweet drinks (37%). At a similar level, the respondents chose: sugar-free tea (35.2%), carbonated water (34%), freshly squeezed fruit juices (33.9%) and cocoa (33.3%). However, compotes and carbonated drinks were present in the diet of the respondents in the same percentage – 29.6%. Other drinks (16.4%) and “light” or “zero” drinks (14.5%) were less popular. Occasionally, the menu included freshly squeezed vegetable juices (5.7%) and processed vegetable juices (4.5%). The choice of energy drinks is alarming, and as many as 18.1% of young people unfortunately declared this choice (Table 2).

Table 2. Types of drinks chosen by the study group

Which drinks are most often chosen by school children and adolescents?		% of respondents
Question	Answer	
Fluid intake (please check 5 answers)	still water	78.1
	sweetened tea	62.7
	processed fruit juices (carton, bottle)	55.8
	sweet drinks	37.3
	tea without sugar	35.2
	sparkling water	34.0
	freshly squeezed fruit juices	33.9
	cocoa	33.3
	compotes	29.6
	fizzy drinks	29.6
	energy drinks	18.1
	other	16.4
	“light” or “zero” drinks	14.5
	freshly squeezed vegetable juices	5.7
	processed vegetable juices (box, bottle)	4.5

Discussion

According to the currently proposed goals of the “Health for All” strategy, one of the more serious social problems of the WHO member states is ensuring the health of the young generation through its harmonious development, both physical and mental [13]. The implementation of this action is certainly supported by the significant progress in knowledge observed in recent years on the impact of genetic and environmental conditions on the health condition of individuals and the general public. Extensive research conducted so far allows us to believe that the lifestyle of the youngest, and in particular proper nutrition combined with physical activity, is not only an important determinant of health, but it also determines the high biological value of future generations.

The nutritional status of young generations, determined by knowledge and eating habits, has a significant impact on their proper development and subsequent health. Maintaining positive eating habits helps one not only to maintain a healthy body weight but to also reduce the risk of diet-related diseases in the future. Therefore, a properly balanced diet, optimal both in terms of quantity and the quality of the food consumed, determines proper functioning of the body at every stage of ontogenesis [14]. This approach is particularly important in the case of children, for whom rational nutrition from the first days of life is crucial for their proper growth and development [15]. In this study, the authors showed that students attending primary schools in selected rural areas have inappropriate eating habits, and their eating habits are not properly balanced.

Unfortunately, following a balanced diet is not an easy task. Currently, the lifestyle of children and teenagers has never been as similar to the lifestyle of adults. Often, the lack of exercise and parents' preference for passive ways of spending free time translate into the way of life of the young generation [16]. The restriction of physical activity and sometimes even hypokinesia have a number of dangerous health consequences in the form of many epidemic diseases. Eating processed and high-calorie fast food products, as well as drinking carbonated drinks, is also worrying. Excessive consumption of sweetened products, small amounts of vegetables and fruit in the diet and eating meals irregularly are also serious problems. The above behaviors that children and young people learn from their family home become their habits, which, unfortunately, become more and more difficult to change as the child grows older. This is facilitated by the everyday functioning of the Polish family, which is different from 30-40 years ago [16]. Long-term work and study has certainly introduced disturbances in home eating patterns. Unfortunately, traditional home nutrition has been replaced by eating meals at work, when studying and on the way to or from work or school [17].

This applies especially to children and adolescents – these age groups have a relatively high demand for water, necessary to maintain proper body composition. The best drink for children and adults is microbiologically and chemically safe water. Proper hydration is a condition of health. Over the last few years, a change in the structure of fluids consumed by young people has been observed. Currently, there is still a high consumption of sweetened drinks, especially those containing caffeine but which have no significant nutritional value [18]. It is commonly known, unfortunately, that the supply of fluids containing carbohydrates results in a higher energy balance, which in turn affects the balance of carbohydrates, fats and proteins needed for the proper growth and development of young organisms [19].

Data on the water content in Great Britain [20], France [21], Spain [22] and the United Arab Emirates [23] published in recent years indicate that it is often too small. In the UK, the percentage of children who drank less water than recommended was 92.8%. However, adequate water consumption amounted to 11% in France, 20.3% in Spain and 36% in the United Arab Emirates.

In Poland, the problem of consumption of sweet drinks among young people is the subject of analysis, observations and disturbing reports from various research centers. A review of literature on the subject provides numerous evidence confirming irregularities in this matter. The results of our own research correspond to the findings of other authors, who indicate the prevalence of bad eating habits in the population of children. In our own study, the respondents appeared to consume adequate amounts of fluids, including water. However, the high frequency of consuming sweetened drinks may be worrying. Łoboda and Gawęcki reached similar conclusions [11], and similar errors were found in other centers [24,25]. An analysis of literature allows for the collection of valuable information regarding the health consequences of improper hydration and nutrition of school children and adolescents [26,27]. The discussed problem is also widely described in foreign publications [28,29]. Many authors present outrageous behavior in relation to the consumption of high-sugar drinks by children and adolescents in various countries in Europe and around the world [30-36]. In Kostecka's study, students most often drank bottled multi-fruit juices (56.0%) and sweet, carbonated drinks (48.0%) [37]. Our own research confirms that the fluids consumed were improperly composed from the point of view of the principles of proper nutrition. Although 78.1% of students declared the consumption of still water, the high consumption of sweetened tea (62.7%) is unfortunately a disturbing phenomenon. However, in the analysis of the frequency and choices regarding fluid consumption in a group of school children and adolescents from the Kraków area, the vast majority of students indicated adequate daily water consumption. However, over 1/3 of them choose water with the addition of juice/syrup or flavored water [38]. The observation conducted by Decyk-Chęcel and Kolanowski [39] shows that despite the declaration of choosing water every day, a high consumption of sweet, carbonated drinks (55.5%) and juices (49.7%) was unfortunately recorded. In turn, research conducted in Australia shows

that the most frequently consumed liquids, in the opinion of 77% of young people, were sweet drinks. Their average consumption was high and amounted to approximately 500 ml, and 31% of students consumed this drink in an amount of 750 ml per day [40].

The above issues regarding the consumption of fluids, especially sweetened ones, seem particularly important from the point of view of broadly understood prophylaxis and public health protection and should be one of the priorities of modern dietetics. Consuming excess processed fluids with added sugar may play a role in the obesity epidemic.

Conclusions

The results of the research and the analysis of literature on the subject lead to the following conclusions:

1. Proper fluid intake during the day applies to 2/3 of the respondents. Unfortunately, the rest do not drink the recommended amount of liquids.
2. The choice of the type of fluids is a positive signal. The respondents most often chose still water.
3. Unfortunately, the level of consumption of energy drinks is worrying; as many as 18.1% of young people prefer such a drink.
4. Therefore, in order to eliminate this unfavorable nutritional pattern, it is necessary to systematically monitor one's condition and diet in the early stages of life, because childhood is the most appropriate period to shape this properly.

The above observations justify the urgent need to emphasize and further properly regulate these issues in the National Health Program for the coming years. The consumption of sweet and carbonated drinks is a significant problem in many places around the world. The essence and importance of the presented issue requires continuous analysis, especially regarding younger and younger children, because bad eating habits repeated during childhood are difficult to eliminate in the subsequent years of life. These suggestions are based on the belief that the health condition of the youngest is the most important determinant of the proper growth and maturation of children and adolescents. Moreover, given the rapid pace of development of new food products, including functional and convenient foods, it will also be important to continue monitoring trends in the consumption of such drinks, especially by the youngest.

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References:

1. Łagowska K, Woźniewicz M, Jeszka J. [Comparison of eating habits of young people taking into account gender and level of physical activity]. *ROCZN. PZH.* 2011; 62(3): 335-342 (in Polish).
2. Pieszko-Klejnowska M, Pęgiel-Kamrat J, Zarzecka-Baran M, Stankiewicz M, Kozanecka I, Łysiak-Szydłowska W. [Differences in the diet of junior high school students in the Pomeranian Voivodeship depending on gender]. *Probl Hig Epidemiol.* 2006; 87(4): 278-283 (in Polish).
3. Wolnicka K, Jaczewska-Schuetz J, Taraszewska A. [Assessment of the nutritional value of daily food rations for children attending primary schools in Warsaw]. *Rocz Panstw Zakł Hig.* 2012; 63(4): 447-453 (in Polish).
4. Sosińska AL, Kowalik J, Kopański Z, Brukwicka I, Wojciechowska M, Furmanik F. [Knowledge and health-promoting behavior in the field of proper nutrition based on research on secondary school students]. *Journal of Public Health, Nursing and Medical Rescue.* 2012; 1: 27-32 (in Polish).
5. Maksymowicz-Jaroszuk J, Karczewski J. [Assessment of the behavior and eating habits of junior high school students from the Białystok area]. *Hygeia Public Health.* 2010; 45(2): 167-172 (in Polish).
6. Figurska-Ciura D, Wencel D, Łoźna K, Biernat J. [Nutrition of 13-year-old youth from a small town]. *ROCZN. PZH.* 2009; 60(3): 235-239 (in Polish).
7. Gardner DSL, Hosking J, Metcalf BS, Jeffery AN, Voss LD, Wilkin TJ. Contribution of early weight gain to childhood overweight and metabolic health: a longitudinal study (*EarlyBird 36*). *Pediatrics.* 2009; 123: e67-e73. <https://doi.org/10.1542/peds.2008-1292>
8. World Health Organization. Obesity and overweight [Internet]. Geneva: WHO; 2021 Jun 9 [access 2023 Nov 3]. Available online: <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
9. Baran J, Weres A, Czenczek-Lewandowska E, Łuszczki E, Sobek G, Pitucha G, et al. Early eating patterns and overweight and obesity in a sample of preschool children in South-East Poland. *Int J Environ Res Public Health.* 2019; 16: 3064. <https://doi.org/10.3390/ijerph16173064>
10. Jarosz M. editor. [Dietary standards for the Polish population – revision]. Warsaw: Narodowy Instytut Zdrowia Publicznego – Państwowy Zakład Higieny; 2020 (in Polish).
11. Łoboda D, Gawęcki J. [Intake of liquids in the diet of a chosen group of teenagers and their body content]. *Probl Hig Epidemiol.* 2011; 92(1): 83-88 (in Polish).
12. Brzozowska A, Gawęcki J. editors. [Water in nutrition and its sources]. Poznań: AR; 2008 (in Polish).
13. Micha R, Karageorgou D, Bakogianni I, Trichia E, Whitsel LP, Story M, et al. Effectiveness of school food environment policies on children's dietary behaviors: A systematic review and meta-analysis. *PLoS ONE.* 2018; 13: e0194555. <https://doi.org/10.1371/journal.pone.0194555>
14. Zalewska M, Maciorkowska E. [The role of nutritional education in the population of children and adolescents]. *Medycyna Ogólna i Nauki o Zdrowiu.* 2013; 19: 375-378 (in Polish).
15. Jonczyk P, Potempa M, Kajdaniuk D. Level of nutrition and nutrition disorders as well as characteristics of dietary habits and physical activity among 6–13-year-old children attending selected primary schools in Opole and Silesia Provinces in Poland. *Pediatr Med Rodz.* 2016; 12(2): 177-193. <https://doi.org/10.15557/PiMR.2016.0018>
16. Platta A, Puksza T. The level of interest regarding nutrition issues among the selected group of children and teenagers aged 10-16 years. *Scientific Journal of Gdynia Maritime University.* 2018; 104: 83-90.
17. Sikorska-Wiśniewska G. [Overweight and obesity in children and adolescents]. *Żywność. Nauka. Technologia. Jakość.* 2007; 6(55): 71-80 (in Polish).

18. Ricciuto L, Fulgoni VL, Gaine PC, Scott MO, DiFrancesco L. Intakes of added sugars, with a focus on beverages and the associations with micronutrient adequacy in US children, adolescents, and teens (NHANES 2003-2018). *Nutrients*. 2023; 15: 3285. <https://doi.org/10.3390/nu15153285>
19. Committee on Nutrition and the Council on Sports Medicine and Fitness. Clinical report – sports drinks and energy drinks for children and adolescents: are they appropriate?. *Pediatr*. 2011; 127(6): 1182-1189. <https://doi.org/10.1542/peds.2011-0965>
20. Vieux F, Maillot M, Constant F, Drewnowski A. Water and beverage consumption patterns among 4 to 13-year-old children in the United Kingdom. *BMC Public Health*. 2017; 17: 479. <https://doi.org/10.1186/s12889-017-4400-y>
21. Vieux F, Maillot M, Constant F, Drewnowski A. Water and beverage consumption among children aged 4-13 years in France: analyses of INCA 2 (Étude Individuelle Nationale des Consommations Alimentaires 2006-2007) data. *Public Health Nutr*. 2016; 19(13): 2305-2314. <https://doi.org/10.1017/S1368980015003614>
22. Perales-García A, Ortega RM, Urrialde R, López-Sobaler AM. Physical activity and sedentary behavior impacts on dietary water intake and hydration status in Spanish schoolchildren: across-sectional study. *PLoS One*. 2018; 31(13): e0208748. <https://doi.org/10.1371/journal.pone.0208748>
23. Ali HI, Al Dhaheri AS, Elmi F, Ng SW, Zaghoul S, Ohuma EO, et al. Water and beverage consumption among a nationally representative sample of children and adolescents in the United Arab Emirates. *Nutrients*. 2019; 11(9): 2110. <https://doi.org/10.3390/nu11092110>
24. Woynarowska B, Oblacińska A. [Shared second breakfast at school. A guide for school principals and employees as well as students' parents]. Warszawa: Ośrodek Rozwoju Edukacji; 2014 (in Polish).
25. Sińska B, Kucharska A, Michota-Katulska E, Zegan M. [Breakfasts of primary school students – qualitative assessment]. *Pielęg Pol*. 2015; 3(57): 273-277 (in Polish).
26. Bajurna B, Gałęba A, Podhajna P, Marcinkowski JT. Various periods of obesity risk among children and adolescents. *Hygeia Public Health*. 2014; 49(2): 244-248.
27. Kwiecień M, Winiarska-Mieczan A, Kwiatkowska K, Kamińska E, Rusinek-Prystupa E, Kiczorowska B, et al. [Assessment of eating habits of school-age children in terms of obesity]. *Probl Hig Epidemiol*. 2017; 98(3): 260-265 (in Polish).
28. Wang YC, Ludwig DS, Sonneville K, Gortmaker SL. Impact of change in sweetened caloric beverage consumption on energy intake among children and adolescents. *Arch Pediatr Adolesc Med*. 2009; 163(4): 336-343. <https://doi.org/10.1001/archpediatrics.2009.23>
29. Muckelbauer R, Libuda L, Clausen K, Toschke AM, Reinehr T, Kersting M. Promotion and provision of drinking water in schools for overweight prevention: randomized, controlled, cluster trial. *Pediatrics*. 2009; 123(4): e661-e667. <https://doi.org/10.1542/peds.2008-2186>
30. Basterfield L, Jones AR, Parkinson KN, Reilly J, Pearce MS, Reilly JJ, et al. Physical activity, diet and BMI in children aged 6-8 years: a cross-sectional analysis. *BMJ Open*. 2014; 4: e005001. <https://doi.org/10.1136/bmjopen-2014-005001>
31. Garipagaoglu M, Budak N, Süt N, Akdikmen Ó, Oner N, Bundak R. *J Pediatr Nurs*. 2009; 24: 332-337. <https://doi.org/10.1016/j.pedn.2008.04.003>
32. Papandreou D, Malindretos P, Rousso I. Risk factors for childhood obesity in a Greek paediatric population. *Public Health Nutr*. 2010; 13(10): 1535-1539. <https://doi.org/10.1017/S1368980009993156>
33. Oliveira LB, Aubrey Sheiham A, Bönecker M. Exploring the association of dental caries with social factors and nutritional status in Brazilian preschool children. *European Journal of Oral Sciences*. 2008; 116(1): 37-43. <https://doi.org/10.1111/j.1600-0722.2007.00507.x>

34. Eloranta AM, Lindi V, Schwab U, Tompuri T, Kiiskinen S, Lakka H-M, et al. Dietary factors associated with overweight and body adiposity in Finnish children aged 6-8 years: the PANIC Study. *International Journal of Obesity*. 2012; 36: 950-955. <https://doi.org/10.1038/ijo.2012.89>
35. de Gouw L, Klepp KI, Vignerova J, Lien N, Steenhuis IH, Wind M. Associations between diet and (in) activity behaviours with overweight and obesity among 10-18-year-old Czech Republic adolescents. *Public Health Nutr*. 2010; 13: 1701-1707. <https://doi.org/10.1017/S1368980010002259>
36. Lehto R, Ray C, Lahti-Koski M, Roos E. Meal pattern and BMI in 9-11-year-old children in Finland. *Public Health Nutr*. 2011; 14: 1245-1250. <https://doi.org/10.1017/S1368980010003034>
37. Kostecka M. [Proper nutrition of early school children as an essential element in the prevention of lifestyle diseases]. *Med Og Nauk Zdr*. 2014; 20(2): 208-213 (in Polish). <https://doi.org/10.5604/20834543.1112239>
38. Piórecka B, Kozioł-Kozakowska A, Jagielski P, Schlegel-Zawadzka M. [Frequency and choices regarding fluid consumption in a group of school children and adolescents from Niepołomice and Kraków]. *Bromat. Chem. Toksykol*. 2019; 2: 168-174 (in Polish).
39. Decyk-Chęcel A, Kolanowski W. [Prevalence of overweight and obesity and eating habits among children aged 10-12 in terms of water and beverage consumption]. *Probl. Hig. Epidemiol*. 2018; 99(2): 134-139 (in Polish).
40. Jensen BW, Nichols M, Allender S, de Silva-Sanigorski A, Millar L, Kremer P, et al. Consumption patterns of sweet drinks in a population of Australian children and adolescents (2003-2008). *BMC Public Health*. 2012; 12: 771. <https://doi.org/10.1186/1471-2458-12-771>