

CONSUMPTION OF SELECTED GROUPS OF FOOD PRODUCTS BY MEDICAL AND NON-MEDICAL STUDENTS DURING THE COVID-19 PANDEMIC

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ABSTRACT

Background. A properly balanced diet should provide multiple valuable nutrients necessary for the proper functioning of the body through the proper frequency of consuming food products that are their source. This is particularly important during the pandemic when there is a need to support the immune system.

Objective. The aim of the study was to assess the frequency of consumption of selected groups of food products and to determine whether this frequency differs among medical and non-medical students in the period before and during the COVID-19 pandemic.

Material and methods. The study was conducted among 435 Polish and Turkish students using an original questionnaire. The proper study was preceded by a pilot study in 40 participants. The Wilcoxon test was used to assess the differences in the frequency of consumption of selected groups of products among medical and non-medical students both during and before the pandemic. A value of $p < 0.05$ was considered statistically significant.

Results. Significant differences were observed in the frequency of consumption of: sweets ($p = 0.02$ among medical students), salty snacks ($p = 0.03$ among both groups of students), fast food products ($p = 0.00$ among medical and $p = 0.01$ among non-medical students) and energy drinks ($p = 0.02$ among medical and $p = 0.00$ among non-medical student) in the analysed periods of time before and during the COVID-19 pandemic.

Conclusions. The study showed that during the pandemic, the frequency of food products consumption in the study groups of students from medical and non-medical faculties is mostly satisfactory. There were significant differences in the frequency of consumption of sweets, salty snacks, fast food products and energy drinks in both groups of students.

Key words: *frequency of consumption, nutrition, pandemic, students, eating behaviours*

STRESZCZENIE

Wstęp. Odpowiednio zbilansowana dieta powinna dostarczać organizmowi wielu cennych i niezbędnych do prawidłowego funkcjonowania organizmu składników odżywczych, poprzez właściwą częstość spożycia produktów spożywczych będących ich źródłem. Jest to szczególnie ważne w trakcie pandemii ze względu na możliwość wspierania odporności.

Cel. Celem pracy była ocena częstości spożycia wybranych grup produktów spożywczych i stwierdzenie czy istnieją różnice w częstości spożycia wśród studentów kierunków medycznych i niemedycznych, w okresie przed i podczas trwania pandemii COVID-19.

Material i metody. Badanie zostało przeprowadzone wśród 435 studentów narodowości polskiej i tureckiej za pomocą autorskiego kwestionariusza ankiety. Badanie właściwe zostało poprzedzone badaniem pilotażowym, którym objęto 40 osób. Do oceny różnic w częstości spożycia wybranych grup produktów wśród studentów kierunków medycznych i niemedycznych zarówno w trakcie pandemii, jak i przed nią zastosowano test Wilcoxon. Za istotne statystycznie uznano wyniki gdzie poziom istotności $p < 0.05$.

Wyniki. W analizowanych okresach czasu przed i w trakcie pandemii COVID-19 istotne różnice zaobserwowano w częstości spożycia: słodczy ($p = 0,02$ wśród studentów kierunków medycznych), słonych przekąsek ($p = 0.03$ wśród obu grup

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studentów), produktów typu fast food ($p=0,00$ wśród studentów kierunków medycznych i $p=0,01$ wśród niemedycznych) oraz napojów energetycznych ($p=0,02$ wśród studentów medycznych i $p=0,00$ wśród studentów niemedycznych).

Wnioski. Badania wykazały, że w czasie pandemii częstość spożycia produktów spożywczych w badanych grupach studentów zarówno kierunków medycznych, jak i niemedycznych jest w większości zadowalająca. W obu grupach studentów występowały istotne różnice w częstości spożycia słodczy, słonych przekąsek, produktów typu fast food oraz napojów energetycznych.

Słowa kluczowe: częstość spożycia, odżywianie, pandemia, studenci, zachowania żywieniowe

INTRODUCTION

The ongoing Sars-CoV-2 pandemic gives rise to many negative states and emotions, such as constant anxiety, fear, stress, fatigue and depression [26]. Despite the passage of time, remote work, online schooling and other pandemic-related limitations have brought about adverse changes in many dimensions, especially in social relations, mental and physical health, as well as have contributed to disturbing lifestyle changes, including eating [5, 15, 22]. Meanwhile, nutrition is very important as a properly balanced diet provides our bodies with multiple valuable nutrients necessary for the proper development. This is of key importance as proper nutrition enhances the immune system, which plays a critical role in combating the virus [3]. It should be therefore ensured that the diet used is rich in unprocessed products, macro- and microelements, such as high-quality proteins, polyunsaturated fatty acids and vitamins, A, C, E and group B vitamins in particular, as well as minerals, such as selenium and zinc [4]. Regular supply of these nutrients can contribute to a significant improvement of immunity, which is of great importance during Sars-CoV-2 pandemic [9]. At this point, it is worth paying attention to whether our everyday eating behaviours are consistent with the current recommendations. Proper selection of nutritional products to boost the immune system and thus reduce the risk of coronavirus infection is recommended [28].

During the pandemic, both medical and non-medical university students are a population characterised by multiple changes on many levels, as confirmed by abundant scientific evidence [5, 15, 22, 26]. These changes are caused, among others, by social isolation or limited social contacts leading to many irregularities, including eating disorders, which may in turn contribute to e.g. abnormal body weight [2]. It is generally recommended to have 4 to 5 meals a day. The meals should contain appropriate nutrients and should be consumed at regular times (at certain intervals), starting with breakfast no later than one hour after waking up, and ending with supper no later than 2 to 3 hours before bedtime. It is essential that these meals contain an adequate amount of high-quality food products. An appropriate frequency of consumption of these foods is also important.

Generally, food products can be classified into two major categories - healthy and unhealthy. Healthy products, which should be consumed at the highest possible frequency, include milk and dairy products, eggs, fatty sea fish, lean meats, vegetables and fruits, nuts, vegetable fats, grain products, and dry legume seeds. These are essential dietary components due to both their content of valuable substances, such as flavonoids, antioxidants, vitamins, dietary fiber, and their anti-inflammatory properties, which reduce the risk of chronic metabolic diseases, including diabetes, cardiovascular diseases and some types of cancer [4, 12, 19]. On the other hand, the group of unhealthy products, the consumption of which should be limited to the necessary minimum in order to gradually and completely eliminate them from the daily diet, include, among others, fast-foods and instant foods, highly processed products, sweetened beverages, sweets, salty snacks, high-fat meats, animal fats, as well as all types of stimulants (including alcohol, drugs and tobacco products), which contribute to the development of many chronic metabolic diseases that may be responsible for premature death [11, 20, 21].

The aim of the study was to assess the frequency of consumption of selected groups of food products and to determine whether this frequency differs among medical and non-medical students in the period before and during the COVID-19 pandemic.

MATERIALS AND METHODS

The study was conducted among 435 Polish and Turkish students, aged 17-27, during the COVID-19 pandemic, in the winter season (period from November 2020 to February 2021), during the intensification of restrictions related to the spread of the virus. The selection of the study group was related to the authors' willingness to present the impact of the pandemic on the lifestyle of the multicultural group. The questionnaire, which included products and meals consumed both in Poland and in Turkey, was distributed with the use of social media, among internet groups of medical and non-medical students, in the appropriate language. All questionnaires were completed correctly. The participants were informed about the anonymity of the study and the use of data solely for scientific purposes. An original questionnaire enquiring about background

data, such as the mode, form and field of study, was used. The questionnaire also asked about the number of meals per day and breakfast consumption, as well as the frequency of consumption of selected groups of food products in the period before and during the COVID-19 pandemic.

The proper study was preceded by a pilot study in 40 participants. Ultimately, 196 questionnaires completed by medical students and 239 questionnaires completed by non-medical students were collected. Data processing was performed using Microsoft Excel 2010 and Statistica 13.1 software. The *Wilcoxon* test was used to assess the differences in the frequency of consumption of selected groups of products among medical and non-medical students both during and before the pandemic. A value of $p < 0.05$ was considered statistically significant.

RESULTS

The number of meals eaten a day and breakfast consumption before and during the pandemic are shown in Table 1.

The majority of medical students consumed 4-5 meals a day both before and during the pandemic (51% and 44.4%, respectively), whereas non-medical students had 3 meals a day (44.8% and 40.6%, respectively). The majority of both medical and non-medical students declared that they always had breakfast before and during the pandemic (56.6% and 70.9% medical students, and 49.4% and 64.4% non-medical students, respectively).

The frequency of consumption of selected plant products before and during the pandemic are presented in Table 2.

Most medical students reported that they had several servings of vegetables and fruit per day before and during the pandemic (44.9% and 47.4% for vegetables, and 38.3% and 40.3% for fruit, respectively). The largest group of non-medical students consumed vegetables once a day before the pandemic, and several

times a week during the pandemic (34.3% and 32.2%, respectively), while they usually had several servings of fruit per week both before and during the pandemic (34.3% and 35.1%, respectively).

Both groups of students consumed whole grain cereal products several times a day before and during the pandemic (50.5% and 49.5% of medical students, and 40.6% and 40.6% of non-medical students, respectively).

The highest percentage of medical students had several servings of nuts and seeds per week (31.1% and 35.2%, respectively) both before and during the pandemic, while the largest percentage of non-medical students consumed these products several times a month (33.1% and 38.1%, respectively).

The highest percentage of medical students consumed legume seeds several times a week before and during the pandemic (46.4% and 51.5%, respectively) compared to several times a month in the case of non-medical students (35.1% and 33.1% respectively).

No statistically significant differences were found in the frequency of consumption of plant products between medical and non-medical students in the analysed periods of time before and during the pandemic.

The frequency of consumption of the selected products of animal origin before and during the pandemic are presented in Table 3.

Both before and during the pandemic, the highest percentage of students from both groups consumed milk and dairy products several times a week (39.8% and 36.7% of medical students, and 38.1% and 36.8% of non-medical students, respectively).

The largest group of medical and non-medical students consumed cottage and rennet cheeses several times a week both before and during the pandemic. Cottage cheese was consumed by 46.9% and 41.8% of medical students, 41.8% and 38.9% of non-medical students, respectively; rennet cheeses were consumed by 37.2% and 39.3% of medical students, and 42.3% and 41% of non-medical students, respectively).

Table 1. Amount of meals and breakfast consumption by studied medical and non-medical students

Tested factor		Before pandemic				During pandemic			
		Medical		Non-medical		Medical		Non-medical	
		N	%	N	%	N	%	N	%
Amount of meals	<3	15	7.7	21	8.8	35	17.9	40	16.7
	3	74	37.8	107	44.8	67	34.2	97	40.6
	4-5	100	51	106	44.4	87	44.4	95	39.7
	>5	7	3.6	5	2.1	7	3.6	7	2.9
Breakfast consumption	Always	111	56.6	118	49.4	139	70.9	154	64.4
	Occasionally	69	35.2	75	31.4	47	24	68	28.5
	Never	16	8.2	46	19.2	10	5.1	17	7.1

Table 2. Frequency of consumption of selected plant products before and during the pandemic

Frequency of consumption		Before the pandemic				During the pandemic				Differences in consumption	
		Medical		Non-medical		Medical		Non-medical		Medical	Non-medical
		N 196	%	N 239	%	N 196	%	N 239	%	p- value	
Vegetables	Several times a day	88	44.9	67	28	93	47.4	68	28.5	0.07	0.07
	Once a day	31	15.8	82	34.3	30	15.3	68	28.5		
	Several times a week	62	31.6	70	29.3	64	32.7	77	32.2		
	Several times a month	5	2.6	12	5	5	2.6	17	7.1		
	Occasionally	8	4.1	8	3.3	1	0.5	8	3.3		
	Never	2	1	0	0	3	1.5	1	0.4		
Fruit	Several times a day	75	38.3	55	23	79	40.3	50	20.9	0.10	0.69
	Once a day	42	21.4	60	25.1	44	22.4	63	26.4		
	Several times a week	54	27.6	82	34.3	55	28.1	84	35.1		
	Several times a month	14	7.1	27	11.3	12	6.1	29	12.1		
	Occasionally	10	5.1	15	6.3	5	2.6	13	5.4		
	Never	1	0.5	0	0	1	0.5	0	0		
Whole grain cereal products	Several times a day	99	50.5	97	40.6	97	49.5	97	40.6	0.51	0.93
	Once a day	35	17.9	65	27.2	31	15.8	59	24.7		
	Several times a week	43	21.9	57	23.8	45	23	65	27.2		
	Several times a month	11	5.6	11	4.6	17	8.7	12	5		
	Occasionally	7	3.6	6	2.5	6	3.1	4	1.7		
	Never	1	0.5	3	1.3	0	0	2	0.8		
Nuts and seeds	Several times a day	11	5.6	11	4.6	7	3.6	8	3.3	0.82	0.17
	Once a day	23	11.7	24	10	24	12.2	18	7.5		
	Several times a week	61	31.1	62	25.9	69	35.2	61	25.5		
	Several times a month	58	29.6	79	33.1	53	27	91	38.1		
	Occasionally	33	16.8	48	20.1	34	17.3	39	16.3		
	Never	10	5.1	15	6.3	9	4.6	22	9.2		
Legumes	Several times a day	8	4.1	3	1.3	4	2	9	3.8	0.48	0.57
	Once a day	10	5.1	11	4.6	10	5.1	10	4.2		
	Several times a week	91	46.4	72	30.1	101	51.5	61	25.5		
	Several times a month	51	26	84	35.1	50	25.5	79	33.1		
	Occasionally	27	13.8	52	21.8	25	12.8	59	24.7		
	Never	9	4.6	17	7.1	6	3.1	21	8.8		

The largest group of medical and non-medical students consumed fish several times a month both before and during the pandemic (39.3% and 40.3% of medical students, 44.8% and 43.9% of non-medical students, respectively).

No statistically significant differences were found in the frequency of consumption of animal products between medical and non-medical students in the analysed periods of time before and during the pandemic. The frequency of consumption of the selected products harmful to health before and during the pandemic are presented in Table 4

The largest group of medical and non-medical students consumed sweets and salty snacks several times a week both before and during the pandemic. Sweets were consumed by 37.8% and 43.4% of medical students, and 42.3% and 40.6% of non-medical students, respectively. The group of medical students consuming sweets once a day during the pandemic decreased by 5.1% compared to the time before the pandemic. Salty snacks were consumed several times a week by 33.2% and 31.1% of medical students and 40.2% and 37.2% of non-medical students, respectively. The group of medical students consuming salty snacks once a day

Table 3. Frequency of consumption of the selected products of animal origin before and during the pandemic

Frequency of consumption		Before the pandemic				During the pandemic				Differences in consumption	
		Medical		Non-medical		Medical		Non-medical		Medical	Non-medical
		N 196	%	N 239	%	N 196	%	N 239	%	p-value	
Milk and milk drinks	Several times a day	62	31.6	34	14.2	66	33.7	35	14.6	0.87	0.43
	Once a day	37	18.9	59	24.7	33	16.8	54	22.6		
	Several times a week	78	39.8	91	38.1	72	36.7	88	36.8		
	Several times a month	11	5.6	29	12.1	16	8.2	37	15.5		
	Occasionally	4	2	16	6.7	4	2	14	5.9		
	Never	4	2	10	4.2	5	2.6	11	4.6		
Cottage cheese	Several times a day	41	20.9	21	8.8	47	24	19	7.9	0.63	0.28
	Once a day	18	9.2	23	9.6	17	8.7	26	10.9		
	Several times a week	92	46.9	100	41.8	82	41.8	93	38.9		
	Several times a month	28	14.3	60	25.1	30	15.3	63	26.4		
	Occasionally	8	4.1	24	10	10	5.1	24	10		
	Never	9	4.6	11	4.6	10	5.1	14	5.9		
Rennet cheeses	Several times a day	17	8.7	19	7.9	16	8.2	20	8.4	0.66	0.47
	Once a day	16	8.2	43	18	21	10.7	38	15.9		
	Several times a week	73	37.2	101	42.3	77	39.3	98	41		
	Several times a month	46	23.5	37	15.5	41	20.9	44	18.4		
	Occasionally	28	14.3	22	9.2	16	8.2	21	8.8		
	Never	16	8.2	17	7.1	25	12.8	18	7.5		
Fish	Several times a day	1	0.5	0	0	0	0	1	0.4	0.31	0.28
	Once a day	2	1	3	1.3	1	0.5	4	1.7		
	Several times week	45	23	37	15.5	52	26.5	43	18		
	Several times a month	77	39.3	107	44.8	79	40.3	105	43.9		
	Occasionally	42	21.4	66	27.6	35	17.9	56	23.4		
	Never	29	14.8	26	10.9	29	14.8	30	12.6		

during the pandemic decreased by 4% compared to the time before the pandemic.

The largest percentage of medical students consumed fast foods occasionally before and during the pandemic (36.7% and 41.8%, respectively), while non-medical students consumed fast foods several times a month (34.3% and 35.1%, respectively). The group of medical students who do not consume eat fast food during the pandemic increased by 10.2%, while the group of non-medical students increased by 6.2%.

Most respondents in both groups declared that they did not consume energy drinks (62.8% and 68.4% of medical students, and 51% and 59.8% of non-medical students, respectively). The group of medical students who do not consume energy drinks increased by 5.6% during the pandemic, while the group of non-medical students increased by 8.8%.

In the analysed time periods, statistically significant differences were found in the frequency

of consumption of salty snacks, fast food products and energy drinks among medical and non-medical students, as well as in the frequency of consumption of sweets among medical students before and during the pandemic.

DISCUSSION

In the present study, the highest percentage of medical students consumed the recommended number of 4 to 5 meals a day both before and during the pandemic (51% and 44.4%, respectively), whereas the highest percentage of non-medical students consumed 3 meals a day (44.8% before and 40.6% during the pandemic).

The number of consumed meals decreased in both cases. *Fila-Witecka* et al., who assessed lifestyle changes caused by the COVID-19 pandemic among 980 Polish students, showed that 43.92% of these

Table 4. Frequency of consumption of products harmful to health before and during the pandemic

Frequency of consumption		Before the pandemic				During the pandemic				Differences in consumption	
		Medical		Non-medical		Medical		Non-medical		Medical	Non-medical
		N 196	%	N 239	%	N 196	%	N 239	%	p-value	
Sweets	Several times a day	22	11.2	35	14.6	17	8.7	37	15.5	0.02	0.12
	Once a day	34	17.3	46	19.2	24	12.2	37	15.5		
	Several times a week	74	37.8	101	42.3	85	43.4	97	40.6		
	Several times a month	38	19.4	28	11.7	36	18.4	32	13.4		
	Occasionally	24	12.2	23	9.6	25	12.8	27	11.3		
	Never	4	2	6	2.5	9	4.6	9	3.8		
Salty snacks	Several times a day	12	6.1	16	6.7	4	2	13	5.4	0.03	0.03
	Once a day	9	4.6	14	5.9	12	6.1	14	5.9		
	Several times a week	65	33.2	96	40.2	61	31.1	89	37.2		
	Several times a month	56	28.6	69	28.9	60	30.6	65	27.2		
	Occasionally	46	23.5	34	14.2	49	25	41	17.2		
	Never	8	4.1	10	4.2	10	5.1	17	7.1		
Fast food products	Several times a day	3	1.5	2	0.8	0	0	3	1.3	0.00	0.01
	Once a day	2	1	6	2.5	3	1.5	10	4.2		
	Several times a week	42	21.4	64	26.8	33	16.8	43	18		
	Several times a month	67	34.2	82	34.3	48	24.5	84	35.1		
	Occasionally	72	36.7	76	31.8	82	41.8	75	31.4		
	Never	10	5.1	9	3.8	30	15.3	24	10		
Energy drinks	Several times a day	1	0.5	3	1.3	0	0	5	2.1	0.02	0.00
	Once a day	4	2	16	6.7	4	2	11	4.6		
	Several times a week	17	8.7	26	10.9	11	5.6	15	6.3		
	Several times a month	18	9.2	25	10.5	21	10.7	20	8.4		
	Occasionally	33	16.8	47	19.7	26	13.3	45	18.8		
	Never	123	62.8	122	51	134	68.4	143	59.8		

respondents declared a reduction in the amount of food they consumed (13). In turn, *Sidor and Rzymiski* [25] assessed eating habits in 1,097 Polish adults during the COVID-19 pandemic and found an increase in the amount of food consumed among 43.5% of respondents and an increased number of snacks among 51.8% of respondents.

There were no significant changes in breakfast consumption in the analysed periods of time ($p > 0.05$) among medical and non-medical students participating in the present study. Different findings were obtained by *Ismail et al.*, who investigated eating habits and lifestyle behaviours among 2,507 Lebanese adults. The authors observed a significant increase in the frequency of breakfast consumption during the COVID-19 pandemic [17]. In turn, *Husain and Ashkanani* [16], who assessed changes in the dietary habits of 415 adult Kuwaitians during the COVID-19 pandemic, found no significant changes

in the regularity of breakfast consumption, which is in line with the present study. Regular consumption of breakfast during the analysed periods was declared by 61.2% of respondents before the pandemic and 58.2% during the pandemic. In the study on lifestyle and dietary habits before and during the COVID-19 pandemic and quarantine in Brazil, *Souza et al.* [27] reported that the frequency of breakfast consumption decreased during the pandemic compared to the pre-pandemic period. Differences in the results obtained between the cited publications may be due to the type of the group and its place of residence.

In the present study, the percentage of non-medical students consuming vegetables decreased during the pandemic. Most respondents in this group consumed vegetables once a day (34.3%) before the pandemic, and several times a week (32.2%) during the pandemic. There were no changes in the frequency of vegetable consumption

among medical students. These results may suggest greater knowledge of medical university students about the ingredients contained in vegetables that have a beneficial effect on the immune system.

Sidebottom et al. [24], who assessed the impact of COVID-19 pandemic and quarantine and physical activity and eating habits of 291 U.S. students, found no statistically significant differences in the amount of vegetables consumed in the analysed periods before and during the pandemic ($p > 0.05$), as in the group of medical students. *Branaccio* et al., [8] who assessed the impact of the COVID-19 pandemic on professional activity, dietary behaviours, eating habits, and physical activity in the university population of Naples, found that the level of vegetable consumption was very similar both during and before the pandemic. The highest percentage of the surveyed students in the present study consumed cereal products several times a day both before and during the pandemic.

Bertrand et al. [6] assessed the impact of the COVID-19 pandemic on eating habits, physical activity and sedentary lifestyle among 125 Canadian university students; contrary to the findings obtained in the presented study, they found that the average frequency of daily cereal consumption decreased from 1.03 to 0.92 during the pandemic.

In the present study no differences in the frequency of nut consumption were found between medical and non-medical students in the analysed periods of time. Similar results were obtained by *Bertrand* et al. [7]. Different findings were reported by *HacıÖmerYılmaz* et al., [29] who assessed the impact of the pandemic on eating habits and consumer behaviours of 2,692 Turkish students of the Faculty of Health Sciences. The results indicate an increased consumption of nuts among 28.9% of these students.

The consumption of milk and dairy products among both groups participating in the present study did not change in the analysed time periods. The lack of changes in the consumption of dairy products by students of medical and non-medical universities could potentially result from the availability and price of dairy products. Milk and milk drinks are highly available and have a low price in both countries. Different findings were reported by *Celorio-Sarda* et al., [10] who investigated the impact of the COVID-19 pandemic on eating habits and lifestyle behaviours of 339 Spanish students and specialists in food science. The researchers observed an increased consumption of milk, cheese, yoghurt and kefir. The increase in the number of people consuming yoghurt and kefir was especially pronounced among students of gastronomic sciences, who accounted for 33.1% of the study group.

The consumption of fast-food products differed significantly in the study periods, both among medical ($p = 0.00$) and non-medical (p

$= 0.01$) students. Before the pandemic, 5.1% of medical students declared that they did not consume fast-food products, while this percentage increased to 15.3% during the pandemic. Despite the lack of information on the cause of the reduction of fast food products consumption, it is known that a large proportion of gastronomic services were closed during the pandemic. Therefore, it can be hypothesized that limited access to this type of products influenced the frequency of their consumption. In order to confirm the hypothesis, further research should be carried out, taking into account the reasons for the above differences. The difference in fast-food consumption was also observed by *Alfawaz* et al. [1], who investigated the impact of the COVID-19 pandemic on eating behaviours and physical activity among 1,965 Saudi Arabian adults. The study showed that the percentage of individuals who did not consume fast-foods increased from 1.5% to 3.7% during the pandemic.

Energy drinks were consumed occasionally by 16.8% students before and 13.3% during the pandemic, respectively, in both periods of time, and several times a month by non-medical students (10.5% before the pandemic and 8.4% during the pandemic, respectively). Significant differences in the frequency of consumption of this type of products were found in both groups. Similar results were obtained by *Błaszczuk-Bębenek* et al., [7] who compared eating behaviours among 312 Polish adults during the COVID-19 pandemic. The study showed that 78.5% of respondents did not consume energy drinks before the pandemic, and this percentage increased to 85.3% during the pandemic ($p < 0.05$). In turn, *Iurcov* et al. [18] showed in their cross-sectional study on the impact of the COVID-19 pandemic on academic activity and health among Romanian medical dentistry students that 86.14% of these respondents did not consume energy drinks, whereas regular consumption of these beverages was reported by 13.86% of respondents.

During the pandemic, the highest percentage of respondents consumed salty snacks several times a week. Such an answer was given by 31.1% of medical students and 37.2% of non-medical students. This may indicate eating salty snacks by students while staying at home, including quarantine time. *Sabilla* and *Mustakim* [23], who assessed food consumption among 413 public health students in Jakarta, showed that 54.5% of their respondents consumed salty snacks 1-3 times a week, which is a higher percentage compared to the present study.

There are differences in the findings reported by many scientists investigating COVID-19 pandemic-triggered changes in the lifestyle of young adults. Regardless of the above, promotion of a healthy

lifestyle and the principles of rational nutrition among medical and non-medical students should be preceded by collection of dietary data in a given group to provide targeted education that meets its specific needs.

CONCLUSIONS

Significant differences in the frequency of consumption of sweets, salty snacks, fast food products and energy drinks were observed both among medical and non-medical students in the analysed periods of time before and during the COVID-19 pandemic. The frequency of consumption of the analysed groups of food products by medical and non-medical students during the pandemic is mostly satisfactory.

It is recommended to implement nutrition education among both groups of students, with a particular emphasis on promoting food products that have a beneficial effect on health, i.e. vegetables, fruit, nuts, legume seeds, dairy products, and fish.

Conflict of interest

The authors declare no conflict of interest.

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