

## **Over-the-counter medicines and dietary supplements consumption among academic youth in Poland.**

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### **Abstract**

Over-the-counter (OTC) medicines and dietary supplements are increasingly popular in Poland, potentially improving overall health but also posing a threat to public health. The study goal is to characterize and assess behaviors related to use of OTC medicines and dietary supplements among Polish university students. A questionnaire-based survey was performed with students divided into groups (gender, subjects studied, period of studies). The majority of students declared using the products, significantly more females and younger students in their early years. Females tended to be more attentive to product information. Students with a background in biological or medical sciences were also more attentive and less influenced by advertising. We conclude that the differences between the defined groups of students should be utilized in tailored educational activities, aiming to rationalize high consumption of OTC medicines and dietary supplements. Targeting other, especially poor and less-educated groups, should follow.

### **Key words:**

OTC medicine, dietary supplement, self-treatment, college student, gender differences, survey

### **Introduction**

Globally, intensive utilization of medicines started in the 19<sup>th</sup> century in parallel with development of their mass-scale production. Since then, many over-the-counter (OTC) medicines have become available without a physician's prescription in addition to medicines that require a prescription [1]. The major benefit of OTC medicines has been to enable patients to self-treat less serious and common ailments before seeking medical advice. Despite

their common availability, all OTC medicines have to obtain market authorization based on scientific evidence of efficacy and safety. Only such medicinal products which can be dispensed without physicians' prescriptions can be registered as OTC medicines in Poland. While some OTC medicines can be purchased in any kind of outlet or general store, the majority are sold in pharmacies.

Dietary supplements contain concentrated vitamins, minerals or other substances with a nutritional or physiological value. They are intended to be used to supplement the normal diet. They are generally produced as pills or capsules, similarly to formulations typical for medicines. However, they are not medicinal products (used in the treatment or prevention of illnesses) which have a pharmacological, immunologic or metabolic mode of action. Unlike OTC medicines, dietary supplements are classified as food products in Poland. As a result, manufacturers, unlike those of medicinal products, are not required to submit scientific evidence of their effectiveness, safety or interactions with other substances prior to marketing, nor do systems exist for monitoring any adverse events associated with dietary supplementation. Whilst dietary supplement labelling should contain a range of information, including composition and recommended daily doses, manufacturers are not obliged to provide more detailed information as is the case with pharmaceuticals [2]. Neither OTC medicines nor dietary supplements should be used instead of prescription medicines where they are indicated, and taking them cannot substitute for obtaining professional advice from physicians or pharmacists where pertinent.

According to recent research, approximately two thirds of Poles purchase OTC medicines and dietary supplements [3]. Others, though, have reported more modest use of dietary supplements in Poland, with 28% of females versus 16% of males aged above 15 years reporting they consumed dietary supplements at least once yearly [4]. Health consciousness has grown in recent years and healthy lifestyles have become increasingly trendy.

Additionally, changes in pharmaceutical policies may well have stimulated the marketing of these products in Poland, as in recent years there have been severe limitations on the marketing of publicly reimbursed pharmaceuticals, encouraging manufacturers to shift their marketing efforts towards non-reimbursed products, including OTC medicines and dietary supplements [5,6]. Currently these products are one of the most frequently promoted commodities on television and radio, and according to recent research almost 31% of Poles buying OTC drugs make their choices based on advertising [7].

Traditionally young people who undertake college studies make up in the future intellectual elites of their national societies, strongly influencing other groups of citizens. Surprisingly, the amount of information available on their behavior regarding the consumption of OTC medicines and dietary supplements is scarce. Studies on college students in the USA revealed that they tended to use OTC medicines and dietary supplements more frequently than the general public [8,9], and in the USA co-payment for pharmaceuticals can be high, apart from generics. Significantly more female college students (80.0% vs. 64.5% male) reported using OTC medicines. However, there were no gender differences in the use of herbs and dietary supplements, the concurrent use of both product types or the median dose frequency for any product among college students in the USA [9].

A study on self-medication among Slovenian students revealed significant preferences amongst females to acquire medicines for self-medication more often from pharmacies than male students at 93% vs. 82%, relatives (30% vs. 24%), friends (19% vs. 16%), healers (4% vs. 3%) and street markets (1.1% vs. 0.7%) [10]. A study on self-medication among high-school students in the UAE also revealed significant use of vitamins, other nutritional supplements and analgesics among women versus men, although herbal and homeopathic medicines were more popular among males [11].

To date, there have been limited publications regarding OTC medicines and dietary supplements consumption in Poland. A survey published in 2010 on dietary supplementation among Polish students revealed significant gender differences, e.g. 76% of females versus 65% males declared using them [12]. However, another study on dietary supplementation among 440 college students in Poland showed limited use of dietary supplements and no gender differences (e.g., 38.3% of females and 37.7% of males declared using supplements) [13].

Consequently, the goal of this study is to characterize and assess self-care and self-treatment behaviors related to usage of OTC medicines and dietary supplements among a large cohort of college students, including a more detailed analysis of consumption and potential related factors including gender, subjects studied and the period of current studies. This is because a survey by Plichta et al. revealed that 66% of public health students assessed the quality of advertisements and information on OTC medicines as unreliable [14], with another survey suggesting that the majority of college students (especially women) would be interested in getting more knowledge on the safe use of medicines [15]. Female students were also found (significantly more often than males) to seek a physician or pharmacist's advice on using different forms of self-medication, as well as professional advice in the case of the drugs' side effects (97.5% vs 93.5%) and psychological problems including anxiety or depression (90.5% vs. 83.1%) [10].

We have also been interested in finding out whether obtaining more knowledge, as measured by the amount of time spent at higher education institutions, could influence individual behavior. Consequently, we attempted to compare earlier versus later years of studies. We believe that analyzing the consumer and patient behavior of college students could be important from a public health perspective and could contribute to further research in the area of OTC medicines.

## **Methods**

The questionnaire, which has been prepared by the Authors of this study, contained 22 questions, of which 15 were closed, 4 open-ended and 3 semi-open-ended (Appendix 1 - Questionnaire). Questions included the characteristics of individual student's OTC medicines and dietary supplements consumption, their gender, age, main means of support, year at university and their subject of study.

It was assumed that the study subject could potentially influence the purchasing of OTC medicines and dietary supplements. Consequently, respondents were divided into 2 groups depending on their study topic (Appendix 2 – Subjects of study). The first group (labelled as MED-BIOL) included studies relating to human health, metabolism, structure and functioning of living organisms. The second group (TECH-HUM) included the remainder. Similarly, it was assumed that the length of study could influence behavior and purchasing decisions. Consequently, another division was applied, with the group labelled as EARLY YRS comprising first and second year students, with the LATE YRS group including all other years.

The questionnaire was piloted in 15 students of both genders, with different ages and educational backgrounds, and then subsequently refined to enhance the information collected. It took on average 10 minutes to complete the questionnaire. Respondents were recruited from among students of higher education institutions in Krakow, Poland. All respondents were assured of full anonymity, their right to withdraw at any possible time from this study and data confidentiality. They received detailed information on the study design before asking

questions. The Jagiellonian University (Krakow, Poland) granted ethical approval for this study.

The statistical analysis included descriptive statistics for each analyzed variable. Age was characterized by mean ( $\bar{x}$ ) and standard deviation (sd). Qualitative variables were described using the number of observations and percent. A chi<sup>2</sup> test was used to assess association between gender, field of study, years of study and examined variables concerning consumer behavior related to usage of OTC medicines and dietary supplements. In cases where there was a small number of answers, the Fisher Exact test was used. The statistical package STATISTICA® v. 10.0 was used for analyses, with the significance level set to  $\alpha=0,05$  [16].

## **Results**

### **Characteristics of the studied group**

Altogether, approximately 450 students were approached at lecture halls or dormitories during a 3-month period in early 2014 and 340 out of them voluntarily agreed to provide answers. 326 completed questionnaires were positively verified for further analysis, while 14 were disqualified as inappropriately filled-in. The characteristics of each group are included in Table 1.

**Table 1. Main characteristics of the studied groups.**

<b>Main characteristics</b>		<b>Females</b>	<b>Males</b>
number		220	106
n (%)		(67.5)	(32.5)
age	range	18-25	19-26
	mean - $\bar{x}$	21.1	21.8
	standard deviation - sd	1.48	1.67
main source of means of support	family - %	72.7	61.3
	own job - %	10.9	25.5
	other sources, like scholarships or annuities - %	16.4	13.2
<b>Main characteristics</b>		<b>MED-BIOL</b>	<b>TECH-HUM</b>
number		146	180
n (%)		(44.8)	(55.2)
age	range	19-25	18-26
	mean - $\bar{x}$	21.0	21.5
	standard deviation - sd	1.52	1.58
main source of means of support	family - %	75.5	63.1
	own job - %	6.4	24.0
	other sources, like scholarships or annuities - %	18.1	12.9
<b>Main characteristics</b>		<b>EARLY YRS</b>	<b>LATE YRS</b>
number		141	185
n (%)		(43.3)	(56.7)
age	range	18-25	20-26
	mean - $\bar{x}$	20.0	22.3
	standard deviation - sd	1.09	1.10
main source of means of support	family - %	81.6	59.5
	own job - %	8.5	21.1
	other sources, like scholarships or annuities - %	9.9	19.5

Overall, the majority of students declared using OTC medicines or dietary supplements, ranging from 92.5% to 99.3% across all categories (Appendices 1, 3-5). The most important findings are discussed below, whilst full information can be found in Appendices 3-5.

### **Association between gender and consumption of OTC medicines and dietary supplements**

Significantly more females declared using OTC medicines or dietary supplements than males (Table 2). There was also a significantly higher use of analgesics and antispasmodics among females (Table 2). More females than males were using OTC medicines and dietary supplements ‘less frequently than once weekly but at least once monthly’. Convenience shops and drug stores were significantly more popular among females as a location for purchase (Table 2), whilst online stores were more popular among males.

**Table 2. The statistically significant associations between gender and consumption of OTC medicines and dietary supplements (part A).**

<b>General confirmation of usage of OTC medicines or dietary supplements</b>	<b>Females N=220 n (%)</b>	<b>Males N=106 n (%)</b>	<b>p</b>
	216 (98.2)	98 (92.5)	0.0101
<b>The analyzed characteristic of consumption</b>	<b>Females N=216 n (%)</b>	<b>Males N= 98 n (%)</b>	<b>p</b>
<b>Confirmation of usage within a recent year:</b>			
Analgesics	193 (89.4)	69 (70.4)	<0.001
Antispasmodics	63 (29.2)	3 (3.1)	<0.001
<b>Frequency of the OTC medicines' usage:</b>			
At least once a week	51 (23.6)	31 (31.6)	<0.001
Less frequently than once weekly, but at least once monthly	123 (56.9)	31 (31.6)	
Less frequently than once monthly	42 (19.4)	36 (36.7)	
<b>Sites of acquisition of the OTC medicines and dietary supplements:</b>			
Convenience shops	73 (33.8)	22 (22.7)	0.0479
Drugstore / chemists's	65 (30.1)	13 (13.3)	0.0014
Internet-based distribution (except pharmacies)	0 (0.0)	4 (4.1)	0.0028

More females than males declared they always or often paid attention to the information on the mode of action, indications for use, dosage and adverse events displayed on the package or product leaflet, whereas more males stated they had never paid attention to this (Table 3).

**Table 3. The statistically significant associations between gender and consumption of OTC medicines and dietary supplements (part B).**

<b>The analyzed characteristic of consumption: information read on the packaging or patient leaflets</b>		<b>Females N=216 n (%)</b>	<b>Males N= 98 n (%)</b>	<b>p</b>
Mode of action	Always or often	165 (76.4)	60 (61.2)	0.0220
	Occasionally or seldom	35 (16.2)	26 (26.5)	
	Never	16 (7.4)	12 (12.2)	
Indications	Always or often	159 (73.6)	61 (62.2)	0.0109
	Occasionally or seldom	44 (20.4)	21 (21.4)	
	Never	13 (6.0)	16 (16.3)	
Dosage	Always or often	184 (85.2)	75 (76.5)	0.0332
	Occasionally or seldom	25 (11.6)	13 (13.3)	
	Never	7 (3.2)	10 (10.2)	
Adverse events	Always or often	96 (44.4)	37 (37.8)	0.0063
	Occasionally or seldom	100 (46.3)	39 (39.8)	
	Never	20 (9.3)	22 (22.5)	

**Association between field of studies and consumption of OTC medicines and dietary supplements**

The frequency of taking dietary supplements was higher in the MED-BIOL group – both in terms of ‘at least once a week’ and ‘less frequently than once weekly but at least once monthly’ (Table 4). A higher percentage of TECH-HUM students stated dietary supplements usage ‘less frequently than once monthly’.

**Table 4. The statistically significant associations between subjects of study and consumption of OTC medicines and dietary supplements (part A).**

<b>The analyzed characteristic of consumption</b>	<b>MED- BIOL</b> N= 140 n (%)	<b>TECH-HUM</b> N= 174 n (%)	<b>p</b>
<b>Frequency of the dietary supplements' usage:</b>			
At least once a week	74 (52.9)	88 (50.57)	0.0277
Less frequently than once weekly, but at least once monthly	20 (14.3)	11 (6.32)	
Less frequently than once monthly	46 (32.9)	75 (43.1)	
<b>Sites of acquisition of the OTC medicines and dietary supplements:</b>			
Online pharmacy	3 (2.1)	14 (8.1)	0.0216

An appreciable higher percentage of MED-BIOL students read the information on the product's composition, adverse events, possible interactions with other substances and contraindications for use compared with TECH-HUM students (Table 5). An appreciably higher percent of MED-BIOL students declared a small or very small influence of advertising on their purchasing decisions - both in traditional and online mass-media. These findings were confirmed through answers to the question on having greater confidence regarding products that were advertised since a significantly higher percent of students from the TECH-HUM group answered positively to this question (Table 5).

**Table 5. The statistically significant associations between subjects of study and consumption of OTC medicines and dietary supplements (part B).**

<b>The analyzed characteristic of consumption</b>		<b>MED- BIOL</b>	<b>TECH-HUM</b>	<b>p</b>
		<b>N= 140</b>	<b>N= 174</b>	
		<b>n (%)</b>	<b>n (%)</b>	
<b>Characteristics of the information read on the packaging or patient leaflets:</b>				
Composition	Always or often	62 (44.3)	52 (29.9)	0.0117
	Occasionally or seldom	55 (39.3)	74 (42.6)	
	Never	23 (16.4)	48 (27.6)	
Adverse events	Always or often	74 (52.9)	59 (33.9)	0.0030
	Occasionally or seldom	52 (37.1)	87 (50.0)	
	Never	14 (10.0)	28 (16.1)	
Possible interactions with other substances	Always or often	58 (41.4)	44 (25.3)	0.0080
	Occasionally or seldom	61 (43.6)	102 (58.6)	
	Never	21 (15.0)	28 (16.1)	
Contraindications	Always or often	77 (55.0)	72 (41.4)	0.0435
	Occasionally or seldom	45 (32.1)	78 (44.8)	
	Never	18 (12.9)	24 (13.8)	
<b>Impact of various factors on purchasing the OTC medicines or dietary supplements:</b>				
Advertising in traditional mass-media (TV, radio, newspapers, leaflets, flyers)	Very low or low	95 (67.9)	103 (59.2)	0.0457
	Medium	34 (24.3)	41 (23.6)	
	High or very high	11 (7.9)	30 (17.2)	
Advertising in online media	Very low or low	114 (81.4)	118 (67.8)	0.0136
	Medium	20 (14.3)	36 (20.7)	
	High or very high	6 (4.3)	20 (11.5)	
<b>Having more confidence towards these OTC medicines or dietary supplements, which are advertised</b>		33 (23.6)	66 (37.9)	0.0065

## Association between periods of studies and consumption of OTC medicines and dietary supplements

Whilst the consumption of OTC medicines and dietary supplements were high for both groups (Table 6), there was a significantly higher use in the EARLY YRS group. Students at the university for longer than 2 years purchased vitamins more often, but antispasmodics less often. Students at the university for 2 years or less purchased OTC medicines and supplements more often at street kiosks, medical herbal shops or specialist medical supply stores, whilst students in their later years read information more often regarding the product's mode of action.

**Table 6. The statistically significant associations between periods of studies and consumption of OTC medicines and dietary supplements.**

General confirmation of usage of OTC medicines or dietary supplements	EARLY YRS	LATE YRS	p
	N= 141 n (%)	N= 185 n (%)	
	140 (99.3)	174 (94.1)	0.0129
The analyzed characteristic of consumption	EARLY YRS	LATE YRS	p
	N= 140 n (%)	N= 174 n (%)	
<b>Confirmation of usage within a recent year:</b>			
Vitamins	98 (70.0)	148 (85.1)	0.0013
Antispasmodics	37 (26.4)	29 (16.7)	0.0348
<b>Sites of acquisition of the OTC medicines and dietary supplements:</b>			
Street kiosk (newsagent)	19 (13.6)	12 (6.9)	0.0487
Medical herbal shop or specialist medical supply store	18 (12.9)	11 (6.3)	0.0468

<b>Characteristics of the information read on the packaging or patient leaflets:</b>				
Mode of action	Always or often	91 (65.0)	134 (77.0)	0.0488
	Occasionally or seldom	32 (22.9)	29 (16.7)	
	Never	17 (12.1)	11 (6.3)	

## **Discussion**

We believe this is the first study in which an association between the study subject and the consumption of OTC medicines and dietary supplements among university students has been analyzed in such detail. The study subject was significantly associated with several characteristics of consumption. The dietary supplements were used with higher frequency by the MED-BIOL than TECH-HUM students and more students from the former group confirmed using all the studied products in general (Table 4). This contrasted with a survey among 400 people in Poland, where respondents from a non-medical environment tended to buy OTC medicines more often than medical staff [17]. However, there was agreement with the study done in Poland by Siglowa et al. that the highest consumption of dietary supplements was among pharmacy students while the lowest number was among students of computer science and electronics [13].

In our study, the MED-BIOL students stated paying more attention to reading product information (Table 5). This contrasts with the findings of Wozniak-Holecka where more than 70% of respondents were not familiar with the composition of their OTC medicines despite 90.1% declaring reading the medicine leaflets and 97.4% stating they understood them [29]. However, the highest and statistically significant level of knowledge was found among medical students and staff surveyed [17].

The MED-BIOL students also stated they were less influenced by advertising and a lower number reported having confidence in advertised products compared with other students

(Table 5). Consequently, consumption seemed to be more rational among those studying human health or biology. On one hand, they tended to use dietary supplements significantly more frequently than other students; whilst on the other hand, their approach was more conscious and better informed (Tables 4,5).

We also found significant gender differences regarding the preferred sites for purchasing OTC medicines and dietary supplements, with convenience stores and drugstores preferred by females and online shops by males (Table 2). This contrasted with the study by Plichta et al. among Polish public health students which found no significant gender differences for purchasing sites, except from specialist shops with nutritional products (more popular among males) [14]. However, the findings of Plichta et al. could be influenced by the homogeneity of the subject of study (public health only) and the relatively small share of males within a studied sample (18.5%). There were also some differences with the recent study on self-medication among Slovenian students, with significant preferences among females to acquire OTC medicines more often in or from: pharmacies (92.7% vs. 82.2%), relatives (29.7% vs. 24.0%), friends (19.3% vs. 16.3%), healers (3.7% vs. 2.7%) and street markets (1.1% vs. 0.7%) [10].

Interestingly, we also found females were more rational towards self-care and self-treatment than males, as significantly more females paid attention to the product information (Table 3). This was similar to the study by Plichta et al., who found female Polish public health students reported seeking professional pharmacist's advice more often, while male students were more influenced by TV advertising in their consumer choices [14]. There was also a higher frequency of OTC consumption overall among females in our study (Table 2).

A more careful approach among female students towards self-medication was also reported in the Slovenian study, where significantly more women declared that increasing drug doses

could be dangerous [10]. In an Australian study on gender- and health-related behavior, women were also more likely to seek advice from their medical practitioner and to attend education sessions, as well as to want information regarding illness prevention [18].

Overall educational background, including the study subject, appears to influence the rational use of OTC medicines and dietary supplements. As our findings suggest, in any health promotion campaign that helps young customers to rationalize approaches to self-treatment and self-care, special attention should be paid to the subjects they are studying, especially in fields not associated in any way with biology. In addition, different messages and media should be selected for females as opposed to males, since males were found to be more influenced by advertisements. Educational activities could also be tailored to the time spent at University since more EARLY YRS students declared using the analyzed products, while LATE YRS students were paying more attention to the product information (Table 6). This suggests that consumer choices, as well as self-care or self-treatment behavior, could be more conscious and rational among more advanced students, in addition to female versus male students (Table 2,3). We have not found any other published studies where the association between time at university and characteristics of consumption was analyzed among university students.

In several parts of our questionnaire, the questions regarding OTC medicines or dietary supplements were posed separately, whilst in the others jointly. This took into account the fact that respondents could potentially be unable to fully differentiate between the product categories (possibly biasing their answers), since a previous study revealed no consensus on inclusion or exclusion of vitamins, dietary supplements, herbal remedies or functional foods into a 'drug' definition among the lay public [19]. Furthermore, both OTC medicines, herbal and dietary supplements were also treated jointly in a study among college students in the USA [9].

We acknowledge that the analyzed group of university students was selected as a convenience sample and cannot be claimed as being representative for the whole Polish student population. Since statistical reasoning only applies to the studied group, drawing conclusions pertaining to all Polish students have to be taken with caution. In addition, the questionnaire was not validated. In case of some questions, a small number of answering students within the sample did not enable us to draw conclusions. It is also possible that differences exist between styles of reporting on self-treatment behavior in females and males (e.g. males could not report all of their use) that were not disclosed in this study. Therefore, this study should be considered as the preliminary study of Polish college students' consumer behavior related to usage of OTC medicines and dietary supplements; its findings and conclusions have to be treated as preliminary as well.

## **Conclusion**

In conclusion, the consumption of OTC medicines and dietary supplements is high among Polish university students. There are significant differences in self-treatment and self-care behavior among differently defined groups of young people, which should not be ignored when any public health activities are planned in Poland aiming to rationalize the use of OTC medicines and dietary supplements, as well as to educate the consumers and raise their consciousness. We believe that our study results contribute to the building of the scientific foundation with respect to the necessary health policy changes.

## **Expert commentary**

The rational and modest use of OTC medicines or dietary supplements may benefit patients and improve the overall health status of societies. However, there may be a growing public health issue with their increasing use - especially if this growth impacts on the citizens' ability to pay for pharmaceuticals prescribed by physicians based on stronger clinical data. This

could be of paramount importance in countries like Poland where co-payments are high. Patients' spending on dietary supplements in Poland amounted to almost PLN 3,000,000,000 (ca. EUR 714,000,000) in 2014 [20]. In parallel, expenditures on OTC medicines reached PLN 11,400,000,000 (ca. EUR 2,714,000,000) and 680,000,000 packages were purchased for that sum. This places Poland in the top position in the European ranking list for these purchases [21].

There are growing concerns that the blossoming market of OTC medicines and dietary supplements in Poland may bring new threats to patients' health. There is a tremendous potential for the excessive or inappropriate use of these products [22-27]. In addition, this may compromised the purchasing of medicines especially where there are high co-payments.

The control over the dietary supplements' market seems to be underdeveloped in Poland. For example, about 6% of samples controlled by the state Sanitary Inspection in 2014 were impeached for various reasons [20]. Moreover, there is a mistaken conviction among many non-aware consumers that since dietary products are 'natural' and constitute a part of the diet, they cannot harm their health. Currently, there is a plethora of these products available on the market and the possibility to discriminate appropriately among 25,000 dietary supplements is close to zero for the average consumer [20]. Furthermore, the average Polish consumer seems to be unprepared for the recent abundance of these heavily advertised and easy-to-access products, since the pertinent legislation was much more restrictive before Poland's accession to the European Union in 2004 [28]. For example, more than a decade ago multi-vitamin and multi-mineral preparations were only available in pharmacies as prescription-only medicinal products. Such issues need further research to develop comprehensive policies for Poland in the future.

## **Five-year view**

The value of the pharmaceutical market in Poland grew by 14% in 2014 as compared with 2013, and is likely to continue growing. This is helped by pharmaceutical companies in Poland currently spending more on advertising than banks or telecommunications companies (spending on marketing activities was PLN 871,000,000, i.e. EUR 207,000,000 in 2014, a 9% yearly increase), as well as changing demographics in Poland. At the same time the average price of an OTC medicine increased by 13% to PLN 13.2 (EUR 3.1) [20]. This again is likely to grow with Polish society experiencing increasing marketing pressure from the producers of OTC medicines and dietary supplements.

Knowledge of the differences between various groups of young people could be utilized by governments and others when undertaking educational activities to rationalize the consumption of OTC medicines and dietary supplements given ever increasing prices. The students, especially males, should increase their level of attention to the information provided by the manufacturers and we will be monitoring this in future years. Those not possessing a more substantial educational background within biological or medical sciences should be better prepared for appropriate perception and practical utilization of this information. Most probably the increasing public health educational efforts will be targeted at these groups since they appear to more extensively succumb to pharmaceutical and food industries' advertising campaigns. This education should be initiated as early as possible, starting at university or even before. Raising awareness of potential concerns with OTC medicines and dietary supplements should also be a focus among the public health authorities in Poland, drawing on this and other studies in this country.

We believe that further studies focusing on other societal groups, including the elderly, less educated and lower income level customers and patients, and utilizing the approach and

methodology described in this study will shed further light on the consumption of OTC medicines and dietary supplements. This will help formulate additional strategies to address the current concerns and will be the next stage of our research.

### **Key issues**

- The consumption of OTC medicines and dietary supplements is high among Polish university students.
- Knowledge of the differences in self-treatment and self-care behavior between differently defined groups of students should be utilized when undertaking educational activities to rationalize the consumption of OTC medicines and dietary supplements.
- More public health educational efforts should be targeted especially at male students and those not possessing a more substantial educational background within biological or medical sciences, since they appear to more extensively succumb to the pharmaceutical and food industries' advertising campaigns.
- Raising awareness of potential concerns with OTC medicines and dietary supplements should be a focus among public health authorities in Poland.

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## **Appendices (online supplementary files)**

### **Appendix 1. Questionnaire.**

#### **The survey on the use of non-prescription medicines and dietary supplements by the university students**

Dear Students!

Please kindly fill in this questionnaire, which aims to gain information on the prevalence of the use of OTC medicines (otherwise known as the non-prescription medicines, or medicines issued "over the counter"), and dietary supplements. Completion of the survey is completely voluntary and anonymous. Please kindly fill it in as best you can.

If you happen to make a mistake, please clearly cross out the wrong response and indicate the correct selection. The results of the present survey will be used for scientific purposes only. Completion of this survey should not take you longer than 10 minutes.

1. Do you use non-prescription drugs, or dietary supplements?

- a) yes
- b) no

2. Please indicate which of the following non-prescription drugs, or dietary supplements you used within the last year (you can select more than one answer):

- a) vitamins
- b) digestants
- c) analgesics
- d) cold medications
- e) immunostimulants
- f) antispasmodics
- g) antiallergics
- h) other - which (please specify)?

.....  
.....  
3. Please list the trade names of the non-prescription medicines used by yourself:

.....  
.....

4. Please list the trade names of the dietary supplements used by yourself:

.....  
.....

5. How often do you use the non-prescription medicines?

- |  |   |
|--|---|
| At least once a week:  | a) daily  |
|  | b) less often than daily but a few times a week         |
|  | c) once a week  |
| Less frequently than once weekly, but at least once monthly: | d) less often than once a week, but a few times a month |
|  | e) once a month   |
| Less frequently than once monthly:                           | f) less often than once a month                         |

6. How often do you use dietary supplements?

- |  |   |
|--|---|
| At least once a week:  | a) daily  |
|  | b) less often than daily but a few times a week         |
|  | c) once a week  |
| Less frequently than once weekly, but at least once monthly: | d) less often than once a week, but a few times a month |
|  | e) once a month   |
| Less frequently than once monthly:                           | f) less often than once a month                         |

7. Please indicate the place where you bought ever any non-prescription medicines or dietary supplements (you can select more than one answer):

- a) pharmacy or a pharmaceutical outlet
  - b) convenience shop
  - c) supermarket
  - d) street kiosk (newsagent)
  - e) drugstore / chemists's (OTC medicines, food supplements, cosmetics and household cleansing agents)
  - f) filling station
  - g) online pharmacy
  - h) medical herbal shop or specialist medical supply store
  - i) other (please specify, e.g. internet-based distribution except pharmacies)
- .....

8. In what situations do you buy any non-prescription drugs, or dietary supplements?

- a) as required (disorder/illness)
- b) just to be on the safe side (to stock up/resupply home first aid kit)

9. What specific information, as published by the manufacturer on the packaging or in a leaflet, do you read?

	always	often	occasionally	seldom	never
Medicine (supplement) composition	<input type="checkbox"/>				
Action	<input type="checkbox"/>				
Indications	<input type="checkbox"/>				
Dosage	<input type="checkbox"/>				
Adverse events	<input type="checkbox"/>				
Possible interactions	<input type="checkbox"/>				
Contraindications	<input type="checkbox"/>				
Mode of storage	<input type="checkbox"/>				

10. Which non-prescription drugs, or dietary supplements, do you buy most often?

- a) well-known and proven
- b) new/launched onto the market recently

11. What is of importance to you when buying any non-prescription medicines or dietary supplements?

	high importance	low										
importance	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td colspan="2" style="padding: 5px;">Very high or high</td> <td style="padding: 5px;">Medium</td> <td colspan="2" style="padding: 5px;">Low or very low</td> </tr> <tr> <td style="padding: 5px; text-align: center;">1</td> <td style="padding: 5px; text-align: center;">2</td> <td style="padding: 5px; text-align: center;">3</td> <td style="padding: 5px; text-align: center;">4</td> <td style="padding: 5px; text-align: center;">5</td> </tr> </table>		Very high or high		Medium	Low or very low		1	2	3	4	5
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product's form (e.g. capsules, tablets)	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px; text-align: center;">1</td> <td style="padding: 5px; text-align: center;">2</td> <td style="padding: 5px; text-align: center;">3</td> <td style="padding: 5px; text-align: center;">4</td> <td style="padding: 5px; text-align: center;">5</td> </tr> </table>		1	2	3	4	5					
1	2	3	4	5								
opinion of your friends and family members	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px; text-align: center;">1</td> <td style="padding: 5px; text-align: center;">2</td> <td style="padding: 5px; text-align: center;">3</td> <td style="padding: 5px; text-align: center;">4</td> <td style="padding: 5px; text-align: center;">5</td> </tr> </table>		1	2	3	4	5					
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own experience	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px; text-align: center;">1</td> <td style="padding: 5px; text-align: center;">2</td> <td style="padding: 5px; text-align: center;">3</td> <td style="padding: 5px; text-align: center;">4</td> <td style="padding: 5px; text-align: center;">5</td> </tr> </table>		1	2	3	4	5					
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1	2	3	4	5
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other reasons (please specify)

.....

---

12. Do you have more confidence in the medicines or dietary supplements that are advertised?

- a) yes
- b) no

13. When offered a choice of several medicines or dietary supplements of the same composition, which ones would you choose?

- a) the cheapest
- b) of preferred form (e.g. tablets)
- c) recommended by a pharmacist
- d) recommended by a physician
- e) intensely advertised in the mass-media

14. Have you ever experienced, while taking any non-prescription medicines or dietary supplements, any type of side effects (adverse events), or any kind of ailments that you would subjectively associate with the actually administered product?

- a) yes
- b) no

If the answer is "no", please move on right away to question no. 17

15. Did you ever consult with your doctor upon experiencing the above referenced adverse events or any problems associated with taking any non-prescription medicines or dietary supplements?

- a) yes
- b) no

16. What did you do after the occurrence of the adverse reactions or any other ailments associated with taking a non-prescription medicine or a dietary supplement:

- a) stopped taking the medicine/dietary supplement

- b) altered the dosage when taking the medicine/dietary supplement
- c) did not change anything when taking the medicine/dietary supplement

17. What is your average monthly expenditure on the non-prescription medicines or dietary supplements?

- a) up to PLN 20.00
- b) within PLN 21.00 - PLN 50.00 range
- c) within 51.00 - 100.00 range
- d) over PLN 100.00

DEMOGRAPHICS:

18. Responder's gender:

- a) woman
- b) man

19. Please indicate your age: .....years of age

20. Academic field, name of a seat of higher learning (e.g. university):

.....

21. Year of studies:

undergraduate studies graduate studies	engineering studies	graduate studies	uniform
a) I	a) I	a) I	a) I
b) II	b) II	b) II	b) II
c) III	c) III		c) III
	d) IV		d) IV
			e) V
			f) VI

22. Your main source of income is:

- a) financial support provided by the family
- b) own job
- c) other (e.g. scholarships, annuities)

Thank you very much indeed for kindly completing this survey.

**Appendix 2. Subjects of study included into MED-BIOL and TECH-HUM groups.**

MED-BIOL	TECH-HUM
medical analyses, biology, nutritional science, pharmacy, physiotherapy, cosmetology, forestry, medicine, education, special education, nursing, midwifery, medical emergency, agriculture, food technology and human nutrition, occupational therapy, public health, animal husbandry	administration, acting, American studies, landscape architecture, automation and robotics, national security, homeland security, general construction, economics, power industry, ethics, Slavic studies, finance and accounting, land surveying and cartography, spatial development and management, mining and geology, India studies, computer science, applied computer science, security engineering, materials engineering, oil and gas engineering, environmental engineering, cultural and media studies, linguistics, mathematics, mechanical engineering, musicology, environmental studies, clothing design, psychology, political science, Polish language studies, law, accounting and controlling, international relations, chemical technology, tourism and recreation, commodities science, technologically advanced materials and nano-technology, management, management and production engineering

**Appendix 3. The associations between gender and consumption of OTC medicines and dietary supplements.**

<b>General confirmation of usage of the OTC medicines or dietary supplements</b>	<b>Females N= 220 n (%)</b>	<b>Males N= 106 n (%)</b>	<b>p</b>
	216 (98.18)	98 (92.45)	0.0101
<b>Detailed characteristics of consumption and purchasing habits</b>	<b>Females N=216 n (%)</b>	<b>Males N= 98 n (%)</b>	<b>p</b>
<b>Confirmation of usage within a recent year:</b>			
Vitamins	167 (77.31)	79 (80.61)	0.5110
Digestants	21 (9.72)	6 (6.12)	0.2918
Analgesics	193 (89.35)	69 (70.41)	< 0.001
Cold medications	177 (81.94)	73 (74.49)	0.1287
Immunostimulants	83 (38.43)	40 (40.82)	0.6876
Antispasmodics	63 (29.17)	3 (3.06)	< 0.001
Antiallergics	32 (14.81)	11 (11.22)	0.3912
<b>Frequency of the OTC medicines' usage:</b>			
At least once a week	51 (23.61)	31 (31.63)	< 0.001
Less frequently than once weekly. but at least once monthly	123 (56.94)	31 (31.63)	
Less frequently than once monthly	42 (19.44)	36 (36.73)	
<b>Frequency of dietary supplements' usage:</b>			
At least once a week	109 (50.46)	53 (54.08)	0.7352
Less frequently than once weekly. but at least once monthly	23 (10.65)	8 (8.16)	
Less frequently than once monthly	84 (38.89)	37 (37.76)	
<b>Sites of acquisition of the OTC medicines and dietary supplements:</b>			
Pharmacy or a pharmaceutical outlet	210 (97.22)	91 (92.86)	0.0720
Convenience shop	73 (33.80)	22 (22.68)	0.0479

Supermarket		113 (52.31)	51 (52.04)	0.9641
Street kiosk (newsagent)		19 (8.80)	12 (12.24)	0.3425
Drugstore / chemists's (OTC medicines, food supplements, cosmetics and household cleansing agents)		65 (30.09)	13 (13.27)	0.0014
Filling station		23 (10.65)	12 (12.24)	0.6770
Online pharmacy		13 (6.02)	4 (4.08)	0.4822
Medical herbal shop or specialist medical supply store		24 (11.11)	5 (5.10)	0.0884
Internet-based distribution (except pharmacies)		0 (0.00)	4 (4.08)	0.0028
<b>Reasons for purchasing the OTC medicines and dietary supplements:</b>				
As required (disorder/illness)		166 (76.85)	78 (79.59)	0.5888
Just to be on the safe side (to stock up/resupply home first aid kit)		50 (23.15)	20 (20.41)	
<b>Characteristics of the information read on the packaging or patient leaflets:</b>				
Composition	Always or often	78 (36.11)	36 (36.73)	0.1604
	Occasionally or seldom	95 (43.98)	34 (34.69)	
	Never	43 (19.91)	28 (28.57)	
Mode of action	Always or often	165 (76.39)	60 (61.22)	0.0220
	Occasionally or seldom	35 (16.20)	26 (26.53)	
	Never	16 (7.41)	12 (12.24)	
Indications	Always or often	159 (73.61)	61 (62.24)	0.0109
	Occasionally or seldom	44 (20.37)	21 (21.43)	
	Never	13 (6.02)	16 (16.33)	
Dosage	Always or often	184 (85.19)	75 (76.53)	0.0332
	Occasionally or seldom	25 (11.57)	13 (13.27)	
	Never	7 (3.24)	10 (10.20)	
	Always or often	96 (44.44)	37 (37.76)	

Adverse events	Occasionally or seldom	100 (46.30)	39 (39.80)	0.0063
	Never	20 (9.26)	22 (22.45)	
Possible interactions with other substances	Always or often	68 (31.48)	34 (34.69)	0.1596
	Occasionally or seldom	119 (55.09)	44 (44.90)	
	Never	29 (13.43)	20 (20.41)	
Contraindications	Always or often	107 (49.54)	42 (42.86)	0.4361
	Occasionally or seldom	83 (38.43)	40 (40.82)	
	Never	26 (12.04)	16 (16.33)	
Mode of storage	Always or often	48 (22.22)	20 (20.41)	0.1121
	Occasionally or seldom	101 (46.76)	36 (36.73)	
	Never	67 (31.02)	42 (42.86)	
<b>Preference towards purchasing predominantly the OTC medicines or dietary supplements which are:</b>				
Well-known and proven		212 (98.15)	93 (94.90)	0.1097
New/ launched onto the market recently		4 (1.85)	5 (5.10)	
<b>Impact of various factors on purchasing the OTC medicines or dietary supplements:</b>				
Advice of a physician	Very low or low	39 (18.06)	26 (26.53)	0.1814
	Medium	52 (24.07)	18 (18.37)	
	High or very high	125 (57.87)	54 (55.10)	
Advice of a pharmacist	Very low or low	22 (10.19)	16 (16.33)	0.2903
	Medium	53 (24.54)	21 (21.43)	
	High or very high	141 (65.28)	61 (62.24)	
Advertising in traditional mass-media (TV, radio, newspapers, leaflets, flyers)	Very low or low	134 (62.04)	64 (65.31)	0.2126
	Medium	57 (26.39)	18 (18.37)	
	High or very high	25 (11.57)	16 (16.33)	
Advertising in online media	Very low or low	163 (75.46)	69 (70.41)	0.0958
	Medium	40 (18.52)	16 (16.33)	

	High or very high	13 (6.02)	13 (13.27)	
Form of a product (e.g. capsules, tablets)	Very low or low	83 (38.43)	46 (46.94)	0.0824
	Medium	50 (23.15)	27 (27.55)	
	High or very high	83 (38.43)	25 (25.51)	
Opinion of friends and family members	Very low or low	25 (11.57)	18 (18.37)	0.0774
	Medium	40 (18.52)	24 (24.49)	
	High or very high	151 (69.91)	56 (57.14)	
Own experience	Very low or low	4 (1.85)	4 (4.08)	0.1430
	Medium	7 (3.24)	7 (7.14)	
	High or very high	205 (94.91)	87 (88.78)	
Price	Very low or low	25 (11.57)	14 (14.29)	0.5855
	Medium	70 (32.41)	35 (35.71)	
	High or very high	121 (56.02)	49 (50.00)	
<b>Other detailed characteristics of consumption and purchasing habits</b>		<b>Females</b> <b>N=216</b> <b>n (%)</b>	<b>Males</b> <b>N= 98</b> <b>n (%)</b>	<b>p</b>
<b>Having more confidence in those OTC medicines or dietary supplements that are advertised</b>		63 (29.17)	36 (36.73)	0.1811
<b>While offered a choice of several products having the same composition. choosing the one which is:</b>				
The cheapest		61 (28.24)	40 (40.82)	0.1431
Has a preferred form (e.g. tablets)		23 (10.65)	11 (11.22)	
Recommended by a pharmacist		67 (31.02)	20 (20.41)	
Recommended by a physician		61 (28.24)	24 (24.49)	
Intensely advertised in the mass-media		4 (1.85)	3 (3.06)	
<b>Questions related to any adverse events or any other complaints which might be subjectively linked to an administered product</b>				
<b>Experiencing ever any adverse events or any other complaints which might be subjectively linked to an administered product</b>		31 (14.35)	8 (8.16)	0.1234

	<b>Females</b>	<b>Males</b>	<b>p</b>
<b>Consulting a physician when adverse events or consumption-related complaints occurred</b>	<b>N=31</b>	<b>N= 8</b>	
	<b>n (%)</b>	<b>n (%)</b>	
	11 (35.48)	3 (37.50)	0.9156
<b>Actions undertaken when adverse events or any other consumption-related complaints occurred:</b>			
Discontinuing intake	21 (67.74)	4 (50.00)	0.6017
Altering the dosage	4 (12.90)	2 (25.00)	
Not altering anything	6 (19.35)	2 (25.00)	
<b>Monthly expenditures on OTC medicines and dietary supplements</b>	<b>Females</b>	<b>Males</b>	<b>p</b>
	<b>N=216</b>	<b>N= 98</b>	
	<b>n (%)</b>	<b>n (%)</b>	
Not more than PLN 20.00	144 (66.67)	70 (71.43)	0.4013
More than PLN 20.00	72 (33.33)	28 (28.57)	

**Appendix 4. The associations between study subjects and consumption of OTC medicines and dietary supplements.**

<b>General confirmation of usage of the OTC medicines or dietary supplements</b>	<b>MED-BIOL</b> N=146 n (%)	<b>TECH-HUM</b> N= 180 n (%)	<b>p</b>
	140 (95.89)	174 (96.67)	0.7113
<b>Detailed characteristics of consumption and purchasing habits</b>	<b>MED-BIOL</b> N=140 n (%)	<b>TECH-HUM</b> N= 174 n (%)	<b>p</b>
<b>Confirmation of usage within a recent year:</b>			
Vitamins	110 (78.57)	136 (78.16)	0.9301
Digestants	11 (7.86)	16 (9.20)	0.6742
Analgesics	117 (83.57)	145 (83.33)	0.9550
Cold medications	111 (79.29)	139 (79.89)	0.8957
Immunostimulants	54 (38.57)	69 (39.66)	0.8450
Antispasmodics	29 (20.71)	37 (21.26)	0.9053
Antiallergics	19 (13.57)	24 (13.79)	0.9547
<b>Frequency of the OTC medicines' usage:</b>			
At least once a week	33 (23.57)	49 (28.16)	0.2489
Less frequently than once weekly. but at least once monthly	76 (54.29)	78 (44.83)	
Less frequently than once monthly	31 (22.14)	47 (27.01)	
<b>Frequency of dietary supplements' usage:</b>			
At least once a week	74 (52.86)	88 (50.57)	0.0277
Less frequently than once weekly. but at least once monthly	20 (14.29)	11 (6.32)	
Less frequently than once monthly	46 (32.86)	75 (43.10)	
<b>Sites of acquisition of the OTC medicines and dietary supplements:</b>			
Pharmacy or a pharmaceutical outlet	135 (96.43)	166 (95.40)	0.6500
Convenience shop	39 (28.06)	56 (32.18)	0.4302

Supermarket		66 (47.14)	98 (56.32)	0.1055
Street kiosk (newsagent)		13 (9.29)	18 (10.34)	0.7545
Drugstore / chemists's (OTC medicines, food supplements, cosmetics and household cleansing agents)		39 (27.86)	39 (22.41)	0.2672
Filling station		11 (7.86)	24 (13.79)	0.0967
Online pharmacy		3 (2.14)	14 (8.05)	0.0216
Medical herbal shop or specialist medical supply store		17 (12.14)	12 (6.90)	0.1105
Internet-based distribution (except pharmacies)		1 (0.71)	3 (1.72)	0.4277
<b>Reasons for purchasing the OTC medicines and dietary supplements:</b>				
As required (disorder/illness)		115 (82.14)	129 (74.14)	0.0903
Just to be on the safe side (to stock up/resupply home first aid kit)		25 (17.86)	45 (25.86)	
<b>Characteristics of the information read on the packaging or patient leaflets:</b>				
Composition	Always or often	62 (44.29)	52 (29.89)	0.0117
	Occasionally or seldom	55 (39.29)	74 (42.53)	
	Never	23 (16.43)	48 (27.59)	
Mode of action	Always or often	106 (75.71)	119 (68.39)	0.3002
	Occasionally or seldom	22 (15.71)	39 (22.41)	
	Never	12 (8.57)	16 (9.20)	
Indications	Always or often	103 (73.57)	117 (67.24)	0.2646
	Occasionally or seldom	28 (20.00)	37 (21.26)	
	Never	9 (6.43)	20 (11.49)	
Dosage	Always or often	118 (84.29)	141 (81.03)	0.1950
	Occasionally or seldom	18 (12.86)	20 (11.49)	
	Never	4 (2.86)	13 (7.47)	
	Always or often	74 (52.86)	59 (33.91)	

Adverse events	Occasionally or seldom	52 (37.14)	87 (50.00)	0.0030
	Never	14 (10.00)	28 (16.09)	
Possible interactions with other substances	Always or often	58 (41.43)	44 (25.29)	0.0080
	Occasionally or seldom	61 (43.57)	102 (58.62)	
	Never	21 (15.00)	28 (16.09)	
Contraindications	Always or often	77 (55.00)	72 (41.38)	0.0435
	Occasionally or seldom	45 (32.14)	78 (44.83)	
	Never	18 (12.86)	24 (13.79)	
Mode of storage	Always or often	35 (25.00)	33 (18.97)	0.4317
	Occasionally or seldom	58 (41.43)	79 (45.40)	
	Never	47 (33.57)	62 (35.63)	
<b>Preference towards purchasing predominantly the OTC medicines or dietary supplements which are:</b>				
Well-known and proven		136 (97.14)	169 (97.13)	0.9931
New/ launched onto the market recently		4 (2.86)	5 (2.87)	
<b>Impact of various factors on purchasing the OTC medicines or dietary supplements:</b>				
Advice of a physician	Very low or low	35 (25.00)	30 (17.24)	0.2198
	Medium	28 (20.00)	42 (24.14)	
	High or very high	77 (55.00)	102 (58.62)	
Advice of a pharmacist	Very low or low	19 (13.57)	19 (10.92)	0.4970
	Medium	29 (20.71)	45 (25.86)	
	High or very high	92 (65.71)	110 (63.22)	
Advertising in traditional mass-media (TV, radio, newspapers, leaflets, flyers)	Very low or low	95 (67.86)	103 (59.20)	0.0457
	Medium	34 (24.29)	41 (23.56)	
	High or very high	11 (7.86)	30 (17.24)	
Advertising in online media	Very low or low	114 (81.43)	118 (67.82)	0.0136
	Medium	20 (14.29)	36 (20.69)	

	High or very high	6 (4.29)	20 (11.49)	
Form of a product (e.g. capsules, tablets)	Very low or low	59 (42.14)	70 (40.23)	0.8263
	Medium	32 (22.86)	45 (25.86)	
	High or very high	49 (35.00)	59 (33.91)	
Opinion of friends and family members	Very low or low	21 (15.00)	22 (12.64)	0.8061
	Medium	29 (20.71)	35 (20.11)	
	High or very high	90 (64.29)	117 (67.24)	
Own experience	Very low or low	3 (2.14)	5 (2.87)	0.9100
	Medium	6 (4.29)	8 (4.60)	
	High or very high	131 (93.57)	161 (92.53)	
Price	Very low or low	18 (12.86)	21 (12.07)	0.3703
	Medium	41 (29.29)	64 (36.78)	
	High or very high	81 (57.86)	89 (51.15)	
<b>Other detailed characteristics of consumption and purchasing habits</b>		<b>MED-BIOL</b>  <b>N=140</b>  <b>n (%)</b>	<b>TECH-HUM</b>  <b>N= 174</b>  <b>n (%)</b>	<b>p</b>
<b>Having more confidence in those OTC medicines or dietary supplements that are advertised</b>		33 (23.57)	66 (37.93)	0.0065
<b>While offered a choice of several products having the same composition. choosing the one which is:</b>				
The cheapest		52 (37.14)	49 (28.16)	0.1790
Has a preferred form (e.g. tablets)		14 (10.00)	20 (11.49)	
Recommended by a pharmacist		42 (30.00)	45 (25.86)	
Recommended by a physician		30 (21.43)	55 (31.61)	
Intensely advertised in the mass-media		2 (1.43)	5 (2.87)	
<b>Questions related to any adverse events or any other complaints which might be subjectively linked to an administered product</b>				
<b>Experiencing ever any adverse events or any other complaints which might be subjectively linked to an administered product</b>		18 (12.86)	21 (12.07)	0.8333

	<b>MED-BIOL</b>	<b>TECH-HUM</b>	<b>p</b>
<b>Consulting a physician when adverse events or consumption-related complaints occurred</b>	<b>N=18</b>	<b>N= 21</b>	
	<b>n (%)</b>	<b>n (%)</b>	
	6 (33.33)	8 (38.10)	0.7573
<b>Actions undertaken when adverse events or any other consumption-related complaints occurred:</b>			
Discontinuing intake	10 (55.56)	15 (71.43)	0.5281
Altering the dosage	3 (16.67)	3 (14.29)	
Not altering anything	5 (27.78)	3 (14.29)	
<b>Monthly expenditures on OTC medicines and dietary supplements</b>	<b>MED-BIOL</b>	<b>TECH-HUM</b>	<b>p</b>
	<b>N=140</b>	<b>N=174</b>	
	<b>n (%)</b>	<b>n (%)</b>	
Not more than PLN 20.00	97 (69.29)	117 (67.24)	0.6991
More than PLN 20.00	43 (30.71)	57 (32.76)	

**Appendix 5. The associations between period of studies and consumption of OTC medicines and dietary supplements.**

<b>General confirmation of usage of the OTC medicines or dietary supplements</b>	<b>EARLY YRS N=141 n (%)</b>	<b>LATE YRS N= 185 n (%)</b>	<b>p</b>
	140 (99.29)	174 (94.05)	0.0129
<b>Detailed characteristics of consumption and purchasing habits</b>	<b>EARLY YRS N=140 n (%)</b>	<b>LATE YRS N= 174 n (%)</b>	<b>p</b>
<b>Confirmation of usage within a recent year:</b>			
Vitamins	98 (70.00)	148 (85.06)	0.0013
Digestants	14 (10.00)	13 (7.47)	0.4269
Analgesics	123 (87.86)	139 (79.89)	0.0589
Cold medications	114 (81.43)	136 (78.16)	0.4749
Immunostimulants	56 (40.00)	67 (38.51)	0.7875
Antispasmodics	37 (26.43)	29 (16.67)	0.0348
Antiallergics	19 (13.57)	24 (13.79)	0.9547
<b>Frequency of the OTC medicines' usage:</b>			
At least once a week	42 (20.00)	40 (22.99)	0.3594
Less frequently than once weekly. but at least once monthly	66 (47.14)	88 (50.57)	
Less frequently than once monthly	32 (22.86)	46 (26.44)	
<b>Frequency of dietary supplements' usage:</b>			
At least once a week	67 (47.86)	95 (54.60)	0.4462
Less frequently than once weekly. but at least once monthly	16 (11.43)	15 (8.62)	
Less frequently than once monthly	57 (40.71)	64 (36.78)	
<b>Sites of acquisition of the OTC medicines and dietary supplements:</b>			
Pharmacy or a pharmaceutical outlet	137 (97.86)	164 (94.25)	0.1110
Convenience shop	49 (35.00)	46 (26.59)	0.1076

Supermarket		76 (54.29)	88 (50.57)	0.5129
Street kiosk (newsagent)		19 (13.57)	12 (6.90)	0.0487
Drugstore / chemists's (OTC medicines, food supplements, cosmetics and household cleansing agents)		41 (29.29)	37 (21.26)	0.1020
Filling station		18 (12.86)	17 (9.77)	0.3876
Online pharmacy		8 (5.71)	9 (5.17)	0.8330
Medical herbal shop or specialist medical supply store		18 (12.86)	11 (6.32)	0.0468
Internet-based distribution (except pharmacies)		0 (0.00)	4 (2.30)	0.0710
<b>Reasons for purchasing the OTC medicines and dietary supplements:</b>				
As required (disorder/illness)		107 (76.43)	137 (78.74)	0.6254
Just to be on the safe side (to stock up/resupply home first aid kit)		33 (23.57)	37 (21.26)	
<b>Characteristics of the information read on the packaging or patient leaflets:</b>				
Composition	Always or often	43 (30.71)	71 (40.80)	0.0722
	Occasionally or seldom	58 (41.43)	71 (40.80)	
	Never	39 (27.89)	32 (18.39)	
Mode of action	Always or often	91 (65.00)	134 (77.01)	0.0488
	Occasionally or seldom	32 (22.86)	29 (16.67)	
	Never	17 (12.14)	11 (6.32)	
Indications	Always or often	90 (64.29)	130 (74.71)	0.0686
	Occasionally or seldom	32 (22.86)	33 (18.97)	
	Never	18 (12.86)	11 (6.32)	
Dosage	Always or often	113 (80.71)	146 (83.91)	0.7450
	Occasionally or seldom	19 (13.57)	19 (10.92)	
	Never	8 (5.71)	9 (5.17)	
	Always or often	53 (37.86)	80 (45.98)	

Adverse events	Occasionally or seldom	64 (45.71)	75 (43.10)	0.2136
	Never	23 (16.43)	19 (10.92)	
Possible interactions with other substances	Always or often	38 (27.14)	64 (36.78)	0.1410
	Occasionally or seldom	76 (54.29)	87 (50.00)	
	Never	26 (18.57)	23 (13.22)	
Contraindications	Always or often	62 (44.29)	87 (50.00)	0.1087
	Occasionally or seldom	53 (37.86)	70 (40.23)	
	Never	25 (17.86)	17 (9.77)	
Mode of storage	Always or often	29 (20.71)	39 (22.41)	0.7185
	Occasionally or seldom	59 (42.14)	78 (44.83)	
	Never	52 (37.14)	57 (32.76)	
<b>Preference towards purchasing predominantly the OTC medicines or dietary supplements which are:</b>				
Well-known and proven		137 (97.86)	168 (96.55)	0.4908
New/ launched onto the market recently		3 (2.14)	6 (3.45)	
<b>Impact of various factors on purchasing the OTC medicines or dietary supplements:</b>				
Advice of a physician	Very low or low	24 (17.14)	41 (23.56)	0.2235
	Medium	29 (20.71)	41 (23.56)	
	High or very high	87 (62.14)	92 (52.87)	
Advice of a pharmacist	Very low or low	13 (9.29)	25 (14.37)	0.3770
	Medium	35 (25.00)	39 (22.41)	
	High or very high	92 (65.71)	110 (63.22)	
Advertising in traditional mass-media (TV, radio, newspapers, leaflets, flyers)	Very low or low	84 (60.00)	114 (65.52)	0.2747
	Medium	33 (23.57)	42 (24.14)	
	High or very high	23 (16.43)	18 (10.34)	
Advertising in online media	Very low or low	103 (73.57)	129 (74.14)	0.8271
	Medium	24 (17.14)	32 (18.39)	

	High or very high	13 (9.29)	13 (7.37)	
Form of a product (e.g. capsules, tablets)	Very low or low	55 (39.29)	74 (42.53)	0.6549
	Medium	33 (23.57)	44 (25.29)	
	High or very high	52 (37.14)	56 (32.18)	
Opinion of friends and family members	Very low or low	26 (18.57)	17 (9.77)	0.0532
	Medium	30 (21.43)	34 (19.54)	
	High or very high	84 (60.00)	123 (70.69)	
Own experience	Very low or low	3 (2.14)	5 (2.87)	0.8482
	Medium	7 (5.00)	7 (4.02)	
	High or very high	130 (92.86)	162 (93.10)	
Price	Very low or low	18 (12.86)	21 (12.07)	0.6556
	Medium	43 (30.71)	62 (35.63)	
	High or very high	79 (56.43)	91 (52.30)	
<b>Other detailed characteristics of consumption and purchasing habits</b>		<b>EARLY YRS</b>  <b>N=140</b>  <b>n (%)</b>	<b>LATE YRS</b>  <b>N= 174</b>  <b>n (%)</b>	<b>p</b>
<b>Having more confidence in those OTC medicines or dietary supplements that are advertised</b>		52 (37.14)	47 (27.01)	0.0548
<b>While offered a choice of several products having the same composition. choosing the one which is:</b>				
The cheapest		41 (29.29)	60 (34.48)	0.2487
Has a preferred form (e.g. tablets)		19 (13.57)	15 (8.62)	
Recommended by a pharmacist		41 (29.29)	46 (26.44)	
Recommended by a physician		34 (24.29)	51 (29.31)	
Intensely advertised in the mass-media		5 (3.57)	2 (1.15)	
<b>Questions related to any adverse events or any other complaints which might be subjectively linked to an administered product</b>				
<b>Experiencing ever any adverse events or any other complaints which might be subjectively linked to an administered product</b>		19 (13.57)	20 (11.49)	0.5791

	<b>EARLY YRS</b>	<b>LATE YRS</b>	<b>p</b>
<b>Consulting a physician when adverse events or consumption-related complaints occurred</b>	<b>N=19</b>	<b>N= 20</b>	
	<b>n (%)</b>	<b>n (%)</b>	
	9 (47.27)	5 (25.00)	0.1455
<b>Actions undertaken when adverse events or any other consumption-related complaints occurred:</b>			
Discontinuing intake	12 (63.16)	13 (65.00)	0.0961
Altering the dosage	5 (26.32)	1 (5.00)	
Not altering anything	2 (10.53)	6 (30.00)	
<b>Monthly expenditures on OTC medicines and dietary supplements</b>	<b>EARLY YRS</b>	<b>LATE YRS</b>	<b>p</b>
	<b>N=140</b>	<b>N= 174</b>	
	<b>n (%)</b>	<b>n (%)</b>	
Not more than PLN 20.00	91 (65.00)	123 (70.69)	0.2821
More than PLN 20.00	49 (35.00)	51 (29.31)	