

## THE NUTRITIONAL AWARENESS OF FUNCTIONAL FOOD AMONG UNIVERSITY STUDENTS IN POLAND

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### ABSTRACT

**Background.** A lack of knowledge or a fear of unknown products are common reasons why new foods are not accepted. A good example of such foods are those containing pro-health ingredients. These are termed functional foods.

**Objective.** The aim of the study was to determine the level of knowledge that university students have on functional foods.

**Material and Methods.** Subjects surveyed were 266 students from the Poznań University of Medical Sciences, majoring in Dietetics and Pharmacy. A short original questionnaire was put to the students comprising 7 closed (force-choice) questions in order to test their knowledge on definition, function, form or examples of functional foods.

**Results.** Compared to Pharmacy students, Dietetic students had significantly greater nutritional awareness about the characteristics, forms and examples of functional foods, as well as they consumed a wider range of functional products. They also evaluated their knowledge more highly than Pharmacy students on such issues. This greater nutritional knowledge in Dietetic students, seems likely to have arisen from the very nature of their studies.

**Conclusions.** There is a need to promote functional foods in medical schools and universities, that not only include those studying nutrition subjects but also in other health-related areas.

**Key words:** *functional food, level of knowledge, students, food neophobia*

### STRESZCZENIE

**Wprowadzenie.** Zdarza się, że brak akceptacji nowego produktu spożywczego wynika z braku wiedzy na jego temat oraz obawy przed nieznanymi produktami, czyli tak zwanej neofobii żywnościowej. Przykładem takim jest tak zwana żywność funkcjonalna, czyli żywność zawierająca składniki prozdrowotne.

**Cel badań.** Celem przeprowadzonych badań było określenie poziomu wiedzy studentów na temat żywności funkcjonalnej

**Material i metody.** W badaniu uczestniczyło 266 respondentów, studiujących na Uniwersytecie Medycznym w Poznaniu, na dwóch kierunkach Dietetyka i Farmacja. Badanych konsumentów poproszono o wypełnienie krótkiego, autorskiego kwestionariusza ankiety zawierającego 7 pytań zamkniętych. Pytania sprawdzały wiedzę ankietowanych w zakresie znajomości definicji, funkcji, postaci oraz przykładów żywności funkcjonalnej.

**Wyniki.** Studenci dietetyki, w stosunku do studentów farmacji, charakteryzowali się istotnie większą wiedzą na temat cech, postaci oraz przykładów żywności funkcjonalnej, jak również korzystali z szerszej gamy produktów funkcjonalnych. Ponadto studenci Dietetyki wyżej oceniali swój poziom wiedzy w zakresie żywności funkcjonalnej. Uzyskane wyniki wskazują na prawdopodobny wyższy poziom wiedzy żywieniowej wśród studentów dietetyki, co może mieć związek z wybranym kierunkiem studiów.

**Wnioski.** Istnieje potrzeba popularyzacji produktów zaliczanych do żywności funkcjonalnej na uczelniach medycznych, nie tylko wśród studentów, których kierunek studiów ma związek z żywieniem, ale również wśród studentów innych kierunków związanych ze zdrowiem.

**Słowa kluczowe:** *żywność funkcjonalna, poziom wiedzy, studenci, neofobia żywnościowa*

### INTRODUCTION

There is an increasing number of scientific writing tackling the issue of the correlation between nutrition and the occurrence of the chronic diseases of modern civilisation [1, 5, 9]. Many authors underline the beneficial influence of bioactive food ingredients, which help to maintain physical and psychological wellbeing as well as improve the general health [1, 5,

7, 16]. Food containing such pro-health ingredients is called functional food [15]. The concept is rooted in the Eastern culture which does not set a clear boundary between a cure or medicine and food. Functional food was first mentioned in Japan in the mid 80's. In the next couple of years, the interest in this type of food spread to the USA and Europe [3]. According to the working definition elaborated in the 1999 FUFOSÉ (*Functional Food Science in Europe*) document,

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functional foods are those foods which “beneficially affect one or more target functions in the body beyond adequate nutritional effects in a way that is relevant to either an improved state of health and well-being and/or reduction of risk of disease” [9, 11]. Additionally, those foods are intended to be consumed as part of the normal diet and do not come in form of a pill, a capsule or any form of dietary supplement [3, 9, 11]. Their beneficial effect on at least one or more human body functions needs to be scientifically proven (besides the nutritional value they have). These foods may enhance health or wellbeing as well as have prophylactic properties [3, 5, 9, 11, 15, 18]. We may distinguish a few kinds of functional foods: naturally rich in pro-health ingredients food, foods with enhanced absorption of pro-health ingredients, purified foods (from which some non-beneficial ingredients have been extracted) and enriched foods [9, 18].

Their common market availability may constitute an opportunity to reduce the risk of many diseases of modern civilisation [11]. For the functional foods to be often consumed and popular, there needs to be broader awareness and acceptance of them, especially among young consumers [16, 18]. As pointed out by *Cha* et al. [7], consumers’ acceptance of functional food depends on several factors, which include: demographic factors (gender, age, education), product factors (price, taste) and psychological factors (confidence and/or concerns about these foods). According to *Steinka* [19], technological advancements as well as unconventional or unknown products are often not well received by consumers who are rather used to their usual foods and eating habits. It is common that new foods are not accepted due to lack of knowledge, some fear of unknown products or risk perception associated with their consumption [1, 7, 18]. This phenomenon is referred to as food neophobia [3, 19]. Basing on these premises, we conducted studies which aimed at uncovering functional food awareness levels among university students.

## MATERIAL AND METHODS

The surveyed group comprised 266 young consumers ranging from aged 18 to 27. They were students of Nutrition and Pharmacy at the Poznan University of Medical Sciences in Poland. Two interviewees’ subgroups were created according to the studies the young people were enrolled in (161 and 105 for the Dietetics and the Pharmacy Studies respectively). The consumers were asked to fill in an original, short questionnaire comprising 7 closed (forced-choice) questions. The knowledge of definition, function, form or examples of functional foods was tested with these questions.

The results were statistically analysed by the StatSoft, Inc. (2011) STATISTICA (Data Analysis Software System) version 10 software. For the initial analysis, a basic descriptive statistics was employed: average ( $X$ ), standard deviation (SD), variance ( $V$  (%)), median (Me), minimum variable (Min), maximum variable (Max). For quantitative variables to verify the normal dispersion, the *Shapiro-Wilk* test was applied. To find the statistically significant differences between the two analysed variables, with the lack of the normal dispersion, the *Mann-Whitney* test was applied. In the case of the variables in categorical scale the Chi2 of independence test was applied, whereas in the case of small quantities in specific categories, the correction of the  $Chi^2$  - the *Fisher’s* exact test was used. For all the analysed variables the statistical significance of  $P$ -value = 0.05 was applied.

## RESULTS

The study results reveal that significantly more Dietetics students than Pharmacy students have already come across the term - functional foods (Table 1).

Table 1. The sources of information of functional food among university students in Poland

The sources of information	Number of answers [%] <sup>b</sup>		Significance of differences between D and P ( <i>Fisher’s</i> exact test)
	Dietetics (D)	Pharmacy (P)	
Family and friends	9	1	p=0.0036
Product packaging	23	3	p<0.0001
TV program, radio	17	10	p=0.0765 <sup>a</sup>
Scientific press	38	5	p<0.0001
Newspapers	8	2	p=0.0534 <sup>a</sup>
Doctors	1	0	p=0.5204 <sup>a</sup>
Internet	37	11	p<0.0001
Other source	37	9	p<0.0001
I do not know	17	69	p<0.0001

<sup>a</sup> no statistically significant differences;

<sup>b</sup> values do not add up to 100 because respondents could choose more than one answer

The analysis of the questions probing the knowledge of functional foods characteristics among young consumers is shown in Table 2. It provided very interesting results.

There were significant differences in the level of knowledge depending on the interviewees' field of study. The Dietetics students were much more knowledgeable in terms of the specific features of functional foods and they were able to indicate that these types of foods are consumed as a part of a normal food pattern. More than a half of

respondents, regardless the field of studies, associated the functional foods with their other name - pro-health foods, however, the Dietetics Studies students did this more often. A similar trend can be observed when it comes to providing examples of functional foods. More Dietetics students were able to provide examples of functional foods as: high fibre, low in calories fruit juices with extra vitamins, probiotic yoghurts and other fermented dairy products, cold pressed oils and *omega-3* enriched eggs.

Table 2. The level of Dietetic and Pharmacy students' nutritional knowledge of the functional food

Checking knowledge questions	Possible answers	Number of answers				Significance of differences between D and P ( $\chi^2$ test)
		Dietetics (D)		Pharmacy (P)		
		n	%	n	%	
Incorrect characteristic of functional food	correct	96	60	42	40	<0.0001
	incorrect	51	31	19	18	
	„I do not know”	14	9	44	42	
Examples of functional food	correct	124	77	60	57	<0.0001
	incorrect	26	16	7	7	
	do not know”	11	7	38	36	
Another name of functional food	correct	140	87	61	58	<0.0001
	incorrect	7	4	3	3	
	“do not know”	14	9	41	39	
The form of functional food	correct	129	80	46	44	<0.0001
	incorrect	20	13	20	19	
	„do not know”	12	7	39	37	

The practical aspect linked to the conducted research was included in the question on functional foods in a normal food pattern (Table 3). Table 3 indicates that the Pharmacy students consume far less functional foods of any kind. The respondents' field of study had a significant influence on the consumption of functional foods such as: cold pressed oils, fermented dairy and

oat products. In terms of other functional foods also commonly consumed by the respondents (such as high fibre grain products, fruit and vegetable juices with added vitamins, green tea), there was no correlation between their popularity and the field of study.

The results of the subjective knowledge level of the students are shown in the Table 4.

Table 3. The most popular functional products among university students

The most popular functional products	Number of answers [%] <sup>b</sup>		Significance of differences between D and P ( <i>Fisher's</i> exact test)
	Dietetics (D)	Pharmacy (P)	
Fermented dairy products	58	20	p<0.0001
Cold-pressed plant oils	47	27	p=0.0008
Eggs fortified in omega-3 acids	7	3	p=0.1727 <sup>a</sup>
Low salt products	20	13	p=0.1874 <sup>a</sup>
Energy drinks	14	17	p=0.4844 <sup>a</sup>
Soy products	19	10	p=0.0832 <sup>a</sup>
Juices with vitamins	35	28	p=0.2296 <sup>a</sup>
Green tea	65	52	p=0.0552 <sup>a</sup>
Cereal products rich in fibre	47	35	p=0.0580 <sup>a</sup>
Oat product	57	34	p=0.0004
Low energy foods	11	10	p=1.0000 <sup>a</sup>
Other functional products	6	1	p=0.0943
I do not use	8	38	p<0.0001

<sup>a</sup> no statistically significant differences;

<sup>b</sup> values do not add up to 100 because respondents could choose more than one answer

Table 4. Subjective assessment of the level of students' knowledge of the functional food

Subjective assessment of the level of students' knowledge	Number of answers				Significance of differences between D and P ( $Chi^2$ test)
	Dietetics (D)		Pharmacy (P)		
	n	%	n	%	
very low	17	11	59	56	< 0.0001
low	31	19	26	25	
medium	74	46	18	17	
high	33	20	1	1	
very high	6	4	1	1	

Most of the Pharmacy students declared their knowledge level to be low or very low, whereas almost a half of Dietetics students indicated their knowledge level to be medium. Significantly more Dietetics students, than those studying Pharmacy, described their level of knowledge on functional foods as high or very high.

## DISCUSSION

Nowadays the Internet is considered to be the best and the fastest source of knowledge on various topics [2, 14]. Also in our study, the most common source of information on the functional foods for both groups was the Internet. The Dietetics students have also often indicated other sources of information on functional foods such as: scientific journals, product packaging or other including university lectures, while the Pharmacy students pointed to TV or radio broadcasts as sources of information on the topic. Similar sources of information were indicated by *Asemi* [2] and *Kramkowska et al.* [14], as the nutritional awareness among students is mainly shaped by the Internet, books and scientific journals.

Our survey results showed that a large group of students of both faculties did not have sufficient knowledge about functional foods and some of them even did not know that they ate functional foods. The results coincide with the results of other authors [1, 3, 17]. According to *Sicińska* and *Bojarska* [17], 89% of students who participated in their research, consumed products fortified with folic acid, however a quarter of them were not aware of the usage of such functional products.

When we compare our results on the most popular functional products with those obtained by other European authors, we may observe that such products in Poland are juices and drinks enriched with minerals, vitamins, fibre or inulin, probiotic yoghurts, energy and isotonic drinks, breakfast cereals and margarine with stanols [11]. At the same time in Europe, the most commonly consumed functional foods are dairy (fermented and unfermented with probiotics) and grain products with extra fibre [3, 11, 18]. The presented study demonstrates a low consumption of energy drinks

among the group of students. These findings disagree with studies by *Bulut et al.* [4], *Buxton and Hagan* [6], *Górnicka et al.* [11] and *Kopacz et al.* [12, 13], where more than a half of studied university students drank energy drinks to stay awake and improve their mental performance. Students most often drank energy drinks during the examination session.

Green tea was a very popular functional product among respondents in the present study. 65% of Dietetics students and 52% of Pharmacy students declared choosing this functional product. These results are similar to results obtained in the study by *Drywień et al.* [8].

Generally, Dietetics students assessed their level of knowledge about functional foods more highly than Pharmacy students. Their higher score may be related to the knowledge they are exposed to during the academic education and to their areas of interest which is linked to their field of studies. It may suggest that the field of study and the knowledge derived from it regarding the functional foods have an indirect influence on the acceptance level and shape positively functional foods eating behaviours. Similar conclusions were drawn by other authors who stated that the more educated the person is and the more food awareness they have, the more positive eating behaviours they present [1, 3, 14, 16, 18]. On the other hand, studies demonstrated that the lack of knowledge about some product made the consumers decide against buying and eating this product [3].

## CONCLUSIONS

1. The results indicate that there is a need to promote functional foods at medical schools and universities, not only among students directly linked with nutrition, but also among the other students of health related degrees.
2. In order to promote functional foods available on the market among various groups of consumers, it is highly important to implement a widespread advertising campaign together with education on the topic. These actions may diminish the risks of diet-related diseases.

**Conflict of interest**

The authors declare no conflict of interest.

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