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Does Diagnosis of Diabetes Affect Consumers' Attitudes towards Pro-Health Food?

Summary

An effective launching of pro-health food on market should be based on a deep knowledge of the target consumers. The study aimed at investigation of attitudes of diabetics toward food enriched with bioactive compounds and effect of diabetes diagnosis on the issue was studied by their comparison with healthy people's attitudes. The research was conducted by the survey method. The diabetic persons were randomly selected; purposive sampling was applied for healthy people to obtain similar socio-demographic characteristics of both groups.

Diabetics claimed knowledge on health benefits of inulin, stevia and mulberry (70%) but their self-estimation of that knowledge did not correspond with the actual state. Fortified food aroused positive emotions in 28% of the participants; however, food was regarded as "unnatural" by over 30%. The low percentage of diabetics bought food with the compounds and searched for information about them on labels.

Despite declarations concerning the increased interest in the food issue after diabetes diagnosis (94%), the limited actual knowledge of pro-health food benefits can cause distrust while purchasing such food.

Key words: consumers' attitudes, *diabetes mellitus*, pro-health food, bioactive compounds.

JEL codes: I12, L66

Introduction

Among numerous trends observed on the food market, the industry is more and more interested in innovations concerning pro-health products with bioactive compounds which consumption would contribute to health improvement and prevention or reduction incidences of the so-called lifestyle diseases (Błaszczak, Grzeskowiak 2014; Siro et al. 2008). Such products can be natural or processed, contain biologically active compounds and must be consumed in certain effective non-toxic amounts to provide health benefit (Martirosyan, Singh 2015). These food products are bracketed together with functional foods. EU authorities have not legislated a definition for functional foods as specific food categories but rather have described its concept. According to the European Commission Concerted Action on Functional Food Science in Europe (FUFOSE), a product can be considered functional when shows beneficial impact on human organism in addition to its basic nutritional effect and it

consumption (in proper amounts) either improves the general and physical conditions or/and decreases the risk of diseases (Siro et al. 2008).

A part of the pro-health products is targeted at people with diabetes mellitus diagnosis (type 1 or type 2). Diabetes is a chronic disease, characterised by a high glucose level in blood as a result of disorders in insulin secretion or improper action (OECD/European Union 2014). Type 1 diabetes comprises about 10-15% of total diabetes (OECD/European Union 2014). However, the latest reports suggest a significant increase in prevalence of type 1 diabetes in the future since presently we observe a steady rise in the numbers of incidences among children, as well as the extent of the diabetic patients' lifespan due to the progress in the diabetes therapy (Chobot et al. 2015; Livingstone et al. 2015).

Effective introducing of pro-health products on food market needs a study of consumer attitudes and their three components: cognitive (knowledge), affective (emotions and motivations) and behavioural (market behaviours). Investigation of the so-called "target group insight" would help to create effective marketing communication (Nestorowicz 2015). There are numerous examples of studies which were conducted to identify pro-health food consumers (Bech-Larsen, Scholderer 2007; Babicz-Zielińska 2010) and factors affecting consumer acceptance of functional food (Urala, Lahteenmaki 2007; Siro et al 2008; Annunziata, Vecchio 2011; Kozirok, Baumgart, Babicz-Zielińska 2012). However, only some of them were focused on diabetics and their behaviours on the pro-health food market, as well as on differences in these behaviours between consumers with and without diabetes mellitus diagnosis (Patch, Williams, Tapsell 2005; Waszkowiak et al 2016).

The aim of the study was to investigate diabetics' attitudes toward pro-health food with bioactive compounds supported diabetes therapy, including their knowledge and emotions, and purchase behaviours. Moreover, the effect of diabetes diagnosis on the components was analysed by a comparison of diabetics' and healthy people's attitudes.

Material and methods

A survey was carried out in the first quarter of 2016. A questionnaire was prepared as a research tool which contained closed-ended questions with a possibility of selection of only one or more than one options from the provided list of defined answers.

The sample included 100 diabetics and 100 healthy people. To collect the sample, social networks were non-randomly selected as typical objects providing access to the studied populations. In the case of diabetics, they were from (e.g. "Cukrzyca 24h Info"/"Diabetes 24h Info", "Cukrzyca t1 – bez paniki"/"Diabetes t1 – no panic") to discuss issues regarding diabetes (members could share their knowledge, observations and concerns). The method of random sampling was applied to select diabetics in the objects. To show the effect of diabetes diagnosis on participants' responses, the studies were also conducted among people without a diagnosis of diabetes (called healthy people in the study) and the method of purposive sampling was applied for selection of these respondents to obtain similar socio-demographic

characteristics for both groups of the survey participants. The characteristics of the respondents are shown in Table 1.

The questionnaires were sent to people who had previously claimed their participation in the survey. The survey was anonymous. Then the completed questionnaires were collected and verified; only those fully completed were subjects of further investigation. The obtained results were normalized and analysed. Hypotheses (H_0) concerning the independence between diagnosis of diabetes and the respondents' knowledge, emotions and behaviours were proposed. For the hypotheses verification, a statistical analysis was conducted by chi-square independence test. In the case of the hypothesis H_0 was rejected ($p < 0.05$), an alternative hypothesis H_1 was adapted on the dependence between the variables.

Table 1
Socio-demographic data of the survive participants

Socio-demographic characteristics		Participants (%)	
		Diabetics (n = 100)	Healthy people (n = 100)
Sex	women	58	59
	men	42	41
Age	≤ 24	38	37
	25-34	40	40
	35-44	16	16
	45-54	6	7
Education	elementary/vocational courses	18	5
	secondary	41	33
	higher	41	62

Source: based on authors' own research.

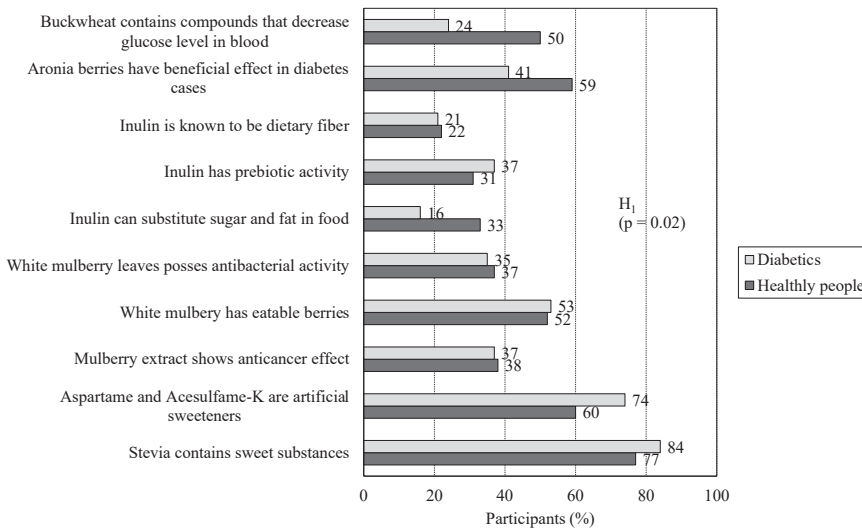
Results

In the study, knowledge of bioactive compounds and food fortified with the compounds was investigated. It was shown that most of the participants properly defined the concept of "bioactive compound" (53% and 69% of diabetes and healthy people, respectively), as well as "fortified food" (about 70% of both participant groups). The results were similar to the results of the previous study carried out among people suffering from inflammatory bowel diseases and patients of diabetes unit of a university hospital (Szymandera-Buszka et al. 2011; Waszkowiak et al. 2016)

Participants were asked for a selection of pro-health food components which health benefits were known to them (the list included also these components which supported diabetes therapy). Diabetics marked inulin, white mulberry and stevia the most frequently (67%, 76% and 77% of participants, respectively); selection of the products was significantly more frequent among diabetics than healthy people (about 30-40%). On the other hand, healthy peo-

ple claimed knowledge of health benefits of aronia berries and buckwheat more frequently than diabetics (76% and 46% of healthy people and 53% and 33% of diabetics, respectively). Statistical analysis with using chi-square independence test confirmed the dependence between diagnosis of diabetes and the claimed knowledge of health benefits of the pro-health food components ($p < 0.01$; H_1).

Figure 1
Participants' knowledge of health benefits of selected pro-health food compounds (chi-square independence test; hypotheses: H_0 - independence between diagnosis of diabetes and the responses given by participants, $p > 0.05$; H_1 - dependence between the features, $p \leq 0.05$)



Source: based on authors' own research.

However, the study also showed, that the knowledge of health benefits of bioactive components found in pro-health products claimed by diabetics did not agree with their actual knowledge of the issue. When participants were asked whether the given statements concerning health and functional properties of the components were correct or not (Figure 1), 20-35% of diabetics were found to know health benefits of inulin; only 16% indicated that it could substitute sugar and fat in food (comparing to 32% of healthy people). No more than 1/3 of the respondents with diagnosed diabetes possessed knowledge of health benefits of white mulberry.

The surveyed diabetics showed a higher level of knowledge of sweeteners; the higher percentage of diabetics than healthy people agreed that stevia and acesulfame-K were natural and artificial sweeteners, respectively. However, a higher percentage of healthy people

than diabetics showed knowledge concerning health benefits of aronia berries and buckwheat. The significance of these differences between the responses of diabetics and healthy people was revealed by chi-square independence test; based on the results, hypothesis H_1 was adapted on the dependence between diagnosis of diabetes and the actual participants' knowledge of health benefits of the pro-health food components ($p=0.02$; Figure 1).

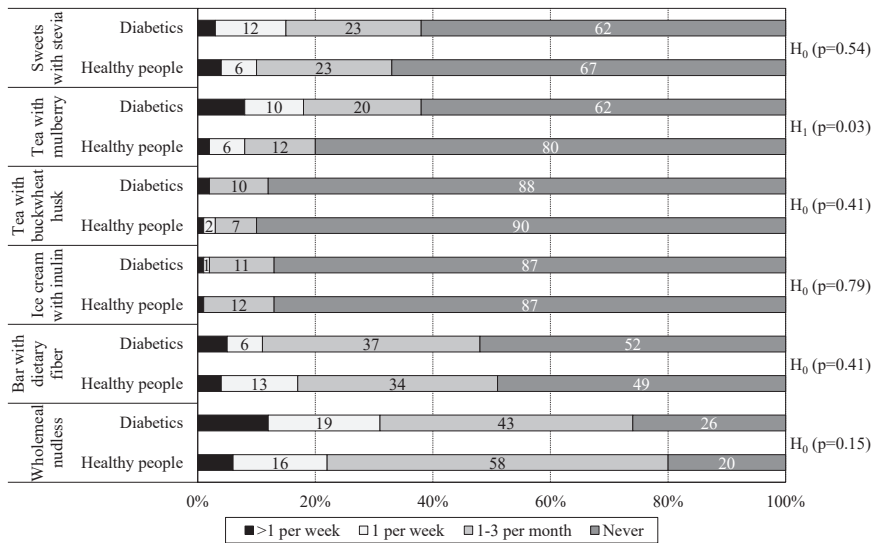
Results of the survey showed an incompatibility between the level of the claimed and actual diabetics' knowledge of benefits of selected bioactive products which support diabetes therapy. Despite the diabetics' declarations (94% of participants) about their growing interest in information on food after diabetes diagnosis, the results did not show a higher level of diabetics' knowledge of bioactive compounds supported diabetes therapy when compared to healthy people. It probably resulted from their low activity in searching for information regarding the compounds. Only 23% of diabetes declared searching for such information; all of them used the Internet and some consultations with a physician /dietician or printed media (about 8%). Analysis of diabetics' opinion about the information provided a very mixed picture; about half of the diabetics searching for the information was not able to express their opinion on the issue (they selected answer: "I do not have any opinion about that"), and opinions of the others were shared almost equally between positive and negative. Results of the previous studies (Filipiak-Florkiewicz et al. 2015; Waszkowiak et al. 2016) showed consumers' dissatisfaction because of the lack of easy access to trustworthy information concerning pro-health food, and emphasized their opinion that education programmes sharing information on nutrition principles and pro-health food in mass media could increase significantly their interest in the food as well as encourage them to buy pro-health products. Therefore, it seems to be important to create such trustable and aimed at diabetics information sources about food enriched with bioactive compounds and their importance in diabetes therapy. Olejniczak (2015) showed a relationship between consumer health state and perceived risk of a failed purchase of functional foods (it was found that the worse health state was declared the higher risk was perceived); such risk can discourage potential consumers from making a purchase. The author concluded that the lack of useful information which helps potential buyers to make a decision can significantly affect their behaviours on the functional foods market.

To study behavioural components of diabetics' attitude toward pro-health food, the survey participants were asked to answer questions concerning the purchase of food enriched with the compounds mentioned above (i.e. inulin, stevia, aronia berries, white mulberry and buckwheat). The diabetes diagnosis was shown to affect the participants' answers (the hypotheses H_1 were adopted, $p<0.01$, according to the results of chi-square independence test). Among the diabetics, 47% claimed that they purchased food with inulin, 40% marked products with stevia and aronia berries, 36% those with white mulberry and 30% with buckwheat. Healthy people more frequent claimed purchase of food with aronia berries and buckwheat (57% and 48%, respectively); low percentage of them indicated buying products with inulin (12%) and white mulberry (18%). This distribution of participants' answers on the question related to their claims concerning knowledge of health benefits of the food compounds – in

both groups, more frequently the participants claimed knowledge of the compound health benefits the more frequently they also claimed that they purchased of food enriched with it.

However, purchase frequency of the selected pro-health food with stevia, inulin, white mulberry and buckwheat (those targeted also at diabetics) was shown to be low among the participants (Figure 2). In the case of most products, the dependence between diagnosis of diabetes and purchase frequency of the products was not shown (by the chi-square independence test results). The dependence was found only in the case of tea with white mulberry (the hypothesis H_1 was adopted; $p=0.03$) which diabetics bought more frequently than healthy people.

Figure 2
Purchase frequency of selected pro-health products among diabetics and healthy people (chi-square independence test; hypotheses: H_0 and H_1 as in Figure 1)



Source: as in Figure 1.

The participants were also asked about the reasons for buying or not-buying pro-health food with the bioactive compounds. Results of chi-square test showed independence between diagnosis of diabetes and the factors affecting buying (hypotheses H_0 ; $p=0.84$) or not-buying of the products (hypotheses H_0 ; $p=0.22$). Among the participants claiming purchasing of the pro-health products, health (68% and 80% of healthy people and diabetics, respectively), interesting sensory attributes (28% and 37% of healthy people and diabetics, respectively) and willingness to try something new (about 28% of those participants) were the most frequently indicated reasons to buy the food. These results showed that consumers of pro-health food

enriched with the above mentioned bioactive compounds are mostly pro-health oriented and behave like innovators on food market (i.e. persons who accept innovations earlier than the others; Gutkowska 2011). A significant effect of knowledge and trust in health benefits of pro-health food on consumer acceptance was shown in previous studies (Urala, Lähteenmäki 2004; Annunziata, Vecchio 2011). Moreover, Verbeke (2005) established that these factors were more important than socio-demographic ones (e.g. age, sex or education). Patch et al. (2005) studied factors which enhance intention toward purchasing pro-health foods enriched with n-3 fatty acids among subjects without and with type-2 diabetes mellitus. The authors showed that attitudes impacted significantly intention of the food buying whereas subjective norms (i.e. social pressure) and control beliefs (i.e. perception of control over the behaviour) did not, irrespectively of the subject group; positive attitudes of the subjects were associated with their belief that eating of n-3 enriched foods would provide a wide range of health benefit and this belief was greater among the diabetics.

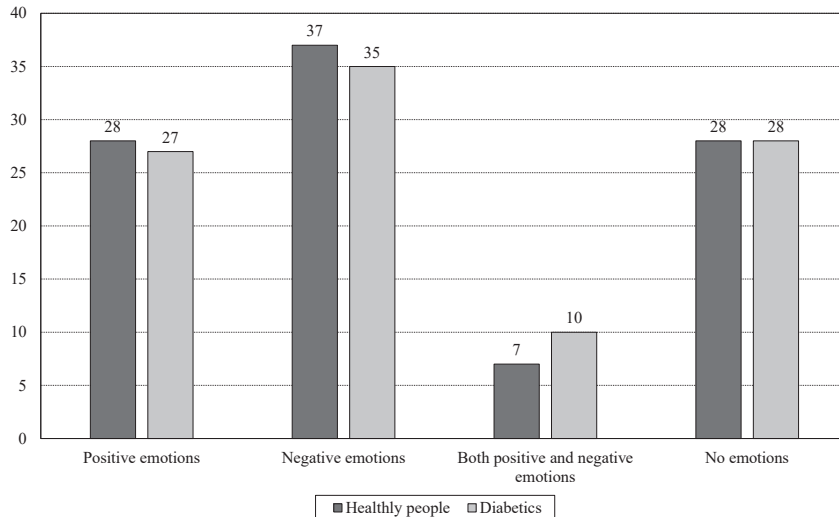
The most frequent reason for not purchasing pro-health products was the consumers' preference to buy traditional products rather than the modified ones (35% and 44% of healthy people and diabetics, respectively). It could be associated with hardly willing of those participants to compromise on the sensory attributes of pro-health foods for health benefits (Verbeke 2006). On the other hand, 33% of healthy people and 25% of diabetics claimed: "I have never heard about the products". It suggests a lack of efficient communication between producers and target consumers which can cause information asymmetry between the market participants.

To investigate purchase behaviours, the participants were also asked about their interest in a composition of purchase food. The higher percentage of diabetics than healthy people answered they always searched for such information on product labels (56% and 38% of participants, respectively); results of chi-square test showed the dependence between diagnosis of diabetes and the behaviour (the hypothesis H_1 was adapted, $p=0.04$). Groups of the surveyed participants differed significantly in their trust in information about a given product composition: 24% diabetics and 37% healthy people answered that the information on product label was not always true in their opinion (based on the results of the chi-square test, the hypothesis H_1 was adapted, $p=0.03$). Therefore, the results showed that as many as a half of the diabetics who searched for information about food composition on product labels did not trust it at the same time. The reason for the distrust seems to be their limited knowledge concerning bioactive compounds supported diabetes therapy. Nestorowicz (2016) observed the dependence between consumers' knowledge of pro-health food and their searching for information; the author found that the more a consumer knows about food, the more likely he will search for information on food packaging, and the less he is susceptible to manipulation sometimes practised in marketing communications.

Consumers' behaviours are also affected by emotions related to the purchased product. Results of the survey showed that pro-health food enriched with bioactive compounds arouses negative connotations in the predominant group of the surveyed participants (Figure 3). The participants described the food as unnatural (37% of healthy people and 33% of diabetics), as well as more expensive (5% and 12%, respectively) and of worse sensory qual-

ity (about 10% of participants) compared to traditional products. On the other hand, those participants who showed positive emotions toward the food (about 28%; Figure 3) indicated that the food was healthier (20%), could substitute diet supplements (17%) or possessed interesting sensory attributes (14% of healthy people and 9% of diabetes) when compared to traditional one. Some participants showed both positive and negative connotations (Figure 3); those participants the most frequently answered that the food “is healthier but more expensive than the traditional one”, and that “it could substitute diet supplements but is not natural”. No significant dependence between the diagnosis of diabetes and participants’ emotions associated with enriched food was found (the results of chi-square independence test: the hypothesis H_0 was adopted, $p=0.90$).

Figure 3
Emotions of diabetics and health people toward pro-health food fortified with bioactive compounds (chi-square independence test; hypotheses: H_0 and H_1 as in Figure 1)



Source: as in Figure 1.

Thinking about enriched food as unnatural seems to be an important factor limiting the purchase of pro-health food enriched with bioactive compounds by the surveyed participants. The studies conducted among women aged 30-50 by Gutkowska et al. (2014) showed their negative attitudes toward improvement or enrichment of food quality because such food was regarded as modified, and thus unhealthy. Moreover, Nestorowicz (2015) emphasised that pro-health food aroused anxiety in women since it could be enriched with artificial additives. Therefore, it seems to be important to earn the trust of target consumers in pro-health food

enriched with bioactive compounds by reassurance in marketing communications that the food or compounds added to the food are of natural origin. Such communications can be an important element of marketing strategy which can support effectively introducing a new product on the pro-health food market.

Conclusions

Despite the diabetics' declarations concerning their increasing interest in food issue after the disease diagnosis, as well as those about knowledge of some pro-health products supporting their therapy (i.e. food with inulin, white mulberry and stevia), the actual knowledge of diabetes on health benefits of the products was shown to be limited. The limited knowledge seems to cause negative attitudes of a large group of diabetes toward pro-health food; their emotions were similar to those aroused among people without a diagnosis of diabetes. Their opinions about pro-health food enriched with bioactive compounds showed distrust because the food was simply regarded as unnatural. The opinions probably caused that they were wary of making the product purchases. Therefore, it seems to be important to create trustworthy communication aimed at people with diagnosed diabetes to efficiently introduce the innovative food enriched with bioactive compounds onto the market. These communications should provide target consumers with a comprehensible knowledge of bioactive compounds and their benefits. They should also emphasise that the compounds are natural to inspire their trust in enriched food and encourage them to purchase the products in focus. In our research only type 1 diabetes were included thus the surveyed group was mostly comprised of young people aged 25-35 years. It could affect their attitudes toward pro-health food as well as acceptance toward such innovations on the food market. Older participants with type 2 diabetes should be included in the future study to evaluate if our observations concerning diabetes' attitudes toward pro-health foods are age-dependent.

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Czy rozpoznanie cukrzycy zmienia nastawienie konsumentów do żywności prozdrowotnej?

Streszczenie

Efektywne wprowadzanie na rynek produktów o cechach prozdrowotnych wymaga poznania ich docelowych konsumentów. Celem było zbadanie postaw diabetyków wobec dedykowanej im żywności wzbogacanej w składniki bioaktywne oraz ustalenie, jak rozpoznanie choroby wpływa na nie (przez porównanie z postawami osób zdrowych). Badania przeprowadzono metodą ankietową. Doboru próby diabetyków dokonano losowo, a zdrowych – celowo dla uzyskania zbliżonej struktury demograficznej prób.

Diabetycy deklarowali znajomość właściwości zdrowotnych inuliny, stewii oraz morwy (70%). Samoocena wiedzy respondentów nie pokrywała się jednak z jej stanem faktycznym. Żywność wzbogacana wzbudzała emocje pozytywne u 28% badanych, ale ponad 30% uważało ją za nienaturalną. Niski odsetek diabetyków kupował żywność prozdrowotną zawierającą ww. składniki oraz poszukiwał informacji o nich na etykietach.

Pomimo deklarowanego wzrostu zainteresowania informacjami o żywności po diagnozie cukrzycy (94%), ograniczona faktyczna wiedza diabetyków o walorach produktów prozdrowotnych może wywoływać obawy związane z ich zakupem.

Słowa kluczowe: postawy konsumenckie, cukrzyca, żywność prozdrowotna, składniki bioaktywne.

Kody JEL: I12, L66

Изменяет ли диагноз диабета отношение потребителей к пище полезной для здоровья?

Резюме

Эффективный ввод на рынок продуктов со свойствами пользы для здоровья требует изучения их целевых потребителей. Цель – изучить отношение диабетиков к предлагаемой им пище с добавлением биоактивных компонентов, а также выявить, как диагноз болезни влияет на них (сравнивая с отношением здоровых лиц). Изучение провели по методу опроса. Отбор выборки диабетиков провели по жеребьевке, здоровых же лиц – целевым способом для получения сближенной демографической структуры выборок.

Диабетики заявляли о знании свойств (с точки зрения здоровья) инулина, стевии и шелковицы (70%). Самооценка знаний респондентов однако не совпадала с их фактическим состоянием. Обогащенная пища возбуждала положительные эмоции у 28% опрошенных, но более 30% считали ее неестественной. Низкий процент диабетиков покупал полезную для здоровья пищу, содержащую вышеуказанные компоненты, и искал информацию о них на этикетках.

Несмотря на заявляемый рост интереса к информации о пище после диагноза диабета (94%), ограниченные фактические знания диабетиков о свойствах полезных для здоровья продуктов могут вызывать опасения, связанные с покупкой их.

Ключевые слова: потребительское отношение, диабет, полезная для здоровья пища, биоактивные компоненты.

Коды JEL: I12, L66

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