

# Level of knowledge concerning diet in type 2 diabetic patients and nurses

## Poziom wiedzy z zakresu diety u pacjentów z cukrzycą typu 2 oraz u pielęgniarek

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### ABSTRACT

**Introduction:** Among patients with diabetes, there are many myths concerning food products which are believed to lower or not influence the blood glucose (BG) level.

The aim of this study was to assess the knowledge of patients with diabetes and hospital nurses concerning popular food products and their impact on BG levels.

**Materials and methods:** The study group consisted of 250 patients with diabetes (DM), members of the Polish Diabetes Association; the other group consisted of 123 healthy nurses (N) from 3 hospitals in Szczecin, Poland. Participants were asked to complete a questionnaire on products common in diabetic diet (grapefruit, honey, coffee substitute, diabetic chocolate, milk soup, pork neck) and their influence on BG levels.

**Results:** The highest percentage of wrong answers was given for pork (DM 71%; N 83%, NS) and grapefruit (DM 51%; N 77%,  $p < 0.01$ ), while the most correct answers were for honey (DM 69%; N 80%;  $p < 0.05$ ) and milk soup (DM 64%; N 67%, NS). Negative correlation was found between the number of correct answers and the age of patients ( $r_s = -0,14$ ;  $p < 0.01$ ) and no correlation between the number of correct answers and the duration of diabetes mellitus (NS). Patients treated with insulin provided correct answers significantly more frequently than patients on oral medication only (44% vs 34.8%;  $p < 0.01$ ).

**Conclusions:** 1. The level of knowledge concerning products commonly used in diabetic diet among patients with diabetes and hospital nurses is low. 2. Both groups, patients and hospital nurses, need education about diabetic diet.

**Keywords:** diabetic diet; education; nurses; myths.

### ABSTRAKT

**Wstęp:** W środowisku pacjentów chorych na cukrzycę krąży wiele mitów dotyczących produktów spożywczych, które mają obniżyć poziom glukozy we krwi lub przynajmniej go nie podnosić. Celem badania było zbadanie stanu wiedzy na temat wpływu popularnych i często stosowanych produktów spożywczych na poziom glikemii wśród chorych na cukrzycę oraz wśród pielęgniarek zatrudnionych w szpitalach.

**Materiały i metody:** Grupa badana obejmowała 250 chorych na cukrzycę (DM), członków Polskiego Stowarzyszenia Diabetyków, oraz grupę kontrolną 123 zdrowych pielęgniarek (N) z 3 szczecińskich szpitali. Badanych poproszono o wypełnienie ankiety weryfikującej ich wiedzę na temat wpływu na glikemię produktów spożywczych często stosowanych w diecie cukrzycowej (grejpfrut, miód, kawa zbożowa, czekolada dla diabetyków, zupa mleczna z płatkami oraz karkówka).

**Wyniki:** Najwięcej błędnych odpowiedzi, zarówno wśród chorych, jak i personelu, zostało zaznaczonych w przypadku

karkówki (DM 71%; N 83%, NS) oraz grejpfruta (DM 51%; N 77%,  $p < 0,01$ ). Najwięcej prawidłowych odpowiedzi pojawiło się w przypadku miodu (DM 69%; N 80%,  $p < 0,05$ ) oraz zupy mlecznej (DM 64%; N 67%, NS). Wykazano negatywną korelację między liczbą poprawnych odpowiedzi a wiekiem pacjentów ( $r_s = -0,14$ ,  $p < 0,01$ ). Czas trwania cukrzycy nie miał wpływu na poziom wiedzy pacjentów z zakresu wpływu wybranych produktów spożywczych na poziom glikemii. Chorzy leczeni insuliną stosowaną mieli wyższy poziom wiedzy niż osoby stosujące leki doustne (44% vs 34,8%,  $p < 0,01$ ).

**Wnioski:** 1. Poziom edukacji pacjentów oraz personelu średniego szpitala z zakresu wpływu popularnych produktów na glikemię chorego jest niski. 2. Zarówno chorzy na cukrzycę, jak i pielęgniarki zatrudnione w szpitalach wymagają edukacji z zakresu diety cukrzycowej.

**Słowa kluczowe:** dieta cukrzycowa; edukacja; pielęgniarki; mity.

## INTRODUCTION

Many myths are circulating in the community of patients with diabetes concerning food products which, despite their carbohydrate content, are believed to lower – or at least not to elevate – blood glucose levels. In Poland, such food products

include grapefruit, natural honey and sweets for patients with diabetes. Patients compose their diets based on word of mouth, web or magazine articles, and bits of information taken out of the context of professional dietary training sessions. Food manufacturers often prey on patients' ignorance and naivety, as patients look for opportunities and ways to eat sweet products

that will not elevate their glucose levels [1, 2, 3]. While numerous studies have been published worldwide on diabetic patient education, there are only few papers that discuss what these people actually know about the impact of the commonly consumed food products on blood glucose levels [4, 5, 6, 7, 8].

The aim of the present study was to investigate what patients with type 2 diabetes mellitus (T2DM) and hospital nurses know about how popular food products used in the diabetic diet affect blood glucose levels.

## MATERIALS AND METHODS

The study group consisted of 250 patients with T2DM, members of the Polish Diabetes Association (PDA), from 7 cities of the West Pomeranian Province, Poland (DM group). Polish Diabetes Association members were known to have participated in training sessions on nutrition in diabetes. The other group consisted of 123 nurses from 3 hospitals in Szczecin, Poland (N group). The study subjects were asked to complete an anonymous questionnaire on the impact of popular food products on blood glucose levels. The form also included questions about the respondent's sex, age, duration of diabetes and current antidiabetic treatment.

In the last question, "How does the product affect sugar levels?", the respondents were asked to encircle one of 4 answers: "Lowers", "Elevates", "Has no effect", "Don't know". The food products listed in the questionnaire were: grapefruit, honey, coffee substitute (a substitute for natural coffee manufactured from roasted rye, chicory and/or beetroot), chocolate for diabetics, milk soup with cereal and pork neck.

Statistical analysis of the results was performed using Statistica 10 (StatSoft); *p* values of <0.05 were considered statistically significant. Arithmetic means and standard deviations (SD) were calculated for age and duration of diabetes. Non-parametric tests were used in the analysis, as the distribution of the variables was not normal (Shapiro-Wilk test). The significance of the differences between the group of patients and the staff was analysed using the Mann-Whitney U test. In order to assess the relationship between the number of correct answers and age and duration of diabetes we used the Spearman rank correlation. The congruence of qualitative variables was measured using the Pearson  $\chi^2$  test.

The study was reviewed by Institutional Review Board (no. KB-0012/97/11/7.11.2011r).

## RESULTS

The group of 250 patients with T2DM included 97 men and 126 women; information on sex was not provided in 27 cases. The mean age was  $66.8 \pm 9.7$  years and the mean duration of diabetes was  $12.6 \pm 10.5$  years. Details related to antidiabetic treatment were as follows: 128 subjects (51.2%) were on oral antidiabetic drugs, 58 subjects (23.2%) were on insulin, 56 subjects (22.4%) were on oral antidiabetic drugs and insulin and 8 subjects

(3.2%) did not provide an answer to this question. The group of nurses included 6 men and 114 women; information on sex was not provided in 3 cases. The mean age was  $46.9 \pm 9.0$  years.

The characteristics of the study groups are provided in Table 1.

TABLE 1. Characteristics of the study groups

Parameter	Patients with diabetes	Healthy nurses	<i>p</i>
Sex (F/M)	126/97	114/6	<0.01
Age (years)	$66.8 \pm 9.7$	$46.9 \pm 9.0$	<0.01
Duration of diabetes (years)	$12.6 \pm 10.5$	-	-

The greatest number of incorrect answers to the questions asked in the questionnaire was observed for pork neck, grapefruit, coffee substitute and chocolate. The percentages of subjects providing an incorrect answer in the DM group and the N group were, respectively: 71% and 83% for pork neck (*p* = NS), 51% and 77% for grapefruit (*p* < 0.001), 49% and 61% for coffee substitute (*p* = NS), and 41% and 54% for chocolate for diabetic subjects (*p* < 0.001). The greatest number of correct answers ("Elevates") was provided for honey (69% and 80%, respectively; *p* < 0.05) and milk soup with cereal (64% and 67% respectively; *p* = NS). Figures 1 and 2 present the characteristics of the answers provided by the subjects.

Both in the DM and the N group, younger age was associated with a higher level of knowledge. The duration of diabetes had no effect on the number of correct answers provided by the subjects (Table 2).

TABLE 2. The relationship between the number of correct answers provided by the subjects and their age and duration of diabetes

Parameter	Number of correct answers	
	patients with diabetes	healthy nurses
Age	<i>R</i> <sub>s</sub> = -0.18 <i>p</i> = 0.01	<i>R</i> <sub>s</sub> = -0.23 <i>p</i> = 0.01
Duration of diabetes	<i>R</i> <sub>s</sub> = +0.10 <i>p</i> = 0.11	-

Patients treated with insulin showed a higher level of knowledge than patients on oral medication (*p* < 0.001), as demonstrated in Table 3.

## DISCUSSION

The fundamental method of managing diabetes mellitus consists in increasing physical activity and introducing diet modifications [9]. Patients with diabetes and healthcare personnel are often educated on diabetic diet during training sessions in the hospitals and in outpatients clinics. Dietary education in Poland most often involves presentation of a list of allowed and disallowed food products without explaining why a given food product is beneficial or not. Our study has shown that the dietary education in its present form is ineffective.

In Poland, the most popular myth concerning diabetic diet is about eating grapefruit. In the patients' opinion, grapefruit is

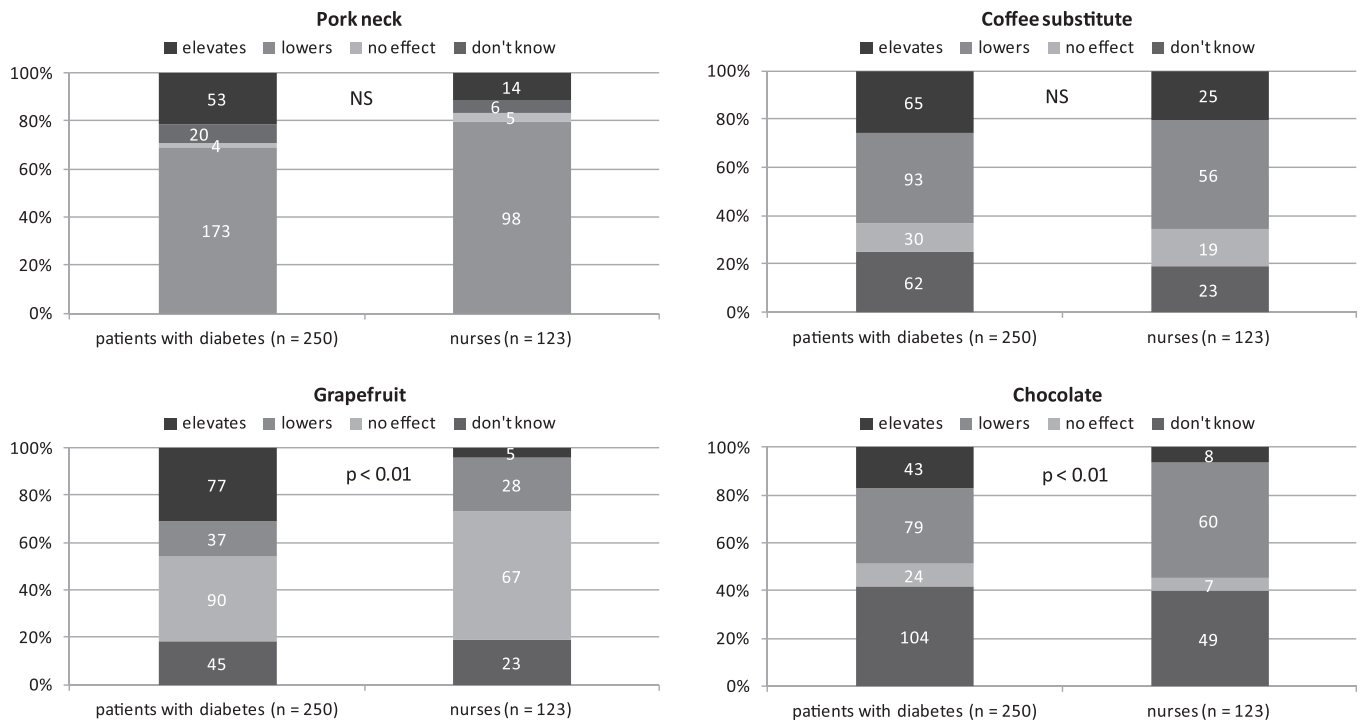


FIGURE 1. The most common incorrect answers

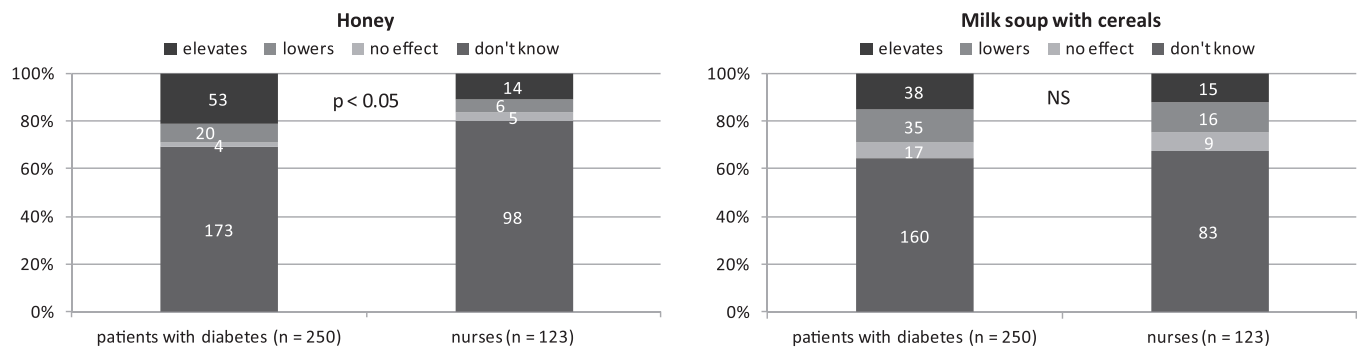


FIGURE 2. The most common correct answers

TABLE 3. Number of correct answers provided by diabetes patients in relation to their sex and antidiabetic treatment (the number of correct answers to 6 questions was calculated for each subject individually)

Parameter		n	Percentage of correct answers	p
Sex	women (n = 126)	288/756	38.0%	NS
	men (n = 97)	231/582	39.6%	
Antidiabetic treatment	oral antidiabetic drugs (n = 128)	268/768	34.8%	<0.01
	insulin, oral antidiabetic drugs and insulin (n = 114)	301/684	44.0%	

famous for not elevating or even reducing glucose levels, which leads to excessive consumption of this fruit, thus resulting in elevation of blood glucose levels. This belief is supported by such factors as: the bitter taste of grapefruit, word of mouth and opinions uploaded on internet discussion groups. In reality, however, an average grapefruit weighing 350 g provides 23 g of rapidly assimilated carbohydrates, i.e. nearly 2.5 carbohydrate units [10]. While there are reports suggesting that grapefruit seed extract lowers blood glucose levels in rats, grapefruit

elevates glucose levels just as any other fruit and should not be consumed by patients without limitation [11]. Our study has shown that, unfortunately, as many as 51% of patients with diabetes and 77% of nurses believe that grapefruit lowers or does not affect blood glucose levels. It should, however, be noted that the answer “Don’t know” was provided to the same question by 31% patients and only by 4% of nurses, which may suggest a deep confidence in the correctness of their answers among medical staff members.

Another myth on diet is the belief that meat, especially fat meat, elevates blood glucose levels. This belief most likely results from the recommendations to eliminate fat meat from the diet that are provided during training sessions and available on many popular websites for patients with diabetes [12, 13, 14, 15, 16]. Having been instructed to rule out fatty meat products from the diet, patients may believe that since this product is not indicated, then it must elevate blood glucose levels, while in reality meat, even high-fat meat, does not contain carbohydrates [10]. In the questionnaire, as many as 69% of the patients and 79% of the nurses said that pork neck elevated blood glucose levels.

Another incorrect belief concerns coffee substitute, which the patients drink instead of natural coffee, treating the former one as a healthier product. When browsing the internet one can find opinions that coffee substitute beneficially affects cholesterol levels, is a healthy beverage and is recommended for patients with diabetes [15]. The raw materials from which this substitute for coffee is obtained differs from region to region. In Poland, coffee substitute is mainly manufactured from roasted rye, chicory and/or beetroot. Patients do not take into account the fact that coffee substitute is made from the same products which are used to obtain flour or sugar. At the same time, they generally know that flour is used to bake bread, which may elevate blood glucose levels [16]. In fact, one portion of coffee substitute (4 g) with 2% milk (125 mL) and a teaspoon of sugar (6 g) corresponds to nearly 1.5 carbohydrate portions [10]. In our study, 49% of the patients with diabetes and 61% of the nurses declared that coffee substitute lowered or did not affect blood glucose levels.

“Forbidden fruit” is always more attractive than something that is widely available or allowed. In the Netherlands, it has been observed that when a child is not allowed to consume fruits or sweets, their consumption grows compared to individuals who are allowed to consume all food products in unlimited quantities [17]. Similarly, many patients with diabetes say that before they were diagnosed with diabetes they had not preferred sweet products, which changed completely at the moment of diagnosis. After a patient is diagnosed with diabetes, he or she is provided with a list of do’s and don’ts, which places sweet products in the “disallowed” column. The patient starts to desire that food and consume more of it, which results in high glucose levels. In response to the demand for the “forbidden” products, many food companies have launched special sweets for patients with diabetes, advertised as sugar-free products that can be used by the patients [1, 2, 3, 18]. Patients with diabetes treat these products as allowed and often consume excessive amounts. Our study has shown that as many as 41% of the patients and 54% of the nurses believe that chocolate for diabetics does not elevate or does not affect blood glucose levels.

Many sources recommend consumption of honey and low-fat dairy products as an element of healthy lifestyle in patients with diabetes [19, 20, 21]. However, glucose surges after consuming these products may be quite considerable, as one tablespoon of honey (25 g) contains almost 2 carbohydrate portions and a portion of milk soup with cereal composed of a glass of

2% milk (250 mL), 4 tablespoons of oats (40 g) and 1 teaspoon of sugar (6 g) is equivalent to more than 4 carbohydrate portions [10]. Our study shows that despite the frequently incorrect popular opinions or internet information regarding consumption of honey and milk soup with cereal, the patients with diabetes and the nurses showed quite good level of knowledge about the impact of these products on blood glucose levels.

Our study also shows that sex and duration of diabetes do not affect the level of patient knowledge regarding the impact of selected food products on blood glucose levels. However, we showed that the level of knowledge presented by patients treated with insulin alone or in combination with oral anti-diabetic drugs is higher than that presented by patients on oral medication only. Among the patients with diabetes, younger individuals were characterised by broader knowledge regarding the diabetic diet. This observation is in accordance with the findings of other authors [22]. The level of knowledge among the nursing staff was surprisingly low, but studies to verify dietary knowledge among doctors in various countries also show a low level of knowledge in this area [23, 24, 25].

## CONCLUSIONS

In conclusion, the results of our questionnaire administered among PDA members and hospital staff members show a low level of education in terms of diabetic diet, with nurses being characterised by a slightly lower knowledge than patients. It is surprising that the low level of knowledge about popular food products has also been noted among members of the PDA, as this group of patients participates in training sessions on diabetes, including sessions provided by dietitians. The low level of knowledge among nurses is alarming and highlights the need to provide thorough education or reeducation in this area.

The current method of dietary education based on lists of allowed and disallowed products has proved ineffective. Changes to the current educational process in the field of diabetic diet should be taken into consideration in order to focus on the more practical aspects of the training. An effective method would be to implement education based on the so-called mindful eating among patients with diabetes, although this issue requires further studies, both in Poland and abroad.

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