

## EATING ATTITUDES TOWARDS FOOD WITH ARTIFICIAL SWEETENERS IN A GROUP OF DIABETICS

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The main objective of this study was to investigate attitudes towards sugar-free products in a group of 74 diabetics from Warsaw region. The diabetics were asked questions about use of specific diets, intake of sweeteners and habits concerning consumption of all food products containing artificial sweeteners. On average, the majority of diabetics avoided sweetening meals/beverages with sucrose, although only one-third replaced it with table-top sweeteners. Less than half the individuals used to consume food products with artificial sweeteners as sugar replacers. The most important factors limiting the consumption among these diabetics were: a worse taste of sugar-free products when compared to traditional foods, the prevalence of reported health disturbances after consumption of food with artificial sweeteners, their too high price and a little knowledge about such products.

### INTRODUCTION

Sensory attributes, including taste, are considered as highly important determinants affecting food choice and food acceptance by a consumer. A need for sweet taste is typical of humans of all ages and influences forming eating habits. Sugar consumed as such and food products with sucrose satisfy the sensation of sweetness, but if it is consumed in excess, it will lead to overweight or obesity and various diet-dependent diseases.

The diabetics are recommended to reduce or eliminate from their diet products containing all monosaccharides and disaccharides naturally occurring, as well as those added to food or beverages [Choundhary, 2004]. The use of artificial sweeteners as sugar replacers is considered as helpful for meeting nutrition recommendations in food manufacturing [Position ADA, 2004]. Moreover, these sweeteners stimulate the sweet sensation in food products, limit energy intake and affect favourably the glucose content and insulin response. Such replacements in the recipe of food products allow to reduce sugar intake, maintaining their sweet taste, which is the most important strategy for the diabetics [Choundhary, 2004; Position ADA, 2004].

The purpose of this study was to investigate selected eating habits towards sugar-free products among females and males and evaluate the frequency of consumption of products containing artificial sweeteners.

### MATERIAL AND METHODS

The study population was recruited among participants of meetings organized by the Polish Diabetic Association and

patients of the Diabetic Clinic in Warsaw. The final sample size was 74 diabetics (44 females and 30 males) with a mean age of  $62 \pm 13$  years. The study was conducted from March to June 2005 by a trained interviewer. A 35-item structured questionnaire, developed specifically for the study purposes was completed. In general, it contained questions on the eating attitudes towards the consumption of sugar-free products. In particular, the diabetics were asked about their use of specific diets, their habits in using the sweeteners and a frequency of consumption of sugar-free products. Prior to the study, a set of different food products, labeled as "sugar-free" or sometimes "no sugar added", and available on the market was gathered. The producers declared on the label use of various sweeteners as sugar replacers. All of these products were described by the name of producer, brand and market name. We used SPSS version 12.0 software for the statistical analyses.

### RESULTS AND DISCUSSION

The study population showed a higher percentage of females (59%) than males (41%). Most respondents were well educated (with secondary or high educational level). Only 11% of subjects declared basic educational level and it was more common among females (16%) than males (4%). As for diseases (besides diabetes), a greater proportion of study population indicated some cardiovascular diseases (58% of total) and arthritis (32% of total). Some diabetic complications like retinopathies, nephropathies or neuropathies were diagnosed in 31% of respondents, but females suffered from these complications and arthritis significantly more often than the males. The mean value for BMI for the whole group

TABLE 1. Eating habits of study participants.

Variable	Total N=74		Females n=44		Males n=30	
	N	%	n	%	n	%
<b>Using specific diets:</b>						
Total, including <sup>1)</sup> :	62	83.8	37	84.1	25	83.3
– low intake of simple carbohydrates	55	74.5	32	72.7	23	75.7
– low-fat *	26	35.1	18	40.9	8	26.7
– highly digestive *	9	12.2	8	18.2	1	3.3
– low-energy	9	12.2	6	13.6	3	10.0
<b>Using sweeteners as sugar replacers:</b>						
Total, including <sup>1)</sup> :	26	35.1	16	36.4	10	33.3
– as table-top	22	29.8	14	31.8	8	26.7
– as powder or liquid	8	10.8	6	13.6	2	6.7
<b>Type of tea sweetener:</b>						
– sugar	7	9.5	4	9.5	3	10.3
– artificial sweetener	15	20.3	11	25.0	4	13.3
<b>Type of coffee sweetener:</b>						
– sugar	14	18.9	6	17.1	8	38.1
– artificial sweetener*	17	23.0	14	31.8	3	10.0

\* significant differences between females and males using Chi<sup>2</sup> at p≤0.05; <sup>1)</sup> the responses number did not sum up to 100% due to the possibilities to give more than one answer

was 29.8 ± 4.8, with a range 19.5 to 43.0 kg/m<sup>2</sup>. Using the recommended BMI categories, 19% had normal weight, 46% were overweight, and 35% were obese.

Table 1 provides descriptive statistics on eating habits in a sample of diabetics. The vast majority of respondents (75%) was on a diet that required limited intake of simple carbohydrates, whereas about 35% of subjects consumed low-fat products. It is noteworthy that females declared using highly digestive diets or low-calorie diets significantly more often when compared to the males (18% vs. 3% and 14% vs. 10%, respectively). Most individuals showed that they were in the habit of no sugar adding to their meals and beverages. As a consequence of this strategy, about two-thirds (70%) were determined to add no sugar to their tea. Only about 19% of respondents used sugar to sweeten coffee, and 10% to sweeten tea. There is a clear evidence that diets of limited simple carbohydrates intake should be regularly used by diabetics [Choudhary, 2004]. In turn, our results revealed that 25% of individuals not used such diet. On the other hand, findings of Bujko *et al.*, [2004] demonstrated that more than one-third of diabetics did not show sufficient nutritional knowledge on this subject.

With regard to eating attitudes towards sweeteners, the results in Table 1 indicate that about 35% of study population declared using table-top sweeteners as sugar replacers, regardless of gender. There was some evidence that the tablets were used more often when compared to powdered or liquid sweeteners. It is interesting to note that about one-fifth of subjects (20%) reported adding this type of sweetener to tea or coffee. Such attitude towards sweetening was significantly different depending on gender. More females than males (32% vs. 10%) declared using it for coffee sweetening. The

inverse association appeared in the case of using sugar for coffee sweetening: males reported doing it more frequently when compared to females (38% vs. 17%). In comparison to earlier studies of Okolska *et al.* [1996], it was found that number of people using table-top sweeteners increased two times, regardless of gender. Furthermore, the similar results were obtained in a Swedish study, where 36% of diabetics were using sweeteners [Ilbäck *et al.*, 2004]. Other results pointed at higher proportion of users of such sugar replacers among diabetics when compared to the total population. In an Australian population study this number of people amounted to 41% [Final Report, 2004].

When faced with data on consumption frequencies of sugar-free food products it was shown that study participants consumed, in general, the following types of food: fruit juices and beverages, soft carbonated or non-carbonated drinks (like cola), confectionary products and cakes (Table 2). However, products with artificial sweeteners were not popular among diabetics. The most often consumed food products during a week were: chocolates, wafers, cakes or biscuits and fruit juices or beverages. The females were in the habit of consuming these products 3-4 times per week, *i.e.* more frequently than the males. It should be emphasized that an unhealthy behaviour was observed among the population under study, *e.g.* eating chocolates or cakes as snacks between main meals. Such behaviour resulted in an increase in calorie and fat intake. Only one-third of subjects (32%) used to drink fruit juices or beverages with sugar replacers; females did it two times more frequently than the males. Interestingly, it was reported that the most rarely consumed products were drinks like cola, other soft beverages and candies, caramels and other sweets. On the other hand, males tended to drink

TABLE 2. Frequency of consumption of selected sugar-free food products.

Frequency*	Total N=74		Females n=44		Males n=30	
	N	%	n	%	n	%
<b>Fruit juices and beverages</b>						
In total	24	32.4	18	40.9	7	23.3
– daily	10	13.5	8	18.2	2	6.7
– 3-4 times per week	10	13.5	7	16.9	3	10.0
– 1-2 times per week	4	5.4	3	6.8	2	6.7
Several times per month or never	50	67.6	26	59.1	23	76.7
<b>Cold - type beverages (light)</b>						
In total	13	17.6	8	18.2	6	20.0
– daily	0	0	0	0	0	0
– 3-4 times per week	6	8.1	2	4.5	4	13.3
– 1-2 times per week	8	10.8	6	13.6	2	6.7
Several times per month or never	60	81.1	36	81.8	24	80.0
<b>Soft drinks, carbonated or non-carbonated</b>						
In total	16	21.6	10	22.7	6	20.0
– daily	6	8.1	4	9.1	2	6.7
– 3-4 times per week	6	8.1	3	6.8	3	10.0
– 1-2 times per week	4	5.4	3	6.8	1	3.3
Several times per month or never	58	78.4	34	77.3	24	80.0
<b>Chocolates</b>						
In total	32	43.2	22	50.0	10	33.3
– daily	3	5.4	2	4.5	2	6.7
– 3-4 times per week	15	20.3	12	27.3	3	10.0
– 1-2 times per week	13	17.6	8	18.2	5	16.7
Several times per month or never	42	56.8	22	50.0	20	66.7
<b>Wafers, cakes, biscuits</b>						
In total	31	41.9	22	50.0	9	30.0
– daily	3	4.1	2	4.5	2	6.7
– 3-4 times per week	15	20.3	10	22.7	3	10.0
– 1-2 times per week	13	17.6	10	22.7	4	13.3
Several times per month or never	43	58.1	22	50.0	21	70.0
<b>Sweets, candies, drops</b>						
In total	14	18.9	9	20.5	5	16.7
– daily	3	4.1	3	6.8	0	0
– 3-4 times per week	5	6.8	4	9.1	1	3.3
– 1-2 times per week	6	8.1	2	4.5	4	13.3
Several times per month or never	60	81.1	35	79.5	25	83.3

\* lack of statistically significant differences between females and males using Chi<sup>2</sup>, p>0.05

beverages like cola or other soft drinks (3-4 times per week) relatively more often when compared to the females. This finding is consistent with other studies [Górecka & Szczepaniak, 2003; Okolska *et al.*, 1996]. The proportion of diabetics declaring the consumption of these food products was relatively low. Górecka *et al.* [2003] demonstrated that the most popular sugar-free products were sweets (mentioned mainly by females) and soft drinks (mentioned mainly by males). Moreover, artificial sweeteners' intake from a diet with sugar-free products is not risky for diabetics [Garnier-Sagne *et*

*al.*, 2001]. It is worth noting that this population was a group that showed potentially higher sweeteners' intake.

As it can be seen in Table 3, almost half the respondents mentioned a "worse taste" as the most important factor resulting in limited consumption of food with sweeteners; "too high price" and "some health disturbances after consumption" were also relatively important (32% and 27%, respectively). As regards "health disturbances after consumption" the majority of study population pointed at stomach aches and/or diarrhoea, nausea and feeling that their mouth was dry. It was assumed

TABLE 3. The factors limiting sugar-free products consumption.

Factors	Total N=44 <sup>1)</sup>		Females n=23		Males n=21	
	N	%	n	%	n	%
Worse taste	20	45.5	12	52.5	8	38.1
Too high price*	14	31.8	10	43.5	4	19.0
Health disturbances after consumption	12	27.3	7	30.4	5	23.8
Little knowledge on such products*	9	20.5	2	8.7	7	33.3
Few products available	8	18.5	4	17.4	4	19.0

\* significant differences between females and males using Chi<sup>2</sup> at p≤0.05; <sup>1)</sup> total number of people consuming sugar-free products very rarely or not at all

that more males than females did not have sufficient knowledge about food products with no sugar added and it was the main reason for limiting the purchase and low consumption of such products. Little knowledge on products with artificial sweeteners, mostly among men, significantly lowered the number of purchased and consumed products. According to Górecka & Szczepaniak [2004], worse taste and too high prices of foods with artificial sweeteners result in a low acceptance of these products by many consumers.

The American Dietetic Association [Position ADA, 2004] underlined the fact that susceptible individuals might suffer from various unfavourable health disturbances after consumption of products with artificial sweeteners, regardless of the amount of a sweetener consumed. Such situation was observed in this study: several respondent listed such problems as stomach aches and / or diarrhoea, nausea, heartburn, and mouth-dryness.

Taking into consideration some unhealthy behaviours of these diabetics it is suggested that professional advice from dieticians would be of great importance, since it would help diabetics improve their diet and make it healthier.

## CONCLUSIONS

1. The majority of respondents consumed a specific diet in order to reduce simple carbohydrates intake, whereas about one-third of subjects consumed low-fat products. On the other hand, most respondents tended to avoid adding sugar into drinks but only one-third used any artificial sweeteners. Females sweetened coffee with artificial sweeteners more often than males.
2. Almost half of the study population consumed food products with artificial sweeteners. In particular, males consumed carbonated or noncarbonated beverages and drinks like cola more often than females; the latter preferred chocolate, confectionery goods, fruit juices and beverages.

3. The main reasons for limiting consumption of food products with sweeteners were: their worse taste, their cost (mainly females), little knowledge on these products (mainly males) and the prevalence of health disturbances after consumption.

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## **POSTAWY ŻYWIENIOWE OSÓB CHORYCH NA CUKRZYCĘ WOBEC PRODUKTÓW ZAWIERAJĄCYCH SZTUCZNE SUBSTANCJE SŁODZĄCE**

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W grupie 74 osób chorych na cukrzycę z rejonu Warszawy badano stosowanie słodzików stołowych oraz częstotliwość spożycia produktów bezcukrowych zawierających sztuczne substancje słodzące. Przeważająca część osób unikała słodzenia napojów sacharozą, ok. 1/3 badanych zastępowało ją słodzikiem stołowym. U blisko połowy respondentów odnotowano spożycie produktów zawierających sztuczne substancje słodzące jako zamienniki sacharozy. Mężczyźni najczęściej spożywali napoje gazowane i niegazowane oraz napoje typu cola, natomiast kobiety – czekoladę, wyroby ciastkarskie oraz soki i napoje owocowe. Czynniki ograniczającymi spożycie produktów bezcukrowych były: gorszy smak w porównaniu do żywności tradycyjnej, występowanie dolegliwości po spożyciu oraz zbyt wysoka cena (głównie u kobiet) i mała wiedza o takich produktach (głównie u mężczyzn).