



## NUTRITION IN SUBJECTS WITH COMPLETE DENTURES: ENERGY AND MACRONUTRIENT INTAKE

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### SUMMARY:

**Introduction:** There are many factors that have an influence on the nutritional status of older people, but the significance of nutrition for the quality of life is indisputable. Complete tooth loss affects and changes nutritional habits, which poses important questions about the intake of energy and macronutrients in subjects with complete dentures.

**The aim** of this study was to make a comparative analysis of the energy and macronutrient intake in subjects with complete dentures, based on the Bulgarian recommendations for the physiological needs.

**Materials and methods:** An individual questionnaire was used to collect the primary information, covering the following areas: demographic, co-morbid and 3-day dietary intake registered data, as well as a dental examination to confirm the total tooth loss. The investigation was conducted between March and April 2017 in Sofia and Varna. The study included 28 subjects, aged 47 to 89 years. Statistical data processing was performed with the SPSS software for Windows 15.0.

**Results:** The average daily energy intake levels were by about 200 kcal higher than the reference needs for the male subjects with low physical activity, aged over 60 years and close to the recommended for the female subjects. For both sexes, protein intake levels corresponding to the reference, but at the expense of animal proteins (>60%); low carbohydrate intake levels (<40%), but increased intake of added sugars (10-12%); low intake of dietary fibers (<25 grams); high intake of fats, mostly at the expense of saturated fatty acids, were found.

**Conclusion:** Unfavorable tendencies were identified in the nutrition of subjects with total tooth loss, which may further contribute to worsening of their co-morbid conditions.

**Keywords:** complete dentures, energy and macronutrient intake.

### INTRODUCTION:

There are many factors that have an influence on the appetite and nutritional status of older people. Physiological factors include cardiovascular, pulmonary and renal diseases, mental problems and even adverse drug effects. An important, but frequently neglected factor is the status of the masticatory system. The significance of the specific nutritional characteristics for ensuring the quality of life and reducing the risk for developing complications of the most common chronic non-communicable diseases in the elderly, determining the duration of their lives, is undoubted. The number of older people with total tooth loss is increasing, and this makes difficult the intake of foods that meet their needs.

A number of evidence [1-4] suggests that people with total tooth loss consume significantly lower amounts of proteins and many other nutrients, including fibers, calcium and certain vitamins, because they avoid several types of food, especially fresh fruits and raw vegetables and other solid and healthy foods, compared to individuals with restored or intact dentition. The relationship between the increased intake of certain macro-elements and micronutrients and the decreased risk of certain diseases has been demonstrated. There is evidence [1, 2] that a diet rich in fruits and vegetables prevents obesity, diabetes, cardiovascular disease and some cancers. The limited dietary intake of people with total tooth loss is probably the cause of poor health. In addition, the inadequate intake of nutrients due to tooth loss is associated with weight loss [5].

**The aim** of this study was to make a comparative analysis of the energy and macronutrient intake in subjects with complete dentures, based on the Bulgarian recommendations for the physiological needs.

### MATERIALS AND METHODS:

An individual interview with a questionnaire that contained questions divided into the following areas: de-

mographic data, anthropometric data and co-morbidities, was used to collect the primary information. Nutrition of all subjects was studied by a 3-day recall of the dietary intake. The food intake (the amount of food consumed and the intake of energy and nutrients) of the studied subjects was evaluated for 3 consecutive days - 2 working days and 1 rest day of the week. The chemical composition - the intake of energy and nutrients - was calculated. A dental examination was performed confirming the prosthesis with complete dentures of the subjects with total tooth loss.

The study was conducted in the period March-April 2017 in dental clinics in Sofia and Varna. The study included 28 subjects at the average age of 69.75 ( $\pm 5.3$ ) years. The statistical data processing was performed with the SPSS software for Windows 15.0.

### RESULTS:

The relative shares of the studied subjects, divided into groups by sex and age, body weight, education and co-morbidities, are presented in Table 1.

**Table 1.** Social-demographic characteristics of the studied subjects

	Male subjects	Female subjects
<b>Age, years (<math>\pm</math>SD)</b>	67.538 ( $\pm 8.379$ )	71.667 ( $\pm 7.558$ )
<b>Body weight, kg (<math>\pm</math>SD)</b>	85.231 ( $\pm 11.847$ )	66.400 ( $\pm 6.755$ )
<b>Education, number</b>		
Higher	2	1
Secondary	8	5
Primary	0	2
Initial	0	1
<b>Co-morbidities, number</b>		
Hypertension	3	8
Ischemic heart disease	2	2
Diabetes mellitus	3	1
Joint disease	1	5

The performed questionnaire showed that the level of physical activity of all subjects was low, and the average age of the respondents was over 60 years, which allowed for comparing the data with the recommended and adequate intake of energy and macronutrients in the draft Ordinance on the physiological norms for nutrition of the population with low physical activity, aged 60-75 years and over (6). The evaluation of the demographic and anthropometric data showed that the average weight of the male and female subjects was about 6 kg above the average weight of the population as per the Ordinance on the physiological norms for nutrition of the Bulgarian population in the respective age group.

The average daily energy, protein, fat, carbohydrate

and fiber intake levels showed values close to the median for both sexes, which is consistent with the normal Gaussian distribution in the respective groups of individuals.

### Energy intake

The comparison of the average levels of energy intake with the reference average needs of the Bulgarian population (Table 2) showed that the average daily energy intake levels were by about 200 kcal higher than the reference needs for the male subjects with low physical activity, aged over 60 years, but the declared average daily energy intake of the women at the same age was close to the recommended energy intake at low physical activity.

**Table 2.** Average daily intake of energy and macronutrients by sex

	Female subjects, mean value ( $\pm$ SD)	Male subjects, mean value ( $\pm$ SD)
<b>Energy</b> kcal	1680.979 ( $\pm 435.870$ )	2203.364 ( $\pm 802.538$ )
<b>Protein</b> g/day	64.132 ( $\pm 21.360$ )	78.958 ( $\pm 18.327$ )
kcal/day	256.531 ( $\pm 85.443$ )	315.832 ( $\pm 73.309$ )
Animal protein g/day	44.253 ( $\pm 18.222$ )	49.700 ( $\pm 16.040$ )

<b>Carbohydrates</b>		
g/day	165.192 ( $\pm$ 40.680)	195.712 ( $\pm$ 42.359)
kcal/day	660.771 ( $\pm$ 162.721)	782.848 ( $\pm$ 169.437)
<b>Fibers (g/day)</b>	16.147 ( $\pm$ 3.422)	22.215 ( $\pm$ 7.719)
<b>Added sugar</b>		
g/day	60.175 ( $\pm$ 59.879)	54.028 ( $\pm$ 41.080)
<b>Fats</b>		
g/day	83.572 ( $\pm$ 27.584)	98.412 ( $\pm$ 25.614)
kcal/day	752.154 ( $\pm$ 248.263)	885.708 ( $\pm$ 230.529)
Saturated fatty acids g/day	312.097 ( $\pm$ 111.128)	314.398 ( $\pm$ 103.388)
Cholesterol g/day	288.600 ( $\pm$ 122.141)	251.000 ( $\pm$ 94.705)

### Protein intake

The average daily total protein intake in the study group ranged from 64.132 ( $\pm$ 21.360) g/day for the women to 78.958 ( $\pm$ 18.327) g/day for the men (Table 2), which is 13-15 grams above the recommended. The protein intake, calculated as the intake per kilogram body weight, was also higher (0.96 and 1.09 g/kg for the female and male subjects, respectively) than the recommended dietary intake of 0.83 g/kg of body weight for both sexes. On the other hand, the mean values of protein intake, expressed as an energy share of the daily food consumed, were within the recommended protein intake of 10-20E% in both groups (15.2% for the female and 14.3% for the male subjects). Such data means that the protein requirements are completely satisfied without creating a risk of excessive intake.

In all subjects studied, the relative share of proteins of animal origin was within the range of 62.9% for the male and 69.0% for the female subjects, i.e. more than a half of the total daily intake of dietary proteins, which is significantly more than the recommended approximately 50.

### Carbohydrate intake

According to the physiological norms for nutrition of the population, the minimum recommended carbohydrate intake for children over 1 year and adults is 130 g/day. A beneficial trend is that there were no subjects in the sample who had a similar low intake of carbohydrates. The average daily carbohydrate intake, expressed as an energy share of the total average daily energy intake, was below the recommended range of 45 - 60% according to the physiological norms for nutrition - 38.8% for the women and 35.5% for the men (Table 2). A relatively high proportion of carbohydrates was also consumed in the form of added sugar - 14% of the energy intake for the women and 10% for the men, given that the recommended intake of added sugars for persons over 1 year old is up to 10% of the energy value of the diet, and the optimal intake, especially in the presence of co-morbidity, is up to 5 E%.

### Dietary fiber intake

According to the EFSA opinion, the recommended average daily intake of dietary fibers is determined on the basis of the influence of dietary fibers on the

gastrointestinal tract. For good gastrointestinal tract function, as well as for improving the lipid status and a number of complications of conditions and diseases, associated with aging, a daily intake of 25 g fibers is recommended for older people. The fiber intake of about 16 grams per day for the female and 22 grams per day for the male subjects was below the recommended (Table 2).

### Fat intake

The recommended dietary intake of fats for individuals over 19 years is 20-35%. The average daily fat intake, expressed as a percentage of the total energy intake in the sample, was 45% for the female and 40% for the male subjects and significantly above the upper limit of the recommended. Saturated fatty acids were predominant in the dietary intake, accounting for 15.4% of the total energy intake for the female and 12.8% for the male subjects (recommended below 10 E%), while cholesterol was within the range of 300 g per day.

## DISCUSSION

Previous studies have shown that in order to achieve a significant improvement in the nutritional status of older patients, the prosthetic rehabilitation of the masticatory system with complete dentures [1, 7-9] or implant treatment [2, 4, 10-12] or other type of prosthesis [13-15], without adhering to a specialized diet, is frequently inadequate and impossible.

The present study proves the restored functional capacity of the masticatory system after prosthetic rehabilitation and the improved masticatory efficiency. The data coincide to a large extent with the study results of Bradbury et al. [1] and Wöstmann et al. [8], which underline the importance of making complete dentures to increase the masticatory efficiency and the OHRQoL of the elderly. Something more- if we compare the results of our study with those from the national representative survey of V. Duvelva and colleagues in 2014 [16], we see that the energy intake, protein and carbohydrate consumption is very similar, fat intake is more (mainly due to saturated fats), while fiber intake is less than that declared from people in the same age range in the representative study. Having in mind how important is higher fiber intake and lower animal fat consumption for the prevention of complications of comorbidities, it might be rational to make

dental specialists aware for strategies of replacing and substituting these important nutrients. The obtained results, however, point to the need to inform older patients in advance of the risks that may occur with the excessive dietary intake as well.

The performed analysis of literature has shown a small number of studies exploring the role of nutrition counseling in patients with complete dentures [1, 3, 17, 19]. In a clinical study [20], the effect of basic nutritional advice by the dentist while delivering new complete dentures was discussed. For this purpose, patients received a brochure with a standardized explanation. Studies after a 30-day period have shown a significant change in the diet and dietary intake of the participants [3].

The study of Ellis et al. has shown that patients

with complete dentures have reduced masticatory capacity and adapt through different ways of chewing and grinding the food to maintain good dietary intake [21], which is different from our results.

### CONCLUSIONS:

The discussed results of energy and macronutrient intake in patients with complete dentures justify the need for a wider study of the problem. Confirming or rejecting the zero hypothesis, according to which there is no difference between the dietary intakes of patients with complete dentures, who have received and adhered to and those who have not received or do not adhere to nutrition counseling, is of interest.

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