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Usual food intake described by Food Intake Variety Questionnaire (FIVeQ) of elderly patients with frailty syndrome – preliminary results

Zwyczajowe spożycie żywności określane Kwestionariuszem Urozmaicenia Spożycia Żywności (FIVeQ) pacjentów geriatrycznych z zespołem słabości – wyniki wstępne

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Abstract

Background. *Food frequency questionnaires (FFQ's) can be used to assess a variety of food consumption among elderly patients. A well-balanced and varied diet provides all necessary nutrients assuring good nutritional status and prevents from malnutrition, progression of chronic diseases, like the frailty syndrome.* ***Aim.*** *The main aim of this paper was to assess the variety of food consumption of frail elderly patients. Also, anthropometric measurements were performed and compared with the variety of food consumption.* ***Material and methods.*** *The variety of food consumption was evaluated among 20 frail elderly patients using the Food Intake Variety Questionnaire (FIVeQ). Moreover, anthropometric measurements (among others: BMI, weight loss, fat mass, free fat mass, arm and calf circumference) and nutritional screening test (Mini Nutritional Assessment, Malnutrition Universal Screening Tool, Nutritional Risk Score-2002) were performed. Food Intake Variety Index (FIVeI) was calculated in order to determine diet variety.* ***Results and discussion.*** *The variety of food consumption for most of the patients (80%) was specified as sufficient. Patients had low BMI (21.1 ± 3.6 kg/m^2), low CC (29.7 ± 3.8 cm) and were malnourished. FIVeI was correlated with age (R= –0.45) and with FFM (R= 0.5), both results were statistically significant. The nutritional status of the examined patients was poor, which was also caused by eating a monotonous diet.* ***Conclusions.*** *A variety of consumed diet has a huge impact on the amount of food eaten and total energy intake, thus may prevent from the decline of muscle mass, loss of weight, muscle strength and frailty among the elderly. (Gerontol Pol 2017; 25; 163-167)*

Key words: *FIVeQ, frailty, elderly, nutritional status*

Streszczenie

Wstęp. *Kwestionariusze oceniające częstotliwość spożycia żywności (FFQ's) mogą być wykorzystywane do oceny urozmaicenia diety pacjentów starszych. Prawidłowo zbilansowana i zróżnicowana dieta dostarcza wszystkich niezbędnych składników odżywczych zapewniając dobry stan odżywienia i zapobiega powstawaniu niedożywienia, progresji chorób przewlekłych, takich jak zespół słabości.* ***Cel pracy.*** *Głównym celem przedstawionej pracy była ocena urozmaicenia spożycia żywności pacjentów geriatrycznych z zespołem słabości. Ponadto wykonano pomiary antropometryczne, które porównano z urozmaiceniem spożycia żywności.* ***Materiał i metody.*** *U 20 pacjentów geriatrycznych z zespołem słabości oceniono urozmaicenie spożycia żywności za pomocą Kwestionariusza Urozmaicenia Spożycia Żywności (FIVeQ). Ponadto wykonano pomiary antropometryczne (m.in. BMI, spadek masy ciała, masę tłuszczu, wielkość beztłuszczowej masy ciała, obwód ramienia i łydki) oraz testy oceniające stan odżywienia (Mini Nutritional Assessment, Malnutrition Universal*

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Screening Tool, Nutritional Risk Score-2002). W celu oceny urozmaicenia diety wyliczono indeks urozmaicenia spożycia żywności (FIVeI). ***Wyniki i dyskusja.*** *Urozmaicenie spożycia żywności dla większości pacjentów (80%) zostało określone jako wystarczające. Pacjenci uzyskali niskie wartości wskaźnika BMI (21,1 ± 3,6 kg/m^2), CC (29,7 ± 3,8 cm) i byli niedożywieni. FIVeI korelowało z wiekiem (R = -0,45) oraz FFM (R = 0,5), oba wyniki były istotne statystycznie. Stan odżywienia badanych pacjentów wskazywał na niedożywienie, do czego przyczyniło się również spożywanie monotonnej diety.* ***Wnioski.*** *Różnorodność spożywanej diety ma ogromny wpływ na ilość spożywanej żywności i energii, przyczyniając się do zapobiegania spadku masy mięśniowej, utraty wagi, siły mięśniowej i rozwoju zespołu słabości wśród osób starszych. (Gerontol Pol 2017; 25; 163-167)*

Słowa kluczowe: *Kwestionariusz Urozmaicenia Spożycia Żywności (FIVeQ), zespół słabości, osoby starsze, stan odżywienia*

Introduction

The way of eating can be assessed using food intake frequency questionnaires (FFQ), like the Food Intake Variety Questionnaire (FIVeQ). These questionnaires have a high level of reliability and repeatability, are inexpensive, practical, easy to use and allow assessing dietary habits of the population, even from a single study [1,2]. The list of food products included in the questionnaires should be determined for a particular population, considering its age and ethnicity [3]. Achieving a well-balanced diet is easier while eating a wide range of food products and nutrients, thus increasing the food variety intake [4]. In the old age, maintaining a diverse diet is more difficult due to the loss of appetite. The diet also becomes low in calories, resulting in an unintended weight loss, particularly loss of muscle mass [5]. Poor nutritional status directly affects patients' health, contributing to the development of anorexia, a dysfunction of organs and body systems, and a progression of chronic diseases, such as frailty syndrome. The frailty syndrome, defined by Fried et al., includes five variables: an unintentional weight loss, exhaustion, the loss of grip strength, slowness and low physical activity. A coexistence of at least three out of five variables mentioned classifies a person as frail. The syndrome is strongly related to protein-energy malnutrition, the loss of muscle mass, an impaired muscle function and disability [6].

The main objective of this study was to assess the variety of food consumption of frail elderly using the Food Intake Variety Index (FIVeI) and parameters determining the nutritional status. Moreover, connections between the variety of food consumption and anthropometric parameters were assessed.

Materials and methods

The study began with the approval of the local Bioethics Committee in June 2015 and will be continued till March 2018. Results from 20 geriatric patients are presented in this paper. Patients included in this analysis, before conducting the FIVeQ survey, had to obtain > points from the Mini-Mental State Examination (MMSE). The criteria used for the diagnosis of frailty were consistent with Fried et al. [7]. All anthropometric measurements were performed in accordance with the WHO guidelines [8] and they included: weight, height, arm and calf circumference. Unintentional weight loss (during 3 months), arm muscle circumference (AMC), and BMI were also calculated. Handgrip strength was measured using a hand dynamometer. Using near-infrared technology the Free Fat Mass (FFM, kg), Fat Mass (FM, kg) and Fat Mass Percentage (%FM) were assessed with body content analyser FUTREX 6100 A/ZL. The body composition is determined by sending a near-infrared light beam into the biceps of the dominant arm, which the body fat will absorb. FUTREX is a validation equipment with repeatability of measurement equalling 0.3% [9]. Nutritional status was also assessed using nutritional screening tests: the Mini Nutritional Assessment (MNA), the Malnutrition Universal Screening Tool (MUST) and the Nutritional Risk Score-2002 (NRS-2002). The assessment of the way of eating was conducted using the FIVeQ questionnaire, which allows specifying the frequency of food consumption [10]. The FIVeQ provides information whether during the previous week a specific food product was consumed in amounts greater than a very small quantity (e.g. seven slices of bread; two tablespoons of vegetable oil). Along with the FIVeQ, the Food Intake Variety Index (FIVeI) was also determined. It is calculated as the sum of food products consumed during the week and has a maximum value of 60 products/week.

Statistical analysis was performed using STATISTICA StatSoft 12.5 PL. For the analysis, non-parametric tests were used. The compliance of distributions with normal distribution was verified with Shapiro-Wilk test. Relationships between FIVeI values and the the results of anthropometric measurements were determined using Spearman's rank correlation.

Results

Seventeen women and three men had evaluated their way of eating with the FIVeQ. Using values obtained with the FIVeQ, values of the FIVeI were calculated and were as follows: inadequate variety of food consumption (V1; < 20 products/week), sufficient (V2; 20-29), good (V3; 30-39) and very good (V4; ≥ 40). None of the examined patients had inadequate or very good variety of food consumption. The variety was determined as good for four patients and sufficient for sixteen patients, which accounted for 80% of all patients. An analysis of differences between sexes was not made due to the small number of men in the study. The mean FIVeI value was 26.5 ± 3.8 points. Values of other parameters and their correlation with the FIVeI are listed in table I.

Table I. Correlation of the FIVeI values with nutritional status parameters of frail elderly

Parameter	N = 20	
	x ± SD	p
FIVeI [products/week]	26.5 ± 3.8	-
Age [years]	83.5 ± 6.9	< 0.05
Body mass [kg]	52.5 ± 8.7	> 0.05
Height [cm]	157.9 ± 7.0	> 0.05
BMI [kg/m^2]	21.1 ± 3.6	> 0.05
Weight loss [%]	11.7 ± 0.9	> 0.05
AC [cm]	22.5 ± 3.1	> 0.05
CC [cm]	29.7 ± 3.8	> 0.05
AMC [cm]	18.9 ± 2.1	> 0.05
Handgrip strength [kg]	11.8 ± 5.4	> 0.05
%FM [%]	30.3 ± 0.7	> 0.05
FM [kg]	16.2 ± 5.5	> 0.05
FFM [kg]	36.0 ± 4.7	< 0.05
MNA	14.3± 4.0	> 0.05
MUST	2.3 ± 1.2	> 0.05
NRS-2002	3.7 ± 1.2	> 0.05

Examined patients had a significant weight loss (11.7%), low BMI values (21.2 kg/m^2), low CC (29.7 cm) and, after conducting nutritional screening test (MNA, NRS-2002, MUST), they were characterized as malnourished. The value of FIVeI was correlated with age (R = –0.45) and with the FFM (R = 0.5), both results were statistically significant.

Discussion

All examined hospitalized elderly patients, according to nutritional screening tests, were malnourished. The values of all three tests were in the lowest range indicating malnutrition/high risk of malnutrition and a necessity to start nutritional therapy. The prevalence of malnutrition among hospitalized elderly, especially those diagnosed with the frailty syndrome, is very high. The NRS-2002 is the most frequently used tool in Poland to screen for those patients. Due to lack of a golden standard for assessing the nutritional status of the elderly, it is recommended to perform at least two nutritional screening tests. The NRS-2002 and the MUST are preferred for initial screening, and results of both of these tests are consistent with the Subjective Global Assessment (SGA) [11]. The MNA, a scale created particularly for the elderly, do not correlate well with the SGA, but is also a reliable tool to identify patients at risk, and with existing malnutrition. The main goal of the therapy, whether it is prevention or treatment, should be the determination of the nutritional assessment tool [12]. Moreover, examined patients had a severe weight loss during past 3 months, an average of 11.7%, which can solely be a determinant of malnutrition.

According to geriatric reference values used for the BMI index, obtained average value (21.1 ± 3.6 kg/m^2) indicated malnutrition (range indicating proper BMI: 22–27 kg/m^2) [13]. The calf and arm circumferences are specific for identifying well-nourished patients. Frequently, they are assessed along with the BMI index in terms of correlation with the MNA. For complete assessment of the nutritional status it is recommended to perform anthropometric measurements together with screening test, and for the MNA the best relation was obtained with AC, BMI and CC [14]. In the presented study, the mean value of the CC (29.7 ± 3.8 cm) indicated poor nutritional status, while the AC was slightly above the cut-off point of 21 cm (22.5 ± 3.1 cm). In a study conducted among 170 elderly inpatients mean CC and AC values were higher (31.5 cm and 27.8 cm respectively), but the study was not concentrated on malnourished patients. The study demonstrated that the calf circumference can be a sensitive indicator of nutritional risk, especially with regard to changes of fat-free mass occurring with age – it was specified as a complementary indicator useful for monitoring the nutritional status of the elderly [15].

In the presented study statistically significant positive correlation was found for the variety of food intake and free fat mass, and also a negative correlation between the FIVeI and age. Variety has a huge impact on the

amount of the food eaten. The effect of variety reduces experienced or expected satiation and promotes greater consumption. Eating a monotonous diet causes a decrease in appetite for consumed food, which becomes less appealing to the consumer, and therefore diversification is important for increasing the food consumption. Unfortunately, the variety effect is less prominent in old age, causing a loss of interest in food [16]. Moreover, related to the aging process, anorexia of aging is also contributing to the loss of appetite or reduced food intake. Both of these factors can increase the risk of frailty, mainly due to low energy intake, possible decline of muscle mass, loss of weight and muscle strength. Demonstrated in this study positive correlation between the Food Intake Variety Index and free fat mass can confirm these relationships. A randomized, controlled, cross-over trial conducted among 19 elderly women with a loss of appetite demonstrated higher food consumption while eating a meal composed of different food products. These results suggested that providing a varied meal might increase the total energy consumption [17]. Similar results were obtained in a cross-sectional study of a national survey data from over a thousand community-dwelling older adults. More varied meals contributed to a higher energy intake and patients with low BMI (< 22 kg/m^2) more frequently had a monotonous diet [18]. A Polish study, also evaluating the way of eating of the elderly using FIVeQ, found that better food variety intake index was achieved by patients with good nutritional status. In contrast, elderly with low FIVeI were more often malnourished, or at risk of malnutrition [19]. Moreover, with age the risk of micronutrient and vitamin deficiencies increases, especially among frail patients, who tend to have a diet consisting of similar food products [20].

This study has some strengths and limitations. Strong points include an accurate nutritional assessment made using a variety of anthropometric and nutritional screening tests. In addition, the study addresses the problem of the variety of food consumption of patients with frailty syndrome, which is not often studied. On the other hand, performed analysis limited the variety of food intake only to the number of foods consumed during the week. What food products were consumed, their nutritional composition, mineral and vitamin content were not evaluated. Overall, eaten diets were analysed only quantitatively. The next step of this study should be a detailed qualitative assessment of consumed food products and possibly determination of a typical diet consumed by a patient with frailty syndrome. It is worth noting that these are preliminary results and new patients are still enrolling to the study.

Conclusions

The variety of food consumption of the elderly diagnosed with frailty syndrome was assessed as sufficient. Patients had strong unintended weight loss (average of 11.7%), decreased values of anthropometric parameters and results of their nutritional screening tests indicated malnutrition. A possible additional reduction in consumption of food products could lead to more severe nutritional shortages. Moreover, the presented study demonstrated that along with increasing age, the food variety consumption is decreasing, which may be an effect of a more frequent use of monotonous diets in older age. Positive correlation was found for the food variety and the FFM values. It may suggest that consumption of a varied diet affects proper maintaining of muscle tissue and reduces the growth of fat tissue. Consuming diversity of food products is crucial for the elderly patients diagnosed with the frailty syndrome in order to improve their nutritional status and support the treatment process.

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