SocioBrains
ISSN 2367-5721, JOURNAL HOMEPAGE: WWW.SOCIOBRAINS.COM
INTERNATIONAL SCIENTIFIC REFEREED ONLINE JOURNAL WITH IMPACT FACTOR
ISSUE 58, JUNE 2019

DEVELOPMENT AND VALIDATION OF A NEW SIMPLE FOOD FREQUENCY QUESTIONNAIRE FOR BULGARIANS

Abstract: The rapid growth of lifestyle and nutrition disorders is a major global problem. To deal with this problem the first step is assessing the eating habits and making the subsequent corrections. Typically, this process is very time consuming as it requires the processing of a huge amount of information. The purpose of the presented study is to create and validate a simple food questionnaire that allows calculating the amount of energy intake from food and the amount of macronutrients - proteins, carbohydrates and fats. In the present investigation were involved 120 Bulgarians, who filled out the questionnaire and kept a food diary. The data obtained from the questionnaire is of a high degree of statistical reliability, as the correlation between the data obtained from the questionnaire and the nutrition records is high. The questionnaire is suitable for fast assessment of nutrition of large groups of people with sedentary lifestyles, active people as well as athletes and it is developed and validated for Bulgarian conditions.

Author information:

Maria Kirkova
Faculty of Public health, health care and sport,
South-West University "Neofit Rilski",
66 Ivan Mihailov str., Blagoevgrad
✉ tania_dzimbova@abv.bg
Bulgaria

Aleksander Markov
Faculty of Public health, health care and sport,
South-West University "Neofit Rilski",
66 Ivan Mihailov str., Blagoevgrad
Bulgaria

Tatyana Dzimbova
Faculty of Public health, health care and sport,
South-West University "Neofit Rilski",
66 Ivan Mihailov str., Blagoevgrad
Bulgaria

Keywords:
nutrition, food frequency questionnaire, total energy intake, macronutrients

Introduction

Food is a main source of energy for the human body and adequate nutrition is very important for body development and proper functioning. Excess of food intake is often connected to different diseases including obesity. The lack of proper diet is associated with various nutritional deficiencies. Measuring the dietary intakes of a single person is important in assessing the energy availability and adequate nutrition intake and it is very useful for different population and different studies.

The most commonly used methods for measuring dietary intakes are based on current and past dietary intakes (Burke, L. & Deakin, V.). In recent years, more and more innovative methods of nutrition have been put into practice - Internet platforms for food records (for example ASA24, https://asa24.nci.nih.gov/), mobile applications. Technologies work to the benefit of researchers and

thus greatly facilitate their work. The problem nowadays is that few people still use freely English, and most platforms work in English. There are still people who have difficulty coping with new technologies. Another point is that these researches are time consuming when a large group of people is included.

The other way to study nutrition is via nutrition questionnaires based on past meals (Mulligan, L. et al., 2014; Uenish, K.et al., 2008; Foster, S., 2014; Neelakantan, N. et al., 2016). They cover longer periods of time and usually refer to the characteristics of a person's diet and can give a more complete picture of his diet. Various questionnaires have been developed that aim to determine different nutrition parameters in a given population. They are validated specifically for this population and do not work for all people. Typically, questionnaires contain questions about typical foods in the given country and in the given population group. For the purposes of our research and conditions of Bulgaria we developed a simple questionnaire to determine the normal amount of energy that studied person has taken with food, as well as quantities of proteins, carbohydrates and fats daily, included in its menu.

Materials and methods

Subjects

The study includes 120 Bulgarians aged 7 to 57, people with sedentary lifestyles, active people and athletes. They were previously aware of the purpose of the study and each of them had previously signed a declaration of informed consent (for subjects aged 7-18 years, this consent was signed by their parents). The study was approved by the South-West University "Neofit Rilski" Research Ethics Committee (SWU REC)

Development of the questionnaire

As a starting point for creating our questionnaire was the questionnaire developed by Taru at el. (2011). We chose this questionnaire because it is easy to use and the data obtained could be processed quickly. The main changes we make are on foods containing rice. In Bulgaria, rice is not a commonly consumed food, as grain products and bread are predominant. Another issue not applicable to our conditions is for soy products. Although they are increasingly entering the market in Bulgaria, still a large percentage of people do not know them and therefore do not consume them. As a result of the changes, the final questionnaire contains 18 questions covering the nutritional preferences of the Bulgarians.

Calculation of total energy intake and intake of essential nutrients in the questionnaire

The formula for calculating the total energy intake and the amount of protein in the food is the same as in the Taru at el. questionnaire (2011). The modification of the formulas for calculating the amount of carbohydrate and fat in the food was done by comparing the nutrition data and correcting the respective coefficients so that the correlation between the questionnaire data and the nutrition records was as large as possible. Since the level of English proficiency is different in the study group and in order to reduce data mistakes, the persons surveyed keep a detailed diary of nutrition in Bulgarian. By preliminary instructions, the participants fill in everything they consume during the day (food and liquids) by marking the right quantities and recording recipes for the dishes described in the diary. Participants aged 7-18 years complete a diary for 5 days (some of them with a help of parents) while the rest fill a diary for 3 days. Data from filled diaries is processed by the ASA24 system by us. The data obtained from the records are averaged, the main used are total energy intake, protein, carbohydrate and fat intake.

Methods of analysis

For data processing and analysis Excel and GraphPad Prism were used. A spreadsheet has been prepared in Excel to calculate the survey results. Formulas that calculate total energy intake with food, protein, carbohydrate, and fat are introduced. GraphPad Prism was used to determine the correlations between the results of dietary intake from questionnaire and food records as well as to evaluate statistical significance using the t-paired test.

Results and discussion

The study involved 120 volunteers who filled in the questionnaire and, accordingly, kept nutrition records that were later analyzed. The data for the participants in the study are presented in the table 1.

The correlation coefficients between the nutrition records and the questionnaire are as follows: total energy intake r = 0.51 (P < 0.0001), protein intake r = 0.56 (P value P <0.0001), carbohydrate intake r = 0.52 (P-value) (<0.0001) and fat intake r = 0.54 (P value <0.0001) (Figure 1). We also performed a t-paired test and the test showed no statistically significant difference between the values obtained by both methods.

Table 1. Characteristics of the subjects and results from food records

	minimum	maximal	Mean value	Standard deviate
Age	7	57	23.39	13.28
Total energy intake (kcal)	561	3762,67	2051.80	646.76
Protein intake (g)	29,67	229.33	98.84	39.91
Carbohydrate intake (g)	40.33	419,3	210.73	90.24
Fat intake (g)	23,3	56.00	39.02	7,63

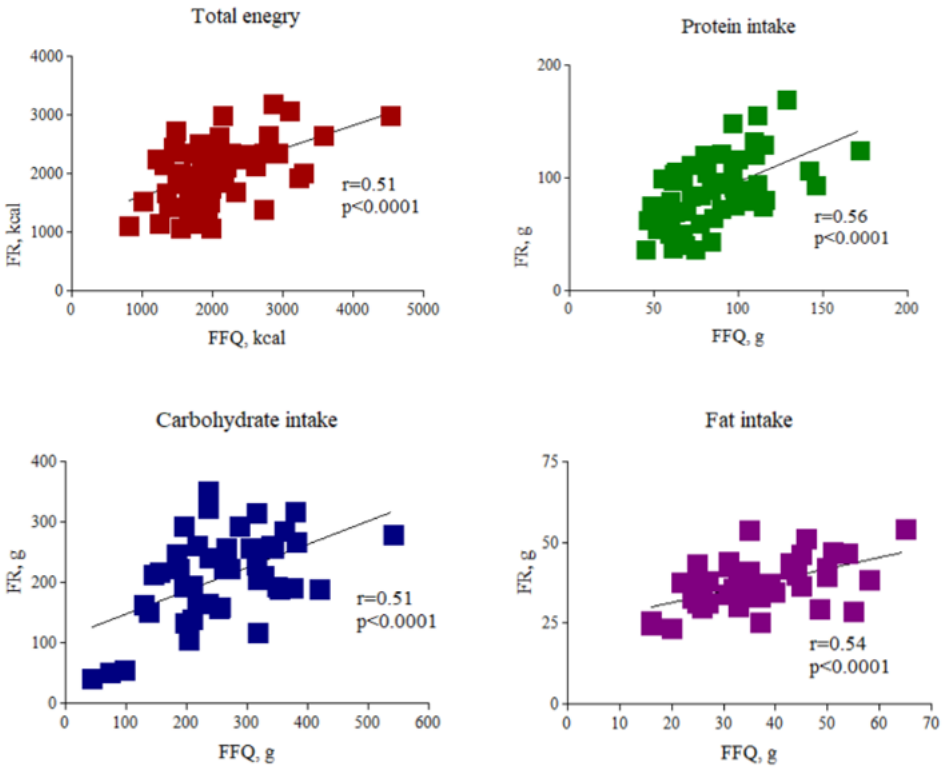

Fig. 1. Validity of the questionnaire data on nutrition records (FR – food records, FFQ – food frequency questionnaire).

The difficulties that my fellow countrymen face with the use of foreign languages and the specific nature of nutrition in the region, as well as the need for a quick method of determining the amount of energy and essential nutrients taken with food, make us create this questionnaire. It can be used for both epidemiological studies and nutrition studies in specific groups, such as athletes. Dietary questionnaires are good for nutrition studies over a long period of time, but they usually take time because they look at all food groups in detail, and most importantly they are in English (Mulligan, L. et al., 2014).

The questionnaire developed by us gives an idea of the main characteristics of a person's diet and, in addition, to the amount of energy consumed by the food, also calculates the amount of protein,

carbohydrate and fat in his usual menu. This provides a quick analysis of eating habits and the ability to respond quickly and make appropriate nutrition adjustments. The high correlation between the results of the nutrition records and the calculations in the questionnaire is an indication of correctness of the results obtained. Of course, use of the questionnaire is limited to determining the quantities of basic nutrients. If a detailed nutrition analysis is needed, including vitamins and minerals, food records, although laborious, remain the only way for assessment.

Conclusion

The developed questionnaire about nutrition is a Bulgarian questionnaire consistent with the dietary habits of Bulgarians. Despite its simplicity, the questionnaire provides accurate enough information on the amount of food intake, as well as the amounts of essential nutrients - proteins, carbohydrates and fats. It enables tracing the nutrition of large groups of people, both sedentary lifestyles and athletes, since representatives of both groups participated in its validation.

References:

1. **Burke L. and Deakin V., 2015:** Clinical sport nutrition, North Ryde: McGraw-Hill Education (Australia) Pty Ltd.
2. **Foster, S., Fallaize, R., Gallagher, C., O`Donovan, C. B., Woolhead, C., Walsh, M. C., Macready, A. L., Lovegrove, J. A. , Mathers, J. C., Gibney, M. J., Brennan L., Gibney, E. R., 2014:** Online Dietary Intake Estimation: The Food4Me Food Frequency Questionnaire, J Med Internet Res, 16,. e150.
3. **Mulligan, L. Luben, N., Bhaniani, A., Parry-Smith, D. J., O`Connor, L., Khawaia, A., Forouhi N. G., Khaw, K.-T., 2014:** A new tool for converting food frequency questionnaire data into nutrient and food group values: FETA research methods and availability, BMJ Open, 4, e004503.
4. **Neelakantan, N., Whitton, C., Sharna, S., Koh, H., Rebello, S. A., Lim, J. Y., Chen, S., Chan, M. F., Chew L., van Dam, R. M., 2016:** Development of a Semi-Quantitative Food Frequency Questionnaire to Assess the Dietary Intake of a Multi-Ethnic Urban Asian Population, Nutrients, 8, 528.
5. **Taru, C., Tsutou A., Miyawaki, I., 2011:** A modified simple questionnaire to estimate dietary intake for Japanese, Kobe J Med Sci, 57, E106-E115, 2011.
6. **Uenish, K., Ishida H., Nakamura, K., 2008:** Development of a simple food frequency questionnaire to estimate intake of calcium and other nutrients for the prevention and menagement of osteoposis," J Nutr Sci Vitaminol, 54, 24-29.