ANALYSIS OF NUTRITIONAL STATUS, DIETARY ROUTINES, NUTRIENT INTAKE VALUES AND FOOD CONSUMPTION FREQUENCY IN THE HUNGARIAN ELDERLY

Doctorial thesis

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Introduction

The subject matter is of utmost interest since in Hungary, like in other European countries, the number of the elderly is growing. However, here both life expectancy and healthy lifespan are lower than the European average.

The Seneca study, the Ageing Nutrition Project, European Nutrition and Health Report and EPIC-Elderly Study are distinguished among international nutritional studies.

Out of the Hungarian nutritional studies 'The First Hungarian Representative Nutritional Study', 'The Second Nutritional Study' carried out on fewer samples, the 'Third National Nutritional Study' in the framework of the National Health Survey, and the most recent 'National Nutritional and Nutritional Status Study of 2009' are the most significant ones.

These studies included the analysis of the nutritional status, nutrient intake and /or food intake values. The most important anthropometric methods included: Body Mass Index (BMI), which record malnutrition or obesity; waist- to- hip ratio; and/or waist circumference, which shows the type of obesity; body composition evaluation based on bioelectrical impedance analysis; and MUAC to define body fat and upper arm circumference. To screen malnutrition among the elderly validated methods best known in Europe are MUST, NRS 2002, and MNA.

To assess nutrient intake several nutrition-epidemiological methods exist. Data can derive from a short, usually one to three day period record (24 hour recall and dietary diary) on consumed foods and drinks, quantities and qualities done with the individual's records or a professional questionnaire. For longer periods FFQ of foods and drinks indicated on a list can also be analysed

Aims

The aim of my/the study was to assess and analyse nutritional status, occurrence and risk of malnutrition, food consumption frequency, nutrient intake values for home-living or institutionalized Hungarian persons over 55 years of age and to identify and analyse conditions that lead to nutritional defects. I tried to find answers to the questions below:

- How prevalent is obesity in the age subpopulation according to BMI and waist/hip ratio?
- How prevalent is malnutrition in the examined age subpopulation according to BMI and MNA?

- Are there links between nutritional status and gender, residence type, family, qualifications, and age groups?
- Are there differences between the results of different methods used to asses nutritional status?
- What is the average energy–, nutrient intake among the population focusing on micronutrients (Na, Ca, B_{12}-, B_6- C-, D-vitamin, folate), latter important for the elderly?
- Are there links between energy–, nutrient intake and gender, residence type, family, qualifications, and age groups?
- Do the subjects consume the different food types as frequently as recommended in guidelines and what is their nutritional patterns?
- What is their bowel function, dentition like; do they indicate chewing or swallowing problems?

Methods

The study was carried out on 350, over 55 year-old volunteers, who live independently or in institutions of community care. Data of 327 people were assessable (male: 91 female: 236), although not everybody answered every question. Among those who live in their homes data recording was possible in day-care centres or clubs for seniors, whereas the members of the other group live in council or private institutions.

Data were obtained with the help of students of dietetics studies. Personal and anthropometric status, bowel function, dietary, dentition, chewing swallowing status, appetite, smoking and coffee consumption data were obtained with an independently compiled questionnaire containing both open and closed questions. To gain BMI body mass and height were measured, to calculate waist/hip ratio waist and hip circumferences were measured and recorded. To screen malnutrition, the Mini Nutritional Assessment (MNA) developed for the elderly was used .Food consumption frequency was done with Food Frequency Questionnaire.

Nutrient intake was examined by a 24-hour recall plus the NutriComp nutrient calculator.

Data statistical process and analyses were done by SAS System for Windows (Release 9.1.3, Statistical Analysis System, SAS Institute Inc, Cary, NC, USA) with descriptive statistical analysis and significance analysis.

Results

Result of Nutritional status study values

25,07 % of subjects were found to be malnourished or at high risk of malnutrition according to Mini Nutritional Assessment and 6,42 % was actually malnourished . Malnutrition or being at high risk of malnutrition was more frequent among the institutionalized, or more advanced in years than among home-living elderly. Note, malnutrition was more frequent in the capital.

Based on the Body Mass Index (BMI) the average for men was 27,15 kg/m^2 for women it was 28,31 kg/m^2. Only 3,98% of the participants were found to be malnourished (BMI<20 kg/m^2), which reflects significant divergence from the MNA results. 31,19% belonged to the category of obese (BMI>30 kg/m^2 No significant gender differences were found. Obesity occurred more frequently in the age group 65-75 years than at younger or more advanced age.

Waist/hip ratio average was 0,94 for men, and 0,89 for women. Among the participants significantly those institutionalised 73,39% fell into the category of high visceral fat mass leading to high risks.(man>0,95; woman>0,8). In this respect those with normal BMI could also be concerned.

Analysis of nutrient intake values

Total energy intake in both men and women is lower (man: 2139,52 kcal/day, woman: 1792,75 kcal/day), than recommended (2500 kcal/day). Women consume significantly less energy. When examining nutrient ratio, protein energy is sufficient (man 15,31 E%, woman: 14,71 E%). Fat energy is higher than recommended (<30 E%) in both genders (man: 31,74 E%, woman: 35,39 E%). Elderly people with a higher qualifications have a more favourable distribution of fatty acid intake. Sadly speaking, the n6/n3 fatty acid ratio is nowhere near the ideal. Carbohydrate rate is lower (man: 50,64 E%, woman: 49,38 E%), than recommended (>55 E%), for the age groups, but it is beneficial that the quantity of added sugar (man 7,03 E%, women 5,76 E%) did not exceed the allowed limit (<10 E%). Interestingly, those in institutionalised care have higher sugar consumption than people living in their own homes.

Daily protein intake is in accordance with protein E% was adequate. However, animal protein intake is higher than the recommended 50%. In both genders the average consumption of dietary fibre is lower (man: 21,16 g/nap, woman: 21,00 g/day), than recommended (≥25 g/day). Cholesterol intake is adequate, lower than the recommended 300mg/day but the most advanced age group has shown a significant surplus.

As for minerals, sodium intake surpasses the recommended rate (≤2000 mg/day) in both genders (man: 1866,33 mg/day, woman: 3860,88 mg/day), but interestingly it is higher in men than women and in the subgroup of elderly with higher qualifications. Excessive sodium intake poses a risk of cardio-vascular diseases, particularly hypertonia, for individuals in the sodium sensitive group. Unfortunately, calcium intake, so important for the elderly, is significantly lower (man: 587,37 mg/day, woman: 589,65 mg/day), than needed (1000 mg/day). P intake is higher (man: 988,17 mg/day, woman: 847,29 mg/day), than recommended (775 mg/day). However, iron intake is acceptable.

As for vitamins, Vitamin B_{12} consumption of women (1,67 µg) do not reach the recommended value while for men and for the home-living elderly the intake is acceptable (2,0 µg). Vitamin C consumption is less (man: 78,88 mg/day, woman: 85,06 mg/day) than recommended (90 mg/day), with higher results for people living independently whose diet contained more. Vitamin D intake (man: 1,58 µg/day, women: 1,52 µg/day) vital at elderly age, is significantly lower than needed (man: 5 µg/day, woman: 6 µg/day) but those in community care have higher values. Retinol equivalent, vitamin B_2-, B_6-, vitamin E and folate intake all have fallen well behind recommended.

Alcohol consumption of volunteers (man: 6,53 g/day, woman: 0,88 g/day) is well below the tolerable level (man: <20 g/day, woman: <10 g/day) but correlated to gender and education level. Men, and people of higher qualifications have drunk more. Average caffeine intake has been the equivalent of ½ cup of coffee or a cup of tea. The overall fluid consumption (man: 1240,53 g/day, woman: 1263,87 g/day) is less than desirable (1500 g/day).

FFQ survey

As for liquid intake vital for the elderly, participants drink water and tea daily or several times a day and 40% of those drinking tea consume it without sugar. Luckily, syrup or soft drinks with high sugar content were on the menu monthly or even less frequently. Fruit drink is only consumed 1-3 times a week only by 10%, likely due to the its high price.

As expected out of the sources of starch white bread, potato, pasta or rice are the favourite. Whole meal bread containing significant amount of fibre or legumes, a good source of protein, are consumed only monthly or less frequently by about half of the interviewees.
According to guidelines vegetables and fruit should be consumed three times a day, and as varied as possible. This was achieved by only by a tiny proportion of people (10-14%) nevertheless, it is favourable that only 30-38% consume sweets, sugary jam, and bottled fruit

weekly or more frequently. Nutrient dense dried fruit is consumed once in awhile, which can be justified by poor dentition and thus chewing defects. Convenience food was also on my questionnaire as the elderly may be in a situation when these product group can serve useful purposes when the they have difficulties in preparing food. Especially if they are aware of the fact how these products can be enriched with fresh ingredients. In the survey I found people are not in need of or do not take advantage of this not even those live at home.

Half a litre of milk or the equivalent dairy products is recommended daily to provide the necessary calcium intake. However, only 50-60% of the examined population drink (various fat content) milk, whereas the consumption of cheese or yoghurt is well behind the recommended. It is favourable that low fat milk and plain yoghurt are popular.

67-68% of the participants eat egg from once to three times a week, and with other types of food containing egg, this amount reaches the recommended level (5 eggs /week). As for meat many prefer lean parts, poultry is eaten with or without skin at the same rate. Latter is more favourable from the aspect of fat and cholesterol intake. Consumption of fish, however, is limited to one to three times a month or less by 86-87%. Fish is essential not only because of the protein intake but also because of n-3 fatty acid in case of sea fish. It is favourable that people tend to choose lean cold cuts, whereas 80% of the elderly consume smoked produce with high sodium content, only one to three times a month or even rarer.

The participants use cholesterol or saturated fat rich animal fat products like lard for cooking or consume cracklings and butter cream only rarely. They prefer butter. As far as vegetable fat is concerned participants prefer light margarine to high fat content margarine and it is likely that they do not like oily seeds (nuts, walnuts), which are rich in favourable fatty acid and Vitamin E because they have dentition problems.

The majority of the participants eat three time a day and some 80% do not consume titbits between meals. According to their answers they have elevenses or afternoon snack less frequently.

Other data from the questionnaire

Constipation, which is characteristic of the elderly age group, occur at a rather high rate, in 30%.

Three quarters have missing poor dentition, 25% have chewing defects, which is more common with people of lower educational background or in the age group of 75-85 years. Bear in mind that it does not mean that chewing problems can only be found with those

having missing teeth. It is common that elderly people are unable to use their denture properly and do not change them if they have problems with it.

Conclusions

In my study I investigated voluntary elderly people over the age of 55 but in a more detailed way than in studies mentioned above in the introduction. It is positive that data were obtained by dietetics students, who thus gained practice in recording anthropometric data on food and nutrient consumption during their college studies. It is also beneficial that anthropometric data were calculated based on measured values.

On the basis of the nutritional status survey the following major conclusions can be drawn:

- In my study both malnutrition (BMI<20kg/$m^{2)}$ and obesity (BMI>30kg/m^2) are frequent, particularly in the 65-75 age group, less so in younger or more advanced age groups.
- Average energy intake is below recommended value, nevertheless, a third of the participants are obese (31,19%). This can be attributed to their low physical activity.
- Comparing BMI, MNA and waist/hip ratio more detailed anthropometric data were available for me. As a new finding I found that there is a discrepancy between the two methods. I maintain that MNA validated for the elderly is more informative and more successful method than BMI.
- According to their waist/hap ratio a very high percent (73,39%) of the elderly belong to visceral fat mass, high risk group (man>0,95; woman>0,8), which emphasises that even those with normal BMI can be concerned.

Balanced nutrition, which focuses on the elderly, would contribute to maintain health greatly, thus it is essential to identify nutrition-related risks, which hinder successful ageing. In my study, hence I emphasize the importance of regular screening and assessment of nutritional status and the nutrition of elderly people. Based on the 24 hour recall analysis I concluded the following:

- I found significant correlation between the nutrient intake values and life style factors (gender, residence, family background, qualification, age group). The fat E % is lower among elderly people with higher qualifications, nevertheless their alcohol consumption is higher. Vitamin B_{12} and C intake are better for people living in their

homes. On the other hand, their sugar and vitamin D intakes are lower than for those living in institutions. Women and people with lower qualifications have lower Sodium intake.

- My study re-enforces the necessity to pay greater attention to the optimal intake of macro– and micro nutrients, which have been imbalanced, excessive or insufficient in elderly people's diet in previous surveys as well.
- During the analysis of nutrient content, the low level of E% of added sugar, low cholesterol intake and sufficient protein intake are favourable.
- High fat E%, low dietary fibre intake, carbohydrate E% and insufficient liquid consumption are all unfavourable. Excessive sodium intake is also unwanted, which is accompanied by insufficient potassium intake, thus sodium-potassium rate is multiple of the recommended value. It is also unfavourable that calcium intake is insufficient in both genders, excessive phosphorus as well as calcium and intake rates are both far from ideal. Insufficient Zn- vitamin B_6-, C-, D-, E-, folate, and vitamin B_{12}, in case of women, must be noted.
- It is novelty, that the dietician students was in possession of the menu of the given day during 24 hour recall so they did not rely only on the memory of the interviewee and the documentation of the consumed food was made easier.

My major conclusions based on FFQ analysis.

- My study proved that elderly people stick to their well-known tastes since white bread of poor-nutrient content, traditional pasta, potato or hulled rice were all popular. Only 10-14% consumes several servings of vegetables and fruit on a daily basis, fish is eaten monthly or even rarer and they do not prefer light margarine or butter.
- However, they accept low- fat milk and liked lean meat. It is a good result that 'consumer products' consumption is at a tolerable level. It is also favourable that the elderly have their meals at regular times, at least three times a day, and rarely have snacks.
- The fact that old people insist on their eating habits and routines and are unwilling to accept novelties must be considered and the beneficial changes in their routine have to be introduced gradually.

- To implement the changes, regular presence and supervision of a dietician is vital in institutions as well as the accessibility of organised or personalised advice for the elderly living in their home.

Summing up the novelty/ new results of my research are the following.

- Data were obtained by dietetics students with well prepared expert's assistance.
- I was the first to apply several different methods when examining nutritional status.
- I proved discrepancy in the results of the different methods used.
- I concluded that central type of obesity is extremely intense at elderly age (73,39%).
- MNA validated for the elderly age group is more informative and successful than BMI in order to assess malnutrition.
- I supplemented the 24 hour recall with guided interview (relying on the menu as well, not only the memory of the interviewee).
- I revealed that fat E% is lower among elderly subjects with higher educational qualifications.
- Significant differences can be found in the national guidelines for the elderly and nutrient intake reference values in different countries, which renders comparative studies of data difficult.
- Thus I conclude that it is necessary to standardise the methodology of nutrition and nutrient intake analysis.

List of own publications connected with theme

1. Bach K, Bencsik K, Erdélyi A, Fehér Fné, Gaálné Labáth K, Horváth Tné, Németh Iné, Rigó J, ***Veresné Bálint M:*** Betegecske öregecske konyhája. Új Őszidő Kiskönyvtára, Budapest, 1991
2. ***M. Bálint,*** E. Mák, I. Szabolcs, M. Pankotai, K. Németh: Studying the habits of food consumption and the quality of lifestyle in the case of elderly people living in different homes. The 6th European Forum for Dietitians (EFAD) Geneva, 2-5 June. 2005. p. 15 **–** ***poszter***
3. E. Mák, ***M. Bálint,*** I. Szabolcs, K. Horváth, E. Pálfi: Studyng the nutrition intake and mental status in the case of elderly people living in different homes. The 6th European Forum for Dietitians (EFAD) Geneva, 2-5 June. 2005. p. 20**. –** ***poszter***
4. ***Veresné Bálint M:*** Idősek táplálkozása 1. rész. Élelmezés 2006; 3: 44-45.
5. ***Veresné Bálint M:*** Idősek táplálkozása 2. rész. Élelmezés 2006; 4: 24-25.
6. ***Veresné Bálint M:*** Idősek táplálkozása 3. rész. Élelmezés 2006; 5: 24-25.
7. ***Veresné Bálint M:*** Idősek táplálkozása 4. rész. Élelmezés 2006; 6: 24-27.
8. ***Veresné Bálint M:*** Idősek táplálkozása 5. rész. Élelmezés 2006; 7-8: 26-27.
9. ***Veresné Bálint M:*** Idősek táplálkozása 6. rész. Élelmezés 2006; 9: 24-26.
10. Békési K, ***Veresné Bálint M,*** Kiss A: Tápláltsági állapot és tápanyag-ellátottság időskorban. Új diéta 2007; 1: 10-11.
11. ***Veresné Bálint M,*** Szabolcs I.: 24-órás recall hitelességének vizsgálata idősek körében - Magyar Táplálkozástudományi Társaság Vándorgyűlése - Pécs, 2008. október 1-3. **-** ***poszter***
    http://www.mttt.hu/portal/downloads/2008_vandor/absztrakt_kotet/2008_%20abszraktok.pdf
12. ***M. Veresné Bálint,*** I. Németh, E. Pálfi, I. Szabolcs: Studying the anthropometric status and the risk of malnutrition in the case of elderly people living in the different nursing homes - Fifth European Congress on Nutrition and Health in the Elderly People - Warsaw, 15-17 September 2008 **-** ***poszter***, http://nhecongress2008.sggw.pl/
13. ***Veresné Bálint M,*** Szabolcs I: idősek tápláltsági állapotának, rágási problémáinak, és egyes tápanyagok fogyasztásának vizsgálata, MTT, Székesfehérvár, 2009. október 8-10., Magyar Táplálkozástudományi Társaság XXXIV. Vándorgyűlése 2009. Abstrakt Book. p. 60. **-** ***poszter***

14. ***M. Veresné Bálint,*** E. Pálfi, I. Szabolcs: Dietetics for Older Adults Internship in Dietician Training, 3rd DIETS Conference, Dieteitians (Net)working with Others, Lisbon, 23-24 September 2009 ***- poszter***
15. Mák E, ***Veresné Bálint M,*** Pálfi E, Németh I, Tóth T, Fehér F, Gaál B, Szabolcs I: Improving the quality of life of the population through the Internet by surveying demand for the use of diet plannaing software. New Medicine (várható megjelenés) 2010; 3: 8-10.
16. ***Veresné Bálint M,*** Lichthammer A, Pálfi E, Szabolcs I: Malnutrution and nutrient intake values int he Hungarian elderly. New Medicine 2010; 4: 133-137.
17. ***Veresné Bálint M***, Prikkné Nagy Á: Idősek tápláltsági állapotának, és élelmiszerfogyasztási gyakoriságának felmérése. Új Diéta. 2010; 2: 12-13.