

CONTENT OF SELECTED VITAMINS IN MENUS FROM A SOCIAL WELFARE HOME

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ABSTRACT

Background: Psychological old age is considered a developmental process in which there is a juxtaposition of profit and loss. Developmental changes are multi-faceted and include biological, psychological and social spheres. The quality of human life diminishes as mobility lessens, and this compromises self-perception. The biological changes of old age are retroactive. Poor nutritional status and other negative behaviors like addictions contribute to the physiological regression of aging. Interest in nutrition amongst the elderly is heightened because of the aging population in Poland and internationally. There is also interest in the application of proper nutrition to prevent diseases in this age group. Proper nutrition is one of the main factors determining ideal human function and positively affects the natural processes within it. Analysis of food composition gives the opportunity to eliminate nutritional errors, which in turn contributes to improving the quality of life and delaying the aging process in the examined age group.

Aim of the study: The aim of this study was to evaluate the content of selected vitamins in 10 seasonal menus applied at a Social Welfare Home.

Material and methods: This study included 40 decade menus, prepared over four seasons of a year for the residents of a Social Welfare Home. The vitamin content of the meals was assessed quantitatively using the computer program, Diet 5. The selected vitamins were those considered most essential to the elderly diet because of the common appearance of their deficiencies. Taking into consideration physical activity of the elderly (1,4 physical activity level) and utilizing the norms developed by the Food and Nutrition Institute, the average norms of the analyzed nutrients were calculated for people over 60 years of age. For this purpose the formula $(K+M)/2$ was used, where K is the norm for women and M is the norm for men. The results obtained were compared with the calculated mean values of the norm for elderly at the level of the estimated average requirements (EAR). The results were analyzed statistically giving the mean value (X) and the median. The calculations were performed using Microsoft Excel.

Results: Deficiencies in vitamin D were found. The menu content of vitamins E and C was correct in all seasons. The amount of vitamins A, B₂, B₁₂ and PP was excessive in all the seasons.

Conclusions: The evaluated menus showed errors in the supply of the assessed vitamins.

KEYWORDS: elderly people, nutrition, nutrients, menu quantitative evaluation

BACKGROUND

Old age in psychology is considered a development process in which there is a balance of profits and losses. These changes are multi-faceted and include biological, psychological and social spheres. The quality of human life diminishes due to reduced mobility, which affects self-perception. In old age, biological changes are retroactive. They become visible and are generally felt at around 60 years of age [1].

Physiological changes in the elderly are in part due to poor nutritional status [2]. The aging process is linked frequently to inappropriate nutrition and addictions (e.g. smoking, alcohol, coffee) [3]. There is interest in nutrition amongst the elderly due to the growing aging population in Poland and worldwide. There is also attention placed upon the application of proper nutrition to prevent diseases in this age group [4]. Good nutrition is one of the main factors determining ideal function

through positively affecting natural processes within the human body [5].

Consumption of nutrients, especially by the elderly, should be consistent with the metabolic needs of the body. The increased occurrence of chronic diseases in old age is often associated with a need for food restrictions. Due to the aging population, nutrition within this group is a significant but also complex problem for the science of human nutrition [6].

It is well-known that excessive consumption of fat and simple sugars leads to a decrease in nutritional density of the diet and thus to potential deficiencies, especially of vitamins and minerals. It is believed that in old age the need for vitamins D, C, E, A and β -carotene increases. Appropriate ingestion of dietary vitamin B6, folic acid and vitamin B12 can positively affect the cardiovascular system and mental performance [7].

The diet of elderly individuals is often not consistent with the principles of rational nutrition, and thus leads to numerous body deficiencies. Regular consumption of varied meals, their proper selection and preparation should be one of the basic behaviors [8].

AIM OF THE STUDY

To evaluate the content of vitamins in the selected decade menus applied at a Social Welfare Home in the different seasons of the year.

MATERIAL AND METHODS

The menus prepared at the Social Welfare Home in Lower Silesia region were assessed. Residential meals were prepared in the canteen located in the facility. Due to the use of menus on a 10-day cycle, we evaluated 10 randomly chosen meals from each season over a one year period across 2016 and 2017. For the purpose of the study Diet 5 software was used to analyze meals chosen from the period of 40 days focusing on breakfast, diner, and super. The selected vitamins were the most essential to the elderly diet because of the common appearance of deficiencies in this age group. Taking into consideration the physical activity of the elderly (1,4 physical activity level) and utilizing the norms developed by the Food and Nutrition Institute [9], we calculated the average norms of the analyzed nutrients for people over 60 years of age. For this purpose the formula was used, where K is the norm for women and M is the norm for men. The results obtained were compared with the calculated mean values of the norm for the elderly at the level of average consumption (estimated average requirements or 'EAR'). The results were analyzed statistically giving the mean value (X) and the median. The calculations were performed using Microsoft Excel.

RESULTS

Tab. 1 presents the content of selected vitamins in the evaluated menus. During analysis, vitamin D deficiency was found. The highest amount was recorded in

Table 1. Content of the selected vitamins in each season.

Season	Assessment parameters	Vitamins						
		Vitamin A [μ g]	Vitamin E [mg]	Vitamin B2 [mg]	Vitamin PP [mg]	Vitamin C [mg]	Vitamin B12 [μ g]	Vitamin D [μ g]
Spring	X \pm SD	867.7 \pm 499.4	9.0 \pm 1.9	1.6 \pm 0.2	16.0 \pm 5.4	68.0 \pm 11.8	3.9 \pm 2.6	4.4 \pm 5.4
	Min	366.4	6.5	1.3	9.5	24.0	1.8	1.8
	Max	2105.5	11.8	2.1	27.0	137.13	9.8	19.8
	Median	708.8	8.4	1.6	15.6	50.4	3.0	2.6
	% of the norm	154	100	160	133	100	195	44
Summer	X \pm SD	2230.3 \pm 3418.7	9.4 \pm 1.7	2.0 \pm 1.0	15.1 \pm 3.4	70.8 \pm 36.0	8.6 \pm 12.7	3.7 \pm 2.5
	Min	587.9	6.7	1.3	9.3	33.1	1.8	1.5
	Max	11856.5	12.8	4.6	21.3	143.8	43.5	10.1
	Median	1130.0	9.2	1.7	15.5	56	3.4	2.9
	% of the norm	395	104	200	126	104	430	37
Autumn	X \pm SD	1105.7 \pm 495.4	9.1 \pm 1.3	1.5 \pm 0.3	14.3 \pm 4.7	64.8 \pm 45.0	4.5 \pm 4.1	4.8 \pm 3.7
	Min	481.0	7.4	1.0	9.3	20.5	1.9	1.7
	Max	2023.1	10.7	2.2	25.5	156.8	12.7	12.1
	Median	999.8	9.2	1.5	13.6	52.3	2.6	3.3
	% of the norm	196	101	150	119	95	225	48
Winter	X \pm SD	990.5 \pm 689.9	9.4 \pm 1.5	1.6 \pm 0.2	14.2 \pm 2.7	74.2 \pm 46.4	4.5 \pm 3.9	4.5 \pm 5.1
	Min	397.0	7.0	1.3	9.5	21.2	1.9	2.0
	Max	2740.3	11.4	1.9	17.9	149.6	14.1	19.0
	Median	748	10	1.6	13.9	61.1	2.6	3
	% of the norm	175	104	160	118	109	225	45

autumn at 4.8 µg, which was 48% of the norm, while the lowest intake was in summer (3.7 µg) and covered 37% of the daily demand of older people.

The content of vitamin E in the evaluated menus was correct in all seasons. The average amount in summer and winter was the highest (9.4 mg) and covered 104% of the demand. The lowest average value was in spring (9.0 mg), meeting the standard at 100%.

The amount of vitamin C was within standard limits in all four seasons. The highest consumption occurred in winter (74.2 mg), which accounted for 109% of the daily demand. The lowest quantity was recorded in autumn (64.8 mg), covering 95% of consumption suitable for the elderly.

The amount of vitamin A in all seasons exceeded the norm. In summer, the average content was 2230.3 µg and it surpassed the standard by almost 4-fold (395%). The lowest consumption was in spring (867.7 µg), although the daily requirements were still exceeded at 154% of the norm.

The content of vitamin B₂ in the diet menus also exceeded recommendations. In summer, it was twice as high as the recommended daily dose, amounting to an average of 2.0 mg, or 200% of the demand. In autumn, slightly lower values (1.6 mg) were noted, which equaled 160% of the daily consumption.

The average content of vitamin B₁₂ was also too high. In summer it was 8.6 µg and exceeded the standard norm by 4-fold. In autumn, the amount (4.5 µg) was twice as high as the recommended norm.

Excessive intake of vitamin PP was found in all seasons. The highest value was observed in spring (16 mg), covering 133% of the daily demand. The lowest consumption occurred in winter (14.2 mg), and was 118% of the daily demand.

DISCUSSION

Quantitative evaluation of the menus tested showed an excess or deficiency in the content of selected vitamins and nutrients for the elderly. Vitamin A is a very important dietary component due to its antioxidant properties. It also participates in the visual process and contributes to normal skin condition through production of collagen fibers. However, it should be remembered that excess accumulation of this vitamin is toxic to the human body. Too much vitamin A may manifest itself in, among others, skin color, weakness and muscle pain as well as gastrointestinal disorders [10]. The average supply of vitamin A in all seasons in the examined diets exceeded the daily dose. Research carried out by Malczyk et al. [11], Tokarz et al. [12], and Goluch-Koniuszy et al. [13] assessing nutrition in the elderly also found that the presence of this vitamin was too high in the diet.

The amount of B vitamins in the daily meals was also too high regardless of the season. In the summer, the daily dose of vitamin B₂ was 2-fold higher, and of B₁₂ up to 4-fold higher than recommended. In a study carried out by Goluch-Koniuszy et al. [13] assessing the nutri-

tional status and diet of people who had been retired for six months, the recommended norm for older people was also exceeded. Malczyk et al. [11] and Tokarz et al. [12] also noted excessive consumption of vitamin B₁₂. Thus far no harmful effects of consuming too high much vitamin B₂ have been observed because the digestive tract has limited ability to absorb this vitamin [10]. Further, excess vitamin B₁₂ is expelled from the body without causing harmful effects.

Excess niacin may eventually contribute to an increase in insulin resistance and consequently to development of insulin-dependent diabetes [9]. Our study has shown too high an intake of niacin in all seasons. Malczyk et al. [11] assessed the nutrition of elderly people living in Jodłów and Nadziejów by [14] analyzing the menus in the selected Social Welfare Home and Care and Treatment Facilities, and stated that the niacin intake was too low. Long-term niacin deficiency may contribute to development of pellagra, which is accompanied by disorders of the nervous system, inflammation of the mouth and tongue as well as dermatitis and diarrhea [10].

Of all the selected vitamins, the largest deficit was found for vitamin D, which covered only 37-48% of the daily intake regardless of the season. Other authors [11,12,15-17] stated that the supply of this ingredient was insufficient in food they analyzed. Vitamin D shows a pleiotropic effect on the human body, directly or indirectly affecting about 200 genes. This vitamin is essential for maintaining calcium-phosphate homeostasis and positively affects the immune, muscular and nervous systems. Therefore, an insufficient dose of vitamin D causes calcium and phosphate metabolic disorders, which in turn may lead to bone demineralization and development of rickets. Vitamin D deficiency can also contribute to development of diabetes or autoimmune diseases. It should be emphasized that, as a result of reduced skin synthesis, the demand for this component in older people is increased [18].

In our presented research, the level of vitamin C and E was sufficient. Vitamin C is vital for humans because it participates in numerous metabolic processes and also affects immunity [18]. However, according to research conducted by Malczyk et al. [11] it appears that average vitamin E consumption was significantly exceeded but the assessed diet was poor in vitamin C. In the research of Syngowska et al. [17], it was noticed that the vitamin E content in an average diet in the study group was satisfactory while the amount of vitamin C was slightly below the recommended norm. Goluch-Koniuszy et al. [13] showed that the variety of groceries was not sufficient in the menus of elderly people, resulting in vitamin C deficiencies. However, the content of vitamin E in meals ingested by women in the study was much higher than the recommended norm.

Overall, our research and that of other authors, proves that the assessed meals of elderly patients had an incorrect supply of vitamins. Thus, there is a constant need to monitor menu planning and such monitoring is possible in such institutions.

CONCLUSION

The menus analyzed were characterized by the correct amount of vitamins C and E, vitamin D deficiency and too high a supply of vitamins A, PP, B₂ and

B₁₂ regardless of the season. Prepared meals for residents of nursing homes should be controlled in respect of the nutritional content. It is possible to introduce supplementation of vitamin D.

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