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ORIGINAL

Assessment of the nutritional status of institutionalized older adults in two residences

Evaluación del estado nutricional de adultos mayores institucionalizados en dos residencias

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ABSTRACT

This study evaluated the nutritional status of elderly adults in two residences, finding notable differences in body mass index (BMI) and dietary trends. Residence A had an average BMI of 27,6, indicating class I overweight, while Residence B showed an average BMI of 21,3, classifying it within the normal weight range. Thirty-two percent of the men in Residence A were overweight, whereas energy deficiencies were detected in Residence B. Although Residence A had a higher consumption of dairy and fruits, Residence B excelled in legumes. Both groups did not meet the recommended intake for macronutrients, although Residence A was closer to the recommendations for proteins and lipids. Additionally, Residence A exceeded the recommendations for calcium, phosphorus, and zinc, while Residence B excelled in iron. These findings suggest the need for personalized nutrition programs to improve the health and well-being of the residents.

Keywords: Nutritional Status; Older Adults; Energy Deficiency; Diet.

RESUMEN

Este estudio evaluó el estado nutricional de adultos mayores en dos residencias, encontrando diferencias notables en el índice de masa corporal (IMC) y las tendencias alimentarias. La Residencia A presentó un IMC promedio de 27,6, indicando sobrepeso tipo I, mientras que la Residencia B mostró un IMC promedio de 21,3, clasificándose dentro del normopeso. El 32 % de los hombres en la Residencia A tenía sobrepeso, mientras que en la Residencia B se detectaron deficiencias energéticas. Aunque la Residencia A tuvo mayor consumo de lácteos y frutas, la Residencia B destacó en leguminosas. Ambos grupos no alcanzaron las recomendaciones de ingesta de macronutrientes, aunque la Residencia A estuvo más cerca para proteínas y lípidos. Además, la Residencia A superó las recomendaciones para calcio, fósforo y zinc, mientras que la Residencia B destacó en hierro. Estos hallazgos sugieren la necesidad de programas de nutrición personalizados para mejorar la salud y el bienestar de los residentes.

Palabras clave: Estado Nutricional; Adultos Mayores; Deficiencia Energética; Dieta.

INTRODUCTION

The aging of the population is a global phenomenon that presents multiple challenges for health and social welfare systems.[1] According to recent data from the World Health Organization (WHO), it is estimated that by 2050, 22 % of the world's population will be over 60 years old, representing a significant increase compared to the 12 % recorded in 2015.(2) This demographic shift has brought to the forefront the need to address the nutritional status of older adults, especially those living in care homes.

The nutritional status of institutionalized older adults is a critical factor that influences their overall health, quality of life, and mortality. Various studies have shown that malnutrition in this population is a prevalent and underdiagnosed problem. For example, a systematic review conducted by Cereda et al.(3) found that the prevalence of malnutrition among older adults in care institutions ranges from 19 to 65 %, depending on the criteria and assessment methods used. Malnutrition in older adults can lead to functional decline, increased risk of falls, infections, hospitalizations, and ultimately higher mortality.(4)

The causes of malnutrition in institutionalized older adults are multifactorial and include physiological, psychological, and social factors. Loss of appetite, metabolic changes, chronic diseases, difficulties in chewing and swallowing, and loneliness are some of the factors contributing to this problem.(5) Additionally, specific conditions within care homes, such as the quality of food provided and personalized care, also play an important role in the nutritional status of residents.(6)

The present study aimed to evaluate the nutritional status of institutionalized older adults in two gerontological institutions in Ecuador. Through this evaluation, the goal is to identify the prevalence of malnutrition and associated factors, as well as to provide evidence-based recommendations to improve the quality of nutrition and well-being of this vulnerable population.

METHOD

This descriptive cross-sectional study was conducted in two gerontological institutions located in Manabí, Ecuador, selected based on convenience. A total of 60 institutionalized residents participated, distributed equally between both residences: 30 in each (15 women and 15 men per residence). Participants were selected using inclusion criteria such as being over 65 years old, a minimum residence time of six months in the institution, and signed informed consent provided by them or their legal representatives.

To assess nutritional status, a combination of anthropometric indicators, dietary intake questionnaires, and general health assessments was employed. Anthropometric measures included the calculation of Body Mass Index (BMI) using weight and height measurements, waist circumference assessed with a standardized flexible measuring tape, and skinfold thickness (tricipital and subscapular) evaluated using a calibrated caliper. Dietary intake was analyzed through a 24-hour dietary recall complemented by a food frequency questionnaire to capture detailed consumption patterns. Additionally, the general health assessment involved reviewing the medical histories of each resident, which included medical background, medication usage, and the presence of chronic diseases.

Malnutrition prevalence was determined using criteria established by the World Health Organization (WHO), including BMI cut-off points and reference values for skinfold measurements.

The collected data were entered into a structured database and analyzed using SPSS software version 25.0. Descriptive analyses and association tests, such as chi-square tests and logistic regression analyses, were performed to identify significant relationships between risk factors and the participants' nutritional status. The validity and reliability of the instruments were ensured through a pilot test conducted with 10 residents not included in the final sample.

The research adhered to ethical principles to ensure the well-being of participants. Informed consent was obtained from all participants or their legal representatives after providing clear information about the study objectives, procedures, risks, and benefits. Participants' anonymity was guaranteed by assigning unique identification codes instead of personal data. Confidentiality was maintained throughout the study by securely storing all data and limiting access to authorized researchers. The study protocol was reviewed and approved by an ethics committee to ensure compliance with ethical guidelines.

RESULTS AND DISCUSSION

Table 1 presents the nutritional status of institutionalized older adults for each residence, highlighting significant differences in the average Body Mass Index (BMI) and the nutritional trends of the residents.

Table 1. Nutritional status of institutionalized older adults

Parameter	Residence A	Residence B
Average BMI	27,6 (1,4)	21,3 (1,8)
BMI range (min-max)	25,0 - 29,7	19,3 - 24,1
Nutritional trend	Type I overweight	Normal weight

Note: Mean (Standard deviation).

The average BMI in Residence A was 27,6, indicating a trend towards Type I Overweight. In contrast, Residence B showed an average BMI of 21,3, categorizing the institutionalized older adults within the normal weight range. This disparity highlighted differences in nutritional status between the two populations. The difference between the average BMIs is notable, suggesting that residents of Residence A, on average, have a higher weight relative to their height compared to those in Residence B.

The BMI range in Residence A varied from 25,0 to 29,7, while in Residence B, it ranged from 19,3 to 24,1. The BMIs in Residence A confirmed the trend toward overweight, as all values were above the upper limit of normal weight (24,9). On the other hand, the BMI range in Residence B indicated that residents remained within the normal weight spectrum, without reaching values indicative of overweight.

The observed nutritional trend in the two residences reflected significant differences. In Residence A, the prevalence of Type I Overweight suggests that a considerable proportion of residents weighted what is considered healthy, which could be associated with higher risks of comorbidities such as cardiovascular diseases, type 2 diabetes, and other health issues related to excess weight. In contrast, the trend towards normal weight in Residence B indicates that residents had a weight more in line with health recommendations, which may be associated with better health outcomes and a lower risk of nutrition-related diseases. According to Allepaerts et al.,[7] the lower the BMI, the higher the energy needs adjusted for weight.

In another study, it was revealed that according to BMI values, the population showed a trend of 51 % towards overweight and 29,8 % prevalence of obesity.[8] Table 2 presents the energy deficiency of institutionalized older adults in Residences A and B.

Table 2. Energy deficiency of older adults

Sex	Residence A		Residence B	
	Classification by BMI	**Percentage**	**Classification by BMI**	**Percentage**
Male	Type I overweight	32	Chronic energy deficiency type I	19
			Energy deficiency type II	15
Female	Chronic energy deficiency type II	15	Chronic energy deficiency type II	13

As shown in table 2, 32 % of the men in Residence A were classified as Type I Overweight. This high percentage indicates that a significant proportion of the men in this residence weighted the recommended range for their height. In the case of women, 15 % were found to have Chronic Energy Deficiency Type II. This condition reflects insufficient energy intake, which can result in weight loss, decreased muscle mass, and overall weakness. Women with Chronic Energy Deficiency Type II are more vulnerable to infections, fractures, and other health complications.[9] It is crucial to implement personalized nutrition programs and ensure that these women receive a diet rich in calories and essential nutrients.

In Residence B, men presented with Chronic Energy Deficiency Type I (19 %) and Energy Deficiency Type II (15 %). Chronic Energy Deficiency Type I suggests a less severe energy intake insufficiency compared to Type II, but it still requires attention to prevent further deterioration of nutritional status. Energy Deficiency Type II indicates a more serious situation that could be associated with greater weight loss and health decline. Nutritional strategies should focus on increasing caloric intake and improving the quality of the diet for these men to reverse the trend of weight loss and enhance their overall health status.

Thirteen percent of women in Residence B suffered from Chronic Energy Deficiency Type II. Although this percentage was lower than that observed in Residence A, the energy deficiency is a cause for concern. Women with this deficiency require immediate dietary interventions to increase their caloric intake and prevent serious complications associated with severe malnutrition.

The differences observed between the residences may result from multiple factors, including variations in diet, levels of physical activity, medical care, and nutritional support provided in each residence. Several studies related to the dietary quality of older adults have been conducted,[10,11,12] with some reporting insufficient energy and nutrient intake.[13,14,15] In Brazil, two National Dietary Surveys were conducted,[16,17] that analyzed energy and nutrient consumption at the population level. Both studies highlighted deficiencies in the intake of pyridoxine, thiamine, vitamin A, and magnesium among older adults, with the most significant deficiencies observed in calcium, vitamin D, and vitamin E. The second survey also identified riboflavin deficiency in men and older adults. On the other hand, Legesse et al.[18] reported that chronic energy deficiency was significantly associated with female sex, age, and loss of appetite due to illness. Table 3 provides information on the average consumption of various food groups in grams between Residences A and B.

Table 3. Consumption of food groups		
Food	**Residence A**	**Residence B**
Cereals and starches (g)	510,3 (43,67) a	500,2 (49,91) a
Dairy (g)	816,9 (131,67) a	306,4 (12,8) b
Legumes (g)	39,43 (14,45) b	135,8 (18,62) a
Red meats (g)	48,5 (13,34) a	29,3 (8,42) b
White meats (g)	50,3 (8,9) a	21,6 (3,89) b
Egg (g)	46,8 (9,3) a	45,3 (7,55) a
Fruits and vegetables (g)	51,8 (11,9) a	34 (9,67) b
Sugar (g)	45,6 (5,15) a	29,6 (5,78) b
Fats (g)	13,6 (7,43) b	21,4 (6,92) a

Note: Mean (Standard deviation); Different letters in the same row indicate a significant difference (p ≤ 0,05).

Residents of Residence A consumed an average of 510,3 g (±157,24 g). Although the average was higher, the high standard deviation indicated significant variability in intake. The difference was statistically significant (p ≤ 0,05), suggesting that, despite a similar average, the consumption patterns of cereals and starches were more varied in Residence B. According to the average consumption, the intake level in Residence B indicated that cereals and starches formed an important part of the diet, with a relatively low standard deviation indicating a fairly uniform intake among residents.

Dairy consumption in Residence A was significantly higher. This significant difference (p ≤ 0,05) indicated that the intake was much higher and less variable. In contrast, dairy consumption in Residence B showed a high standard deviation, indicating considerable variability in dairy intake among residents.

The consumption of legumes was much lower in Residence A; however, although residents of B had a relatively high consumption, the high standard deviation suggested that intake varied considerably among residents. Nonetheless, the higher consumption of legumes was associated with a diet richer in plant proteins in Residence B.

No statistically significant differences were observed regarding red meat consumption, although there was a trend toward higher consumption in Residence A. On the other hand, Residence B had a considerably lower intake of white meats. No differences were observed in egg consumption either.The average consumption of fruits and vegetables was significantly higher in Residence A, contributing to a greater intake of vitamins and minerals. This same pattern was noted in sugar consumption, which could have been influenced by the consumption of non-caloric sweeteners and honey, due to their potential healthy effects.[19] Although the average fat consumption was higher in Residence B, the difference was not significant, which might reflect similar consumption patterns.

The significant differences in food consumption between Residences A and B suggested important variations in diets that could have influenced the health and well-being of the residents. The higher intake of dairy, white meats, fruits, and vegetables in Residence B compared to Residence A could indicate differences in dietary patterns or nutrition policies. Differences in sugar and fat consumption also suggested the need to evaluate and adjust diets to optimize the health of residents in both residences.

The most served food group was dairy products, with an average of 376,25 g/day. Potatoes (109,64 g/day) and sweets and pastries (62,14 g/day) were also offered in large quantities. The daily amount of fruit (138,34 g/day) and vegetables (239,47 g/day) corresponded to only one daily serving in each case. Milk was the most consumed food, with an average of 311 g/day. Most of the energy came from foods with high energy density, such as fats and sauces, sweets and pastries, and bread. The average protein consumption was 82,6 g/day, with no significant differences recorded between men and women.[20] Table 4 shows the average energy intake in the two residences, along with the recommended energy intake and the percentage of adequacy.

Table 4. Energy consumption and adequacy			
Residence	**Energy (kcal)**	**Recommended intake (kcal)**	**Percentage of adequacy**
A	1925,6 (391,02) a	2646,00	81,65
B	1704,5 (277,69) b	2586,38	70,23

Note: Mean (Standard deviation); Different letters indicate a significant difference (p ≤ 0,05).

Residents of Residence A consume an average of 1925,6 kcal (±391,02 kcal). This value is below the recommended intake of 2646 kcal, reaching a percentage of adequacy of 81,65 %. The percentage of adequacy of 81,65 % indicates that the energy intake in Residence A is relatively close to the recommendation but still presents a deficit. Although the intake is adequate compared to the recommendation, a percentage of adequacy around 80 % can lead to long-term energy insufficiency if not adjusted, which could negatively impact the health and well-being of the residents.

In Residence B, the average energy intake is 1704,5 kcal (±277,69 kcal), which is also below the recommended intake of 2586,38 kcal. The percentage of adequacy is 70,23 %. The percentage of adequacy of 70,23 % is lower than that of Residence A and reflects a greater deviation from the recommended intake. This suggests that the residents of Residence B are consuming less energy compared to their recommended needs. A percentage of adequacy at this level could indicate a higher risk of energy deficit, which could have significant negative consequences for health, including weight loss, weakness, and a compromised immune system.

Residence A shows energy intake closer to the recommended intake compared to Residence B. Although both residences have energy intake below the recommendations, Residence B displays a greater deviation from the recommended energy needs.

For older adults, adequate eating behavior facilitates proper intake of energy and nutrients. A balanced diet, which provides the necessary nutrients for the proper functioning of the body, is essential for a good quality of life. However, alterations in eating habits can affect this balance and impact nutritional status. These modifications may be due to factors such as pathological conditions, loss of a partner, rigid eating habits, or economic limitations, among others.[21-23]

A study evaluated the dietary intake of 107 older individuals, aged between 65 and 98 years, through a seven-day food intake monitoring using a precise weighing method. Men had a total energy intake that was significantly higher (130,5 %) than women (115,6 %) relative to the recommended value.[24] Table 5 shows the average macronutrient consumption of institutionalized older adults in the two residences.

Table 5. Average macronutrient consumption in the diet

Macronutrient	Residence A	Recommended intake	Residence B	Recommended intake
Protein (g)	71,65 (16,50) a	78,6	54,69 (8,32) b	79,7
Lipids (g)	42,97 (12,72) a	86,3	31,48 (1,32) b	78,8
Carbohydrates (g)	319,74 (62,85)	386,9	291,67 (61,24)	396,42

Note: Mean (Standard deviation); Different letters in the same row indicate a significant difference (p ≤ 0,05).

The results show that the average protein intake was significantly higher in Residence A (71,65 ± 16,50 g) compared to Residence B (54,69 ± 8,32 g). Distinct letters (a, b) indicate statistically significant differences between the residences. The recommended protein intake was similar in both residences (78,6 g for A and 79,7 g for B), but neither reached the recommended intake. The higher intake in Residence A may be related to greater availability or preference for protein-rich foods in that residence.

Lipid intake was also higher in Residence A (42,97 ± 12,72 g) than in Residence B (31,48 ± 1,32 g), and this difference was statistically significant. The recommended lipid intake was also higher in Residence A (86,3 g) than in Residence B (78,8 g). Similar to protein, Residence A's lipid intake is closer to the recommendation, suggesting better dietary adequacy in terms of lipids compared to Residence B.

Regarding carbohydrate intake, no significant differences were observed between Residences A and B, with values of 319,74 ± 62,85 g and 291,67 ± 61,24 g, respectively. The recommended carbohydrate intake was higher in Residence B (396,42 g) compared to Residence A (386,9 g). Both residences did not reach the recommendations, but Residence A is closer to the recommended value. The lack of significant differences may indicate a similar intake of carbohydrate sources in both residences.

Residence A shows higher protein and lipid intake compared to Residence B, approaching the recommended values for these macronutrients more closely. However, both residences fall short of the carbohydrate recommendations, suggesting the need for nutritional intervention to increase carbohydrate intake and adjust the diet in both residences. The differences in macronutrient intake could be influenced by food availability and the specific dietary preferences of each residence.

García-Arias et al.[24] analyzed the amounts of protein, carbohydrates, fats, alcohol, dietary fiber, and cholesterol, in addition to measuring weight and height. The macronutrient profile showed a notable imbalance: the energy contribution from protein was high (16,7 %), fat intake was also elevated, especially among women (39,6 % compared to 34,4 % in men), while carbohydrate contribution was low, although higher in women (41,5 %) than in men (35,8 %). The high alcohol consumption among men (9,1 %) contributed to this imbalance. Table

6 presents the micronutrient intake for institutionalized older adults in the residences.

Table 6. Micronutrient intake for institutionalized older adults

Micronutrients	Residence A	Adequacy percentage	Residence B	Adequacy percentage
Calcium (mg)	782,76 (608,81) a	101,21	398,97 (43,09) b	46,54
Phosphorus (mg)	996,84 (548,26) a	122,98	805,38 (132,36) b	99,86
Iron (mg)	11,9 (2,26) b	83,32	15,8 (3,21) a	110,34
Zinc (mg)	13,67 (2,86) a	71,72	10,63 (1,67) b	57,23

Note: Mean (Standard deviation); Different letters in the same row indicate a significant difference ($p \leq 0{,}05$).

The residents of Residence A had a significantly higher amount of calcium compared to Residence B, with 101,21 % of the recommended intake. This suggests that Residence A was more adequate in meeting calcium needs compared to Residence B. Residence A also provided more phosphorus than Residence B, although both residences were adequate to cover daily phosphorus needs as they exceeded 90 % adequacy.

On the other hand, Residence B provided more iron and had a higher percentage of adequacy (110,34 %) compared to Residence A (83,32 %). This indicated that Residence B was more efficient in meeting iron needs. Residence A had a greater amount of zinc and a better percentage of adequacy compared to Residence B, suggesting that Residence A was more suitable for meeting zinc needs.

Overall, Residence A provided higher amounts of calcium, phosphorus, and zinc and offered greater adequacy for these micronutrients. However, Residence B excelled in the quantity and adequacy of iron. The choice between the residences will depend on which micronutrient is more critical for the specific nutritional objective or the target population of the recommendation.

Magalhães et al.[9] found a high prevalence of inadequate intake of energy, macronutrients, and micronutrients among older adults. A high prevalence of inadequate micronutrient intake was recorded, exceeding 90 % for vitamin E, folate, pyridoxine, and calcium in both sexes and between 50 % and 70 % for selenium, retinol, riboflavin, cyanocobalamin, and vitamin C.[25]

Traditional Manabí cuisine offers a rich nutritional foundation,[26,27] that can be adapted to meet the needs of older adults, balancing its high energy and fat content with essential nutrients such as proteins, vitamins, and minerals. By incorporating healthy preparation techniques (28) such as steaming or baking and reducing saturated fats and sodium, these dishes can be optimized to prevent age-related diseases such as osteoporosis and sarcopenia.[29] Furthermore, combining them with a diet rich in fruits, vegetables, and whole grains can improve the quality of life of this population, while preserving their cultural connection and promoting sustainable food practices in public health programs.[30][31] In this sense, a balanced diet enriched with probiotics supports gut microbiota and can positively influence the mood of older adults. Barcia et al.[32] highlight the connection between microbiota and major depressive disorder, emphasizing the role of probiotics in modulating the gut-brain axis and reducing depressive symptoms. Thus, consuming fermented foods such as yogurt, chicha de maíz, or traditional pickles could contribute to both physical health and emotional well-being in this population.

CONCLUSIONS

This study highlighted significant differences in nutritional status and dietary trends among older adults in the two analyzed residences. Residence A showed a higher prevalence of overweight, with greater consumption of dairy products and fruits, while Residence B stood out for its consumption of legumes but exhibited concerning energy deficiencies. Both groups did not meet the recommended macronutrient intake, underscoring the need for tailored nutritional strategies for each residence. The variability in micronutrient intake also suggests the importance of designing personalized nutrition programs that address the specific needs of residents to improve their overall health and well-being.

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