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Nutrition status of the elderly differs by elderly care facility

El estado nutricional en los adultos mayores es diferente de acuerdo con cada tipo de hogar geriátrico

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ABSTRACT

The prevalence of malnutrition in homes for the elderly is well-known, yet research does not exist concerning differences among types of homes. In this study, the association of nutritional status (measured with MNA-FV and anthropometric measures) with the type of home for the elderly (charity, government, private) was evaluated. A cross-sectional study in adults >60 years was carried out. Student's t, U of Mann-Whitney, ANOVA, or Kruskal Wallis test with statistical significance p<0.05 were used for statistical analysis. In the study, 152 elderly (95 female) persons with an average age of 81.4 years (SD 7.82) participated; 59.6% had a normal nutritional status and 45.3% had a normal BMI. Malnutrition, risk of malnutrition and low calf circumference were associated with private homes (p<0.05). We concluded that nutritional status varies by type of home and this nutritional profile possibly depends on criteria used to admit persons into each type of facility.

Keywords: Aged; Body Weights and Measures; Cross-Sectional Studies; Homes for the elderly; Malnutrition; Nutrition Assessment; Nutritional Status.

RESUMEN

La prevalencia de la malnutrición en los hogares geriátricos es bien conocida, aunque no existen investigaciones sobre las diferencias del estado nutricional entre los tipos de hogares. Se realizó un estudio transversal en adultos > 60 años que evaluó la asociación del estado nutricional (medido con MNA-VL y medidas antropométricas) con el tipo de hogar geriátrico (caridad, gobierno, privado); para el análisis estadístico se utilizó la prueba de t de Student, U de Mann-Whitney, ANOVA o Kruskal Wallis con significación estadística p<0,05. Participaron 152 ancianos (62,5% mujeres) y edad promedio de 81,4 (+/- 7,82 años); el 59,6% tenía un estado nutricional normal y el 45,3% tenía un IMC normal. La malnutrición, el riesgo de desnutrición y la baja circunferencia de la pantorrilla (<31cm) se asociaron con hogares privados (p<0,05). Concluimos que el estado nutricional varía según el tipo de hogar y este perfil nutricional posiblemente dependa de los criterios utilizados para admitir a los ancianos en cada hogar.

Palabras clave: Adultos mayores; Estado nutricional; Estudios transversales; Evaluación nutricional; Hogares para ancianos; Malnutrición; Peso corporal y mediciones.

INTRODUCTION

As the elderly population increases in Colombia and Latin America, so does the necessity of investigating their health and nutritional problems. Malnutrition has been described as a deficiency or imbalance of energy, protein, and other nutrients, which alters metabolism, impairs body function and causes loss of body mass[1]. Malnutrition in the elderly is associated with adverse outcomes, including

prolonged hospital stay and rehabilitation, pressure ulcers, poor wound healing[2], functional impairment[3], fall risk, and impaired activity[4].

The nutritional status in homes for the elderly is different respective to community-dwelling elderly; specifically, elderly persons who live in senior facilities have been shown to have a lower BMI and/or MNA scores compared to those living in the community ($p<0.05$)[2,5,6]. Additionally, several studies compared nutritional status according to different types of homes, for example Strupeit et al.[7] in Germany, that compared Home-living setting with Shared-housing arrangements (no risk according to MNA: 55.7% Vs. 16.6% respectively ($p<0.001$); van Nie-Visser et al.[8] contrasted nursing home characteristics of three countries (Netherlands, Germany and Austria) and found differences by sex, age, length of stay, and dependency.

Colombia has numerous types of homes for the elderly and the most common are charity facilities (attended by a religious order), government (administered by the government) and private (paid for by private means). Evidence about differences in nutritional status in these three types of homes is absent. Therefore, the aim of this research was to describe the prevalence and association of nutrition status among elderly residents of three types of facilities (charity, government and private) in Bogotá, Colombia.

MATERIAL AND METHODS

Study design

A cross-sectional study in adults over 60 years old was carried out. Participants were enrolled in one of the four homes for the elderly selected in Bogotá in October 2013. The ethical principles of the Declaration of Helsinki, the World Medical Association and the local regulations concerning research were fulfilled. The study was approved by the committee of research ethics of the Universidad El Bosque (code: PCI 2012-336). Research subjects were informed and understood the aspects of the study; they accepted participation in the research through the written informed consent process.

Population

Men and women over 60 years old participated. They had been enrolled in the homes in October 2013. Persons with mental or physical disabilities were excluded from the study.

The sample size calculated for each type of home was 41 subjects and based on the following values: confidence level of 95%, power of 80%, and difference between proportions of 30%. The homes were sampled or selected for convenience, according to the possibility of access to information and to the elderly population. The study enrolled four nursing homes and divided them into three types of homes, corresponding to their administration: one of government, one of a religious order or charity, and two private facilities.

The facilities had the same health professionals. In each institution, the health team consisted of a general physician, a nurse, a nutritionist and nursing assistants. In the private home, there was also a geriatrician and physiotherapist. The feeding service of each geriatric home was supervised by a nutritionist who designed a diet according to the diagnoses of each elderly resident.

Measurements

Nutritional status was measured with the Mini Nutritional Assessment full version (MNA). The MNA classifies nutritional status in three types: normal nutrition, risk of malnutrition, or malnutrition[8,9,10,11].

Weight, height, mid-arm circumference, calf circumference, and triceps skinfold were measured according to International Society for the Advancement of Kinanthropometry (ISAK); body mass index (BMI) was calculated, and parameters of the Panamerican Health Organization[12] were used: slim <23 kg/m^2, normal 23 to 27.9 kg/m^2 and overweight ≥28 kg/m^2. The equipment for anthropometric measures were the 201 SECA stadiometer, the 803 SECA scale, the SECA tape measure and the Lange skinfold calliper.

Sex, age, marital status, level of education, time at home, antecedent of another home, meal times, dietary prescription, use of supplements, and medical diagnostics were collected from medical records. Dietary prescription was classified as: consistency modification (e.g.: soft, purée or chopped diet), hypercaloric (increase in calories from carbohydrates and/or fats), hypocaloric (restriction in calories from carbohydrates and/or fats), nutrient modified (diet modification of the content or type of salt, glucose, protein or fatty acids), or other modifications (e.g.: laxative, astringent, high in fiber, or antireflux diet).

Statistical analyses

All information was collected in printed forms and entered into an Excel database. The qualitative variables were: sex, marital status, level of education, antecedent of another home, dietary prescription, use of supplements, medical diagnostics, interpretation of BMI, nutritional status, and type of home (government, charity, or private); the quantitative variables were: age, time at home, mealtimes, anthropometric measures and BMI. Qualitative variables were described by frequencies and percentages. Quantitative variables were expressed by means and standard deviations (SD). The analysis of group comparison was made with variables of sex, nutritional status and type of home for the aged.

The comparison of percentages between groups was performed with the Chi^2 test; if the cross tables show 20% of the cell with expected frequencies less than five, the variable was transformed to less values; if the same result was obtained or it was not feasible to

group the responses, the p value was not reported (NC: not calculated).

In the comparison of the quantitative variables, the normal distribution and the homogeneity of variances were checked in each group using the Shapiro-Wilk tests, the Levene statistic, and assuming a p value <0.05 as statistically significant. For the comparison of the means or medians between the groups, according to the normal distribution of the variables, the statistical tests used were: Student's t, U of Mann-Whitney, ANOVA, or Kruskal-Wallis test. The association between quantitative variables in the population was evaluated with Pearson's correlation coefficient test (r) or Spearman's correlation coefficient test (rho). We used the SPSS 21 statistical software licensed to Universidad El Bosque.

RESULTS

In the study, 152 geriatrics (62.5% female) participated, average age 81.5 years (SD 7.82), and 56.6% were over 80 years old (Table 1). In the sample, 59.6% had normal nutritional status, 45.3% had normal BMI, 65.1% had dietary prescription, and 36.2% consumed supplements. Residents of the private home were older, had a higher number of women, had a higher prevalence of widowers, had a higher prevalence of malnutrition or risk of malnutrition, had less than average calf-circumference compared to those in the other homes (Table 2).

Comparing sex, females were older than men (83.1 years SD 7.65 vs. 78.8 years SD 7.39; p0.001), had higher prevalence of malnutrition or risk of malnutrition (48.4% vs. 27.3%; p= 0.027), had higher BMI (26.61 SD 5.05 kg/m^2 vs. 23.71 SD 2.88 kg/m^2; p= 0.001), and were more overweight (35.93% vs. 7.2%; p= 0.001). In relation to diagnoses, the three most prevalent diseases were (p value >0.05): circulatory system (charity 78%, government 58%, private 88.1%), osteomuscular system (charity 52.5%, government 34%, private 47.6%) and metabolic disease (charity 32.2%, government 36%, private 64.3%).

Table 1. Description of the sample according to type of care facility.

Variables	Private n 43 (28.3%)	Government n 50 (32.9%)	Charity n 59 (38.8%)	Total n 152	p value
Female (%)	93	36	62.7	62.5	0.001
Age. years ‡	85.65 (6.95)	76.86 (6.53)	82.36 (7.49)	81.48 (7.82)	0.001
Over 80 years (%)	76.7	34	61	56.6	0.001
Marital status (%)					
Married/union	2.3	6.1	5.1	4.7	
Separated	11.6	30.6	8.5	16.6	0.001
Single	32.6	40.8	66.1	48.3	
Widowed	53.5	22.4	20.3	30.5	
Education level (%)	41.9	68.1	71.9	61.9	
<secondary	34.9	25.5	21.1	26.5	0.011
Secondary	23.3	6.4	7	11.6	
Technical or university					
Time at home. years ‡	4.33 (6.60)	4.15 (2.73)	8.27 (7.51)	5.80 (6.33)	0.001
Antecedent of another home (%)	23.8	80	8.6	36.7	0.001

‡: Values reported as mean (standard deviation).

Malnutrition and risk of malnutrition was associated with being female, other diet modification, lower BMI, underweight or overweight, lower arm circumference, and lower calf-circumference (Table 3).

We found that age correlated with height (rho -0.41 p<0.001), weight (rho -0.41 p<0.001), arm circumference (rho -0.25 p0.003), and calf-circumference (rho -0.35 p<0.001). BMI was associated with arm circumference (rho 0.75 p<0.001), triceps skinfold (rho 0.62 p<0.001), and calf-circumference (rho 0.48 p= 0,001). Arm circumference correlated with weight (rho 0.71 p<0.001), triceps skinfold (rho 0.65 p<0.001), and calf-circumference (rho 0.7 p<0.001). Calf-circumference was associated with triceps skinfold (rho 0.36 p<0.001).

Table 2. Association of nutritional variables according to type of care facility.

Variables	Private	Government	Charity	Total	p value
MNA †					
Normal	16 (39.0)	32 (69.6)	39 (66.1)	87 (59.6)	
Risk of malnutrition	18 (43.9)	13 (28.3)	19 (32.2)	50 (34.2)	0.006
Malnourished	7 (17.1)	1 (2.2)	1 (1.7)	9 (6.2)	
Have-dietary prescription (%)	28 (65.1)	35 (70)	36 (61)	99 (65.1)	0.415
Type of modification in the diet †					
Consistency	4 (14.3)	1 (2.9)	3 (8.6)	8 (8.2)	NC
Hypercaloric	0	0	3 (8.6)	3 (3.1)	NC
Hypocaloric	0	11 (31.4)	6 (17.1)	17 (17.3)	0.005
Modified Nutrients	20 (71.4)	26 (74.3)	30 (85.7)	76 (77.6)	0.340
Other modifications	6 (21.4)	24 (68.6)	11 (31.4)	41 (41.8)	0.001
Consumes supplements †	16 (37.2)	15 (30.6)	23 (40.4)	54 (36.2)	0.575
BMI (Kg/m^2) ǂ	26.5 (6.7)	24.3 (3.1)	25.6 (3.2)	25.4 (4.5)	0.518
BMI †					
Normal	12 (29.3)	23 (47.9)	32 (54.2)	67 (45.3)	0.062
Underweight	14 (34.1)	17 (35.4)	13 (22.0)	44 (29.7)	
Overweight	15 (36.6)	8 (16.7)	14 (23.7)	37 (25.0)	
Arm Circumference (cm) ‡	27.3 (5.98)	26.4 (2.07)	26.8 (3.85)	26.83 (4.17)	0.898
Triceps skinfold (mm) ‡	17.1 (10)	13.4 (6.5)	14.7 (6.7)	15 (7.8)	0.315
Arm muscle area (cm^2) ‡	0.17 (0.03)	0.18 (0.02)	0.18 (0.02)	0.17 (0.02)	0.647

†: Values reported as frecuency (%); ‡: Values reported as mean (standard deviation); ǂ: Value calculated for private home vs. the rest; NC: It is not calculated to have more than 20% of the cells with expected values under 5. BMI: Body Mass Index. MNA: Mini Nutritional Assessment.

Table 3. Factors associated with nutritional status.

	Malnourished n 9 (6.2%)	Risk of malnutrition n 50 (34.2%)	Normal n 87 (59.6%)	Total n 146	p value
Sex Female †	8 (88.9)	36 (72)	47 (54)	91 (62.3)	0.027
Age. years ‡	88.67 (5.15)	80.8 (7.51)	81.08 (8.09)	81.38 (7.83)	0.223
Over 80 years †	7 (77.8)	27 (54)	47 (54)	81 (55.5)	0.667 ₳
Time at home. years ‡	6.41 (4.13)	4.36 (4.4)	6.59 (7.3)	5.8 (6.37)	0.158
Antecedent of another home †	1 (12.5)	19 (38)	34 (39.5)	54 (37.5)	0.318
Have-dietary prescription †	7 (77.8)	33 (66)	57 (65.5)	97 (66.4)	0.809
Type of modification in the diet †					
Consistency	2 (28.6)	3 (9.1)	2 (3.6)	7 (7.3)	0.124 ₳
Hypercaloric	0	2 (6.1)	1 (1.8)	3 (3.1)	0.569 ₳
Hypocaloric	1 (14.3)	4 (12.1)	12 (21.4)	4 (12.1)	0.523
Modified Nutrients	5 (71.4)	27 (81.8)	43 (76.8)	75 (78.1)	0.777
Other modifications	1 (14.3)	9 (27.3)	31 (55.4)	41 (42.7)	0.003 ₳
Consumes of supplements †	6 (66.7)	17 (34)	29 (33.3)	52 (35.6)	0.065
BMI. (Kg/m^2) ‡	21.48 (4.28)	25.34 (5.77)	25.79 (3.62)	25.4 (4.53)	0.045
BMI †					
Normal	0	20 (40)	45 (51.7)	64 (44.4)	0.032 ₳
Underweigh	6 (75)	18 (36)	19 (21.8)	43 (29.9)	
Overweight	2 (25)	12 (24)	23 (26.4)	37 (25.7)	
Arm Circumference (cm): ‡	22.3 (3.1)	26.78 (4.9)	27.3 (3.51)	26.8 (4.17)	0.006
Triceps skinfold (mm): ‡	15.6 (9.2)	11.8 (4.1)	15.2 (7.2)	15 (7.8)	0.545
Arm muscle area (cm2): ‡	0.18 (0.03)	0.15 (0.01)	0.18 (0.02)	0.17 (0.02)	0.002
Calf circumference (cm): ‡	27.1 (2.9)	31.1 (3.8)	32.5 (3.5)	31.8 (3.75)	0.001

†: Values reported as frecuency (%); ‡: Values reported as mean (standard deviation); ₳: Value calculated for Normal nutritional status Vs. the rest; BMI: Body mass index

DISCUSSION

This is the first research about nutritional status by type of home for the aged conducted in Colombia. In comparison with other reports, we found a high prevalence of malnutrition or risk of malnutrition in the entire population, especially in residents of private institutions. Calf-circumference was associated with nutritional status and type of home; BMI and arm circumference were consistent across type of home, but these were associated with nutritional status. These discoveries highlight the necessity of monitoring and intervening in the nutritional status of elderly people. Nutritional interventions include nutritional screening, dietetic advice, oral nutrition supplements, and modified diet, but, these have differents outcomes on nutritional status[13].

The difference of nutritional status and calf-circumference by type of home can be explained by connections among age, anthropometric measures and nutritional status[14]. We observed that when age increased, all anthropometric

measurements decreased and the private home presented older age (with worse nutritional status and low calf-circumference) and government homes tended to have younger residents (with better nutritional status and high calf-circumference).

Another explanation are the criteria used to admit older adults in each home and how these contribute to the nutritional profile of the home. The charity home admits adults in vulnerable conditions, the government home accepts people without physical disabilities, and the private home admits persons who generally have low functionality. These characteristics are associated with better or worse nutritional status[14,15].

Other research evaluated prevalence of nutritional status (with MNA) in homes for the aged, for example, Hallaj[16] in Syria and Ongan and Rakıcıoglu[17] in Turkey found a high prevalence of risk of malnutrition or malnutrition (59.2% and 55.8% respectively), despite being younger than our sample; Borgström et al.[18] evaluated 308 Swedes and found a prevalence of risk of malnutrition or malnutrition of 58.4%, but they were older (85, range 65–101 years) and had more women (72.1%) than our sample. Serrano and Garcia[19] in Spain, demonostrate a similar prevalence (40.1%) with similar sociodemographic characteristics to our study.

Few studies have evaluated nutritional status by type of home. Strupeit et al.[7] compared shared-housing arrangements and home-living arrangements in Germany, and found that shared housing arrangements have higher malnutrition and risk of malnutrition than home living arrangements (83.4% vs. 44.3%; $p<0.001$). Klingelhöfer-Noe et al.[20] in Germany compared nursing homes with assisted living facilities and found high prevalence of malnutrition according to BMI <18.5kg/m^2 (5.6% nursing homes and 11.4% of assisted living facilities; $p<0.001$), which is lower than our results by the cut-off point used.

Therefore, the strength of this research is based on: 1.) comparison of three elderly care facilities administered by different organizations with different admitting practices, but with similar medical and nutritional care; 2.) the results suggest that the prevalence of malnutrition in the elderly is different by type of nursing home and could be mediated by the presence of the female and older population.

At the same time, the research has two limitations that limit the extrapolation or inference of the results to other populations: only three types of geriatric homes were included and four geriatric homes in a city participated. Therefore, future research should include other types of nursing homes (retirement villages, halftime homes and homes for disabled elderly), to verify our findings; in addition, the number of geriatric homes must be increased, in order to be able to reproduce the heterogeneity of geriatric homes present in each place.

In conclusion, malnutrition and risk of malnutrition was prevalent in homes for the elderly and risk differed by type of home. Nutritional status in each home depend of criteria used to admit older adults in each home, mainly those related to greatest age and sex. In the same way, nutritional status was associated with female sex and some anthropometric variables (BMI, arm circumference and calf-circumference). For the above, monitoring and nutritional intervention are necessary in all types of home for the elderly, with the purpose of improving the state of health of the residents.

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