

Comparative study of nutritional status of elderly population living in the home for aged vs those living in the community

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Abstract

The higher incidence of malnutrition in elderly is well documented. Elderly nursing home residents seem to have a higher risk of malnutrition with respect to the community dwelling elderly population. A comparative study was therefore performed to evaluate the nutritional status of elderly living at old age homes and in community, in the city of Mangalore. Subjects aged over 60 years were included in this study. Nutritional status was evaluated by anthropometric measurements to calculate the Body Mass Index, W/H ratio, and Triceps skin fold thickness and by data collected through the Mini Nutritional Assessment. A total of two hundred and ten subjects participated in this study. The study subjects were constituted by 108 inmates of old age homes and 102 people who were residing at their houses. The results showed that the elderly at home had higher BMI ($p < 0.001$) and higher MNA scores ($p < 0.001$) compared to those living in old age homes. The MNA results revealed that 19.4% of subjects were malnourished and 57.4% were at risk of malnutrition among the old age home residents. The prevalence of malnutrition by MNA was 2%, those at risk of malnutrition were 14.7% in free living elderly. The results of this study show a high risk of malnutrition ($p < 0.05$) in the old age home residents, and confirm the need for increased surveillance of nutritional status among residents of old age homes.

Key words: Elderly, malnutrition, anthropometric measurements, Mini Nutritional Assessment

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Introduction

India has acquired the label of aging nation with 7.7% of its population being more than 60 years old. There has been a sharp increase in the proportion of elderly population in India as a result of demographic transition [1]. The proportion of elderly persons in the population of India rose from 5.63 per cent in 1961 to 6.58 per cent in 1991 [2] and to 7.5 per cent in 2001 and it has been estimated that they would become 12% of total population by 2030 [3]. This is attributed to decrease in mortality arising from longer lifespan of individuals and improvements in public health and medical services leading to control of infectious diseases. The rapidly increasing aging population adds to the socio economic challenges that face India [2, 3]. The scientific progress has reached a level where nutritional interventions may play a part in the prevention of degenerative conditions of age, improvement of quality of life and impact on health care burden and resources. Moreover a timely intervention can stop weight loss in elderly at risk of malnutrition or undernourished [4]. Evaluation of nutritional status is important for any

nutrition or dietary modification. We therefore did a comparative study to evaluate the nutritional status of elderly living at old age homes and in community, in the city of Mangalore combining anthropometry and mini nutritional assessment. Nutrition screening of older adults is extremely difficult; the shortcomings of existing screening tools do not make the problem any easier [5]. Some of the screening methods can only be administered by trained clinicians. Biochemical markers are time consuming and expensive to use in home situations, and the criteria for their interpretation in old age are unclear [6]. A comprehensive tool specifically developed for use with elderly people is the Mini-Nutritional Assessment (MNA): this is a rapid and simple tool for evaluating the nutritional state of the frail elderly, which allows, if necessary, for nutritional intervention and/or diet modification [7]. The MNA is a test composed of 18 simple and rapid easy to measure items which can be performed in less than 15 minutes. (Table 8) [8]. The MNA has been validated in three successive studies of more than 600 elderly [7]. The MNA detects risk of malnutrition before severe change in weight or serum proteins occur [4].

Materials and Methods

A total of 210 subjects above 60 years of age were studied over a period of 30 days. As it was a time bound study, those elderly subjects available during the limited time period were included. The study subjects were constituted by 108 inmates of old age homes and 102 people who were residing at their houses. The standard informed consent was taken from all the subjects following approval from the college ethics committee. The old age home inmates were studied from Abhaya Ashram at Kodialbail, Prashanti Nivas Jeppu, Geriatric ward of Kasturba Medical College, Mangalore. The members of KMC Ashraya were also included in this study. KMC Ashraya is an organization within KMC, working for the welfare of senior citizens, and physically disabled.

Inclusion criteria

Subjects over 60 years of age were included in this study as this is the geriatric age group as defined by the World Health Organisation.

Exclusion criteria

Subjects with cancer, end-stage renal disease or terminal illness.

Those receiving artificial enteral or parenteral nutrition.

A detailed history was taken and clinical examination was done for each subject.

Persons with chronic illness (diabetes, hypertension, COPD) were categorized into the co-morbidity group. Every subject under study was individually assessed for nutritional status with anthropometry and Mini nutritional assessment.

Anthropometry

Height, weight, mid upper arm circumference (MUAC), calf circumference (CC) and triceps skin fold thickness (TSF) of all subjects were measured by standard techniques. Lange calipers were used to measure triceps skin fold thickness. Body mass index (BMI) of all subjects were calculated. Waist and hip circumferences were also measured and W/H ratio calculated.

Waist-Hip ratio >1.0 in men and >0.85 in women have a greater risk of stroke, coronary artery disease and diabetes mellitus [9]. Accordingly the W/H ratio of the elderly subjects were divided into normal or at risk groups.

Mini nutritional assessment-

The test involves (1) anthropometric assessment (weight, height, mid arm and calf circumferences, weight loss) (2) general assessment (six questions related to lifestyle, medication and mobility) (3) dietary assessment (eight

questions related to number of meals, food and fluid intake, and autonomy of feeding); and (4) subjective assessment (self perception of health and nutrition). The test did not require any modification to be applied in the study population. A score was given to each subject on the basis of MNA questionnaire. The scoring categorizes the elderly subjects in the following manner.

>23.5 - satisfactory nutritional status

17-23.5- at risk of malnutrition

< 17 -malnutrition

Gender, categories of MNA score and W/H ratio were summarized using frequency and percentage across the elderly at old age home and at home. Chi Square test was used to compare the differences in nutritional status between two groups and to find the association between nutritional status and co morbid illness at old age home and home separately. Age, Height, Weight, BMI, Mid upper arm circumference, Calf circumference, Triceps skin fold thickness, Waist and Hip circumferences, and MNA scores were summarized using median and Interquartile range across the two elderly groups. Mann Whitney U test was used to compare the median differences between the two groups. Pearsons correlation coefficients were performed for linear relations between total MNA scores and BMI, MUAC, CC and age.

The data were analysed using SPSS for windows version 15 (Bangalore). A p value of less than 0.05 was considered to be statistically significant.

Results

Out of the total 210 elderly population studied, 108 subjects were inmates of old age home and 102 subjects were residing at their houses. Table 1 shows the distribution of elderly subjects according to residence and gender. The age and anthropometric measurements of the subjects according to the residence are depicted in Table 2. The mean MNA scores of the subjects were higher in the subjects at home compared to those in old age homes ($p<0.001$). The prevalence of malnutrition was 2.0% in the free living elderly and 19.4% in old age home residents (by MNA) (Table 3). Age wise prevalence of malnutrition is shown in Table 4. Table 5 gives the distribution of elderly subjects according to co morbid illness. There was no significant difference between at risk, malnourished and well-nourished groups

($p=0.397$ at old age home, $p=0.197$ at home). Total MNA scores positively correlated with mid upper arm circumference both in old age home residents ($r=0.472, p=0.001$) and in residents at home. ($r=0.32, p=0.001$). There was significant positive correlation between MNA scores and calf circumference in both the groups ($r=0.521, p<0.001$ in old age home subjects, $r=0.38, p<0.001$ in subjects at home). With BMI there was significant correlation only

with elderly at old age home ($r=0.299, p<0.002$). There was no correlation of MNA scores with age. (Table 6). The waist hip ratio was at risk in 47% of subjects in old

age home and 60% in elderly at home. The difference was statistically different ($p<0.027$) (Table 7).

Table 1. Distribution of subjects according to residence and gender

Gender	Elderly at old age home n (%)	Elderly at home n (%)
Male	65 (60.2)	45 (44.1)
Female	43 (39.8)	57 (55.9)
Total	108 (100)	102 (100)

Table 2. Age, Anthropometric measurements and MNA scores of elderly

Measurements	Elderly at old age home (n=108) Median (Q1-Q3)	Elderly at home (n=102) Median (Q1-Q3)	p value
Age (years)	71.5 (60-90)	66.5 (60-85)	0.001
Body weight (kg)	50 (30-78)	62 (35-79)	0.001
Height (cm)	156 (124-170)	160 (138-179)	0.001
BMI (kg/m^2)	22 (13.8-40)	24.6 (17.3-33)	0.001
MUAC (cm)	22 (11-34)	26 (15-34)	0.001
CC (cm)	29 (18-39)	33 (15-34)	0.001
TSF (mm)	10 (3-38)	13 (5-29)	0.001
Waist circumference (cm)	64 (48-108)	76.5 (52-109)	0.001
Hip circumference (cm)	69.5 (52-120)	85 (56-110)	0.001
MNA scores	20.67 (7.5-28)	24.93 (16-29)	0.001

$p<0.05$ by Mann Whitney U test

Table 3. Assessment of Malnutrition according to Mini Nutritional Assessment

MNA score	points	Elderly at home n=102 n (%)	Elderly at old age home n=108 n (%)	Total n=210 n (%)
malnourished	<17	2 (2)	21 (19.4)	23 (11)
At risk of under-nutrition	17-23.5	15 (14.7)	62 (57.4)	77 (36.6)
wellnourished	>23.5	85 (83.3)	25 (23.1)	11 (52.4)

$p<0.001$ by Chi Square test.

Table 4. Age wise prevalence of nutritional status according to Mini Nutritional Assessment

Residence of elderly	Age group (years)	Malnourished (17) n (%)	At risk of undernutrition (17-23.5) n (%)	Wellnourished n (%)	Total n (%)
Old age home	60-69	6 (11.3)	32 (60.37)	15 (28.3)	53 (100)
	70-79	10 (27.8)	18 (50)	8 (22.23)	36 (100)
	>80	5 (26.3)	12 (63.15)	2 (10.53)	19 (100)
	total	21 (19.4)	62 (57.4)	25 (23.14)	108 (100)
Home	60-69	1 (1.3)	11 (14.1)	66 (84.61)	78 (100)
	70-79	1 (4.5)	4 (18.18)	17 (77.27)	22 (100)
	>80	0 (0)	0 (0)	2 (100)	2 (100)
	Total	2 (2)	15 (14.7)	85 (83.3)	102 (100)

Table 5. Distribution of subjects according to co-morbid illness

Residence of elderly	Co-morbid illness	Malnourished and At risk of malnutrition	Well nourished	Total	p value
Old age home	yes	47 (85.5)	8 (14.5)	55 (100)	0.397
	no	42 (79.2)	11 (20.8)	53 (100)	
	total	89 (82.4)	19 (17.6)	108 (100)	
Home	yes	14 (28.6)	35 (71.4)	49 (100)	0.162
	no	9 (17)	44 (83)	53 (100)	
	total	23 (22.5)	79 (77.5)	102 (100)	

Table 6. Correlation coefficients for MNA score according to residence

Measurements	MNA SCORE	
	Elderly at old age home (n=108) r (p)	Elderly at home (n=102) r (p)
Age (year)	-0.157 (0.104)	-0.059 (0.559)
BMI (kg/m ²)	0.299 (0.002)	0.147 (0.142)
MUAC (cm)	0.476 (0.001)	0.32 (0.001)
CC (cm)	0.521 (0.001)	0.38 (0.001)

p<0.05 by Pearsons test

Table 7. Comparison of Waist-Hip Ratio in Two study groups

Waist-Hip ratio	Elderly		Total	p value
	Old age home	home		
Normal (%)	61 (56.5)	42 (41.2)	103 (49)	0.027
At risk (%)	47 (43.5)	60 (58.8)	107 (51)	
Total (%)	108 (100)	102 (100)	210 (100)	

p<0.05 by chi square test

Table 8. The Mini Nutritional Assessment Form

Name Age Sex Weight (Kg) Height (cm) BMI Mid upper arm circumference (cm) Calf circumference (cm) Anthropometric Measurement

Ref: Guigoz Y, Vellas , Garry PJ. Mini Nutritional Assessment: A practical assessment tool for grading the nutritional state of elderly patients. *Facts Res Gerontol* 1994; 4 (suppl 2):15-59

1.Body mass index BMI (weight in Kg/Height in m ²) a. less than 19 = 0 points b.19 to less than 21 =1 points c.21 to less than 23 = 2 points d.23 or greater = 3points	12.Selected consumption markers for protein intake at least one serving of dairy products (milk, cheese or yo-ghurt)per day? yes no two or more servings of legumes or eggs per week? Yes no Meat, fish or poultry every day? Yes no a.0 or 1 yes=0.0 points b.2 yes =0.5 points c.3 yes =1.0 points
2.Mid – upper arm circumference (MUAC) in cm a. less than 21 cm = 0 points b. 21 or 22 =0.5points c.MAC 22 or greater =1points	13. Consumes two or more servings of fruits or vegetables per day? 0= No 1= Yes
3.Calf circumference (CC) in cm a. less than 31 = 0points b. CC 31 or greater=1point	14. Has food intake declined over the past three months due to loss of appetite, digestive problems, chewing or swallowing

4. Weight loss during last 3 months?
 a. Weight loss greater than 3 kg=0 points
 b. Does not know= 1 point
 c. Weight loss between 1 and 3 kg= 2 points
 d. Weight loss = 3 points

General Assessment

5.Lives independently (not in nursing home or hospital)
 a =0 point b= 1 point

6.Takes more than 3 prescriptions per day
 a =0 point b= 1 point

7.Has suffered psychological stress or acute disease in past 3 months
 a = 0 points b = 1 point

8.Mobility
 a. Bed or chair bound=0 points b. Able to get out of bed or chair but does not go out=1 point
 c. Goes out=2 point

9.Neuropsychological problems
 a. Severe dementia or depression=0 points
 b. Mild dementia=1 point
 c .No psychological problems=2 points

10.Pressure sores or skin ulcers
 a. yes=0 points b= 1 point

Dietary Assessment

11. How many meals does the patient eat daily?
 a.1 meal=0 point b.2 meals=1 points c.3 meals=2 points

15. How much fluid (water, juice, coffee, tea, milk) is consumed per day?
 a. less than 3 cups =0 points
 b. 3-5 cups =0.5 points
 c. more than 5 cups =1 point

16.Mode of feeding
 a. unable to eat without assistance =0 points
 b. self fed with some difficulty =1 points
 c. self fed without any problem =2 points

Self Assessment

17.Self view of nutritional status
 a. view self as being malnourished=0 points
 b. is uncertain of nutrition states =1 point
 c. view self as having no nutritional problem =2 points

18.In comparison with other people of the same age, how do they consider their health status
 a. not as good =0 points b .does not know =0.5point
 c. good =1.0 points d. better =2.0 points

ASSESSMENT TOTAL maximum (30 points)

MALNUTRITION INDICATOR SCORE

>23.5 - satisfactory nutritional status
 17-23.5 - at risk of malnutrition
 < 17 - malnutrition

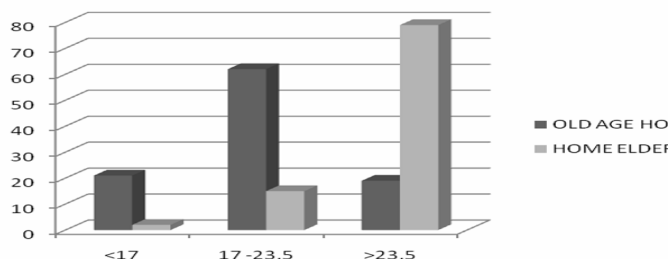


Figure 1. Assessment of malnutrition according to Mini Nutritional Assessment

Discussion

In the present study the prevalence of malnutrition was 2.0% in the free living elderly and 19.4% in old age home residents (by MNA) (table 3).The prevalence of malnutrition in free living elderly is similar to that found by Soini et al [10] but less than in Maliheh et al[11]. In old age home residents, the number of people who were malnourished is less than in Souminen et al [12] more than Langanio et al [13]. According to MNA, those at risk of malnutrition were 57.4% in old age home residents and 14.7% in free living elderly subjects. Thus 76.8% subjects in old age home were either malnourished or were at risk of malnutrition. Even without an acute or chronic disease, the composition of body changes with age [14].Loss of muscle mass starts in the middle of adulthood and continues through old age. A dietary nutrient deficit with lower energy expenditure is associated with decreased weight and height in the elderly [15, 16].The decreased height in elderly is also result of shortening of spinal column with associated osteoporosis and kyphosis [17]. The nutritional status is independent of associated co morbid illness (table 5).So aging perse with decreased nutrient intake and lack of exercise would have resulted in lower BMI (table 2) and increased risk of malnutrition in elderly at old age home.

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The MNA score showed significant correlation with mid upper arm circumference and calf circumference in both the groups. With BMI, there was significant correlation only in nursing home residents (table 6). Thomas et al had found high correlation of MNA score only with BMI [18].However with age, there was no correlation with

MNA score. Anja Saletti et al showed that age correlated with MNA score and BMI [19]. A study on 1564 elderly volunteers in Turkey showed a decrease in MNA score with increase in age [20].

The significant difference between the triceps skin fold thickness of the two groups might indicate towards lesser nutritional status in old age home residents (table 2). The mean value of waist circumference in free living elderly and old age home residents was 78.5 and 66.1 respectively (table 2). The difference was statistically very highly significant. The waist-hip ratio of elderly at home were more at risk compared to old age home residents (table 7). This may predispose the elderly at home for trunkal development of metabolic syndromes. Sibai et al showed that elderly living at home had significantly higher waist circumference and mean body mass index than those living in institutions [21]. Prospective studies of Gotherburg, Sweden have shown that both men and women who have a high Waist-Hip ratio have increased risk of death, stroke, IHD, Diabetes mellitus, Hypertension and Hyperlipidemia [22]. According to Gill et al Waist Hip Ratio was positively related to circulatory mortality in both men and women [23].

Conclusion

1. Undernutrition as well as obesity are common health hazards in our geriatric population.
2. The prevalence of malnutrition (by MNA) is significantly higher in inmates of old age home compared to elderly at home.
3. Mini Nutritional Assessment appears to be a practical and reliable method to assess the nutritional status of elderly people and more importance should be attached to those living in old age / nursing homes to prevent their nutritional problems.
4. The elderly at home are posed at greater risk of health problems resulting from obesity.

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