

Determinants of Malnutrition among Elderly Women Living in Institutional Care

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INTRODUCTION

The proportion of elderly individuals is growing in both industrialized and developing countries. India's National Census report predicts that the number of older adults will rise from 138 million to 194 million by 2031.^[1] As the body undergoes various changes with age, older adults are at an increased risk for health problems. Malnutrition and chronic illnesses are particularly prevalent among this population.^[2] A recent meta-analysis found that 18.29% of older adults in India are malnourished and at risk of malnutrition.^[3] Changes in body composition, lifestyle, medical conditions, psychological factors, and socioeconomic status contribute to malnutrition in older adults.^[4] If left untreated, malnutrition can negatively impact the quality of life, causing immobility, micronutrient deficiencies, psychological and functional impairments. Furthermore, malnutrition can perpetuate poverty, increase

hospital stays, and negatively impact economic growth.^[5,6] Due to illiteracy, poverty, and isolation from family, the number of elderly women residing in old-age homes (OAHs) is on the rise.^[7,8]

While many studies have looked at the prevalence of malnutrition among different age groups, races, and ethnicities, a limited amount of primary research studies focus on assessing malnutrition in geriatric populations living in hospitals and OAHs. This study aimed to evaluate the risk of malnutrition among institutionalized older women using the Mini Nutritional Assessment (MNA) tool.

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ABSTRACT

Background: Healthy aging and well-being are largely influenced by nutrition. **Objective:** The objective of the study was to evaluate the risk of malnutrition in elderly women residing in institutional care and its contributing factors. **Methodology:** One hundred institutionalized women aged 60 years and above were screened for malnutrition using Mini Nutritional Assessment (MNA) tool. Details on sociodemographic profile, physical activity, medical conditions, and food habits were gathered through researcher administered survey method. **Results:** The study participants had an average height of 149.70 cm (± 7.31), weight of 50.72 kg (± 9.11), body mass index of 22.77 kg/m² (± 4.68), body fat percentage of 31.30% (± 8.99), mid-arm circumference of 27.36 cm (± 7.84), calf circumference of 30.11 cm (± 7.51), MNA score of 10.42 (± 4.06), and hand grip strength score of 18.69 kg/lbs (± 3.80). Upon analyzing the MNA scores, it was found that 9% of elderly women were well nourished, 62% were at risk of malnutrition, and 29% were malnourished. A significant difference was observed in the mean MNA scores ($P < 0.05$). Age, education level, body fat percentage, appetite, and dental problems were significantly associated with malnutrition ($P < 0.05$). **Conclusion:** Geriatric residents in old-age homes require adequate nutrition to maintain health. This can be achieved by providing individualized meal planning, reducing barriers to eating, and incorporating nutrient-dense foods.

KEYWORDS: Healthy aging, institutionalized women, malnutrition, nutritional status

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Table 1: General profile

Particulars	Young-old (n=45), n (%)	Middle-old (n=40), n (%)	Old-old (n=15), n (%)
Sociodemographic profile			
Education			
Illiterate	12 (26.67)	8 (20)	3 (20)
Primary school	11 (24.44)	14 (35)	3 (20)
High school	14 (31.11)	6 (15)	4 (26.67)
Higher secondary school	7 (15.56)	6 (15)	2 (13.33)
Undergraduate	1 (2.22)	6 (15)	2 (13.33)
Postgraduate	-	-	1 (6.67)
Occupation			
Employed	11 (24.44)	16 (40)	8 (53.33)
Unemployed	34 (75.56)	24 (60)	7 (46.67)
Marital status			
Single	4 (8.89)	3 (7.5)	8 (53.33)
Married	41 (91.11)	37 (92.5)	7 (46.67)
Duration of stay (year)			
<1	6 (13.33)	8 (20)	2 (13.33)
1–2	20 (44.44)	18 (45)	5 (33.33)
>2	19 (42.44)	14 (35)	8 (53.33)
Physical activity			
Habit of exercising			
Yes	41 (91.11)	36 (90)	5 (33.33)
No	4 (8.89)	4 (10)	10 (66.67)
Duration of exercise (min)			
<15	35 (85.37)	30 (83.33)	15 (100)
15–30	6 (14.63)	6 (16.67)	-
>30	-	-	-
Frequency of exercising			
Thrice a week	12 (26.67)	5 (12.50)	2 (13.33)
Once a week	15 (33.33)	17 (42.50)	1 (6.67)
Rarely	14 (31.11)	14 (35)	7 (46.67)
Never	4 (8.89)	4 (10)	5 (33.33)
Personal history of medical conditions			
Type 2 DM			
Yes	18 (40)	17 (42.5)	6 (40)
No	27 (60)	23 (57.5)	9 (60)
HTN			
Yes	9 (20)	15 (37.5)	8 (53.33)
No	36 (80)	25 (62.5)	7 (46.67)
CVD			
Yes	1 (2.21)	4 (10)	-
No	44 (97.78)	36 (90)	15 (100)
Thyroid problems			
Yes	2 (4.44)	4 (10)	1 (6.67)
No	43 (95.56)	36 (90)	14 (93.33)
Asthma			
Yes	3 (6.67)	4 (10)	-
No	42 (93.33)	36 (90)	15 (100)
Dental problems			
Yes	21 (46.67)	11 (27.5)	10 (66.67)
No	24 (53.33)	29 (62.5)	5 (33.33)
Osteoporosis			
Yes	12 (26.67)	25 (62.5)	8 (53.33)
No	33 (73.33)	15 (37.5)	7 (46.67)

Contd...

Table 1: Contd...

Particulars	Young-old (n=45), n (%)	Middle-old (n=40), n (%)	Old-old (n=15), n (%)
Bowel incontinence			
Yes	7 (15.56)	10 (25)	4 (26.67)
No	38 (84.44)	30 (75)	11 (73.33)
Bladder incontinence			
Yes	12 (26.67)	5 (12.5)	4 (26.67)
No	33 (73.33)	35 (87.5)	11 (73.33)
Dietary habits			
Type of diet			
Vegetarian	23 (51.11)	25 (62.5)	13 (86.67)
Nonvegetarian	22 (48.89)	14 (35)	2 (13.33)
Ova-vegetarian	-	1 (2.5)	-
Appetite			
Good	11 (24.44)	7 (17.5)	2 (13.33)
Fair	31 (68.89)	25 (62.5)	7 (46.67)
Poor	3 (6.67)	8 (20)	6 (40)
Beverage consumption			
<1 L/day	8 (17.78)	10 (25)	5 (33.33)
1–2 L	10 (22.22)	25 (62.5)	7 (46.67)
>2 L	27 (60)	5 (12.5)	3 (20)
Number of meals consumed in a day			
3	3 (6.67)	2 (5)	6 (40)
4	20 (44.44)	30 (75)	9 (60)
5	22 (48.89)	8 (20)	-

DM: Diabetes mellitus, HTN: Hypertension, CVD: Cardiovascular disease, Values in parentheses indicate percentage

METHODOLOGY

One hundred elderly women were selected from three OAHs – Athulya Assisted Living, Mercy OAH, and Nandhini Senior Citizens Home, Chennai. Subjects who were able to communicate freely and voluntarily agreed to participate were selected. Nonambulating women and those with kyphosis, presbycusis, speech disorders, and neurological problems were excluded from the study. Ethical clearance (No: WCC/HSC/IEEC-2019:186 dated September 19, 2019) was obtained before conducting the study.

Tools used for data collection

Information on sociodemographic characteristics, dietary habits, medical history, and physical activity level was collected using an interview schedule. Malnutrition was diagnosed using the MNA tool. Based on the scores obtained, the subjects were categorized into three categories: (1) malnourished (<17), (2) at risk of malnourishment (17 and 23.5), and (3) normal (>24).^[9] A 3-day dietary recall method was used to assess nutrient intake.

Anthropometric measurements

Height, weight, mid-arm circumference (MAC), and calf circumference (CC) were measured with minimal clothing. Height and weight were measured using a stadiometer and a digital weighing machine. Body fat

percentage was analyzed using a body fat analyzer. MAC and CC were measured using a nonstretchable measuring tape. CC was measured at the widest point around the left calf and MAC was measured at the midpoint of the upper arm, between the shoulder and elbow.

Hand grip strength

Hand grip strength (HGS) was measured using a digital hand dynamometer. Subjects were instructed to stand upright, hold the hand dynamometer, and exert maximum force for 6 seconds using their dominant hand.

Statistical analysis

SPSS software (SPSS version 15.0; IBM Corp., Endicott, NY, USA) was used for data analysis. Chi-square test and one-way analysis of variance followed by Tukey's HSD were used and statistical significance was set at $P < 0.05$.

RESULTS

The participants were divided into three age groups: young-old (60–74), middle-old (75–84), and old-old (>85 years). The average age of the participants was 75.23 ± 8.85 years. Majority of the participants were not college educated and were married (85%). With regard to physical exercises, majority of the elderly women did basic exercises such as walking and stretching (82%). As the participants' age increased, the risk of

Table 2: Mean anthropometric measurements, Mini Nutritional Assessment, and hand grip strength scores

Based on age				
Particulars	N=100	Young-old (n=45)	Middle-old (n=40)	Old-old (n=15)
Height (cm)	149.70±7.31	149.91±5.77 ^{a,b}	150.83±6.71 ^b	146.07±11.57 ^a
Weight (kg)	50.72±9.11	53.70±9.24 ^b	48.47±8.12 ^{a,b}	47.76±9.41 ^a
BMI (kg/m ²)	22.77±4.68	23.95±4.19 ^a	21.38±3.89 ^a	22.98±7.06 ^a
Body fat (%)	31.30±8.99	34.41±7.22 ^b	29.49±10.01 ^b	26.81±8.51 ^a
MAC (cm)	27.36±7.84	28.18±9.21 ^a	27.29±6.48 ^a	25.11±6.88 ^a
CC (cm)	30.11±7.51	31.17±7.81 ^a	29.85±6.75 ^a	27.67±8.64 ^a
MNA scores	10.42±4.06	19.98±3.45 ^b	18.15±3.54 ^{a,b}	16.23±4.27 ^a
HGS scores (kg/lbs)	18.69±3.80	12.03±4.02 ^b	9.30±3.65 ^a	8.59±3.75 ^a
Based on MNA classification				
Particulars	N=100	Well nourished (n=9)	At risk of malnutrition (n=62)	Malnourished (n=29)
Height (cm)	149.70±7.31	145.28±11.81 ^a	150.87±6.41 ^a	148.57±7.13 ^a
Weight (kg)	50.72±9.11	52.92±9.89 ^b	53.09±8.26 ^b	44.96±8.45 ^a
BMI (kg/m ²)	22.77±4.68	25.64±7.21 ^b	23.48±4.33 ^{a,b}	20.37±3.58 ^a
Body fat (%)	31.30±8.99	34.69±11.53 ^b	33.24±7.31 ^b	26.11±9.73 ^a
MAC (cm)	27.36±7.84	30.09±6.70 ^a	27.69±8.08 ^a	25.82±7.69 ^a
CC (cm)	30.11±7.51	32.82±4.61 ^a	30.82±7.00 ^a	27.77±8.94 ^a
MNA scores	10.42±4.06	25.61±0.78 ^c	20.09±2.02 ^b	14.19±2.20 ^a
HGS scores (kg/lbs)	18.69±3.80	13.11±4.67 ^a	10.47±3.98 ^{a,b}	9.48±3.85 ^a

One-way ANOVA followed by Tukey's HSD test. Values carrying different superscripts within the same row are statistically significant ($P<0.05$). BMI: Body mass index, MAC: Mid-arm circumference, CC: Calf circumference, MNA: Mini Nutritional Assessment, HGS: Hand grip strength, HSD: Honestly significant difference

Table 3: Mean nutrient intake

Based on age					
Nutrients	RDA	N=100	Young-old (n=45)	Middle-old (n=40)	Old-old (n=15)
Energy (kcal)	1600	981.04±27.75	1065.69±231.86 ^a	1012.14±308.74 ^a	924.94±255.78 ^a
Carbohydrates (g)	350	155.08±52.15	169.01±49.94 ^a	158.16±58.15 ^a	147.78±46.78 ^a
Proteins (g)	55	30.72±8.38	33.49±6.69 ^a	31.76±9.13 ^a	28.88±7.94 ^a
Fat (g)	20	24.56±8.76	26.31±9.43 ^a	26.15±9.39 ^a	22.55±7.66 ^a
Fiber (g)	40	18.73±6.44	21.38±5.70 ^a	17.31±4.81 ^a	24.56±8.76 ^a
Calcium (mg)	600	380.96±18.65	450.38±19.15 ^a	376.22±20.75 ^a	361.94±17.79 ^a
Iron (mg)	21	5.3±1.75	6.00±1.86 ^a	5.33±2.04 ^a	5.05±1.38 ^a
Based on MNA classification					
Nutrients	RDA	N=100	Well-nourished (n=9)	At risk of malnutrition (n=62)	Malnourished (n=29)
Energy (kcal)	1600	981.04±27.75	972.81±23.45 ^a	977.99±25.76 ^a	956.12±33.23 ^a
Carbohydrates (g)	350	155.08±52.15	160.56±45.79 ^a	153.59±29.44 ^a	150.77±32.61 ^a
Proteins (g)	55	30.72±8.38	28.64±6.25 ^a	30.74±7.96 ^a	30.33±9.88 ^a
Fat (g)	20	24.56±8.76	22.05±9.00 ^a	24.91±7.87 ^a	24.59±6.53 ^a
Fiber (g)	40	18.73±6.44	19.29±5.14 ^a	18.98±6.99 ^a	18.73±6.44 ^a
Calcium (mg)	600	380.96±18.65	313.20±20.47 ^a	385.10±17.26 ^a	371.21±21.44 ^a
Iron (mg)	21	5.3±1.75	5.23±1.17 ^a	5.20±1.76 ^a	5.13±1.91 ^a

One-way ANOVA followed by Tukey's HSD test. Values carrying the same superscript within the row are not statistically significant ($P>0.05$). RDA: Recommended dietary allowance, MNA: Mini Nutritional Assessment, HSD: Honestly significant difference

noncommunicable diseases and other health problems also increased. Participants had chronic diseases such as type 2 diabetes, hypertension, cardiovascular disease, respiratory problems, osteoporosis, and thyroid issues. In addition, most of the study participants were vegetarians [Table 1].

One hundred geriatric women were screened for malnutrition, of which 9% of them had adequate

nutrition, 62% were at risk of malnutrition, and 29% were malnourished. Results highlight the importance of identifying and addressing malnutrition among the elderly, especially those residing in institutional settings, to improve their overall physical and mental well-being.

Age-related declines in the mean values of various anthropometric parameters (body weight, body mass index, body fat, MAC, and CC) were observed [Table 2].

Table 4: Factors associated with malnutrition among elderly women

Factors	Well nourished, <i>n</i> (%)	At risk of malnourishment, <i>n</i> (%)	Malnourished, <i>n</i> (%)	χ^2	<i>P</i>
Age					
65–74	5 (55.56)	33 (53.23)	7 (24.14)	11.304	0.023*
75–84	3 (33.33)	24 (38.71)	13 (44.83)		
>85	1 (11.11)	5 (8.06)	9 (31.03)		
Education					
Illiterate	2 (22.22)	13 (20.97)	8 (27.59)	19.766	0.003**
Primary school	2 (22.22)	17 (27.42)	9 (31.03)		
High school	1 (11.11)	16 (25.81)	7 (24.14)		
Higher secondary school	2 (22.22)	10 (16.13)	3 (10.34)		
Undergraduate	1 (11.11)	6 (9.68)	2 (6.90)		
Postgraduate	1 (11.11)	-	-		
Marital status					
Single	2 (22.22)	10 (16.13)	3 (10.34)	10.184	0.618 (NS)
Married	7 (77.78)	52 (83.87)	26 (89.66)		
Duration of stay (years)					
<1	2 (22.22)	9 (14.52)	5 (17.24)	9.521	0.902 (NS)
1–2	5 (55.56)	25 (40.32)	13 (44.83)		
>2	2 (22.22)	28 (45.16)	11 (37.93)		
Body fat					
Lean	4 (44.44)	16 (25.81)	14 (48.27)	4.246	0.001**
Moderate	3 (33.33)	25 (40.32)	11 (37.93)		
High	1 (11.11)	15 (24.19)	2 (6.90)		
Excess	1 (11.11)	6 (9.68)	2 (6.90)		
Presence of dental problems					
Yes	3 (33.33)	32 (51.61)	9 (31.03)	11.719	0.003**
No	6 (66.67)	30 (48.39)	26 (68.07)		
Problem with chewing food					
Yes	9 (100)	23 (37.10)	20 (68.97)	14.290	1.250 (NS)
No	-	39 (62.90)	9 (31.03)		
Appetite					
Good	4 (44.44)	13 (20.97)	3 (10.34)	12.594	0.013*
Fair	4 (44.44)	43 (69.35)	16 (55.17)		
Poor	1 (11.11)	6 (9.68)	10 (34.48)		
Type of diet					
Vegetarian	5 (55.56)	36 (58.06)	20 (68.97)	1.603	2.548 (NS)
Nonvegetarian	4 (44.44)	25 (40.32)	9 (31.03)		
Ova-vegetarian	-	1 (1.61)	-		
Bowel incontinence					
Yes	2 (22.22)	10 (16.13)	7 (24.14)	8.489	0.063**
No	7 (77.78)	52 (83.87)	22 (75.86)		

*Significant at $P < 0.05$, **Significant at $P < 0.01$. NS: Not significant, Values in parentheses indicate percentage

Study participants did not meet the recommended daily intake of macronutrients and micronutrients [Table 3]. The body's need for macronutrients increases with age but decreases in older age due to changes in body composition and decreased physical activity. However, there is still a significant need for essential micronutrients. These findings emphasize the importance of developing effective strategies to enhance nutrient intake among older adults.

Age, education, body fat percentage, presence of dental problems, and appetite were associated with geriatric malnutrition ($P < 0.05$) [Table 4].

DISCUSSION

Given the complex and numerous factors that contribute to malnutrition and the growing population of older adults, it is essential to screen and identify elderly individuals who may be at risk of malnutrition using appropriate standardized tools. In this study, malnutrition was screened using the MNA tool. Results showed that 9% of institutionalized elderly women were well nourished, 62% were at risk of malnutrition, and 29% were malnourished. Sharma *et al.*^[10] reported that a significant portion of the Indian elderly population,

specifically 45.7%, was at risk of malnutrition, and 19.8% were found to be malnourished. Patil and Shindhe^[11] found that nearly a quarter (23.5%) of Indian elderly individuals were suffering from malnutrition, nearly half (49%) were at risk of malnutrition, and 27.5% were well nourished. Cereda *et al.*^[12] found that the prevalence of nutritional derangements was high among newly institutionalized elderly, with 90% identified using the MNA tool and 70% identified using the Geriatric Nutritional Risk Index tool.

The average values of anthropometric measurements decreased non significantly with age [Table 2]. A study by Singh *et al.*^[13] found that weight, biceps, and thigh skinfold thickness decreased significantly in elderly people aged 60 years and above. HGS has been shown to strongly predict prognosis and susceptibility to illness.^[14] The optimal cutoff point for HGS as a screening tool for nutritional risk in women aged 65–74 years is 17.0 kg and 14.6 kg for women aged 75–90 years. In addition, the optimal cutoff point for using HGS as a screening tool for subjective global assessment in women aged 65–74 years is 15.2 kg and 13.5 kg for women aged 75–90 years.^[15,16] The mean HGS in this study was 18.69 ± 3.80 kg/lbs and decreased with age and MNA lower scores, but these changes were not statistically significant ($P > 0.05$). This study also showed a difference in low MNA and advanced age ($P < 0.05$), in line with previous research findings.^[17-19]

In this study, all elderly residents were served food prepared in a centralized kitchen using refined oil, following a cyclic menu. The daily menu comprised rice, pulses, vegetables, milk, and milk products, which were served to all residents. Milk was consumed in the form of tea and coffee. Fruits were provided twice a week and eggs, meat, and meat products were rarely served. A soup was provided before lunch to stimulate the appetite. As per ICMR recommendation, the daily requirements of macro- and micronutrients were not met by the study participants.^[20] Repetitive food options/lack of variety could be one contributing factor to decreased food intake among the subjects. Nutrient intake was low among malnourished subjects compared to those at-risk and well-nourished subjects, though these differences were not statistically significant [Table 3]. Similar findings were reported by Ruiz-López *et al.*,^[21] regarding decreased nutrient intake in malnourished subjects. In the present study, oral problems, difficulty in eating hard foods, and changes in taste and smell due to medications could have led to a decrease in food intake. Given these findings, it is crucial that nutritious meals and snacks should be provided to the elderly to meet their daily

nutritional needs that can be achieved by shifting from high-calorie to nutrient-rich options.^[22]

Age, education, body fat percentage, dental issues, and appetite were significantly associated with malnutrition [Table 4]. According to research conducted by Vaish *et al.*,^[23] age, gender, educational attainment, marital status, place of residence, income per person, financial reliance, and family size had a significant impact on malnutrition. Gupta *et al.*^[24] conducted a study on the nutritional status of the elderly population living in altitudinous regions of India. The study found a high prevalence of malnutrition among individuals who were financially dependent (75.2%), illiterate (74.5%), poor appetite (71.6%), difficulty with chewing (63.1%), and had low monthly income (43.3%). Based on the findings of current and previous research, implementing low-cost, prevention-focused interventions to address poor nutrition, loss of appetite, and dental problems may potentially decrease the incidence of malnutrition among the geriatric population.

CONCLUSION

The nutritional requirements of the elderly are multifaceted and necessitate a holistic strategy. To fully optimize their nutritional well-being, we suggest the implementation of community-based nutrition programs that prioritize the distinct needs of older adults. These programs should emphasize raising awareness about dietary guidelines importance of personalized meal plans, cultivating robust social support systems, and promoting access to healthy foods through educational campaigns. By adopting these measures, the overall health and quality of life of the elderly can be enhanced significantly, thereby promoting their longevity.

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Conflicts of interest

There are no conflicts of interest.

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