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ORIGINAL ARTICLE

Assessment of Nutritional Status and Influencing Factors among Elderly in Mathikere, Urban Bengaluru, Karnataka of India

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ABSTRACT

Background: In India, geriatric people aged ≥60 years are an important component of elderly care that warrants further attention. Hence we aimed to assess nutritional status and influencing factors among elderly people in Mathikere, Urban Bengaluru, Karnataka, India.

Methods: A community based cross sectional study was carried out by doing house to house survey after obtaining informed consent from 195 elderly participants. Sociodemographic and self-reported morbidity details were collected using a semi-structured questionnaire. Mini nutritional assessment (MNA) tool was utilized to evaluate nutritional status and dietary intake. Cognitive status of elderly was assessed using Hindi Mental Status Examination (HMSE), depression among the elderly was investigated using Geriatric Depression Scale Short Form (GDS-SF), functional status was determined by Barthel index and Lawton scale. Anthropometric measurements such as height, midarm circumference, calf circumference were measured by non-stretchable measuring tape and weight was assessed using Equinox EQ-BR 9201 personal weighing scale.

Results: With the MNA tool, out of 195 study participants, total prevalence of elderly people who needed nutritional intervention was 56 subjects (28.7%). The independent predictors of risk of malnutrition among the elderly after adjusting other variables in multiple logistic regression analysis were depression by Geriatric Depression Scale, Short Form, Barthel index, Lawton scale and ≥2 self-reported chronic morbidities.

Conclusion: Total prevalence of the elderly who needed nutritional intervention living in Karnataka, India was 28.7%. Hence, public health professionals should develop effective screening strategies to detect malnutrition among the elderly.

Introduction

Ageing of the population is a demographic process and in developed countries which are far ahead in demographic transition, they have already experienced the consequences of ageing of the population. With rapid demographic transition, increase in geriatric age has become an issue of serious concern in many developing countries. In

fact, the demographic and societal changes over the years had consequent impact on geriatric population in developing countries. The emergence of small families and nuclear family system has changed attitudes of younger generation towards elderly population. The increasing longevity together with physical separation of parents from adult children as a result of rapid industrialization, urbanization, and rural-to-urban age selective migration have also affected the lives of the elderly population. In India, a citizen who reached the age of 60 years or above was referred as 'senior citizen' (1). According to the World Health Organization (WHO) (2), based on age, the elderly population was classified into 3 groups of (i) Young old as persons in the age group of 60-69 years; (ii) Old persons in the age group of 70-79 years; and (iii) Oldest persons aged 80 years and above. Nutritional deficiencies in geriatric age group have been common and often as sub-clinical that escaped the desired interventions (3).

Nutritional status can affect the elderly immunity system, functional ability and general well-being sensation. It constitutes an important component of elderly care that warrants further attention too. Hence, this study intended to assess the nutritional status and influencing factors among elderly people in Mathikere, Urban Bengaluru, Karnataka, India.

Materials and Methods

In a community based cross sectional study, elderly persons aged 60 years and above in Mathikere, Urban Bengaluru, Karnataka, India from June 2018 to January 2019 were enrolled. Inclusion criteria were being elderly aged ≥60 years, and residing ≥6 months in Mathikere, Urban Bengaluru, Karnataka, India. Elderly people who were bed ridden (among them Body Mass Index (BMI) as an important component of full MNA tool was not calculated) were excluded from the study. House to house visits was made to identify the elderly satisfying the inclusion and exclusion criteria. The elderly were explained about the purpose of the study and subsequently a written informed consent was obtained from those who agreed to participate. A good rapport was established before obtaining information from the elderly. A Pre-tested, semi structured questionnaire was administered to obtain information regarding socio-demographic details and factors influencing nutritional status such as age, gender, income, marital, educational, living and financial status, alcohol consumption, tobacco habits, physical activity, employment, family type, and self-reported chronic morbidity status. Cognitive status of the elderly was assessed using Hindi Mental Status Examination (HMSE).

This scale consisted 20 items, which tested different components of intellectual capability. Cognition was considered normal if total score was >19 and in case of literate, the score >24 (4).

Geriatric Depression Scale Short Form (GDS-SF) was used to assess depression. This scale consisted 15 items and was administered orally. Total scores of >5 indicated the depression (5). Functional status assessment by Barthel scale was used to assess the Activities of Daily Living (ADL). It consisted of 10 variables to describe ADL and mobility (6). Lawton scale was applied as a tool to determine independent living skills by identifying how a person was functioning at the present time and for identifying improvement or deterioration over time (7). Anthropometric measurement of height was in centimetres (cm) using non-stretchable measuring tape up to an accuracy of 0.5 cm. Subjects were instructed to stand on an even or flat and firm floor surface. Subjects removed their shoes/slippers and stood up straight with heels together, while heels, buttocks and shoulders pressed against the wall. Arms hang freely with palms while facing the thighs. Anthropometric measurement of weight was determined in kilograms (kg) using Equinox EQ-BR 9201 personal weighing scale (manufactured by Camry measuring technology, Hong Kong and imported to India by Equinox Overseas Private Limited) up to accuracy of 0.5 kg. The participant was instructed to stand in the centre of the scale platform facing the investigator, hands at sides and looking straight ahead. The weighing scale was calibrated whenever in use. Anthropometric measurement of mid arm circumference was investigated in centimetres (cm) using non-stretchable measuring tape up to an accuracy of 0.5 cm. Elderly were asked to bend their non-dominant arm at the elbow at a right angle with the palm up. Distance between the acromial surface of the scapula and the olecranon process of the elbow on the back of the arm was noted. Mid-point between the two was marked with the pen. Measuring tape was positioned at the mid-point on the upper arm and tightened snugly. Anthropometric measurement of calf circumference was evaluated in centimetres (cm) using non-stretchable measuring tape up to an accuracy of 0.5 cm. The subjects were asked to be seated with the left leg hanging loosely or standing with their weight evenly distributed on both feet. They were later asked to roll up the trouser to uncover to the calf and the tape was wrapped around the calf at the widest part.

Mini nutritional assessment (MNA) tool was developed by Nestle to examine the nutritional status. While using a 18 items questionnaire, a total score of 24 or greater indicated the person to be

well-nourished and needed no further intervention. A score of 17-23.5 revealed the person to be at risk of malnutrition. A score of less than 17 demonstrated the person to be malnourished. Any morbidities/ nutritional deficiencies were referred to the nearest health centre (8).

Sample size was calculated based on the study conducted at Coimbatore in India by Mathew *et al.* (9) which showed malnutrition among the elderly in urban population to be 19%. Sample size was assessed with 95% confidence level and 5.5% of absolute precision with 195 elderly people in the urban area as follows: Sample size=Z^2PQ/L^2 (Where Z=1.96, P=19%, Q=100-P=100-19=81%, L^2=5.5×5.5=30.25). Sampling technique included the Mathikere, Urban Bengaluru center caters to

the needs of people residing in Ward-17 comprising of 107 Census Enumeration Blocks (CEB) and Ward-36 with 70 CEBs, with a population of 49,610 and 37,036; respectively. Elderly aged ≥60 years constituted 8.4% of urban population (10). Hence there would be 4,167 and 3,111 elderly persons in Ward-17 and 36; respectively. Based on distribution of the elderly in each of the wards, the total sample size was proportionately divided, which accounted 113 elderly people to be enrolled in Ward-17; while 82 elderly people from Ward-36 were included. Therefore, 4 CEBs from Ward-17 and 2 CEBs from Ward-36 were selected using a random number table. Approval from institutional ethics committee (Ref no SS-1/EC/15/2016) was acquired before the commencement of the study.

Table 1: Socio-demographic details and association of various factors with nutritional status among study participants.

Variable	Subtype	Nutrition			χ^2 value	*P* value
		Malnutrition N (%)	**At risk** N (%)	**Normal** N (%)		
Gender	Male	1 (1.2)	20 (24.7)	60 (74.1)	1.729	0.421
	Female	5 (4.4)	30 (26.3)	79 (69.3)		
Marital status	Married	4 (2.6)	34 (22.2)	115 (75.2)	7.421	0.284
	Widow	2 (4.8)	16 (38.1)	24 (57.1)		
Financial status	Dependent	3 (3.7)	20 (24.4)	59 (72)	1.691	0.792
	Partially	2 (4.9)	12 (29.3)	27 (65.9)		
	Independent	1 (1.4)	18 (25)	53 (73.6)		
Education	Not literate	2 (3.6)	15 (26.8)	39 (69.6)	7.421	0.284
	Primary	2 (7.1)	11 (39.3)	15 (53.6)		
	Secondary	1 (1.1)	18 (20.7)	68 (78.8)		
	Graduate and above	1 (4.2)	6 (25)	17 (70.8)		
Family type	Nuclear	0 (0)	3 (14.3)	18 (85.7)	11.77	0.067
	Three-generation	2 (1.8)	33 (28.9)	79 (69.3)		
	Joint	1 (25)	0 (0)	3 (75)		
	Others	3 (5.4)	14 (25)	39 (69.6)		
Tobacco habits	Cigarette	0	4 (23.5)	13 (76.5)	2.929	0.231
	Beedis	0	3 (42.9)	4 (57.1)		
	Smokeless	0	3 (13)	20 (87)		
Alcohol intake	No	6 (3.4)	43 (24.6)	126 (72)	1.570	0.456
	Yes	0	7 (35)	13 (65)		
Physical activity	Yes	0	10 (18.5)	44 (81.5)	4.865	0.088
	No	6 (3.1)	40 (25.6)	95 (71.3)		
Cognition (HMSE)	Normal	1 (0.5)	47 (25.5)	135 (73.8)	64.47	<0.05
	Impaired	5 (41.7)	3 (25)	4 (33.3)		
Depression (GDS-SF)	Normal	1 (0.5)	47 (25.4)	137 (74.1)	79.39	<0.05
	Depression	5 (50)	3 (30)	2 (20)		
IADL (Lawton)	Dependent	4 (3.4)	21 (17.8)	93 (78.8)	9.64	<0.05
	Independent	2 (2.6)	29 (37.7)	46 (59.7)		
ADL (Barthel)	Total dependent	2 (100)	0	0	114.7	<0.05
	Severe	3 (17.6)	12 (70.6)	2 (11.8)		
	Moderate	1 (2.1)	19 (39.6)	28 (58.3)		
Number of morbidity	0	0 (0)	4 (11.8)	30 (88.2)	77.24	<0.05
	1	0 (0)	12 (17.9)	55 (82.1)		
	≥2	6 (6.3)	34 (36.2)	54 (57.5)		
-	Total 195 (100%)	6 (3.1)	50 (25.6)	139 (71.3)	-	-

The collected data was entered into a MS excel sheet and analysis was done using SPSS software (Released 2009, Chicago, IL, USA). Descriptive statistics were employed to summarize the quantitative data such as age, number of morbidities, etc. in terms of mean and standard deviation. Qualitative variables were expressed as percentages with 95% confidence interval. To test for the difference in proportion for independent samples, Chi square test was employed. Mcnemar's test was employed for dependent or mutually not exclusive samples, to find out the factors associated with nutritional status. All the factors were dichotomised into risk and non-risk categories and univariate odds ratio along with 95% confidence interval was estimated. Those variables which were found to be significant in the univariate analysis by Mcnemar's test at $p{\leq}0.05$ level were included for multiple logistic regression analysis. Multiple logistic regression analysis was utilized to identify the independent predictors associated with risk of malnutrition.

Results

A total of 195 elderly people from Mathikere, Urban Bengaluru, Karnataka, India were included for the study. Majority of the elderly around 157 subjects (80.5%) were in the age group of 60-69 years. Socio-demographic details and association of various factors with nutritional status among study participants were shown in Table 1. Nutritional assessment by MNA tool revealed that 6 elderly people (3.1%) in the study area were malnourished (under nourished) and 50 elderly people (25.6%) were at risk of malnutrition. A total 56 elderly (28.7%) needed nutritional intervention. Chi square test showed that elderly people with impaired cognition, depression, dependency by Barthel and Lawton scales and with ≥2 self-reported chronic morbidities were significantly ($p<0.05$) associated with the risk of malnutrition (Table 1).

Univariate analysis revealed that the elderly aged ≥70 years, female gender, death of spouse/not married, non-nuclear family, sedentary lifestyle, impaired cognition, depression, dependent by Barthel and Lawton scales and with ≥2 self-reported chronic morbidities were independently associated ($p<0.05$) with lower MNA scores (Table 2).

On multiple logistic regression analysis, it was found that depression among the elderly (male or female), dependency by Barthel and Lawton scales and with ≥2 self-reported chronic morbidities were found to be independent predictors of risk of malnutrition after adjusting for other variables (Table 2).

Discussion

This study showed 157 elderly peolple (80.5%) were 60-69 years old and 14 elderly (7.1%) were ≥80 years. Similar pattern was also found in studies conducted by Kansal *et al.* (11), Lena *et al.* (12), Gupta *et al.* (13) and Damayanthi *et al.* (14). The mean age in years±standard deviation (SD) among study participants was 67.07±7.402 years.

Table 2: Crude odds ratio (95% CI) of nutritional status according to associated factors in univariate analysis by Mcnemar's test and multiple logistic regression analysis among study participants.

Variables	Levels	Univariate Odds ratio	95% CI	Multivariate Odds ratio	95% CI
Age (years)	≥70 (reference)	4.30	2.05-9.04	Not significant	-
	60-69	-	-	-	-
Gender	Female (ref)	1.26	0.67-2.39	Not significant	-
	Male	-	-	-	-
Marital status	Others (ref)	2.30	1.15-4.59	Not significant	-
	Married	-	-	-	-
Physical activity	No (ref)	2.13	0.98-4.60	Not significant	-
	Yes	-	-	-	-
Family type	Non-nuclear (ref)	2.62	0.74-9.30	Not significant	-
	Nuclear	-	-	-	-
HMSE scale	Impaired (ref)	5.62	1.62-19.52	Not significant	-
	Normal	-	-	-	-
GDS-SF	Depressed (ref)	11.41	2.34-55.64	6.99	1.18-41.16
	Normal	-	-	-	-
Barthel scale	Dependent (ref)	7.07	3.56-14.03	4.96	2.38-10.34
	Independent	-	-	-	-
Lawton scale	Dependent (ref)	2.50	1.32-4.728	2.09	1.005-4.36
	Independent	-	-	-	-
Self-reported morbidities	≥2 (ref)	3.93	2.00-7.71	2.81	1.33-5.94
	0 and 1	-	-	-	-

Damayanthi *et al.* (14) reported the mean age of 70.8 years and Sandeep *et al.* (15) the mean age of 69 years for male and 70 years for female in their studies, respectively. Around 144 study participants (73.8%) of our study were female. Similar gender distribution was also seen in studies conducted by Kritika *et al.* (3) and Damayanthi *et al.* (14). Data of India 2011 revealed that 66% of the elderly were literate in urban areas (16). Our study revealed demonstrated that 139 elderly people (72.3%) were literate. Kansal *et al.* (11) noticed that 46% of elderly people were illiterate; whereas the study conducted in West Bengal of India by Lahiri *et al.* (17) showed that 72.8% of elderly people had educational level up to primary.

The majority of 114 elderly subjects (58.4%) in the present study were living in three-generation family and 63 elderly participants (32%) had no source of income and were financially dependent on others. The study conducted in Nepal by Gupta *et al.* (13) revealed that 75% of elderly population were involved in farming and 90% of elderly people were living with their families. Similarly, a study conducted in Haryana of India by Sandeep *et al.* (15) illustrated that 94% of elderly people were living in joint families. As assessed by MNA tool in the present study, 6 elderly (3.1%) in urban areas were malnourished, 50 (25.6%) were at risk of malnutrition. The total prevalence of elderly people who needed nutritional intervention was 56 subjects (28.7%). A study conducted by Damayanthi *et al.* (14) in Sri Lanka showed that the prevalence and risk of malnutrition was 12.5% and 52.4%, respectively. Another study conducted in Iran by Aliabadi *et al.* (18) showed that 12.0% of elderly people were malnourished and 45.3% were at risk of malnutrition. A systematic review and meta-analysis study by Kushwaha *et al.* (19) in India indicated the 18.29% prevalence of malnutrition and 48.17% displayed the risk of malnutrition among elderly people.

Univariate analysis of the present study revealed that the elderly aged ≥70 years, were female gender, with death of spouse/not married, being non-nuclear family, having sedentary life style, with impaired cognition and depression, being dependent by Barthel and Lawton scales and ≥2 self-reported chronic morbidity were independently associated with lower MNA scores ($p<0.05$). A study conducted in urban area of India by Mathew *et al.* (9) using univariate analysis revealed that elderly people who were dependent, single/widowed/divorced were significantly associated with malnutrition. Another study by Kushwaha *et al.* (19) in India showed that the prevalence of malnutrition among elderly people was higher among females, clinic settings, urban areas and northern regions of India (27.37%).

Multiple logistic regression analysis in the present study demonstrated that the elderly who were depressed, dependent by Barthel and Lawton scales and ≥2 self-reported chronic morbidities were at risk of malnutrition after adjusting for other variables. It points towards the fact that activities of daily living and chronic non communicable diseases had a direct impact on nutritional status of elderly. In the multivariate model of study conducted by Damayanthi *et al.* (14) in Sri Lanka showed that the hypertension, alcohol consumption and older age were significantly associated with malnutrition of subjects. This heightens the need for nutritional intervention among the elderly population.

Nutritional intervention strategies for older people can cover a broad range of different measures, which contribute in addressing malnutrition. Regarding direct nutritional measures, oral strategies are always the first choice. These include various modifications of usual foods as well as offering oral nutritional supplements. Moreover, enteral and parenteral nutrition are important options for older patients too, although were less often indicated. Other important strategies are identification and elimination of potential causes of malnutrition, avoidance of dietary restrictions, pleasant eating environment in institutions, meal time assistance in case of eating dependency, energy-dense meals on wheels with additional meals, family support, nutritional information and education, easy access to food and finally; the nutritional counselling that play important roles.

The strengths of the study were disabled, depressed and mentally-ill elderly people who were not excluded from the study and the care takers employed to collect the information. Also, good rapport and cooperation could be established since the study was conducted in the field practice area of community medicine department. The questionnaire was interviewer-administered and probing was used to ensure that the participants recalled information to minimize the recall bias. There were some limitations in our study. It was a cross-sectional study, which limited the establishment of causality and laboratory investigations for nutritional assessment that could not be done due to the cost and logistics reasons.

Conclusion

Totally, 28.7% of the elderly population in Mathikere, Urban Bengaluru, Karnataka, India were shown to need nutritional invervention. Elderly subjects who were depressed (GDS-SF), dependent by Barthel and Lawton scales and with ≥2 self-reported chronic morbidities were found to be independent predictors of risk of malnutrition after adjusting for other variables. Hence, public health professionals should

develop effective screening strategies according to the identified risk factors to improve the nutritional status and well being of the vulnerable elderly population.

Acknowledgement

Authors' Contribution

GS has helped in designing the study and BR has helped in analysis and proofreading.

Conflict of Interest

None declared

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