Malnutrition among community dwelling older adults in a rural block area of South India

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ABSTRACT

Background: Kerala state has highest proportion of older adults in India. There is paucity of information on burden of malnutrition (under-nutrition) among them in the state. This study aimed to measure prevalence and associated factors of malnutrition among older adults in a rural community of Kerala. **Methods:** A community based cross-sectional study was conducted in 2018, among randomly selected 245 older persons (age ≥ 60 years) across rural area of Nemom block panchayath in Thiruvananthapuram district of Kerala. Nutritional status was determined by Mini Nutritional Assessment tool. Other components of the interviewer-administered questionnaire were Barthel Index, Geriatric Depression Scale-15, socio-demography, morbidity and substance abuse details. Chi Square test and binary logistic regression were done appropriately. **Results:** Prevalence of malnutrition was 14.3% (95% CI – 9.9% to 18.7%) and 44.1% (95% CI – 37.9% to 50.3%) were at risk of malnutrition. Older-old (70-79 years), oldest-old (≥80 years), unmarried or widowed, those with chewing and swallowing difficulties, those who screened positive for depression and those who had higher grade of dependency in any activities of daily living were more likely to be malnourished (p < 0.05). Older-old age (aOR – 3.358), depression (aOR – 4.859) and higher grade of dependency in activities of daily living (aOR – 2.940) were the attributes independently associated with malnutrition after adjusting for other factors. **Conclusions:** The older persons in the rural area of Kerala had high burden of malnutrition. Older-old, dependent and depressed individuals are more likely to be affected.

Keywords: Geriatric assessment, Kerala, malnutrition, mini nutritional assessment, older persons

Introduction

Population ageing is a global demographic trend of the 21st century which poses multiple socio-economic challenges to nations.[1] India has the second largest elderly population in the world.[2] As per 2011 census, there were 104 million elderly people (aged 60 years and above) in India with 8.6% share of total population.[3] About 78% of the elderly of India lives in rural areas.[4] Kerala, one of the southern states of India, has the highest proportion of elderly (currently 12.6%) with faster pace of population ageing.[4]

Good nutrition in old age maintains the quality of life by contributing to mobility, independence, cognitive function, psychological and social wellbeing.[5] However, older population are vulnerable to malnutrition, due to various functional, physiological, cognitive, social and lifestyle changes.[6] Malnutrition seems to be more prevalent in rural areas.[7] It acts as both a cause and effect of various morbidities among elderly, posing a vicious cycle.[8] Nutritional impairment acts as precursor and exacerbating

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factor for geriatric syndromes.[9] Malnutrition is associated with micronutrient deficiencies, functional impairment, reduced quality of life and dependence.[10] Malnourished elderly consume more healthcare costs than their well-nourished counterparts.[6]

Malnutrition among elderly is often overlooked as a public health problem and there are no nation-wide survey reports in India. There were studies from different states in India on prevalence of malnutrition in old age but, none from Kerala when this study was planned. Hence this study was conducted to find the prevalence and associated factors of malnutrition among elderly in a rural community of Kerala.

Methods

This community-based cross-sectional study was conducted in Nemom block panchayath in Thiruvananthapuram district from March to May of 2018. There are seven grama-panchayaths in Nemom (Kalliyoor, Maranalloor, Malayankeezhu, Vilappil, Vilavoorkkal, Pallichal and Balaramapuram).[11] The block area covered a total population of 2,64,042 (males – 1,29,351, females – 1,34,691) according to census 2011.[11] Individuals of age 60 years and above were the potential study participants. Those who were temporarily absent in the households during the study period were excluded.

The sample size calculated was 249 for an expected prevalence of 17.9%,[12] alpha error of 5%, absolute precision of 5% and non-response rate of 10%. Five wards were selected by simple random sampling from each of the seven grama-panchayaths. Study participants were selected from Voter's list of the wards by simple random sampling.

A pilot-tested structured questionnaire was used by the principal investigator to interview the participants at their households. The questionnaire included socio-demographic variables, self-reported morbidities and substance abuse, Mini Nutritional Assessment – Short Form (MNA-SF), Mini Nutritional Assessment - Long Form (MNA-LF), 15-item Geriatric Depression Scale (GDS) and 20-point Barthel Index. Anthropometric measurements (height, weight, demi-span, half arm-span, mid upper arm circumference, calf circumference and knee height) were taken by the techniques detailed in Mini Nutritional Assessment guide (MNA guide).[13] Those who could not be weighed were assessed only by MNA-SF. Weight was measured with 1 Kg accuracy using a calibrated weighing machine. Height was measured to nearest millimeter, using a stadiometer. Arm span and calf circumference were recorded using a measuring tape to the nearest millimeter.

The participants were categorized into three age groups – old-old (60-69 years), older-old (70-79 years), and oldest-old (≥80 years).[14] Socioeconomic class was determined by Modified Kuppuswamy Scale 2017.[15] Barthel Index was used to assess Basic Activities of Daily Living (BADL).[16] Participants were classified for dependency in BADL as those who were independent in all domains, those who had only intermediate scores for dependency in all domains and those who had worst score for dependency in any domain. The cut off for screening depression on Geriatric Depression Scale (GDS-15) was score above seven.[17] Categorization based on Mini Nutritional Assessment – Short Form (MNA-SF) was as followed – normal (12-14), at risk (8-11) and malnourished (<8).[18] Those who were weighed and had score <12 by MNA-SF were further assessed by Mini Nutritional Assessment – Long Form (MNA-LF). Categorization based on MNA-LF was as followed – normal (24-30), at risk (17-23.5) and malnourished (<17).[18]

Statistical analysis

Data entry was done in Epidata software version 3.1 and analysis was done in R software version 3.1.3. Numerical variables were converted into ordinal or nominal variables. Proportions of categories were calculated for nominal and ordinal variables. Mean and standard deviation was calculated for age. Chi-Square test was done to find association of independent variables with malnutrition and Yates continuity correction was done where appropriate. The associations were quantified as odds ratios with 95% confidence intervals. The variables which had *P* value < 0.20 were included for multivariate analysis by binary logistic regression. *P* value less than 0.05 was regarded as statistically significant.

Ethical considerations

The study was approved by the Institutional Human Ethics Committee of Central University of Kerala (CUK/IHEC/2018/021). Voluntary written informed consent was taken from the participants. Privacy of the participants was ensured and confidentiality of the data is maintained. The study was approved by the Institutional Human Ethics Committee of Central University of Kerala (CUK/IHEC/2018/021) on 20th February 2018.

Results

A total of 249 older persons (aged 60 years and above) were approached for the study of which four did not consent. Socio-demographic details of 245 consented participants like age, gender, socioeconomic class, marital status, current employment status and number of meals taken alone on a day are given in Table 1. Mean age of the study participant was 70.6 years with SD of 7.4 years.

Morbidities were reported by 216 (88.2%) participants. Among the participants, 97 (39.6%) had diabetes mellitus and 141 (57.6%) had hypertension. Among the participants, 178 (72.7%) had impaired mobility, 148 (60.4%) had vision impairment and 74 (30.2%) had hearing impairment. Symptoms in oral cavity (dryness, pain) were reported by 128 (52.2%) participants. There were 70 (28.6%) who had history of tobacco smoking, 72 (29.4%) who had alcohol use and 46 (18.8%) who had history of tobacco chewing.

Among the participants, 96 (39.2%) were totally independent, 101 (41.2%) had only intermediate scores for dependency in any domain and 48 (19.6%) had worst score for dependency in any domain of Basic Activities of Daily Living (BADL). There were 97 (39.9%) screened positive for depression (score > 7) by Geriatric Depression Scale – 15 (GDS-15).

The flow chart for Mini Nutritional Assessment is shown in Figure 1. Three participants were assessed by Mini Nutritional Assessment – Short Form (MNA-SF) alone as they could not be weighed – two were found to be malnourished and one was found to be at risk of malnutrition. The final nutritional status by MNA is shown in Table 2. The minimum and maximum screening scores respectively were 0 and 14 in MNA-SF and 2 and 29.5 in Mini Nutritional Assessment – Long Form (MNA-LF). The prevalence of malnutrition in the community by MNA was 14.3% (95% CI – 9.9% to 18.7%) and 44.1% (95%CI – 37.9% to 50.3%) were at risk of malnutrition.

Among socio-demographic characteristics, age, marital status [Table 3]; among morbidity characteristics, GDS-15 score, dependency in BADL, oral cavity symptoms [Table 4]; and among substance abuse, tobacco chewing were the variables associated with malnutrition (p-value < 0.05) in bivariate analysis [Table 4]. Gender, socioeconomic status, taking meals alone; self-reported morbidity status; tobacco smoking and alcohol use were not associated with malnutrition.

Variables which had *P* value < 0.20 were considered for multivariate analysis [Table 5]. Older-old persons had significantly higher risk (adjusted Odds Ratio (aOR) - 3.36) of malnutrition compared to old-old. Persons who had GDS-15 score suggestive of depression (GDS > 7) had a significantly higher risk (aOR-4.86) for malnutrition. Those who had worst score for dependency in any domain of Basic Activities of Daily Living (BADL), had a significantly higher risk of malnutrition (aOR-2.94).

Discussion

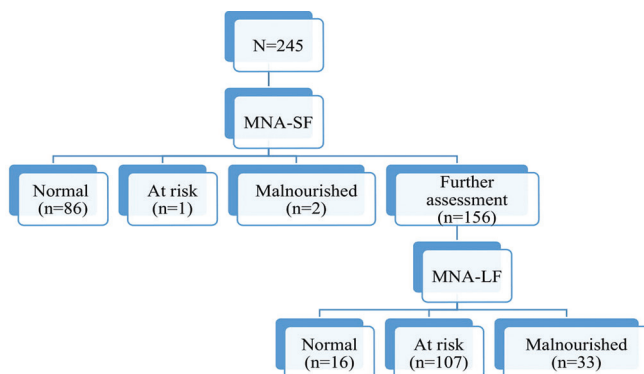In this study, prevalence of malnutrition among older persons was 14.3% (95% CI - 9.9% to 18.7%). Older-old, screened positive for depression and those with worst score for dependency in any domain of Basic Activities of Daily Living (BADL) had an independent risk for malnutrition. Marital status, oral cavity symptoms and history of tobacco chewing had only a confounding association with malnutrition.

Similar prevalence of malnutrition were reported from Pathanamthitta district in south Kerala and Thrissur district in central Kerala, which were 11.6% and 12% respectively.[19,20] Studies from Puducherry, Tamil Nadu and Assam had comparable prevalence of malnutrition.[12,21,22] Another study from Tamil Nadu had a zero prevalence of malnutrition which could be attributed to the predominance of young-old persons and low rate of dependency among the sample population.[23] In a recently published systematic review of cross sectional studies in India, pooled prevalence of malnutrition in meta-analysis was 10.36% (95% CI: 7.56% to 13.47%) in old age home/community settings.[24] A study from rural Iran had comparable prevalence of malnutrition.[7] Higher prevalence was reported from a study in Bangladesh.[25] Studies from high income countries had very low prevalence of malnutrition.[26]

Increasing age is a known risk factor for malnutrition.[21,22] Probably there was a healthy survivor effect in this study as oldest-old did not have an independent association with malnutrition. Primary care physicians may focus screening of older-old adults (70 to 79 years) to pick up malnutrition

Table 1: Socio-demographic characteristics of participants

Variables		Frequency	Percentage
Age (in years)	Old-old (60-69)	121	49.4%
	Older-old (70-79)	85	34.7%
	Oldest-old (≥80)	39	15.9%
Gender	Male	105	42.9%
	Female	140	57.1%
Socioeconomic Class	Lower - Lower	28	11.4%
	Upper - Lower	153	62.5%
	Lower - Middle	34	13.9%
	Upper - Middle	27	11.0%
	Upper	3	1.2%
Marital status	Currently married	144	58.8%
	Widow/Widower	99	40.4%
	Unmarried	2	0.8%
Current Employment status	Employed	49	20.0%
	Unemployed	196	80.0%
Number of meals taken alone on a day	All	117	47.8%
	Some	61	24.9%
	None	67	27.3%

Figure 1: Flow chart of Mini Nutritional Assessment of study participants

Table 2: Distribution of Mini Nutritional Assessment by Gender

Category	Malnourished		At risk		Normal	
	n	%	n	%	n	%
Male (n=105)	12	11.4%	44	41.9%	49	46.7%
Female (n=140)	23	16.4%	64	45.7%	53	37.9%
Total (n=245)	35	14.3%	108	44.1%	102	41.6%

Table 3: Socio-demographic factors associated with Malnutrition

Variables		n (%)		Bi-variate analysis	
		Malnourished	Not malnourished	P*	OR (95% CI)
Age	Oldest-old	10 (25.6%)	29 (74.4%)	0.001*	4.81 (1.55-15.42)
	Older-old	17 (20.0%)	68 (80.0%)	0.004*	3.51 (1.35-9.93)
	Old-old	8 (6.6%)	113 (93.4%)	-	1
Gender	Male	12 (11.4%)	93 (88.6%)	0.268	0.66 (0.31-1.39)
	Female	23 (16.4%)	117 (83.6%)		
Marital status	Widowed/unmarried	20 (19.8%)	81 (80.2%)	0.039*	2.12 (1.03-4.38)
	Married	15 (10.4%)	129 (89.6%)		
Current employment status	Unemployed	29 (14.8%)	167 (85.2%)	0.648	1.24 (0.47-3.19)
	employed	6 (12.2%)	43 (87.8%)		
Socio-economic class	Lower	29 (16.0%)	152 (84.0%)	0.191	1.84 (0.73-4.67)
	Upper/Middle	6 (9.4%)	58 (90.6%)		
Number of meals taken alone	All	19 (6.2%)	98 (83.8%)	0.403	1.36 (0.66-2.78)
	Some/none	16 (12.5%)	112 (87.5%)		

*P<0.05 considered as significant, OR - Odds Ratio, aOR - adjusted Odds Ratio, CI - Confidence interval

Table 4: Morbidity characteristics and Substance Abuse Associated with Malnutrition

Characteristics		n (%)		Bivariate analysis	
		Malnourished	Not Malnourished	P	OR (95% CI)
Self-reported morbidity status	Any morbidity	33 (15.3%)	183 (84.7%)	0.226†	2.43 (0.55-10.73)
	No morbidity	2 (6.9%)	27 (93.1%)		
Geriatric Depression Scale	GDS >7	25 (25.8%)	72 (74.2%)	<0.001*	5.99 (2.57-13.95)
	GDS ≤7	8 (5.5%)	138 (94.5%)		
Functional status on Barthel Index	Worst score	15 (31.2%)	33 (68.8%)	<0.001*	4.02 (1.87-8.65)
	Independent/intermediate	20 (10.2%)	177 (89.8%)		
Oral cavity symptoms	Present	24 (18.8%)	104 (81.2%)	0.044*	2.22 (1.04-4.77)
	Absent	11 (9.4%)	106 (90.6%)		
History of tobacco smoking	Present	9 (12.9%)	61 (87.1%)	0.686	0.84 (0.37-1.91)
	Absent	26 (14.9%)	149 (85.1%)		
History of tobacco chewing	Present	13 (28.3%)	33 (71.7%)	0.003*	3.17 (1.45-6.91)
	Absent	22 (11.1%)	177 (88.9%)		
History of alcohol use	Present	8 (11.1%)	64 (88.9%)	0.359	0.676 (0.29-1.57)
	Absent	27 (15.6%)	146 (84.4%)		

*Statistically significant P, †Chi square test with Yate's continuity correction, OR - Odds Ratio, aOR - adjusted Odds Ratio, CI - Confidence Interval, GDS - Geriatric Depression Scale

Table 5: Independent Association of Factors with Malnutrition

Factors		Association with Malnutrition	
		P	Adjusted odds ratio (95% CI)
Age	Oldest-old Vs. Old-old	0.373	1.731 (0.517-5.794)
	Older-old Vs. Old-old	0.014*	3.358 (1.278-8.823)
Marital status	Widowed/unmarried Vs. Married	0.597	1.256 (0.540-2.921)
Socioeconomic status	Low class Vs. Middle/High class	0.510	0.695 (0.235-2.054)
Score on Geriatric Depression Scale	Suggestive of depression Vs. Others	0.001*	4.859 (1.874-12.601)
Functional status in any domain (Barthel Index)	Worst score Vs. Others	0.020*	2.940 (1.184-7.299)
Chewing/Swallowing difficulties	Present Vs. Absent	0.441	1.449 (0.564-3.723)
Habit of tobacco chewing	Ever Vs. Never	0.119	2.050 (0.832-5.055)

*Statistically significant P.

for a higher yield. Age was not associated with malnutrition in a study from Japan.[27] In some of the studies, gender was not associated with malnutrition.[27] and contrastingly there were studies which showed an association.[7,22,28] Widowed/unmarried status was associated with malnutrition in a study from an urban area.[29]

The factors such as unemployment,[7] low socioeconomic status,[29] low literacy, low family income,[19] low education and low occupational status which could be associated with malnutrition,[7] were not significant in this study. This may be probably due to achievements of social security schemes in Kerala.[28]

In a study, older persons who take meals alone were found to be malnourished unlike in this study.[28] Depression is a risk factor for malnutrition in old age.[26,27] Dependency in BADL was a risk for malnutrition.[22] Both of these associations were demonstrated in this study also. Family physicians will come across older persons with dependency or depressive symptoms in practice. These are two aspects which family members also can pick up. These can be used as quick pointers to pick up individuals to be screened for malnutrition in busy out-patient clinics. A study reported dependency in BADL was not associated with malnutrition as the assessment was limited to only one domain.[29] Symptoms in oral cavity and swallowing difficulties were associated with malnutrition in some studies[22,27] and in one study the same was not seen.[28] Tobacco chewing which is a practice adopted by poorer sections of society to stave off hunger,[30] was associated with malnutrition in this study.

The strength of the study was the use of validated tools which enabled comparison with a number of studies. This study was done in southern most district in Kerala hence, may not be representative of the entire state.

Conclusions

Prevalence of malnutrition among community dwelling older adults in the rural area of Nemom block panchayath is similar to the estimates reported from other parts of Kerala. More than one-tenth of older adults in rural areas of Kerala are malnourished. Older-old (70-79 years) are more likely to become malnourished. Dependency in basic activities of daily living and depression are factors associated with malnutrition. These attributes may be used to pick up older adults to screen for malnutrition.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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