

Original Research Article

**A PREVALENCE STUDY ON MALNUTRITION AMONG ELDERLY PERSONS OF KANCHEEPURAM DISTRICT IN TAMILNADU**

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**Abstract**

**BACKGROUND:** Under nutrition is still a major problem and elderly are highly vulnerable and are often neglected. Early diagnosis and timely intervention can arrest malnutrition at its incipient stage, so as to enable healthy and active ageing. **OBJECTIVES:** To estimate the burden of malnutrition and its associated factors among the elderly. **MATERIALS AND METHODS:** A community based cross sectional study was done among 487 elderly (60 years and above) in randomly selected areas of Kancheepuram district in 2016. Data was collected using an interview based questionnaire and nutritional assessment using Mini Nutrition Assessment and depression using Geriatric Depression Scale – Short Form. **RESULTS:** About 47.4% were at risk of malnutrition and 2.9% were malnourished. The proportion of malnutrition and at risk of malnutrition increases significantly with increasing age, female gender, who were single, widow and widower, who had no formal education, financially dependent only on Old Age Pension Scheme, living alone, belonging to lower socio economic class and with co-morbid conditions. Logistic regression revealed that the risk of developing malnutrition and at risk of malnutrition is significantly higher with increasing age (OR 2.35, CI – 1.28 - 4.32), female gender (OR 2.58, CI – 1.61 - 4.14), Depression (OR 6.02, CI – 3.9 to 9.3), Lower socio economic status (OR 3.99, CI – 2.48 - 6.4), Tobacco abuse (OR 2.38, CI – 1.18 - 4.79) and Arthritis (OR 1.99, CI – 1.05 - 3.78). **CONCLUSION:** A comprehensive nutritional screening is needed for elderly in the primary health care setting through geriatric clinics and nutritional screening may be done as part of NCD (Non Communicable Disease) Programme. Nutritional support for the elderly could be provided through existing ICDS (Integrated Child Development Scheme) centers.

**KEYWORDS:** At risk of malnutrition, Elderly, Malnutrition.

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**Introduction**

Malnutrition is a major problem worldwide. Children, Pregnant mothers and Elderly are vulnerable to malnutrition due to physiological and functional changes. The intervention programs are directed towards children and pregnant mothers and often elderly people are neglected.<sup>(1)</sup> But there has been a substantial rise in elderly population globally. In 2001, the proportion of older people was 7.7%

which increased to 8.14% in 2011 and projected to be 8.94% in 2016.<sup>(2)</sup> Apart from malnutrition, the elderly suffer from multiple morbidities either communicable or non –communicable which worsens the nutritional status and in turn the nutritional status worsens the co-morbid conditions.<sup>(1)</sup>

The physiological changes of ageing like limited mobility, sensory impairment negatively affects the nutritional status. In contrast to younger age group,

the energy needs decreases with age but the need of nutrients remains the same which further increases the risk of malnutrition among elderly.<sup>(3)</sup> Restriction in the diet due to co-morbid conditions creates disinterest in food intake along with decreased physical activity and a progressive decrease in lean body mass impairs immunity which further increases the risk.

Not only the physiological changes, the psychological and environmental changes like isolation, depression and inadequate finances added on the risk.<sup>(4)</sup> At the global level, nearly half of all people who have reached statutory pensionable ages do not receive a pension, and for many of those who do receive a pension, the levels of support is still inadequate. In 2015, 30 per cent of men and 15 per cent of women who are 65 years or over were active in the labour force and this is more in the developing countries<sup>(5)</sup> making elderly more vulnerable to undernutrition.

Under nutrition is a public health problem among elderly which rises the mortality and morbidity by increasing the susceptibility to infection, increased risk of falls due to progressive depletion of lean body mass, increases the chances of hospitalization, longer stay in hospitals due to delayed recovery.<sup>(6)</sup> Malnutrition is associated with diminished cognitive function, the ability to care for one's self and limits mobility among elderly. Hence malnourished elderly needs health care and social services often posing a burden on caregivers and economic cost to society and to the country.<sup>(7)</sup>

Evaluation of nutritional status is important among elderly and early diagnosis and timely intervention can arrest malnutrition at its incipient stage to improve the health status of elderly for a healthy and active ageing which is our ultimate goal. Hence this study focus on the nutritional status of elderly and the presence of co-morbid conditions like diabetes, hypertension, chronic kidney disease, stroke etc., along with depression as malnutrition is a presenting symptom of depression in elderly.

## Methodology

This was conducted as a community based cross sectional study among elderly (60 years and above) in selected areas in Kancheepuram district of Tamil

Nadu from April 2016 to September 2016. The study was approved by the Institutional Ethics Committee of Madras Medical College vide IEC No:24062016.

## Study procedure

The study procedure involved mapping of all villages in rural area and electoral wards in urban area of Kancheepuram. The areas were selected by simple random sampling technique and the individuals were selected from the household list available with the health nurse. Elderly who are resident and willing were enrolled in the study. Those not available on two consecutive visits and critically ill were excluded. Data was collected on an interview basis and the questionnaire had socio – demographic details, history of co-morbid conditions, anthropometry, nutritional assessment and depression scale. Each participant was given a brief introduction about the study and informed written consent was obtained from all participants (In illiterate elders, a thumbprint was taken in front of witnesses). Relevant information was obtained from the respondent using the Tamil version of the questionnaire at their homes. Questions were read out to the study subjects in exactly the same order as listed in the questionnaire and sufficient time was given to the subjects to respond. If the study subject haven't understood the question, the question was repeated in the same manner without probing for the answer. After completing the questions and viewed the health records based on the availability, anthropometry were measured.

The socio – demographic details included the name, age, sex, residence, religion, marital status, educational status, occupation, economic status, type of family, income of the family and total number of family members, Diet and Drug abuse. The details of co-morbid conditions were elicited from the history and the medical records available. Anthropometric tools: weighing machine (Weight measurement), stadiometer (Height measurement), measuring tape (Mid upper arm circumference, waist circumference, Hip circumference & Calf circumference measurement).

Nutritional assessment was done with Mini Nutritional Assessment (MNA) of Nestle Nutrition Institute which is a validated tool. Apart from Body

Mass Index (BMI), the mid – arm circumference and calf circumference were measured – easy and useful tool as a marker of malnutrition among elderly.<sup>(8)</sup> The mid upper arm circumference (MUAC) is a simple and valid measurement of thinness than BMI and have a strong association with mortality among elderly.<sup>(9)</sup> MNA has 18 questions to assess dietary intake, global indicators, anthropometric measurements (BMI, MUAC, Calf circumference (CC)) and self- perception on one’s own nutritional status. MNA classification is based on scores: Scores of 24 – 30 are considered Normal; 17 – 23.5 indicate at risk of malnutrition; Less than 17 points indicate Malnutrition. The questions were probed using MNA guide.<sup>(10)</sup> The original validation study on the full MNA demonstrated the MNA had a sensitivity of 96%, specificity of 98% and positive predictive value of 97% compared to clinical status.<sup>(11)</sup> The presence of depression was assessed using Geriatric Depression Scale – Short Form (15 questions). Scores of 0-4 are considered normal.<sup>(12)</sup> The Tamil version by Cynthia Swarnalatha Sriekavan of the University of Manitoba, Canada was used.<sup>(13)</sup> The GDS was found to have a 92% sensitivity and 89% specificity when evaluated against diagnostic criteria.<sup>(14)</sup>

**Data analysis:** The responses were verified twice, entered and analyzed using IBM SPSS version 16.0. The descriptive and inferential statistics of the responses to the questions were calculated. A two tailed p value of <0.05 was considered as statistically significant.

## Results

A total of 500 participants were approached and after excluding for non- respondents and partial responses – 487 were enrolled in the study. The mean age (S.D) was 65.47 (5.7) years. Young old (60-69 years) were 81.7%, Middle old (70-79 years) were 14.2% and Very old (80 years and above) were 4.1%.

Participants with normal nutritional status were 49.7%, 47.4% were at risk of malnutrition and 2.9% were malnourished (undernourished). The association of nutritional status and socio – demographic factors are shown in table 1 and 2. The

**Table 1: Association between nutritional status and socio – demographic factors**

Variables	Normal Nutrition Status N = 242	At risk of Malnutrition N = 231	Malnourished N = 14	Total N- 487	p - Value
<b>Residence</b>					
Rural	111 (44.8%)	127 (51.2%)	10 (4%)	248	<b>0.042*</b> χ <sup>2</sup> = 6.350 df = 2
Urban	131 (54.8%)	104 (43.5%)	4 (1.7%)	239	
<b>Age Category</b>					
Young old	207 (52%)	186 (46.7%)	5 (1.3%)	398	<b>0.001*</b> (Fisher exact)
Middle old	29 (42%)	35 (50.7%)	5 (7.2%)	69	
Very old	6 (30%)	10 (50%)	4 (10%)	20	
<b>Gender</b>					
Male	137 (62.6%)	76 (34.7%)	6 (2.7%)	219	<b>0.001*</b> χ <sup>2</sup> = 26.876 df = 2
Female	105 (39.2%)	155 (57.8%)	8 (3%)	268	
<b>Marital Status</b>					
Currently married	192 (59.1%)	126 (38.8%)	7 (2.2%)	325	<b>0.001*</b> (Fisher exact)
Widow	30 (25.9%)	81 (69.8%)	5 (4.3%)	116	
Widower	13 (35.1%)	23 (62.2%)	1 (2.7%)	37	
Separated	2 (100%)	0 (0)	0 (0)	2	
Single	5 (71.4%)	1 (14.3%)	1	7	
<b>Educational Status</b>					
No formal education	61 (33.3%)	115 (62.8%)	7 (3.8%)	183	<b>0.001*</b> (Fisher exact)
Primary education	59 (48.8%)	60 (49.6%)	2 (1.7%)	121	
Secondary education	31 (47%)	32 (48.5%)	3 (4.5%)	66	
Higher Secondary education	48 (67.6%)	22 (31%)	1 (1.4%)	71	
Diploma / Degree	43 (93.5%)	2 (4.3%)	1 (2.2%)	45	
<b>Occupational Status</b>					
Not working	120 (44.1%)	140 (51.5%)	12 (4.4%)	272	<b>0.001*</b> (Fisher exact)
Unskilled worker	42 (41.2%)	60 (58.8%)	0 (0)	102	
Semi - skilled worker	12 (52.2%)	9 (39.1%)	2 (8.7%)	23	
Skilled worker	9 (75%)	3 (25%)	0 (0)	12	
Shop owner / Land lord	56 (74.7%)	19 (25.3%)	0 (0)	75	
Professional	3 (100%)	0 (0)	0 (0)	3	
<b>Dependency Status</b>					
Independent	156 (61.2%)	95 (37.3%)	4 (1.6%)	255	<b>0.001*</b> (Fisher exact)
Dependent on Family members	82 (39%)	124 (59%)	4 (1.9%)	210	
Dependent only on OAP**	4 (18.2%)	12 (54.5%)	6 (27.3%)	22	
<b>Living Status</b>					
Living with Spouse	103 (65.2%)	53 (33.5%)	2 (1.3%)	158	<b>0.001*</b> (Fisher exact)
Living with Children	119 (44.7%)	141 (53%)	6 (2.3%)	266	
Alone	20 (31.7%)	37 (58.7%)	6 (22.9.5%)	63	

\*- p value – Significant. \*\*- Old Age Pension from Government. df – Degree of freedom

**Table 2: Association between nutritional status and socio – economic status and other associated factors**

Socio Economic Status					
Upper class	78 (79.6%)	19 (19.4%)	1 (1%)	98	0.001* (Fisher exact)
Upper middle class	53 (63.9%)	29 (34.9%)	1 (1.2%)	83	
Middle class	44 (40.7%)	61 (56.5%)	3 (2.8%)	108	
Lower middle class	56 (34.8%)	97 (60.2%)	8 (5%)	161	
Lower class	11 (29.7%)	25 (67.6%)	1 (2.7%)	37	
Diet					
Mixed diet	186 (46.3%)	206 (51.2%)	10 (2.5%)	402	0.001* (Fisher exact)
Vegetarian diet	56 (65.9%)	25 (29.4%)	4 (4.7%)	85	
Tobacco Abuse					
Yes	22 (37.3%)	35 (59.3%)	2 (3.4%)	59	0.091 (Fisher exact)
No	220 (51.4%)	196 (45.8%)	12 (2.8%)	428	
Alcohol Abuse					
Yes	28 (54.9%)	22 (43.1%)	1 (2%)	51	0.842 (Fisher exact)
No	214 (49.1%)	209 (47.9%)	13 (3%)	436	
Body Mass Index					
Underweight	4 (14.8%)	19 (70.4%)	4 (14.8%)	27	0.001* (Fisher exact)
Normal	128 (49.2%)	124 (47.7%)	8 (3.1%)	260	
Overweight / Obese	110 (55%)	88 (44%)	2 (1%)	200	
Waist – Hip ratio					
Normal	25 (44.6%)	29 (51.8%)	2 (3.6%)	56	0.625 (Fisher exact)
Increased	217 (50.3%)	202 (46.9%)	12 (2.8%)	431	

\*- p value – Significant. df – Degree of freedom.

proportion of malnutrition and at risk of malnutrition is increased significantly in elderly of increasing age, female gender, rural residents, who were single, widow and widower, who had no formal education, financially dependent only on Indira Gandhi National Old Age Pension Scheme, living alone (table 1) and who belongs to lower socio economic class (table 2).

The proportion of malnutrition and at risk of malnutrition increases significantly with co – morbid conditions like Diabetes, Hypertension, Chronic Kidney Disease, Stroke, Depression etc., and also malnutrition increases as co – morbidities increases and is shown in Table no:3

**Multi variate analysis:**In Logistic regression, the individuals were divided into two groups – well-nourished and at risk of malnutrition / Malnourished. After adjusting for other factors it revealed that the

**Table 3: Association of nutritional status and Co-morbid conditions**

Variables	Normal Nutrition Status N = 242 (49.7%)	At risk of Malnutrition N = 231 (47.4%)	Malnourished N = 14 (2.9%)	Total N- 487	p - Value
Depression					
Yes	60 (25.6%)	163 (69.7%)	11 (4.7%)	234	0.001* $\chi^2= 104.563$ df = 2
No	182 (71.9%)	68 (26.9%)	3 (1.2%)	253	
Diabetes					
Yes	108 (54%)	81 (40.5%)	11 (5.5%)	200	0.002* $\chi^2= 12.843$ df = 2
No	134 (46.7%)	150 (52.3%)	3 (1%)	287	
Hypertension					
Yes	92 (46.9%)	93 (47.4%)	11 (5.6%)	196	0.011* $\chi^2= 9.051$ df = 2
No	150 (51.5%)	138 (47.4%)	3 (1%)	291	
Chronic Kidney Disease					
Yes	0 (0)	5 (83.3%)	1 (16.7%)	6	0.015* (Fisher exact)
No	242 (50.3%)	226 (47%)	13 (2.7%)	481	
Stroke					
Yes	0 (0)	3 (75%)	1 (25%)	4	0.017* (Fisher exact)
No	242 (50.1%)	228 (47.2%)	13 (2.7%)	483	
Arthritis					
Yes	24 (35.3%)	42 (61.8%)	2 (2.9%)	68	0.028* (Fisher exact)
No	218 (52%)	189 (45.1%)	12 (2.9%)	419	
COPD					
Yes	4 (36.4%)	4 (36.4%)	3 (27.3%)	11	0.005* (Fisher exact)
No	238 (50%)	227 (47.7%)	11 (2.3%)	476	
Tuberculosis					
Currently on ATT	0	1 (100%)	0	1	0.16 (Fisher exact)
Old Cases	0	4 (100%)	0	4	
No	242 (50.2%)	226 (46.9%)	14 (2.9%)	482	
Ischemic Heart Disease					
Yes	18 (56.3%)	13 (40.6%)	1 (3.1%)	32	0.588 (Fisher exact)
No	224 (49.2%)	218 (47.9%)	13 (2.9%)	455	
Cancer					
Yes	0	5 (100%)	0	5	0.047* (Fisher exact)
No	242 (50.2%)	226 (46.9%)	14 (2.9%)	482	
No. of Co - morbidities					
0 or 1	106 (43.1%)	138 (56.1%)	2 (0.8%)	246	0.001* (Fisher exact)
More than one	136 (56.4%)	93 (38.6%)	12 (5%)	241	

\*- p value - Significant. df – Degree of freedom

**Table 4:Independent risk factors for the risk of developing malnutrition and at risk of malnutrition**

Variables	B	S.E	Wald	df	Sig	Exp(B)	95% C.I for Exp(B)	
							Lower	Upper
Age	0.855	0.31	7.602	1	0.006	2.352	1.281	4.321
Gender	0.948	0.241	15.485	1	0.001	2.58	1.609	4.137
Socio – economic status	1.383	0.242	32.72	1	0.001	3.986	2.482	6.401
Tobacco abuse	0.866	0.358	5.847	1	0.016	2.376	1.178	4.793
Arthritis	0.687	0.327	4.402	1	0.036	1.988	1.046	3.776
Depression	1.795	0.222	65.417	1	0.001	6.017	3.895	9.295

risk of developing malnutrition and at risk of malnutrition depends on increasing age (OR 2.35 times, CI – 1.28 to 4.32), female gender (OR 2.58 times, CI – 1.61 to 4.14), Lower socio economic status (OR 3.99 times, CI – 2.48 to 6.4), Tobacco abuse (OR 2.38 times, CI – 1.18 to 4.79), Depression (OR 6.02 times, CI – 3.9 to 9.3) and Arthritis (OR 1.99 times, CI – 1.05 to 3.78) shown in table 4.

### Discussion

In the present study, malnutrition was determined using MNA among elderly. The prevalence of malnourished in our study was 2.9% which is lower than studies done in rural Tamilnadu – 14%<sup>(15)</sup>, in Assam - 15%<sup>(1)</sup>, in urban area of Coimbatore - 19.47%<sup>(16)</sup>, in Dehradun- 20.83%<sup>(17)</sup> and the prevalence of malnutrition in our study is higher when compared to a study of rural Tamilnadu, where no one was malnourished.<sup>(18)</sup> In our study, the proportion of elderly at risk of malnutrition was 47.4% which is corroborated with some studies<sup>(15,17)</sup> and lower prevalence of at risk of malnutrition was shown by few studies.<sup>(16,18)</sup> According to BMI, 5.8% were underweight, 32.5% overweight and 8.1% were obese in our study. The proportion of obesity in our study corroborates with a study<sup>(17)</sup>, but the proportion of underweight in our study is lower than these studies.<sup>(17,19)</sup> This may be due to the difference in life style and socio economic status.

The proportion of malnutrition increases with age in our study, which is consistent with some studies<sup>(1,15)</sup> and females are more affected than males in our study which is supported by some studies<sup>(1,20)</sup> but, no gender association was seen in another study.<sup>(15)</sup>

Among the social factors, lower socio economic status compared to upper class, single/ widow/ widower compared to married, people depending only on government old age pension scheme as financial assistance, living alone were significantly associated with at risk of malnutrition/ malnutrition. This implies that the nutritional status depends on multiple factors which is again supported by some studies.<sup>(1,15,16)</sup>

Malnutrition and at risk of malnutrition were significantly associated with co-morbid conditions like diabetes, hypertension, chronic kidney disease, stroke, arthritis, COPD, cancer and depression. The association of depression and malnutrition is supported by few studies.<sup>(20,21)</sup> No significant association was seen with current alcohol consumption, increased medications and increasing number of co-morbidities in our study and this is supported by a study.<sup>(16)</sup>

In logistic regression analysis, the independent risk factors associated with the risk of malnutrition and at risk of malnutrition were increasing age, female gender, lower socio economic status, tobacco abuse, arthritis and presence of depression. The association of increasing age, depression with malnutrition is supported by some studies.<sup>(20,21)</sup>

### Conclusion

In this community based study, half of elderly people are at risk of malnutrition. It is evident that the causes are multifactorial. There was a significant association between malnutrition in the elderly and increasing age, female gender, lower socio economic status, financial dependency and substance abuse. Co-morbidities like depression and arthritis also have a significant negative effect on the nutritional status of the elderly.

These findings warrant for a comprehensive nutritional screening for elderly along with mental health services and health education in the primary health care settings, with proper referral and rehabilitative services must be ensured.

### Limitations of the study

Co- morbidities were self – reported or medical report based. Bio – chemical markers were not studied to assess malnutrition.

Malnutrition among depressed is high but it's a chicken-and-egg phenomenon which could not be explained in this study.

### Recommendations

Geriatric clinics may be set up at primary health centers and nutritional screening may be done as part of NCD (Non Communicable Disease) Programme. Nutritional support for the elderly belonging to BPL (Below Poverty Line) families could be provided through existing ICDS(Integrated Child Development Scheme) centers.

Further research is needed to develop appropriate guidelines for nutritional screening and interventional programs among geriatric population.

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