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Original Research Article

Nutritional Status and Functional Ability of the Elderly in Rural Area of South India: A Cross Sectional Study

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ABSTRACT

Background: India has a rapidly increasing population of elderly persons. Currently 8% of the total population is aged 60 years and above, estimated to rise to 12% by 2025. Nutritional problems among the elderly are underestimated even though highly prevalent.   Depression is also common which is highly underestimated by health professionals.

Objective: It was to study the nutritional status and to assess the functional ability among the elderly in Mugalur Subcentre of Sarjapur PHC, Bangalore Urban District, Karnataka.

Methodology: It was a cross sectional study done in 8 villages under using systematic random sampling method. The tools used were Mini Nutritional Assessment Questionnaire for nutritional status and Anthropometry Katz Index of ADL, Lawton's IADL scale, Geriatric Depression Scale, Get up and go test, Whisper test for functional status. It was followed by a general Physical Examination. Data was entered in Microsoft Excel and analysed using SPSS V.20.

Results: 181 elderly were interviewed with 58% males and 42% females in the study area. The prevalence of malnutrition was found to be 60.2%. 97% were partially dependent for ADL with 55% being freely mobile and 16% screened positive for depression. There was a   significant association (p<0.05) between nutritional status and age, chronic co-morbidities.

Conclusion: There was a high prevalence of poor nutritional status and impaired functional ability among the study population. High priority needs to be given to adequate nutrition of the elderly thereby improving their quality of life.

Key words: Mini nutritional Assessment, KATZ ADL, IADL, Geriatric Depression Scale.

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INTRODUCTION

The demographics of the global human population has been changing drastically with the fraction of individuals >60 years increased from 9.2% in 1990 to 11.7% in 2013 and is projected to reach 21.1% (>2 billion) by 2050.[1] Ageing presents many challenges to society and individuals. Increased average age of the human population presents huge challenges to society. Human quality of life is enhanced by age-appropriate and function-appropriate goals. With gradual and sustained increase in life expectancy, the number of elderly, both relative and absolute, is increasing all over the world.[1] Majority of the world's elderly people (61%) live in developing countries, a proportion that will increase to nearly 70% by 2025.[2] With 1.21 billion population counted in its 2011 census, India is the second most populous

country in the world. The elderly (>60yrs) population currently accounts for 8% of India's national population, translating into approximately 93 million people. By 2050, its elderly population share is projected to rise to 19%, or approximately 323 million people. The elderly dependency ratio will rise dramatically from 0.12 to 0.31, largely as a result of fertility decline and increasing life expectancy.[3]

Diseases can influences and is influenced by the nutritional status and the functional capacity of an individual.[4] Previous studies done in rural area of India found the prevalence of malnutrition among elderly to be nearly 33%.[5] With ageing of the population, the number of frail elderly is increasing. Frailty is more often seen in patients aged 75 and above who have cognitive or physical

impairments that interfere with the performance of their activities of daily living.[6] Elderly people can make an invaluable socio-economic contribution to the society. They do help with special family work such as caring for young children, food preparation and looking after animals.

This helps in freeing younger people for other productive activities.[7] Nutritional status and the functional ability among the elderly, especially from poorer sections of the developing countries, has to be assessed to facilitate the able functioning of the elderly.

In view of this the present study is aimed to assess the nutritional status and functional ability of the elderly in rural area of Karnataka. There is also a paucity of scientific data with regards to nutritional assessment in the geriatric population and their functional ability in the study area. The outcome of the study is to quantify important variables with regards to nutrition and functional ability in the elderly. This will help future studies and also make way for better policy making & health care in the geriatric population. The study was thereby conducted with the primary objective of assessment of the nutritional status among the elderly in rural Sub health-centre of a Primary Health Centre in Bangalore Urban District, Karnataka and also to assess the functional ability of the elderly population and it's association to the nutritional status.

MATERIALS AND METHODS
Elderly (>60 yrs) belonging to eight villages under the Sub-health centre of the rural field practice area of Department of Community health of St. John's Medical College Hospital were taken as the study area. Cross sectional study design was used.

Sample size and sampling method: The sample size was calculated using the formula $n = z^2pq/d^2$, where n is the sample size, p is the prevalence, q is $1-p$, and d is the absolute precision. A total of 181 elderly person participated in the studyThe sample comprised of individuals whose age was ≥ 60 years and residing in villages under the Mugalur sub- health center for a period of more than one year. Systematic random sampling method was used to select the study group with the individual elderly considered as the sampling unit..

Tools: The following tools were used: Mini Nutritional Assessment Questionnaire[8], Katz Index of Independence in Activities of daily living[9], the Lawton Instrumental activities of daily living scale[10], Geriatric Depression scale[11], Timed Get up & go test[12] and a general physical examination.

Data collection: This study was conducted from March- July 2013. A list of all the elderly (age > 60 yrs) in the 8 villages under the Mugalur Sub Centre was made. The number of elderly to be interviewed & examined in each village was calculated using Population proportional to size (PPS). Systematic random sampling method was used to select the houses by calculating sampling interval for each village, starting from the centre, a direction was chosen randomly. In the event of a household having more than one elderly, only one elderly was chosen randomly irrespective of gender. In the event of a house being locked, the house was visited on two other occasions. If it was still found to be locked, an elderly from the adjacent house was interviewed. A written informed consent was obtained from the participant prior to the interview, after explaining about the study, in a language understood by the participant. Data was collected using initial interview Schedule for socio demographic details, history of co morbidities, habits. The nutritional status was assessed using the Mini nutritional assessment questionnaire. The blood pressure was recorded and anthropometric measurements i.e. height, weight, calf circumference and mid upper arm circumference were taken. A general physical and head to toe examination was carried out to look for signs of nutritional deficiency. Screening for visual and hearing impairment was also done. The activities of daily living was assessed using the KATZ index of activities of daily living and the Lawton's Index of instrumental activities of daily living. A psychiatric assessment to look for the prevalence of depression in the elderly was carried out using the Geriatric depression scale. The mobility was assessed using the timed get up & go test.

Analysis of Data: The data was entered into Microsoft Excel 2007 and analyzed using SPSS version 16. The data was analyzed for percentages, mean and standard deviation. The tests of significance used were Analysis of Variance (ANOVA) and Independent t test. A p value of <0.05 was considered significant.

Table 1: Baseline demographic data of the population(n=181)

Demographic data		No. of Persons (%)
Age Group	**Young- Old (60-69 years)**	**98(54)**
Mean: 69.7(Sd+7.96 yrs);	**Old (70- 79 years)**	56(31)
Median: 68; **Range:**60-100	**Old-Old (≥80 years)**	27(15)
Sex	**Female**	**104(57)**
	Male	77(43)
Occupation	**Not gainfully employed**	**116(64)**
	Agriculture	38(21)
	Coolie/ Labourer	18(10)
	Shop Owner	3(1.5)
	Business	5(3)
	Others	1(0.5)
Education	**Illiterate**	**141(78)**
	Primary	21(12)
	Secondary	11(6)
	PUC	6(3)
	Degree	1(1)
Socio- economic status (n=79)	**Lower**	**42(54)**
	Upper Lower	22(29)
	Lower Middle	11(14)
	Upper Middle	3(4)
	High	0(0)

RESULTS

Demographics: The study was conducted in the Mugalur Sub centre of Sarjapur Primary Health Centre (PHC), Bangalore. There are 8 villages under the Mugalur Sub centre which serves a population of approximately 6000 persons and includes 1549 elderly persons. A total of 181 elderly persons were interviewed and assessed. The study group comprised of 58% females and 42% males with a mean age of 68 and a range between 60-100 yrs.(Table.1) The majority belonged to the young old age group (54%), were financially dependent (54%), illiterate (78%) and not gainfully employed (64%).

Prevalence of Malnutrition: In the study population, the prevalence of malnutrition based on the BMI was found to be 60.2%. (Table 2) The prevalence of over nutrition (43.6%) was found to be more than under nutrition (16.6%). Based on the MIS, 3% of the elderly were found to be malnourished with 44% at risk of malnutrition. The MUAC and calf circumference measurements indicated 9% and 28% to be undernourished respectively. Significant pallor was noted in 60% of the elderly subjects. The assessment of the nutritional status in the study population is depicted in table 2.

Table 2: Nutritional status of the population (n=181)

Nutritional Indicator	Male	Female	Total (%)
Body Mass Index(BMI)			
Underweight	15(8)	15(8)	30(17)
Normal	33(18)	39(22)	**72(40)**
Overweight	14(8)	22(12)	36(20)
Obese	15(9)	28(15)	43(23)
Malnutrition Indicator Score(MIS)			
Malnourished	2(1)	4(2)	6(3)
At risk of Malnutrition	30(17)	49(27)	**79(44)**
Normal	45(25)	51(28)	96(53)
Mid Upper Arm Circumference			
Normal	59(33)	64(35)	123(68)
At risk of Malnutrition	15(8)	27(15)	**42(23)**
Undernourished	3(2)	13(7)	16(9)
Mid-Calf Circumference			
Normal	45(25)	85(47)	**130(72)**
Undernourished	32(18)	19(10)	51(28)

Table 3: Assessment of functional ability in the population (n=181)

Functional Ability	Male (%)	Female (%)	Total (%)
KATZ Activities of Daily Living Index			
Fully functional	2(1)	4(2)	6(3)
Moderate Impairment	75(41)	100(56)	**175(97)**
Completely dependent	0	0	0
Lawton Instrumental activities of Daily living Index(Dependence)			
Shopping	51(28)	71(39)	**122(67)**
Food preparation (n=105)	-	49(47)	**49(47)**
Housekeeping (n=105)	-	29(28)	29(28)
Transportation	17(9)	30(17)	47(26)
Medication	12(7)	20(11)	32(18)
Finances	12(7)	39(21)	51(28)
Geriatric Depression			
Normal	70(39)	83(46)	**153(85)**
Depressed	7(4)	21(12)	28(16)
Mobility- Timed get up & go test			
Freely mobile	50(27)	50(27)	**100(55)**
Mostly independent	18(10)	40(22)	58(32)
Variable mobility	6(3)	13(8)	19(11)
Impaired mobility	3(1.5)	1(0.5)	4(2)
Visual Impairment			
Present	24(13)	29(16)	53(29)
Absent	53(29)	75(43)	**128(71)**

Table 4: Socio-demographic factors influencing nutritional status

Socio-demographic factors	N	BMI (Mean ± S.D.)	p value	MIS (Mean ± S.D.)	p value	MUAC (Mean ± S.D.)	p value
Age[1]					**<0.01**		**0.03**
• Young-old	98	22.79 ± 3.2	**0.02**	23.85 ± 2.3		24.81± 3.1	
• Old	56	21.96 ± 4.1		22.73 ± 3.1		24.26± 3.3	
• Old-old	27	20.76 ± 3.5		20.59 ± 3.6		23.04± 3.1	
Sex[2]			0.76		0.43		0.13
• Male	77	21.76 ± 3.4		23.43 ± 3.1		25.30± 3.3	
• Female	104	22.58 ± 3.6		22.71 ± 2.9		23.69± 2.8	
Tobacco use[2]			0.37		**0.03**		**0.02**
• Present	101	21.75 ± 3.6		22.54 ± 3.3		23.91± 2.8	
• Absent	80	22.82 ± 3.4		23.62 ± 2.5		24.96± 3.4	
Co morbidities[2]			0.58		0.97		0.94
• Present	74	22.33 ± 3.5		23.11 ± 3.1		24.57± 3.1	
• Absent	10	21.47 ± 3.4		22.82 ± 3.2		24.24± 3.3	
Mobility[1]			0.14		**<0.01**		**0.01**
• Freely mobile	100	22.72 ± 3.4		23.89 ± 2.4		25.00± 3.2	
• Mostly independent	58	21.89 ± 3.8		22.47 ± 2.9		23.81± 2.9	
• Variable mobility	19	20.96 ± 3.6		20.47 ± 4.1		22.79± 2.9	
• Impaired mobility	4	20.78 ± 2.2		21.12 ± 3.9		24.62± 4.6	
Katz ADL[2]			0.65		0.58		0.92
• Dependent	6	19.12 ± 3.1		19.58 ± 3.6		23.50± 4.0	
• Independent	175	22.34 ± 3.5		23.17 ± 2.9		24.41± 3.2	
Depression[2]			0.78		**<0.01**		0.07
• Present	28	22.32 ± 3.5		21.12 ± 2.9		23.39± 3.2	
• Absent	153	21.75 ± 3.6		23.37 ± 2.6		24.56± 3.1	

1- ANOVA test; 2- Independent sample t test; p value <0.05 is taken as significant

Assessment of Functional Ability

The functional ability (table 3) in the elderly was assessed using the following tools viz. KATZ index of activities of daily living, Lawton Instrumental activities of daily living, Geriatric depression scale, Timed get up and go test (TGUGT) and a general physical examination which helped to assess the visual and hearing capacity in the elderly. According to KATZ index, 97% of the elderly were found to be dependent for activities of daily living. The prevalence of Depression in the elderly was found to be 16%. The TGUGT, a test used to assess the mobility, indicated that thought the majority (55%) were freely mobile, 11 % and 2% of the elderly subjects were found to have variable and impaired mobility respectively. Visual impairment was noted in 29% of the subjects and 67% of the elderly were found to have cataract in either of the eyes. Hearing impairment was noted in 6% of the elderly. The Lawton index was used to assess independence in eight different instrumental activities of daily living. Three of the activities namely food preparation, housekeeping and laundry were exclusively assessed in women. The results of the functional ability assessment in the study population is depicted in the table 3.

Factors influencing nutritional status

The nutritional status in the elderly was found to be significantly influenced by age.(table.4) There was a significant difference in BMI for young old and old old(<0.026) The mid upper arm circumference and the calf circumference also significantly vary with age. The prevalence of chronic co morbidities such as diabetes and hypertension were also found to have an impact on the nutritional status. Pallor was also found to be a significant finding in elderly who were under nourished. It was noted that the calf circumference and mid upper arm circumference measurements are good anthropometric measurements to detect undernourishment in the elderly based on the strong significant associations with nutritional indicators such as BMI and MIS. The study also tried to co relate nutritional status with the functional ability and it was interesting to note that there was no significant association between the KATZ activities of daily living index and BMI (p=0.060) & KATZ ADL and MIS (p= 0.071). However, depression and impaired mobility as gauged by the Geriatric depression scale and the timed get up & go test respectively, was found to significantly contribute towards the nutritional status in the elderly.

DISCUSSION AND CONCLUSIONS

Old age is part of a lifespan; James (1959) defined old age as "regular changes that occur in the mature genetically representative organisms living under representative environmental conditions as they advance in chronological age". Major concern in old age is health. Health problems such as disease and disability not only erode the general wellbeing but also have indirect effects by priming people to have negative perceptions of their health (Jang *et al.*, 2004; Kahana *et al.*, 1995 and Martin *et al.*, 2000).

Chronic illness is endemic among many older people in the developing world, where technical advances in medicine have far outrun the social and economic development which in industrialized countries have enabled disease-free living.[4]

Previous studies done in rural area of India found the prevalence of malnutrition among elderly to be nearly 33%.[5] Physical frailty is defined as dependence in at least one activity of daily living, or cognitive deterioration or decreased outside mobility. The prevalence of frailty is somewhat difficult to determine, but of those living outside of institutions, 5 to 8% of persons over 65 and more than 33% of those over 85, need assistance with at least one basic activity of daily living. Moreover, balance and gait disorders affect 10-15% of elderly patients who thus suffer an increased risk of falling.[6] The lack of functional autonomy to look after one self and to prepare & eat food is a factor that can result in malnutrition and deserves the attention of professionals and family since functional capacity assessment can be an indicator of nutritional risk which is particularly associated with food intake. Depression is also a common disorder among elderly which is highly underestimated by health professionals. It is one of the profound factors which influence functional ability in the geriatric population. In a similar cross-sectional study done among 360 elderly in Boko-Bongaon Block, Assam, India, 15% were found to be malnourished and 55% were at risk of malnutrition[13]. The association between nutritional status and older age group, female gender, dependent functional status, dependent financial status and inadequate calorie intake was found to be significant as in this study. The functional status of the elderly determines their ability to perform basic self care tasks and live independently, which also includes food intake. The association between functional and nutritional status was found to be significant and the corroborated other studies[14-16]. There was significant association between calorie intake and nutritional status. Similar observations were also revealed by Vedantam et al. in their study in South India[17]; the most common reasons cited for inadequate calorie intake were difficulty in chewing and swallowing (59.5%), and loss of appetite (54.2%). The inability of elderly to take decisions about food intake (47.8%), lack of funds (48.4%) lack of awareness (38.4%) were other reasons cited. Physical and financial dependency thus definitely influenced nutritional status[17]. In a similar cross sectional study conducted in Dehradun among elderly it was seen that were independent in their ADLs, with more dependence in the very old elderly with Maximum inability in Bathing and dressing female elderly being more dependent than male (p<0.05).Education and socio-economic status had a positive effect on independence in IADLs. Among all IADLs male elderly showed a maximum dependency for cooking and laundry while females showed a greater dependency in using telephone, managing money and travelling.[18]

In conclusion this study showed that there was a high prevalence of poor nutritional status and impaired functional ability among the study population. High priority needs to be given to adequate nutrition of the elderly thereby improving their quality of life.

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