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Original Research Article

ASSESSMENT OF NUTRITIONAL STATUS AND INFLUENCING FACTORS AMONG ELDERLY IN KAIWARA, RURAL BENGALURU, KARNATAKA OF INDIA

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ABSTRACT

Background: In India, geriatric age group aged ≥60 years constitute 8.3% of the total population. Nutrition of the elderly affects immunity, functional ability and general well being and it constitutes to be an important component of elderly care that warrants further attention. **Objectives:** To assess the nutritional status among elderly. To identify factors influencing nutritional status among elderly. **Materials and Methods:** After obtaining an informed consent from the 211 elderly participants, a house to house survey was done using a semi-structured questionnaire. Details about socio-demographic, morbidity status and the nutritional status and dietary intake, using mini nutritional assessment (MNA) tool.

Results: In rural area 7.1% of the 211 subjects were malnourished and 20.8% were at risk of malnourishment by MNA tool. Multiple logistic regression analysis revealed elderly aged ≥70 years, not married/window/widower/separated, impaired cognition, dependent by Lawton scale and ≥2 self-reported chronic morbidities were found to be independent predictors of risk of malnutrition after adjusting for other variables in study area. **Conclusion:** Prevalence of risk of malnutrition(under-nutrition) is high 27.9% among elderly population living in the rural community. Hence, Public health professionals should develop effective screening strategies to detect at risk of malnutrition among elderly.

Keywords: Elderly, Rural area, Nutritional status, Mini Nutritional assessment tool, Barthel index, Lawton scale.

INTRODUCTION

A citizen of India who has attained the age of 60 years or above is referred as 'senior citizen'.[1] According to the World Health Organization (WHO),[2] based on their age, the elderly are further classified into 3 groups(a)Young old: Persons in the age group of 60 years to 69 yearsb (b)Old old: Persons in the age group of 70 years to 79 years (c)Oldest old: Persons aged 80 years and above.Nutritional deficiencies in geriatric age group are common and often sub-clinical thus escaping the desired interventions.[3] Nutrition of the elderly affects immunity, functional ability and general well being and it constitutes an important component of elderly care that warrants further attention. Hence, this study was conducted with an objective to assess the nutritional status and identify factors influencing the nutritional status among elderly.

MATERIALS AND METHODS

Study population: Elderly persons aged 60 years and above. **Inclusion & exclusion criteria:** Elderly aged 60 years, residing since ≥6 months in rural field practice area (Kaiwara) was included for the study. Elderly persons who were bed ridden and in whom anthropometric measurements could not be done were excluded from the study. **Study period:** June 2018 to January 2019. **Methodology:** A community

based cross sectional study was carried out in Kaiwara, Rural Bengaluru of India. House to house visits was made to identify the elderly satisfying the inclusion and exclusion criteria. The elderly were explained the purpose of the study and subsequently a written informed consent was obtained from those who agreed for the study. 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 nutrition like age, gender, income, marital status, educational status, living status, financial status, alcohol consumption, physical activity, family type, and self-reported chronic morbidity status. Cognitive status of the elderly was assessed using Hindi Mental status examination (HMSE). This scale consists of 20 items, which test different components of intellectual capability. Cognition was considered normal if, total score of >19 in case of not literate or score >24 in literates.[4] Depression among the elderly was assessed using Geriatric depression scale short form (GDS-SF). This scale consists of 15 items and was administered orally. Total scores of >5 indicates depression.[5] Functional status assessment was done using Barthel scale. It is used to assess the activities of daily living(ADL).It consists of ten variables to describe activities of daily living and mobility.[6] Lawton scale was used to assess independent living skills by identifying how a person is functioning at the present time and for identifying improvement or deterioration over time.[7] Anthropometric measurements: Height - It was measured in centimetres (cms), up to an accuracy of 0.5cms using non-stretchable measuring tape .Subjects was instructed to stand on an even or flat surface Even and firm floor surface was chosen. Subjects removed shoes/slippers and stand up straight with heels together, and with heels, buttocks and shoulders pressed against the wall. Arms hang freely with palms facing thighs. Weight: It was measured in kilograms (kgs), up to accuracy of 0.5kg by using Equinox EQ-BR 9201 personal weighing scale. It is manufactured by Camry measuring technology (Hong Kong) and imported to India by Equinox Overseas Private Limited. 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 when ever in use. Mid arm circumference: It was measured in centimetres (cms), up to an accuracy of 0.5cms using non-stretchable measuring tape. 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 tighten snugly. Calf circumference: It was measured in centimetres (cms), up to an accuracy of 0.5cms using non-stretchable measuring tape. The subjects were asked to be seated with the left leg hanging loosely or standing with their weight evenly distributed on both feet. Later asked to roll up the trouser to uncover to calf. Tape was wrapped around the calf at the widest part and measurement was noted. Nutritional status assessment was done using Mini nutritional assessment (MNA) tool. It was developed by Nestle to assess nutritional status. It is a 18 items questionnaire. A total score of 24 or greater indicates the person is well nourished and needs no further intervention. A score of 17-23.5 indicates the person is at risk of malnutrition. A score of less than17 indicates the person is malnourished.[8]Any morbidities / nutritional deficiencies found was referred to the nearest health centre. Sample size: It was calculated based on the study conducted at Dehradun,[9] which showed 21% malnutrition among elderly in rural population. Sample size was calculated with 95% confidence level and 5.5% absolute precision to be 211. Sample size = Z2PQ/L2 (Where, Z = 1.96, P = 21%, Q = 100-P=100-21 = 79%, L2= 5.5×5.5=30.25)= 6,373.2/30.25 = 211 elderly

Sampling technique: Kaiwara rural PHC with 21,235 population has 4 sub centres. Among the four, one sub centre was selected using simple random sampling technique. Selected sub-centre had 7 villages with a total population of 4,242. Three villages were clubbed together since they had small population. Finally out of 5 villages, we selected 3 villages using random number table. Elderly (aged 60 years and above) constitutes 8.3% of rural population.[1] Selected 3 villages were Perumachanahalli (867 population-72 expected elderly), Nayandalli (909 population-75 expected elderly) and Gendalli (897 polulation-74 expected elderly).The required minimum sample of 211 elderly was achieved by covering above 3 villages. Ethical approval from institutional ethics committee (Ref no SS-1/EC/15/2016) was acquired before the commencement of the study

Statistical analysis of data: The collected data was entered into a MS excel sheet and analysis was done using SPSS Inc. Released 2009. 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 employed to identify the independent predictors associated with risk of malnutrition.

RESULTS

A total of 211 elderly in Kaiwara rural area of India were included for the study. Socio demographic details and association of various factors with nutritional status among study participants is shown in Table 1.

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

FACTORS	Sub-type	NUTRITION			χ^2 value	p-value
		Malnutrition	At risk	Normal		
		n(%)	n(%)	n(%)		
Gender	Male	0	24(27)	64(73)	13.72	<0.01
	Female	15(12)	20(16)	88(72)		
Marital status	Married	5(3)	31(17)	143(80)	48.09	<0.01
	Widow/Seperated	10(31)	13(41)	9(28)		
Financial status	Dependent	4(27)	11(73)	0	11.8	0.01
	Partially	5(11)	28(64)	11(25)		
	Independent	44(33)	49(37)	39(30)		
Education	Not literate	13(12)	21(20)	73(68)	8.35	0.01
	Literate	2(2)	23(22)	79(76)		
	Nuclear	2(2)	22(21)	93(77)	44.27	<0.01
Family type	Three-generation	0	0	7(100)		
	Joint	3(5)	11(20)	41(75)		
	Others	10(32)	11(34)	11(34)		
Alcohol intake	No	5(3)	37((23)	120(74)	17.6	<0.01
	Yes	10(20)	7(14)	32(65)		
Physical activity	No	15(14)	31(30)	57(56)	31.7	<0.01
	Yes	0	13(12)	95(88)		
Cognition (HMSE)	Normal	4(2)	19(12)	140(86)	69.9	<0.01
	Impaired	11(23)	25(52)	12(25)		
Depression (GDS-SF)	Normal	2(1)	11(8)	130(91)	126.6	<0.01
	Depression	13(19)	33(49)	22(32)		
IADL (Lawton)	Dependent	2(1)	11(8)	130(91)	79.14	<0.01
	Independent	13(19)	33(49)	22(32)		
ADL (Barthel)	Totally dependent	4(67)	0	2(33)	128.4	<0.01
	Severe dependent	9(41)	11(50)	2(9)		
	Moderately dependent	2(5)	19(45)	21(50)		<0.01
	Independent	0	14(10)	127(90)		
Number of	0	1(2)	1(2)	57(96)	85.2	<0.01
Morbidity	1	2(2)	15(19)	64(79)		
	≥2	13(18)	28(39)	31(43)		

Nutritional assessment by MNA tool revealed 15(7.1%) elderly people in study area were malnourished (under nourished) and 44(20.8%) elderly people were at risk of malnutrition .Total prevelance of the elderly who need nutritional intervention is 59 (27.9%) .Chi square test showed female gender , financially dependent,not literate,living alone,physically inactive,alcohol consumption,impaired cognition, depression, dependency by Barthel scale, Lawton scale and ≥2 self-reported chronic morbidities were significantly($p<0.05$) associated with risk of malnutrition[Table 1].

Univariate analysis showed that elderly aged ≥ 70yrs, female gender, death of spouse, non-nuclear family, sedentary lifestyle, impaired cognition, depression, dependent by Barthel scale, Lawton scale and ≥2 self-reported chronic morbidities were independently associated(P,<0.05) with lower MNA scores[Table 2].

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)**	14.80	6.77-32.37	**7.26**	1.61-32.73
	60-69				
Gender	**Female(ref)**	1.06	0.57-1.95	not significant	-
	Male				
Marital status	**Others(ref)**	10.15	4.32-23.81	**7.39**	1.75-31.18
	Married				
Physical activity	**No(ref)**	1.47	0.80-2.69	not significant	-
	Yes				
Family type	**Non-nuclear(ref)**	5.89	2.93-11.84	not significant	-
	Nuclear				
HMSE scale	**Impaired(ref)**	2.29	1.24-4.24	not significant	-
	Normal				
GDS-SF	**Depressed(ref)**	18.26	8.30-40.16	**6.75**	2.32-19.63

	Normal				
Barthel scale	**Dependent(ref)**	16.32	7.81-34.13	not significant	-
	Independent				
Lawton scale	**Dependent(ref)**	20.90	9.74-44.87	**26.68**	6.88-103.3
	Independent				
Self-reported morbidities	**≥2(ref)**	8.89	4.50-17.55	**5.33**	2.0-14.18
	0 & 1				

On Multiple logistic regression analysis it was found that elderly aged >70yrs, death of spouse or living alone, depression among elderly, dependency by Lawton scale and ≥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 was conducted among elderly residing in rural field practice area of a Medical College. Majority of elderly 166(78.6%) in rural area were young old(60-69yrs), while a small proportion 10(4.7%) were very old (≥80yrs). Similar pattern was also seen in studies conducted by Kansal D et al,[10] Lena et al,[11] Gupta et al,[12] and Damayanthi et al.[13] The Mean age(years) ± standard deviation (SD) in study area is 67.25±6.403. Damayanthi et al,[13] reported participants mean age of 70.80 years (CI: 70.13, 71.47) and Sandeep et al,[14] reported mean age for men 69 years [standard deviation(SD) = 7.5] and for females 70 years (SD = 6.3) in their studies.

Majority of the study participants 123(58.2%) in this were females. Similar gender distribution was also seen in studies conducted by Kritika et al,[9] and Damayanthi et al.[13] Present study showed 104(49.3%) elderly in rural were literate. Census of India 2011 showed 51% of elderly male & 18% of elderly female in rural area are literate.[15] Kansal et al,[10] reported 46% elderly as not literate whereas study conducted in rural area of West Bengal by Lahiri et al,[16] showed 7.7% elderly were not literate and 72.8% had education only up to primary level.

In present study 33(16%) of elderly had no source of income and were financially dependent on others. Study conducted at rural south India by Vedantam et al,[17] showed that majority of elderly were living with their children and had no income. Whereas study conducted in Nepal by Gupta et al,[12] revealed 75% were still earning & majority involved in farming and nine out of ten were living with their families.

In present study 178(84%) elderly had one or the other source of income and 50(24%) were financially independent. As per the population census 2011 data, 66% of elderly men and 28% of elderly women in rural areas participate in economic activity in the capacity of main or marginal worker. The proportions increased for women as compared to 2001 population census data in both rural and urban areas.[15]

Our study revealed Hypertension, diabetes, lower limb pain /arthritis, poor vision and backache were among the most common self-reported chronic morbidities among elderly in rural area .Similar findings were also seen in the study conducted by Lena et al.[11] National Sample Survey of India, 60th Round, (2004) showed that the prevalence of heart diseases among elderly men and women was much higher in urban areas than in rural areas. Urinary problems were more common among aged men while more aged women reported to suffer from problem of joints.[15]

As assessed by the MNA tool 15(7.1%) elderly were malnourished and 44(20.8%) elderly were at risk of malnourishment. A study conducted by Damayanthi et al in Srilanka,[13] showed that the prevalence and risk of malnutrition was 12.5% and 52.4% respectively. Similarly another study conducted by Ghani et al in Pakistan,[18] revealed that 5.53% of subjects were malnourished and 42.10% were at risk of malnutrition. This finding has been seen among community-dwelling elderly from India and other parts of the world. This is primarily due to the fact that the MNA is better at identifying those at risk of malnutrition among healthy elderly in the community.[8]

Univariate analysis for rural area showed that older age ,elderly female, not married / window / widower / separated, not literate, sedentary lifestyle, non-nuclear family, impaired cognition, depression, dependency by Barthel and Lawton scale, ≥2 self-reported chronic morbidities (P,<0.05) were independently associated with lower MNA scores. Study conducted in rural area of West Bengal by Lahiri et al,[16] showed elderly female, older age and low literacy level were independently associated with lower MNA scores. Another study in rural south India by Vedantam et al,[17] showed older age, decreased food intake and consuming fewer meals were independently associated with lower MNA scores.

Multiple logistic regression analysis in present study revealed elderly aged ≥70 years, not married / window / widower / separated, impaired cognition, dependent by Lawton scale and ≥2 self-reported chronic morbidities were found to be independent predictors of risk of malnutrition after adjusting for other variables. In the multivariate model of study conducted by Damayanthi et al at Srilanka showed that hypertension, alcohol consumption and increased age were positively associated with malnutrition. An increased number of people living with the older person was a protective factor among those at risk for malnutrition.[13]

Strengths of the study:Disabled, depressed and mentally-ill elderly were not excluded from the study and care takers were used to collect the information. Good rapport and cooperation could be established since the study was conducted in the rural field

practice area of Community medicine department. Questionnaire was interviewer-administered and probing was used to ensure that the participants recalled information to minimize the recall bais.

Limitations of the study: This is a cross-sectional study, which limits the establishment of causality. Laboratory investigation for nutritional assessment could not be done due to cost and logistics reasons.

CONCLUSION

Prevalence of risk of malnutrition(under-nutrition) is high 27.9% among elderly population living in the rural community. Elderly who were depressed (GDS-SF), dependent by Barthel and Lawton scale and ≥2 self-reported chronic morbidity 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 of the vulnerable elderly population.

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Authors contribution

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

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