Assessment of nutritional status in senior citizens in a rural area of western Maharashtra: A cross-sectional estimate

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Abstract

The nutritionally venerable geriatric population of India is on the rise. The community estimate of this venerability is far and few.
Aim and Objectives: To estimate the nutritional status of geriatric population in rural India and ascertain the different contributors.
Materials and Methods: MNA (Mini Nutritional Assessment) developed by Nestle Nutrition Institute and other relevant nutritional anthropometry surrogates were used. 'Chi-Square' test and 'Z-test' of variation between two means were applied to compare various anthropometric measurements with various grades of nutrition. P-value of significance was set at <0.05.
Results: For 160 participants the mean age was 72.11($\pm$6.59) years, out of which 113(43.46%) were well-nourished, 111(42.46%) at risk of malnutrition and 36(13.84%) were undernourished. A highly significant association between age and grade of nutrition was observed (x^2= 34.41, d.f. =8, p<0.001). So was with participants economic status (p<0.001). The Z score demonstrated grade of nutrition is significantly associated with BMI, Mid-arm circumference, Calf circumference, Waist circumference, Hip circumference (p<0.05). Various Activities of Daily Living and Instrumental Activities of Daily Living were also strongly associated with nutritional grade.
Conclusion: With increasing geriatric population India should take note of their major issues which includes nutrition so that they can have a healthy and self-supportive living.

Keywords: Indian Geriatrics, MNA, Nutritional status, Socio-demography.

Introduction

Nutrition is a determinate factor to good health and functional ability across all age groups more so in the older population. In India, old persons are revered for their experience and the traditional joint family system was their only social security scheme. But the scenario has reversed with the socio-demographic transition. This revert sect in spite of their growing number is also becoming isolated and venerable. Nutritional neglect is getting recognized as the major one. Few studies in India have pointed out the issue of underweight in over 50% of this population and decreased nutritional intake among more than 90% of them.[1-4] This has guided the present research to explore the nutritional vulnerability of geriatric population in an unexplored rural setup of western Maharashtra.

Aim

This concluding research was undertaken to assess the nutritional and health status of the above 65-year population in a rural area of western Maharashtra.

Objectives

An attempt was made to study the prevalence of undernutrition and health conditions in above 65 years age group and find out and associations among them and the functional status of living.

Materials and Methods

A community-based cross-sectional assessment was carried out in a village under the field practice area of a rural medical college situated in western Maharashtra.

The sample size was estimated by the formula $4pq/l^2$ where the prevalence of malnutrition in the elderly was taken as 20% and maximum allowable error at 5%. The estimated sample was 256 participants which were round up to the nearest figure of 260.

Inclusion criteria

Permanent residents of the village aged $\geq$ 65 years, with the ability to understand and answer the questions and giving valid written consent were selected for the study.

Exclusion criteria
Residents with malignancy and severe illness were not considered.

Ethical approval
It had local IEC approval and permission from ICMR with ref. no 2010-00995.

Data collection
260 Individuals were selected by systemic random technique. Randomization done at an interval of 5 and visits were made to their residing places over 2 month time. Informed consent was obtained from each participating individual. Data was collected with the help of MNA and geriatric health questionnaires. Participants age was determinate from government-issued 'Ration card", and in case of its nonavailability surrogate questions like age at marriage, age of children, well known historic events around the time of birth were used.[5,6]

Mini Nutritional Assessment Questionnaire(MNA®) designed specifically for nutritional assessment in the elderly developed by Nestle Nutrition Institute was used.[23] It consists of two parts. 1st part includes 'Screening'. One who scores less than 12 points in 1st round is considered for risk assessment in the second round and with a score > 12 are considered well-nourished. In the 2nd round participants with a score of 17 - 23.5 are categorized as 'At the risk of malnutrition' and those with a scored < 17 as 'Undernourished'. Different relevant anthropometric measurements were taken. Weight was measured on a floor spring weighing machine with accuracy up to 0.5 kilograms and the resting level was adjusted to 0 prior to each measurement. Subjects were asked to remove footwear and pre empty heavy items in their pockets or sari waist pouches before weight recording. Height was measured on stadiometer on barefoot and the finding was rounded up to the nearest 0.5 centimetres. Left mid-arm, waist, hip, left side calf and other measurements were taken adhering to standard guidelines by flexible fibreglass FREEMANS® tape with class III accuracy by EEC pattern up to the nearest value of 0.1 centimetres.

Data analysis: Collected data were coded and feed to SPSS 20 version. Descriptive and inferential analyses were conducted. Association among variables were tested by 'Chi' and 'Z' tests with the probability of significance at 0.05.

Observations and results: Most participants 124(47.69%) were between 65-70 years of age The mean age for all participants was 72.11 (±6.59) years, and for males and female was 72.0 (±6.57) years and 72.27 (±6.57) years respectively. Illiteracy 183(70.3%) and low income 143(54.9%) were predominant social issues. Studied demographic data are presented in table 1.

Table 1: Relevant sociodemographic characteristics of the study sample

Age			
Age(years)	**Male**	**Female**	**Total**
65-70	76(51.35%)	48(42.1%)	**124(47.69%)**
71-75	39(26.35%)	34(30.36%)	**73(28.08%)**
76-80	13(8.78%)	20(17.86%)	**33(12.69%)**
81-90	17(11.48%)	7(6.25%)	**24(9.23%)**
>90	3(2.03%)	3(2.68%)	**6(2.3%)**
Total	148(100%)	112(100%)	260(100%)
Per capita Income:*			
In INR	**Male**	**Female**	**Total**
<350	2(13%)	3(2.6%)	**5(1.9%)**
350-700	24(16.2%)	26(23.2%)	**50(19.2%)**
700-1100	48(32.4%)	40(35.7%)	**88(33.8%)**
1100-2200	46(31%)	28(25%)	**74(28.4%)**
>2200	28(18.9%)	15(13.3%)	**43(16.5%)**
Total	148(100%)	112(100%)	260(100%)
*As per modified B.G.Prasad classification			

Educational status			
Education	**Male**	**Female**	**Total**
Illiterate	95(64.1%)	88(78.5%)	183(70.3%)
primary	26(17.5%)	13(11.6%)	39(15.2%)
secondary and higher secondary	18(12.1%)	10(8.9%)	28(10.7%)
College	9(6%)	1(0.8%)	10(3.8%)
Total	148(100%)	112(100%)	260(100%)
Family support			
Living with	**Male**	**Female**	**Total**
Child and spouse	85(57.4%)	58(51.7%)	143(55%)
Child only	28(18.9%)	24(21.4%)	52(20%)
Spouse only	22(14.8%)	17(15.1%)	39(15%)
Others	13(8.78%)	13(11.6%)	26(10%)
Total	148(100%)	112(100%)	260(100%)

Out of 260 senior citizens studied, 113(43.46%) were well-nourished, 111(42.46%) were at risk of malnutrition and 36(13.84%) were undernourished. The Chi-square analysis of data in table number 2 demonstrates the presence of a highly significant association between age and grade of nutrition; i.e. (χ^2= 34.41, d.f.=8, p<0.001).

Table 2: Nutritional status of participants as assessed by MNA

| Grade of nutrition	Gender	65-70 yrs	71-75 yrs	76-80 yrs	81-90 yrs	>90 yrs	Total
Well nourished	Male	44(16.9%)	16(6.2%)	1(0.4%)	4(1.6%)	0(0%)	113 (43.46%)
	Female	30(11.5%)	11(4.2%)	7(2.7%)	0(0%)	0(0%)	
	Total	74(28.5%)	27(10.4%)	8(3.7%)	4(1.5%)	0(0%)	
At risk of Mal Nutrition	Male	27(10.4%)	19(7.3%)	9(3.5%)	11(4.2%)	1(0.4%)	111 (42.69%)
	Female	16(6.2%)	16(6.2%)	7(2.7%)	3(1.2%)	2(0.8%)	
	Total	43(16.5%)	35(13.5%)	16(6.2%)	14(5.4%)	3(1.2%)	
Under nourished	Male	5(1.9%)	4(1.5%)	3(1.2%)	2(0.8%)	2(0.8%)	36 (13.84%)
	Female	2(0.8%)	7(2.7%)	6(2.3%)	4(1.6%)	1(0.4%)	
	Total	7(2.7%)	11(4.25)	9(3.5%)	6(2.3%)	3(1.2%)	

Gender-based analysis for nutritional status showed 20 (17.85%) females were undernourished while 44(39.28%) were at risk of malnutrition, whereas 16(10.81%) males were undernourished and 67(45.27%) were at risk of malnutrition. The prevalence of deficient nutritional status was more but not significantly so (p>0.05) in females. Fig. 1 presents these observations.
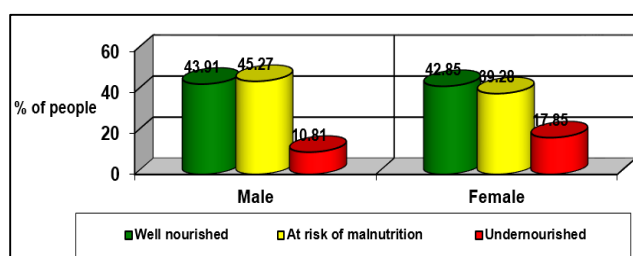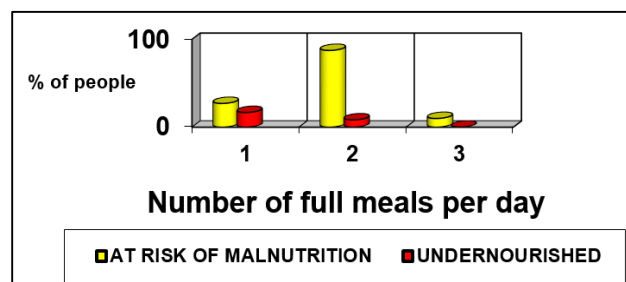

Fig. 1: Nutritional status based on the gender composition of participants

On economic parameters, low-income groups were found to have a significantly higher level of undernutrition (p<0.001) Fig. 2.
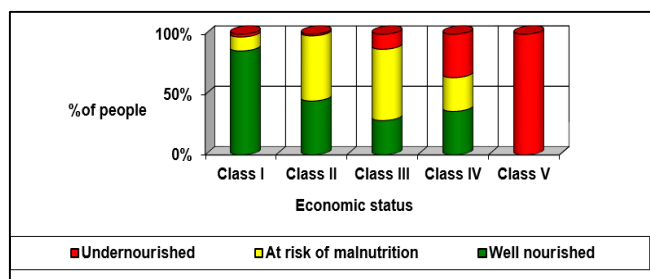
Fig. 2: Participants economic status and their association with grades of nutrition

Fig. 3: Association between the Number of meals per day and grades of nutrition

Similar observations were reported with reduced food intaken and weight loss in the last 3 months (p<0.001), out of 19 participants who had weight loss over 3 kg. 14(74%) were undernourished. From 58 people who experienced an acute illness or any kind of psychological stress during the past 3 months, 20(35%) were undernourished and 29(50%) were at risk of malnutrition (p<0.001). consumption of the number of meals per day and grades of undernutrition was significant too (p>0.001) Fig. 3.

It was also observed that there existed a highly significant association between protein intake, the number of vegetables or fruits servings per day, self-view of nutritional status, and self-view of health status with various grades of malnutrition (p<0.01).

Mean and SD for studied anthropometric measurements were recorded and comared with different grades of nutrition. Table 3 represents those details.

Table 3: Values of mean and SD for Anthropometric parameters and their respective nutritional grades

Anthropometric parameters	Well-nourished (Mean±SD)	At the risk of malnutrition (Mean±SD)	Undernourished (Mean±SD)
(BMI)Body Mass Index(kg/m^2)	25.06±2.82	21.1±3.99	18.79±3.25
(UMAC) Upper Mid-arm circumference(cms)	25.1±2.5	22.23±2.85	19.98±2.67
Calf circumference(cms)	30.82±3.21	28.67±2.9	27.2±3.4
Waist circumference(cms)	83.68±13.52	71.62±15.62	65.21±13.03
Hip circumference(cms)	88.83±11.62	77.9±12.77	70.42±13.79
Waist/Hip	0.92±0.06	0.89±0.07	0.87±0.04

On comparing the difference between two means by 'Z'-statistic, significant results were observed between BMI, UMAC, calf, waist and hip circumferences and grades of nutrition (p<0.05). but Waist/ Hip ratio was non-comitant (p>0.05). This result is presented in table 4.

Table 4: Z statistic of anthropometric variables and grades of nutrition

Anthropometric parameter	Well-nourished v/s At the risk	Well-nourished v/s Undernutrition	At the risk v/s Undernutrition
Body Mass Index	8.57 (p<0.001)	10.42 (p<0.001)	3.52 (p<0.001)
Mid-arm circumference	8.01 (p<0.001)	10.19 (p<0.001)	4.33 (p<0.001)
Calf circumference	5.28 (p<0.001)	5.63 (p<0.001)	2.34 (p<0.001)
Waist circumference	6.175 (p<0.001)	7.338 (p<0.001)	2.437 (p<0.05)
Hip circumference	6.701 (p<0.001)	7.233 (p<0.001)	2.879 (p<0.001)
Waist/Hip	0.56 (p>0.05)	0.936 (p>0.05)	0.373 (p>0.05)

Discussion

It was found that 42.69% of elderly populations over 65 years were at the risk of malnutrition and 13.84% were undernourished. Baweja et al. in their community-based study conducted in western Rajasthan, India; reported a prevalence of undernourishment at 11% and an at-risk population of 61.6%.[7] A. Vedantam et al. in rural south India also reported similar prevalence i.e. 14% malnourished and 49% at the risk of malnutrition.[8] Even in countries like Finland, the prevalence of undernutrition in rural home-cared elderly was 3% and at risk of undernutrition was 48%.[9] A recent study by Sinha ND et al. from western Madhya Pradesh using MNA tool detected the prevalence of malnutrition (under-nutrition) at 60%, and at risk of Malnourishment at 24%.[10] Even studies from Iran reported similar figures.[11]

Reports of H.Soini et al. relating to weight loss, psychological stress, self-perceived nutritional and health status, a decline in food intake and UMAC showed a strongest significant correlation (p=0.001) with the total MNA score.[9] These observations toed findings reported in the present study which demonstrated a highly significant association (p<0.001) between nutritional grades and age, socio-economic status, decreased food intake, psychological stress, weight loss in last 3 months, protein intake, vegetable and fruits intake, self-view of nutrition and health status. Furthermore, significant association (p<0.05) between nutritional grades and number of meals per day, and fluid intake was reported in this study. The study also reported a highly significant association (p <0.001) between different anthropometry and nutritional score. M. Kuzuya et al. M. Aliabadi et al. and A. Vedantam et al.also provided shreds of evidence comparable to the present one.[8,11,12]

The gender-based observation of nutritional status in the presenting study found that both sexes are at increased risk of undernourishment. A. Vedantam et al in south India and Sinha ND et al in Wester Madhya Pradesh reported similar figures in population over 65 years of age.[8,10]

Strengths and weakness: A valid sample size, sound research methodology and tools (MNA) were its main strengths. As it's a unicentric study limited to one village the results are difficult to generalize. More study employing a similar approach is needed across the country to get the real national and zonal picture of the problem so as to influence constructive policymaking.

Conclusion

Aging is a physiologically catabolic state thereby needing special attention. But unfortunately, this especially venerable group are a subject of chronic neglect. Their declining nutritional status and the associate factors as observed here indicates this. Though this issue is recognized and efforts are made to address this the results are yet to be seen especially in developing nations like India and more so in rural population. Our endeavour to solve this by 'National Programme For Health Care Of The Elderly(NPHCE)', should be pursued with more vigour and additional components added and implemented at the grassroots level so that we do not lose out the benefits of the constructive role of this experienced and expert population in nation-building.[13,14]

Source of Funding

Conflict of Interest

None.

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How to cite this article: Mishra B, Vadgaonkar RA, Mohapatra SC. Assessment of nutritional status in senior citizens in a rural area of western Maharashtra: A cross-sectional estimate. *J Community Health Manag.* 2020;7(1):26-31.