

How healthy is our geriatric population? a community-based cross-sectional study

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ABSTRACT

Introduction: With the rise in aged population there is a greater need to look into their nutritional and physical disability aspects which is otherwise neglected. The study aimed to assess the prevalence of malnutrition, anemia and physical disability among the community-dwelling aged population. **Materials and Methods:** A cross-sectional study was carried out in a rural block of north Tamil Nadu. Seventeen villages were selected using cluster sampling based on probability proportional to size. A total of 340 participants of age 60 years and above were selected from these clusters using simple random sampling. Nutritional status and physical disability were assessed using mini nutritional assessment scale and Barthel index. Blood samples were collected for anemia. Appropriate data entry and statistical analysis were done in EPIDATA and SPSS 16. **Statistical Analysis Used:** Besides calculating prevalence chi square and logistic regression tests were done to identify associated risk factors. **Results and Conclusions:** The overall prevalence of “at risk of malnutrition,” anemia and physical disability were 10.9%, 38.2% and 20.6%, respectively. None of the community-dwelling aged population was found to be malnourished. Anemia and physical disability were significantly higher among the older age group [(OR 2.29 (1.17–4.89), (OR 2.81 (95% CI 1.31–6.04), respectively)]. Similarly women were more affected with physical disability than men (OR 2.27 (1.28–4.02)). Further studies need to be done to explore the reasons for high prevalence of anemia.

Keywords: Cimminitu, disabled person, geriatric assessment, India, nutritional assessment

Introduction

The population of the aged across the world will be 15 percent of the total population by 2025^[1] with Asia witnessing doubling of old age dependency ratio by 2050.^[2] India’s “National policy on older persons” classifies 60 years and above as aged^[3] who will constitute 10% of the total population by 2021^[4] putting pressure on government as the demand for financial and social support increase due to health and related issues whose prevalence vary between 2% and 37%^[1-6] as per various hospitalized or institutionalized studies. With the rise in geriatric population in India, it is important that we look into various health issues encountered by them.^[7-10] Nutrition, anemia and physical disability of the aged are neglected aspects despite being vital health problems.^[11-16] This study looks into nutritional and physical disability aspects of a community-dwelling geriatric population.

Materials and Methods

A cross-sectional study was carried out, among those who were aged 60 years and above, in one of the rural blocks of north Tamil Nadu in India. The total population of the block was about 1,16,000, which was distributed in 88 villages. A sample size of 340 was calculated using the prevalence of physical disability 27%,^[6] absolute precision of 7%, design effect of 2% and drop out of rate of 5%. Multi-staged sampling was carried out. The first stage was a cluster sampling where clusters were selected based on probability proportional to size (PPS). The second stage of sampling involved selecting the aged from within the clusters by simple random sampling. A written informed consent was taken from all the participants. A semi-structured interviewer administered questionnaire was used, the part 1 of which included socio-demographic characteristics and part 2 and part 3 were mini-nutritional assessment (MNA)^[17] scale and Barthel index, respectively. MNA is a simple reliable scale with definite thresholds. No prior training is needed to use the scale.^[17,18] It has two parts: Screening and assessment. Those

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who were found to be malnourished or at risk of malnutrition were further assessed with the assessment part. Finally, the screening and the assessment scores were added to calculate the malnutrition indicator score. The scoring and classification of MNA scale are given in Table 1. Barthel index was used to assess physical disability. The total score of Barthel index was 100. In this, we considered anyone with a score less than 100 as having some disability. Barthel index is a very simple tool and can be easily administered by health care professional.^[19] A 5 ml blood was collected from each study participant to measure hemoglobin level.

Results

A total of 340 aged from 17 different villages participated in the study. About 73% were in the age group 60–69 years, 23% in the age group 70–79 years and the remaining participants were in the age group 80 years and above. Of total, 46.8% (159) were men and 53.2% (181) were women. 69.7% (237) were currently married. Almost one third (29.7%, 101) of the study population was not currently married, of whom 84 were widows and 17 were widowers. More than half of the study population, 57.9% (197), were living with their sons. Nearly 33% (115) of them were not staying with their children. A total of 46.5% (158) were in nuclear family and the rest were in extended/joint family. The nuclear family included people who had their unmarried children living with them. Of the 340 participants 22 (6.5%) were living in government made houses. 5.3% (18) and 9.4% (32) of the participants were living in hut and katcha houses, respectively. More than half, 54.7% (186), were living in pucca houses. There were three (0.9%) participants who were living in mansions. Houses were made in their own property by majority of the participants (97.1%, 330), and 1.8% (6) were staying in rented property. Of the remaining, two houses were in government land and two in neighbors' land on which they were living without paying any rent. Majority of the study population belonged to upper lower socio-economic status (ses) (57.6%, 196) followed by lower middle (30.6%, 104) and upper middle category (7.6%, 26) of modified Kuppuswamy scale. There were 1.2% (4) and 2.9% (10) participants in upper and lower socio-economic group, respectively. A total of 82.7% (281) were having associated co-morbidities. The prevalence of different co-morbidities among the study population is given in Table 2. About 83.5% of those belonging to the low ses and 82.1% of those belonging to the middle/high ses had associated co-morbidities. Nearly 43% (147) had more than one co-morbidity.

Prevalence of anemia

The overall prevalence of anemia among the study population was 38.2% (95% CI 33.0–43.4). The percentage of women and men who were anemic were 38.7% and 37.7%, respectively. The mean hemoglobin was 12.05 g/dl among women, ranging from 5.4 g/dl to 15.2 g/dl. For men the mean was 13.5 g/dl with range being 6.1–20.8 g/dl. Anemia was classified into mild, moderate and severe using the WHO cut-off points.^[5] The details are given in Tables 3 and 4.

Table 1: MNA score classification

Screening score: Subtotal max 14 points	
12-14 points	Normal nutritional status
8-11 points	At risk of malnutrition
0-7 points	Malnourished
Assessment max score: 16 points	
Total assessment 30 points (malnutrition indicator score)	
24-30 points	Normal nutritional status
17-23.5 points	At risk of malnutrition
Less than 17 points	Malnourished

Table 2: Percentage of different co-morbidities

Co-morbidity	Percentage
Joint pain	48.8
Poor vision	33.2
Poor hearing	9.7
Hypertension	23.8
Diabetes	14.1
Asthma/chronic obstructive pulmonary disease	4.4
Ischemic heart disease	2.1
Cerebro-vascular accident	1.5

Table 3: Classification of hemoglobin and anemia among women

Hemoglobin category	Frequency (%)
Normal (12 g/dl and above)	111 (61.3)
Mild anemia (10-11.9 g/dl)	52 (28.7)
Moderate anemia (7-9.9 g/dl)	14 (7.8)
Severe anemia (less than 7 g/dl)	4 (2.2)
Total	181 (100)

Table 4: Classification of hemoglobin and anemia among men

Hemoglobin category	Frequency (%)
Normal (13 g/dl and above)	99 (62.3)
Mild anemia (12-12.9 g/dl)	34 (21.4)
Moderate anemia (9-11.9 g/dl)	19 (11.9)
Severe anemia (less than 9 g/dl)	7 (4.4)
Total	159 (100)

A sub-group analysis has been carried out for the age group 60–69 years, 70–79 years and 80 years and above and it was noticed that the mean hemoglobin was decreasing with the increase in age category. The mean hemoglobin values were 12.9, 12.4 and 11.8, respectively, but this was not found to be statistically significant ($P=0.56$; $df=2$).

Prevalence of malnutrition

At the end of screening using MNA, 83 out of 340 (24.4%) were at risk of malnutrition. The remaining 75.6% had normal nutritional status. Those who were at risk of malnutrition were further analyzed using the assessment part of MNA scale to find out the actual prevalence of malnutrition. The

study showed there was no malnutrition among community dwelling geriatric population. The prevalence of “at risk of malnutrition” was 10.9% (95% CI 7.52–14.28). Of 37 who were “at risk of malnutrition” 17 (45.9%) were anemic. Sub-group analysis has been carried out for the age groups 60–69 years, 70–79 years and 80 years and above which showed a gradual decrease in the mean MNA score, 26.1, 25.5 and 25.3, respectively and this decrease was found to be statistically significant ($P = 0.44$; $df=2$).

Prevalence of physical disability

The prevalence of disability among the study population, as per Barthel index score less than 100, was 20.6% (95% CI 16.2–25.0). The remaining 79% of the study population did not report any physical disability. The most affected domain in the Barthel index was climbing stairs were 56 (16.5%) participants needed help and the remaining 2 (0.6%) were unable to climb. In all the other domains feeding, bathing, grooming, dressing, bowel bladder incontinence, toilet use, transfer and mobility of the participants were independent. Only two or three needed help in each domain. Further subgroup analysis done for the age category 60–69 years, 70–79 years and 80 years and above showed a decreasing trend in mean Barthel score, 99.02, 97.67 and 94.69, respectively and this difference was statistically significant ($P=0.001$; $df=2$).

Factors affecting anemia

Logistic regression was done comparing anemia and factors like gender, age, place of stay and socio-economic status (ses) the details of which is given in Table 5. Nearly 57% of the participants in the age group 75 years and above were anemic as compared to 36.1% in the age group 60–74 years, which was statistically significant (OR 2.399 (95% CI 1.177–4.889); $P<0.005$). The percentage of people who were anemic in both the gender was almost equal. 40.8% of the people belonging to the low ses were anemic whereas only 34.3% were anemic in middle and high ses combined. ($P = 0.227$). 21.7% of those who were at risk of malnutrition was found to have moderate or severe anemia as compared to 11.6% among those with normal nutritional status ($P=0.56$; OR 2.124 (0.967–4.664)).

Factors affecting at “risk of malnutrition” and physical disability

71.7% of those who are at risk malnutrition had low ses while the remaining 28.3% had middle/high ses ($P=0.096$). Logistic regression looking for the association between at risk of malnutrition and factors like gender, age, place of stay and socio-economic status showed no statistically significant association. When looked for the association between above-mentioned factors and physical disability, it was found that as age increases, physical disability also increases (Odds ratio=2.81 (95% CI 1.31–6.04), $P=0.008$). It was also noticed that physical disability was more among females (Odds ratio 2.27 (1.28–4.02); P value=0.005) than among males. No statistically significant association was noted with place of stay and socio-economic status.

Discussion

A cross-sectional study has been carried out in the rural block of North Tamil Nadu among geriatric population of age 60 years and above to understand their socio-demographic profile, nutritional status and physical disability level. The cluster sampling with probability proportional to size was used to remove inter-cluster and intra-cluster variability. Data was collected from 340 study participants and selected by simple random sampling from the 17 clusters. This included 181 female and 159 male participants. All statistics show that the sex ratio in the age group 60 years and above is 105 per 100 males.^[20] Among our participants this ratio was more or less maintained, with 113 women per 100 men. There was five times more number of widows than widowers, nearly half the aged women were widows. This is in consistent with the general trend seen in India where, due to mortality and marriage pattern, a number of men entering into the age group 60 years and above are still married compared to women in the same age group.^[20] In India, being deeply patriarchal, it is the male child who provided the social security for the aged since antiquity.^[21] This study had found that only 60% were living with their sons and were part of extended or joint family. The rest were living in nuclear families. Whether it was an indication

Table 5: Factors affecting Anemia

Variable	Anemia (%)		Unadjusted		Adjusted	
	Present	Absent	P	Odds ratio (95% CI)	Odds ratio (95% CI)	P
Gender						
Female	70 (38.7)	111 (61.3)	0.859	1.04 (0.67-0.61)	0.99 (0.63-1.55)	0.976
Male	60 (37.7)	99 (62.3)				
Age category						
> = 75 years	20 (57.1)	15 (42.9)	0.015	2.36 (1.16-4.8)	2.39 (1.17-4.88)	0.016
60-74 years	46 (36.1)	88 (63.9)				
Place of stay						
Living alone	45 (39.1)	70 (60.9)	0.808	1.05 (0.66-0.68)	0.98 (0.59-1.61)	0.944
Others	85 (37.8)	140 (62.2)				
SES						
Low ses	84 (40.8)	122 (59.2)	0.232	1.31 (0.83-0.07)	1.34 (0.83-2.19)	0.227
Middle/high	46 (34.3)	88 (65.7)				

SES: Socio-economic status

Table 6: Classification of public health significance of anemia^[5]

Category of public health significance	Prevalence of anemia (%)
Severe	≥40
Moderate	20.0-39.9
Mild	5.0-19.9
Normal	≤4.9

toward a changing trend needs further evaluation. With regard to the socio-economic status, it has been said that nearly half of the aged population in India belonged to the low socio-economic status.^[22] This study also showed similar results with 60% of the participants being in low socio-economic status as shown by modified Kuppaswamy scale. Among the diseases that had been plaguing the study participants the most common were joint pain, poor vision, poor hearing, diabetes and hypertension. The studies from other parts of India have shown a comparatively higher prevalence of hypertension and diabetes.^[23-25] The prevalence of poor vision and hearing impairment were also higher among the geriatric population.^[26] The data regarding co-morbidity among the aged was self-reported data. No specific instrument was used to measure these co-morbidities. This probably might be reason for the lesser prevalence of these conditions among the participants. Though it is reported that variations in morbidity conditions exist across socio-economic status.^[27] This study did not find any statistically significant difference in morbidity conditions among different socio-economic groups.

Anemia is one of the most common hematological conditions found among the geriatric population. The estimated prevalence of anemia by WHO among those who were aged 60 years and above was 45%.^[5] WHO had put forward a classification of public health significance of anemia in populations on the basis of prevalence estimated from blood levels of hemoglobin or hematocrit which is shown in Table 6.

The prevalence of anemia among the aged in the study area was 38.2% (95% CI 33.0–43.4), thereby falling into the WHO category of moderate to severe public health significance. The most common risk factors associated with anemia are age, gender, physiological state, pathological conditions and low socio-economic state. In the geriatric population, nutritional anemia is quite prevalent due to the gradual decline in the quality and the quantity of food intake.^[5] In this study, it was noticed that as the age increased there was 2.39 times (95% CI 1.17–4.88; $P < 0.05$) higher risk for anemia. Other conditions like low socio-economic status, gender and living alone have not been found to be statistically associated with anemia. The nutritional status of the aged often gets ignored and overlooked. The consequence of not eating healthy can be serious particularly when people get older. MNA scale, an instrument used in this study for assessing nutrition, is developed in 1989 and is a sensitive, specific and accurate tool in assessing malnutrition among the geriatric population.^[18] The results from this study showed that community dwelling geriatric population was not

malnourished. 10.9% (95% CI 7.52–14.28) were found to be at risk of malnutrition. It was also noticed that prevalence of anemia was two times higher among those who were at risk of malnutrition ($P = 0.56$, OR 2.124 (0.967–4.664)). We looked into few conditions like gender, increase in age, low ses and living alone as probable cause for at risk of malnutrition. But none of these factors showed statistically significant association. The health care coverage of the study area is high with two secondary level hospital and two medical colleges with in a distance of half an hour. Apart from this there are field workers covering every thousand population. This probably may be the reason for nil levels of malnutrition among the aged in this region.

In our study, the Barthel index was used to assess the physical disability among the aged. This index has a score ranging from 0 to 100 and it primarily measures activities of daily living. Anybody with a score less than 100 was taken as having some disability. Nearly 80% of the participants scored 100. Only 20.6% had a score less than 100. Majority of them need help in climbing stairs. Otherwise the participants were functionally independent.

The study had an ample sample size of 340 which was one of its major strengths. The problems related to aged are often overlooked especially in developing countries. In that context, this study is very relevant as it gives bird's view into socio-demographic conditions, nutritional status and physical activity levels of the aged. Further studies can be done focusing in depth each of these areas which will contribute to various policies and plans focusing on geriatric community.

Conclusion

This study had found that community-dwelling geriatric population was not malnourished, but nearly two fifth of them had anemia and one fifth of them had physical disability and were found to be increasing with age. Further studies need to be done to identify the reasons for high prevalence of anemia in this age group.

Approval by institutional review board: This study has been approved by the institutional review board of Christian Medical College, Vellore, Tamil Nadu, India (IRB Min No.7395).

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References

1. Kirtana MP. Comparative study of nutritional status of elderly population living in the home for aged vs those living in the community - MU Digital Repository. Biomed Res 2011;22:120-6.
2. Vedantam A, Subramanian V, Rao NV, John KR. Malnutrition in free-living elderly in rural south

- India: Prevalence and risk factors. *Public Health Nutr* 2010;13:1328-32.
3. Saha S, Basu A, Ghosh S, Saha AK, Banerjee U. Assessment of Nutritional Risk and Its Associated Factors among Elderly Women of Old Age Homes of South Suburban Kolkata, West Bengal, India. *J Clin Diagn Res* 2014;8:118-20.
 4. Tettamanti M, Lucca U, Gandini F, Recchia A, Mosconi P, Apolone G, *et al*. Prevalence, incidence and types of mild anemia in the elderly: The "Health and Anemia" population-based study. *Haematologica* 2010;95:1849-56.
 5. De Benoist B. World Health Organization, Centers for Disease Control and Prevention (U.S.). Worldwide prevalence of anaemia 1993-2005 of WHO Global Database of anaemia. Geneva: World Health Organization; 2008. Available from: http://www.who.int/publications/2008/9789241596657_eng.pdf [Cited accessed on 2014 May 22].
 6. Srinivasan K, Vaz M, Thomas T. Prevalence of health related disability among community dwelling urban elderly from middle socioeconomic strata in Bangalore, India. *Indian J Med Res* 2010;131:515-21.
 7. Rao DB. World Assembly on Aging. Discovery Publishing House; 2003. Available from: http://www.books.google.com/books?hl=en&lr=andid=ANxrNgJnKkgCandoi=fnd&pg=PR7&dq=%22as+an+integral+part+of%22+%22more+fully+to+the+socio-economic+implications+of+the+aging+of+populations%22+%22economic+order+and+increased+international+technical%22+%22social+and+economic+security+for+the+elderly,+as+well+as%22+andots=H_JBxQR9y4&sig=qH37zoXO5AkVU65R5aOL7MmZFec. [Cited accessed on 2014 May 22].
 8. Bremner J, Frost A, Haub C, Mather M, Ringheim K, Zuehlke E. World Population Highlights: Key Findings From PRB's 2010 World Population Data Sheet. Population Reference Bureau; 2010. Available from: <http://teachersites.schoolworld.com/webpages/RGilliam/files/2010%20population%20summary1.pdf>. [Cited accessed on 2014 May 22].
 9. KYR Elderly Esingle.pmd - KYR Elderly English Final.pdf. Available from: <http://www.nhrc.nic.in/Documents/Publications/KYR%20Elderly%20English%20Final.pdf>. [Cited accessed on 2014 May 15].
 10. Microsoft Word - coverpages - elderly_in_india.pdf. Available from: http://www.mospi.nic.in/mospi_new/upload/elderly_in_india.pdf. [Cited accessed on 2014 May 15].
 11. Wells JL, Dumbrell AC. Nutrition and Aging: Assessment and treatment of compromised nutritional status in frail elderly patients. *Clin Interv Aging* 2006;1:67.
 12. Ruiz-López MD, Artacho R, Oliva P, Moreno-Torres R, Bolaños J, de Teresa C, *et al*. Nutritional risk in institutionalized older women determined by the Mini Nutritional Assessment test: What are the main factors? *Nutrition* 2003;19:767-71.
 13. Malnutrition in the Elderly: An Unrecognized Health Issue. Available from: <http://www.rnjournal.com/journal-of-nursing/malnutrition-in-the-elderly-an-unrecognized-health-issue>. [Cited accessed on 2014 May 15].
 14. Vanasse GJ, Berliner N. Anemia in Elderly Patients: An Emerging Problem for the 21st Century. *Hematology* 2010;2010:271-5.
 15. Douglas L. Smith MD. University of Wisconsin Medical School, Madison, Wisconsin. Anemia in the Elderly - American Family Physician. *Am Fam Physician* 2000;62:1565-72.
 16. Fried LP, Guralnik JM. Disability in older adults: Evidence regarding significance, etiology, and risk. *J Am Geriatr Soc* 1997;45:92-100.
 17. MNA_english.pdf. Available from: http://www.mna-elderly.com/forms/MNA_english.pdf. [Cited accessed on 2014 Sep 22].
 18. Guigoz Y. The Mini Nutritional Assessment (MNA) review of the literature--What does it tell us? *J Nutr Health Aging* 2006;10:466-87.
 19. Jan Dewing. A critique of the Barthel Index. *British Journal of Nursing*, 1992, Vol 1, No 7. Available from: <http://barthelindex.wikispaces.com/file/view/a+critique+of+the+BI.pdf>. [Last accessed on 2015 Jan 14].
 20. Subaiya Lekha, Dhananjay W Bansod. Demographics of Population Ageing in India: Trends and Differential. BKPPI Working, New Delhi: United Nations Population Fund (UNFPA). 2011. p. 1.
 21. Irudaya RS. Population ageing and health in India. Mumbai: Centre for enquiry into health and allied themes (CEHAT); 2006.
 22. Lena A, Ashok K, Padma M, Kamath V, Kamath A. Health and Social Problems of the Elderly: A Cross-Sectional Study in Udipi Taluk, Karnataka. *Indian J Community Med Off Publ Indian Assoc Prev Soc Med* 2009;34:131-4.
 23. Pratim DP, Bhaswati S, Nilanjan G, Ashique FK, Subhasis C, Arpita D, *et al*. Hypertension and Related Morbidity among Geriatric Population of Eastern India. *Mater Socio-Medica* 2012;24:29-33.
 24. Barman SK, Lata K, Ram R, Ghosh N, Sarker G, Shahnawaz K. A study of morbidity profile of geriatric population in an urban community of Kishanganj, Bihar, India. Available from: <http://www.gjmedph.org/uploads/O1-Vo3No1.pdf>. [Cited accessed on 2015 Jan 03].
 25. Radhakrishnan S, Balamurugan S. Prevalence of diabetes and hypertension among geriatric population in a rural community of Tamilnadu. *Indian J Med Sci* 2013;67:130-6.
 26. R,D. and Kasthuri, A. (2012), Visual and hearing impairment among rural elderly of south India: A community-based study. *Geriatrics and Gerontology International*,12:116-22. doi: 10.1111/j.1447-0594.2011.00720x.
 27. Dey S, Nambiar D, Lakshmi JK, Sheikh K, Reddy KS. Health of the Elderly in India: Challenges of Access and Affordability. 2012; Available from: <http://www.ncbi.nlm.nih.gov/books/NBK109208/>. [Cited accessed on 2014 Oct 05].

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