Original Research Article

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Effect of socio-economic, demographic and environmental factors on nutritional status of elderly: a cross sectional study

Darshan J. Patil, Maheshkumar M. Shindhe*

Department of Community Medicine, Belgaum Institute of Medical Sciences, Belagavi, India

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*Correspondence:

Dr. Maheshkumar M. Shindhe, E-mail: docmaheshms@gmail.com

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ABSTRACT

Background: Worldwide elderly population is rapidly increasing. This is posing many challenges in elderly population. Malnutrition in them is one of the major problems but ignored component. Socio-economic, demographic and environmental factors are those greatly influence their nutritional status. Hence the present study was undertaken to assess the effect of socio-economic, demographic and environmental factors on nutritional status of elderly.

Methods: The present study was a cross-sectional study which included 545 elderly population of Uchagaon subcentre and was carried out over a period of 1½ years. After selecting Uchagaon subcentre by simple random sampling technique and house to house survey was carried out to select eligible elderly participants who met the selection criteria. Data was collected from eligible elderly by using pretested questionnaire and Mini Nutritional Assessment (MNA) tool.

Results: 65.1% were between the age group of 60-69 years. 55% were females, 66% were currently married, 60% had no formal schooling, 67.2% were belongs to socio-economic status of either class IV/V. 23.5% were malnourished and 49% were at risk of malnutrition. There was association found between nutritional status of elderly with increase in age, marital status, educational status, occupation, socio-economic status, type of family and housing condition.

Conclusions: In the present study majority of the elderly were at risk of malnutrition. The nutritional status of elderly was associated with increase in age, marital status, educational status, occupation, socio-economic status, type of family and housing condition of rural elderly and subsequently modify those factors to improve the nutritional status of elderly and this can be a scope for further study in future.

Keywords: Elderly, Nutritional status, Socio-economic, Demographic factors, Mini nutritional assessment tool

INTRODUCTION

'Aging' is a continuous process which is progressive and inevitable. No one knows why the 'aging' occurs. However, Horman postulates states that 'aging' is a result of progressive accumulation of changes in the body. This is also because of wearing of structures and functions in the body during development.¹

'Aging' is the most important demographic transformation of 21st century. The elderly population is

growing faster than any other age group. It is expected to cross the age group of 0-9 years by 2030 and 10-24 years by $2050.^2$ This is because of increase in life expectancy which has increased in last 10 years.³

In 1991, the elderly population in India was 6.8% of total population and by 2011 it increased to 8.6%. It is expected to cross 18.3% by 2050. The elderly population in Karnataka (7.7%) also increasing. However it is lesser than Tamil Nadu (10.4%), Goa (11.2%) and Kerala (12.6%).⁴

Rapid rise in elderly population causes many problems including malnutrition, which is a major but neglected component. Elderly are vulnerable to malnutrition because of many factors. Some of the important factors are low socio economic status, poor environmental condition, reduced physical activity, poor dietary pattern, reduced physical activity, personal habits and others which influences their nutritional status in them.

To estimate the nutritional status of elderly, Nestlé's Mini Nutritional Assessment (MNA) is one of the most recognized screening tools and is used all over the world. Mini nutritional assessment (MNA)-is an 18 questionnaire screening tool with a total scoring of 30. Nutritional status were classified as normal nutritional status (24-30), at risk of malnutrition (17.5-23.5) and malnourished (<17).⁵ It is specially designed for elderly to detect malnutrition and those at risk of malnutrition. It has high sensitivity of 96% and specificity of 98%.⁶

The nutritional status in elderly is affected by many factors. A study conducted by Shivaraj et al revealed that, the malnutrition among the elderly was associated with increase in age, female sex, illiterate, cultivator, financial dependency.⁷

In rural set up only few studies were carried out to know the effect of socio-economic, demographic and environmental factors on the nutritional status of elderly. Hence an attempt was made to carry out the present study to assess the effect of socio-economic, demographic and environmental factors on the nutritional status of elderly in rural area of Belagavi district.

METHODS

Study area

The study was carried out in Uchagaon subcentre, Uchagaon, Rural Health Training Centre (RHTC), BIMS, Belagavi.

Study design

A cross-sectional study.

Study duration and period

Duration of $1\frac{1}{2}$ years, between January 2016 to June 2017.

Sample size: Considering the prevalence of malnutrition in elderly as 15%.⁸

$$n = \frac{z^2 2pq}{d2}$$

where, n= sample size

z= alpha error= 1.96

so, n= $\frac{(1.96)^2 \times 15 \times 85 = 544.5}{3^2} \approx 545$

n=545.

Method of collection of data

It was a cross sectional study conducted in Uchagaon RHTC, which has 6 sub centres. A simple random sampling technique was used to select Uchagaon sub centre which covers 2 villages. House to house survey was carried out to select eligible elderly after applying below mentioned selection criteria.

Inclusion criteria

Persons aged ≥ 60 years, residing in the selected area for >1 year.

Exclusion criteria

Terminally illness.

Data collection

Data was collected using pretested questionnaire which comprised of socio-demographic, socio-economic status (by using Udai-Pareek's SES classification) and environmental information. Nutritional status was assessed by Nestlé's Mini Nutritional Assessment (MNA) tool. Written informed consent was obtained from all the participants.

Statistical analysis

The data was analysed using SPSS version 22.0 after entering in Microsoft Excel Windows 10 spreadsheet. The association between the MNA score with epidemiological factors and other variables were tested using chi-square test. Significance level was considered at 'p' value of ≤ 0.05 .

RESULTS

Among the 545 elderly participants, 245 (45%) were males and 300(55%) were females. Majority of the participants (65.1%) were in the age group of 60-69 years followed by 70-79 years age group (26.6%). Maximum participants among total males (58.8%) and females (70.3%) were in the age group of 60-69 years. Overall the mean age (\pm SD) of the study participants was 67.84 (\pm 6.38) years (Table 1).

Majority of the participants were Hindu by religion (89.2%). 66% were currently married. 60% were illiterates and 40% were completed at least their primary

education. More than 3/4th (67.2%) of the participants belonged to class IV and V socio economic status. Majority of the participants were engaging themselves in their household works (34.7%) followed by agricultural activity (22.0%). 5.9% were retired from their previous jobs. Among the total participants, 253 (46.6%) were with 3 generation family. 63.3% were staying with spouse and children, 27.5% were staying with only children and only 3.1% were staying alone. 247 (45.3%) participants were living in mixed type house and cattles were present in 30.1% of the participants (Table 2).

Table 1: Distribution of the elderly participants according to their gender and age group.

| | Gender | Total | |
|------------|---------------|-----------------|------------|
| (in years) | Male N (%) | Female N (%) | N (%) |
| 60-69 | 144 (58.8) | 211 (70.3) | 355(65.1) |
| 70-79 | 77 (31.4) | 68 (22.7) | 145 (26.6) |
| ≥80 | 24 (9.8) | 21 (7) | 45 (8.3) |
| Total | 245 (45) | 300 (55) | 545 |

Table 2: Distribution of the participants according to the characteristics.

| Characteristics | | Number (N) | Percentage (%) |
|---------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| | Hindu | 486 | 89.2 |
| Religion | Christian | 32 | 5.9 |
| | Muslim | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | |
| Maaritaal ada daa a | Married | Number (N)Percentage (% 486 89.2 32 5.9 27 4.9 360 66 arried/Separated 185 34 327 60 134 24.6 31 5.7 38 7 38 7 $300e$ 15 2.7 179 32.8 366 67.2 32 5.9 120 22 47 8.6 hold) works and others 189 34.7 157 28.8 96 17.4 253 46.6 179 32.9 17 3.1 20 3.7 150 27.5 dren 345 63.3 13 2.4 17 3.1 88 16.2 247 45.3 210 38.5 164 30.1 381 69.9 | 66 |
| Marital status | Widow/Unmarried/Separated | | 34 |
| | Illiterate | 327 | 60 |
| | Primary | 134 | 24.6 |
| Educational status | Middle | 31 | 5.7 |
| | High school | 38 | 7 |
| | Degree and Above | 15 | 2.7 |
| SES (Pareek's | I,II,III | 179 | 32.8 |
| classification) | IV,V | 366 | 67.2 |
| | Retired | 32 | 5.9 |
| | Agriculture | 120 | 22 |
| Occupation | Laborer | 47 | 8.6 |
| | Home (house hold) works and others | 189 | 34.7 |
| | None | 157 | 28.8 |
| | Nuclear | 96 | 17.4 |
| Type of family | 3 generation | 253 | 46.6 |
| i ype of failing | Joint family | 179 | 32.9 |
| | Single* | 17 | 3.1 |
| | Spouse | 20 | 3.7 |
| | Children | 150 | 27.5 |
| Staying with | Spouse+Children | 345 | 63.3 |
| | Relatives | 13 | 2.4 |
| | Alone | 17 | 3.1 |
| | Kutcha | 88 | 16.2 |
| Housing | Mixed | 247 | 45.3 |
| | Pucca | 210 | 38.5 |
| Cattles | Yes | 164 | 30.1 |
| Calles | No | 381 | 69.9 |
| | | | |

*Single: Unmarried/Separated/separated elderly those who were staying single.

Among the 545 participants, 128 (23.5%) participants were malnourished, 267 (49%) were at risk of malnutrition and 150 (27.5%) had normal nutritional status (Table 3).

It was observed that, among the participants aged 60-69 years and 70-79 years, majority were at risk of developing malnutrition and in the participants aged

 \geq 80years, majority were malnourished. There was a statistically significant association found between advancing age and low MNA score. Among males, 46.5% were at risk of malnutrition and 21.2% were malnourished. And in females, 51% were at risk of malnutrition and 25.3% were malnourished. However, there was no statistically significant association found between gender and MNA score (Table 4).

Among the elderly those who were widowed/unmarried/separated, majority (46.5%) were malnourished than the currently married (11.7%). There was statistically significant association found between marital status and MNA score. In the present study, among the illiterates 51.7% of the participants were at risk of malnutrition and 29.3% were malnourished, whereas among the group with educational status of primary and above, 45% were at risk of malnutrition and only 14.7% were malnourished. Statistically significant association found between educational status and nutrition of elderly (Table 5).

Table 3: Distribution of participants according to
their MNA scoring.

| MNA categorization | Number | Percentage (%) |
|------------------------------|--------|-------------------|
| Normal nutritional status | 150 | 27.5 |
| At risk of malnutrition | 267 | 49 |
| Malnourished | 128 | 23.5 |
| Total | 545 | 100 |

Table 4: Association between age group, gender of participants and MNA scoring.

| Variable | | MNA scoring | Ţ. | | | χ^2 value and p value |
|----------------------------|-----------|-------------|-----------|--------------|------------|----------------------------|
| variable | | Normal | At risk | Malnourished | Total N(%) | |
| Age group (Years) N (%) | 60-69 | 138 (38.9) | 185(52.1) | 32 (9) | 355 (65.1) | χ^2 : 186.01 |
| | 70-79 | 11 (7.6) | 77 (53.1) | 57 (39.3) | 145 (26.6) | 'p' value: <0.001 |
| | ≥ 80 | 1 (2.2) | 5 (11.1) | 39 (86.7) | 45 (8.3) | |
| Gender N (%) | Male | 79 (32.3) | 114(46.5) | 52 (21.2) | 245 (45) | χ^2 : 5.125 |
| | Female | 71 (23.7) | 153 (51) | 76 (25.3) | 300 (55) | 'p' value: 0.07 |

Table 5: Relation between marital status, education status and nutritional status of elderly with MNA score.

| | | MNA scori | ng | | | | |
|----------------|----------------------|------------|------------|------------|----------|------------------------------|--|
| Variable | | Normal | At risk | Malnourish | Total | χ^2 value and p value | |
| | | N (%) | N (%) | N (%) | N (%) | | |
| Marital status | Married | 128 (35.5) | 190 (52.8) | 42 (11.7) | 360 (66) | | |
| | Widow/ | | | | | χ ² : 91.051 | |
| | Unmarried/ | 22 (11.9) | 77 (41.6) | 86 (46.5) | 185 (34) | p<0.001 | |
| | Separated | | | | | | |
| Education | Illiterate | 62 (19) | 169 (51.7) | 96 (29.3) | 327 (60) | | |
| | Primary and above | 88 (40.3) | 98 (45) | 32 (14.7) | 218 (40) | χ^2 : 34.986 p<0.001 | |
| | and above | 88 (40.3) | 98 (45) | 32 (14.7) | 218 (40) | p<0.001 | |

Table 6: Association between occupation, socio-economic status and MNA scoring of the elderly.

| | | MNA scoring | | Total | χ^2 value and | |
|-------------------|---------------------|-------------|------------|------------|--------------------|-------------------------|
| Variable | | Normal | At risk | Malnourish | N (%) | 'p' value |
| | Agriculture | 49 (40.8) | 60 (50) | 11 (9.2) | 120 (22) | |
| | Laborer | 14 (29.8) | 26 (55.3) | 7 (14.9) | 47 (8.6) | |
| Occupation | House works | 62 (35.6) | 97 (55.8) | 15 (8.6) | 174 (31.9) | χ^2 : 112.03 |
| N (%) | Others | 5 (33.3) | 4 (26.7) | 6 (40) | 15 (2.8) | 'p' value: |
| | Retired/None | 20 (7) | 80 (38.9) | 89 (54.1) | 189 (34.7) | < 0.001 |
| Socio- | I,II,III | 95 (53.1) | 70 (39.1) | 14 (7.8) | 179 (32.9) | χ ² : 96.384 |
| economic N (%) | IV,V | 55 (15.1) | 197 (53.8) | 114 (31.1) | 366 (67.1) | 'p' value: <0.001 |
| | Total | 150 | 267 | 128 | 545 | |

Among the elderly, those who have retired/doing no work, majority were malnourished (54.1%) which was high when compared to those who were doing other works (40%), labourers (14.9%) and house wives (8.6%). Statistically significant association was found between occupation and MNA scoring of the elderly. The total cases of malnutrition was found to be high among the

elderly participants belonging to class IV and V socio economic status (31.1%) when compared to the participants belonging to class I,II,III socio economic status (7.8%). A significant association was found between SES and MNA score of elderly (Table 6).

| | | | MNA scoring | | Total* | χ^2 value and |
|--------------|----------------------------|------------|-------------|--------------|------------|----------------------------------------------|
| Variable | | Normal | At risk | Malnourished | N (%) | p value |
| | | N (%) | N (%) | N (%) | | |
| | Single* | 02 (11.8) | 02 (11.8) | 13 (76.4) | 17 (3.1) | |
| Type of | Nuclear | 33 (34.4) | 50 (52.1) | 13 (13.5) | 96 (17.4) | χ^2 : 36.865 |
| family | 3 generation | 75 (29.7) | 116 (45.8) | 62 (24.5) | 253 (46.4) | p value < 0.001 |
| | Joint family | 40 (22.4) | 99 (55.3) | 40 (22.3) | 179 (32.9) | |
| | Spouse | 5 (25) | 11 (55) | 4 (20) | 20 (3.7) | χ ² : 89.738 p value <0.001 |
| | Children | 19 (12.7) | 66 (44) | 65 (43.3) | 150 (27.6) | |
| Staying with | Spouse and children | 123 (35.6) | 181 (52.5) | 41 (11.9) | 345 (63.3) | |
| | Alone/Friend/ Relatives | 3 (10) | 9 (30) | 18 (60) | 30 (2.4) | |
| | Total | 150 | 267 | 128 | 545 | |

Table 7: Association between type of family and staying with status with MNA scoring of elderly.

*Single: unmarried/separated elderly those who were staying alone

Table 8: Relation between type of housing, status of cattle shed and MNA scoring of elderly.

| Variable | | MNA scoring | | Total | r^2 relation and | |
|-------------|--------|----------------|-----------|--------------|--------------------|----------------------------------|
| | | Normal At risk | | Malnourished | Total | χ value anu |
| | | N (%) | N (%) | N (%) | N (%) | p value |
| Housing | Kutcha | 11(12.5) | 38 (43.2) | 39 (44.3) | 88 (16.2) | x^2 , 45.07 |
| Housing | Mixed | 57 (23.1) | 129(52.2) | 61 (24.7) | 247 (45.3) | $\chi : 45.97$ p value <0.001 |
| conuntion | Pucca | 82 (39) | 100(47.6) | 28 (13.4) | 210 (38.5) | |
| Cattle shed | Yes | 74 (45.1) | 69 (42.1) | 21 (12.8) | 164 (30.1) | χ^2 : 40.087 |
| | No | 76 (19.9) | 198 (52) | 107 (28.1) | 381 (69.9) | p value <0.001 |
| | Total | 150 | 267 | 128 | 545 | |

In the present study majority of the participants were from 3 generation family. The malnutrition status was found to be high among those who were living single (76.4%) than the 3 generation (24.5%), nuclear (13.5%) and joint (22.3%) families. There was a significant difference found between type of family and MNA scoring.

Out of 545 elderly, 30 (2.4%) were staying alone or with friends/relatives. Among them 60% were malnourished which was high when compared to those who stay with children (43.3%), with spouse (20%). There was a significant association found between with whom they stay and MNA score (Table 7).

Among the elderly participants the malnutrition was found to be high among those who had Kutcha house (44.3%) than those with mixed type of house (24.7%) and pucca house (13.4%). Their association was found to be statistically significant. Malnutrition was found to be high (28.1%) among those who had no cattle shed. There was a significant association found between status of cattle shed and MNA score of the elderly (Table 8).

DISCUSSION

Elderly population is increasing in faster rate. Increasing in elderly population raising many challenges.

Malnutrition is one among them. It is influenced by many factors like socio-economic, demographic and environmental factors.

Keeping these in mind, the study was carried out over a period of 1½ years which included 545 elderly residing in Uchagaon sub centre, RHTC, Belagavi.

In the present study, almost 2/3rd (65.1%) of the elderly participants were in the age group of 60-69 years with the mean age of 67.84±6.38 years. A significant association was found between low MNA scoring and advanced age. The finding observed in our study was similar to the study conducted by Kansal et al in rural Belagavi, Kavya et al in rural Bangalore and Vedantham et al.⁹⁻¹¹ Study conducted by Paul et al, Agarwal et al and Krithika et al also showed similar association between advanced age and low MNA score et al.^{8,12,13} A study conducted by Reddy et al in rural areas of Tamil Nadu observed that the mean age of the entire study population was 69.8±7.8 years which was almost similar to our study.¹⁴

In the present study, 55% of the participants were females with female to male ratio of 1.25:1 suggesting female predominance. No significant association was found between gender and MNA score. Studies conducted by Kansal, Kavya et al showed similar pattern of distribution with female predominance with no significant association found between gender and MNA scoring.^{9,10}

In contrast, studies conducted by Lahiri, Kritika, Reddy et al had shown that male participants were more than the females.¹³⁻¹⁵ However, there was no significant association between gender and MNA scoring. The female predominance could be because of greater life expectancy in females than males in India.

The present study revealed that, 60% were illiterate and remaining 40% participants were literates and a significant association was found between educational status and MNA scoring. These findings were similar to studies conducted by Kritika, Lahiri, Shivaraj, Vedantam, Mathew et al.^{7,11,13,15,16}

In contrast to the present study, Bishnoi et al revealed low illiteracy rate (28%).¹⁷ But Ghimire et al had shown higher illiteracy (72.3%).¹⁸ However both the studies had shown significant association between literacy and MNA scoring. In literates the malnutrition was found to be less than the illiterates. This could be because; literates are well aware of dietary intake and maintain nutritional status.

In the present study, 66% were currently married. There was an association between MNA score and marital status. The findings are comparable with the study conducted by Bishnoi et al where 69.3% were currently married.¹⁷ In other studies done by Lahiri (88.9%), Meenu (80.7%), Kritika et al (71.4%) were currently married.^{13,14,19}

In our study, majority of the participants belonged to class IV/V (67.1%) socio economic status. The observations are almost similar to that of the study conducted by Kansal et al where majority of the participants belonged to class IV/V (54.21%).⁹ In contrast to the present study, studies by Mathew, Bishnoi et al revealed that majority of the participants belonged to class I, II, III socio economic status.^{16,17}

The present study revealed, 46.4% of the participants were from 3 generation family, followed by joint family (32.8%) and nuclear family (17.4%). As compared to the study conducted by Khushboo et al which showed that, majority of the participants were from nuclear family (72%) followed by joint family (28%).²⁰

63.3% of the study participants were staying with spouse and children, 27.5% were staying with only children, 3.7% were staying with only spouse, 2.4% were staying with relatives/ friends/ staying alone. Comparing to our study, a study conducted by Vedantham et al most of the elderly participants were living with their children (66%) and 21% were living with other family members including spouse and relatives.¹¹ In the present study higher prevalence of malnutrition was found among the elderly those who were staying with friends/family/ alone. This could be due to poor nutritional care provided by friends/relatives than children/spouse.

Present study revealed, 45.3% were staying in mixed type (semi pucca) house, 38.5% were in pucca house and 16.2% were living in kutcha house. The observations are almost similar to the study conducted by Arlappa et al where majority of the participants were residing in semipucca house (65%) followed by kutcha (19%) and pucca (16%) house.²¹ There was a significant association found between housing condition and MNA scoring. The reason could be because, those who reside in kutcha house/no house belonged to low socio economic status and had poor awareness regarding nutrition and dietary intake.

Our study has certain limitations. The present study was carried out in only one sub centre. No blood investigations were carried out to determine the nutritional status of elderly. Except calories intake, detailed analysis of the dietary intake was not carried out.

Many epidemiological factors influenced the nutritional status of rural elderly. There is a need to modify those factors to improve the nutritional status of elderly and this can be a scope for further study in future.

CONCLUSION

The present study revealed, majority of the elderly participants were in the age group of 60-69 years, currently married, females, belongs to Hindu religion, illiterates, from 3 generation family, staying in mixed type of houses and belongs to class IV/V SES. In the present study the nutritional status of elderly by MNA tool revealed that majority of the participants were at risk of malnutrition. The nutritional status of elderly was associated with increase in age, marital status, educational status, occupation, socio-economic status, type of family and housing condition. There was no association found between nutritional status and gender difference.

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