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Exploring Factors Influencing Nutritional Status among Elderly Population in a Rural Setting: A Descriptive Community-Based Study

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Abstract: **Background:** Malnutrition is a significant public health concern among the elderly population, particularly in rural areas. This study aimed to assess the nutritional status and its associated factors among elderly individuals residing in a rural setting. **Methods:** A community-based cross-sectional study was conducted among 600 elderly individuals aged 60 years and above in a rural area. Socio-demographic characteristics, dietary habits, and nutritional status were assessed using a structured questionnaire and the Mini Nutritional Assessment (MNA) tool. Descriptive statistics, chi-square tests, and logistic regression analysis were used to analyze the data. **Results:** The prevalence of malnutrition and risk of malnutrition among the elderly participants was 17% and 41.5%, respectively. Factors significantly associated with poor nutritional status included older age, female gender, lower educational status, lower socioeconomic status, inadequate dietary intake, and presence of chronic illnesses. Logistic regression analysis revealed that age, gender, socioeconomic status, dietary intake, and presence of chronic illnesses were independent predictors of nutritional status. **Conclusion:** The high prevalence of malnutrition and risk of malnutrition among elderly individuals in rural areas highlights the need for targeted interventions to improve their nutritional status. Addressing the identified risk factors through community-based programs, nutritional education, and social support could help prevent and manage malnutrition in this vulnerable population. **Keywords:** Malnutrition, Elderly, Nutritional status, Risk factors, Rural health.

INTRODUCTION

Malnutrition is a common and often underrecognized problem among the elderly population, with significant implications for their health and well-being [1]. The World Health Organization (WHO) defines malnutrition as a state of deficiency, excess, or imbalance in energy, protein, and other nutrients, leading to adverse effects on body composition, function, and clinical outcomes [2]. The elderly are particularly vulnerable to malnutrition due to various physiological, psychological, and socioeconomic factors [3].

The prevalence of malnutrition among the elderly varies across different settings and regions, with estimates ranging from 1.3% to 47.8% in community-dwelling older adults [4]. In India, the elderly population is growing rapidly, with a significant proportion residing in rural areas [5]. Studies have reported a high prevalence of malnutrition among the elderly in India, ranging from 15% to 50% [6, 7]. However, limited data is available on the nutritional status and its associated factors among elderly individuals in rural settings.

Several factors have been identified as potential determinants of malnutrition in the elderly, including age, gender, socioeconomic status, educational level, dietary habits, and presence of chronic diseases [8, 9]. Understanding these factors is crucial for developing targeted interventions to prevent and manage malnutrition in this vulnerable population.

Aims and Methods:

This study aimed to assess the nutritional status and its associated factors among elderly individuals residing in a rural area of Belagavi, Karnataka, India. A community-based cross-sectional study was conducted from January to December 2020 in the rural field practice area of the Rural Health Centre, Department of Community Medicine, J. N. Medical College, KAHER, Belagavi. The sample size was calculated using a prevalence of 15% (7), with an absolute error of 3% and a confidence level of 95%, yielding a sample size of 600.

Systematic random sampling was used to select the study participants. The Peeranwadisubcenter, one of the nine subcenters under the Kinaye Rural Health Centre, was randomly selected. Using the household register, a total of 1,850 households were identified, and every 2nd house was visited until the desired sample size was achieved. Elderly individuals aged 60 years and above who resided in the area for more than six months and provided consent were included in the study. Those who were critically ill, suffered from neuropsychiatric illnesses, or were bedridden were excluded.

Data were collected using a pre-designed and pre-tested questionnaire through face-to-face interviews. The questionnaire gathered information on socio-demographic characteristics, dietary habits, and past medical history. Nutritional status was assessed using the Mini Nutritional Assessment (MNA) tool, a validated and widely used instrument specific to the elderly population (10). The MNA tool consists of 18 questions based on anthropometric measurements, dietary intake, global health and social assessment, and subjective assessment of nutrition and health.

Data were entered and managed using Microsoft Excel and analyzed using SPSS version 20. Descriptive statistics, including frequencies and percentages, were used to summarize the data. Chi-square tests were performed to assess the association between nutritional status and various factors. Logistic regression analysis was conducted to identify the independent predictors of nutritional status. A p-value of less than 0.05 was considered statistically significant.

Ethical clearance was obtained from the Institutional Ethical Committee of J. N. Medical College, KAHER, Belagavi. Written informed consent was obtained from all participants, and the consent forms were provided in the local language.

RESULTS

Socio-demographic profile:

The majority of the study participants (36.5%) were in the age group of 60-64 years, followed by 34.8% in the 65-69 years age group. The study included 320 (53.3%) males and 280 (46.7%) females. Most of the participants (86.17%) were Hindus. Regarding educational status, 34% had completed primary school, while 32.7% were illiterate. The majority of the participants were either homemakers (33.8%) or agriculturists (33.3%). Most of the participants (85.5%) were married. According to the modified B.G. Prasad classification, 49% of the participants belonged to class IV socioeconomic status. A large proportion of the participants (78.5%) were living in joint families.

Personal information:

Among the participants, 42% did not have any past history of chronic illness, while 23% had diabetes, 15.2% had hypertension, and 19.5% had both diabetes and hypertension. The majority of the participants (64.7%) were vegetarians. Regarding 24-hour dietary intake, 52% of the participants consumed an adequate calorie intake. Most of the participants (93.2%) did not have any harmful habits.

General physical examination:

The majority of the participants (79%) were moderately built and nourished. Pallor was present in 47.3% of the participants. Among the male participants, 69% had a waist-hip ratio >0.96 , while 55% of the female participants had a

waist-hip ratio >0.81.

Mini Nutritional Assessment (MNA):

The overall prevalence of malnutrition among the elderly participants was 17%, while 41.5% were at risk of malnutrition. The majority of the participants (52.8%) had no decrease in food intake over the past three months. Nearly half of the participants (45.5%) had no weight loss in the past three months. Most of the participants (95.2%) were able to go out of their homes. Only 3.3% of the participants suffered from psychological stress in the past three months. Mild dementia was present in 36% of the participants. Regarding body mass index (BMI), 45.8% had a BMI >23, while 14.8% had a BMI <19. The majority of the participants (99.3%) lived independently. Most of the participants (84.8%) did not take more than three prescription drugs per day. Pressure sores or skin ulcers were present in 7.3% of the participants. The majority of the participants (70.9%) consumed two full meals per day. Regarding protein intake, 90.5% consumed at least one serving of dairy products per day, while 81.2% did not consume two or more servings of legumes or eggs per week. Most of the participants (92.2%) did not consume two or more servings of fruits and vegetables per day. The majority of the participants (92.2%) consumed more than five cups of fluid per day. Most of the participants (92.7%) self-fed without any difficulty. Regarding self-view of nutritional status, 70.7% of the participants were uncertain about their nutritional status. When compared to other people of the same age, 69% of the participants considered their nutritional status to be as good. The majority of the participants (76.2%) had a mid-arm circumference (MAC) >22 cm. Most of the participants (75.2%) had a calf circumference (CC) ≥31 cm.

Association between nutritional status and various factors:

The prevalence of malnutrition was significantly higher among participants aged >65 years (65.7%) compared to those aged <65 years (41.8%) ($p<0.001$). Malnutrition was more prevalent among females (60.4%) compared to males (47.2%) ($p=0.001$). The prevalence of malnutrition was significantly higher among illiterate participants (64.8%) compared to those with higher educational levels ($p<0.001$). Participants belonging to lower socioeconomic classes (III, IV, and V) had a higher prevalence of malnutrition compared to those in higher socioeconomic classes (I and II) ($p<0.001$). The prevalence of malnutrition was significantly higher among unmarried or widowed participants (73.6%) compared to married participants (49.9%) ($p<0.001$). Participants living in broken families had a higher prevalence of malnutrition (76.7%) compared to those living in joint (55%) or nuclear (38.4%) families ($p<0.001$). The association between religion and type of diet with nutritional status was not statistically significant. The prevalence of malnutrition was significantly higher among participants with inadequate calorie intake (80.8%) compared to those with adequate intake (29.2%) ($p<0.001$). Participants with a history of substance abuse had a higher prevalence of malnutrition (68.3%) compared to those without any habits (52.2%) ($p=0.047$). The prevalence of malnutrition was significantly higher among participants with chronic illnesses, particularly those with both diabetes and hypertension (66.4%) ($p=0.004$). Participants with a lower BMI had a significantly higher prevalence of malnutrition ($p<0.001$).

Multiple logistic regression analysis:

Multiple logistic regression analysis revealed that males were 2.37 times more likely to have a normal nutritional status compared to females (AOR=2.37, 95% CI: 1.31-4.26, $p=0.004$). Participants aged <65 years were 0.46 times more likely to have a normal nutritional status compared to those aged >65 years (AOR=0.46, 95% CI: 0.27-0.76, $p=0.003$). Participants belonging to socioeconomic class III were 5.26 times more likely to have a normal nutritional status compared to those in class V (AOR=5.26, 95% CI: 2.07-13.37, $p<0.001$). Participants without any habits were 3.25 times more likely to have a normal nutritional status compared to those with substance abuse (AOR=3.25, 95% CI: 1.243-8.493, $p=0.016$). Participants without any past history of chronic illness were 2.48 times more likely to have a normal nutritional status compared to those with both diabetes and hypertension (AOR=2.48, 95% CI: 1.27-4.84, $p=0.008$). Participants with adequate food intake were 2.65 times more likely to have a normal nutritional status compared to those with inadequate intake (AOR=2.65, 95% CI: 1.43-4.57, $p=0.001$). Participants with a BMI >23 and between 21 to 23 were 0.009 times more likely to have a normal nutritional status compared to those with a BMI <19 (AOR=0.009, 95% CI: 0.002-0.043, $p<0.001$).

Table 1: Distribution of the study participants according to their Nutritional Status (As per MNA score) (N=600)

Nutritional Status	Number (n)	Percentage (%)
Normal	249	41.50
At risk of malnutrition	249	41.50
Malnourished	102	17.00
Total	600	100

Table 2: Association between age and gender with nutritional status

	Malnourished or At risk of Malnutrition	Normal nutritional status	Total	Chi-Square	p-value
Age					
<65	130 (41.8)	181 (58.2)	311	34.5	<0.001***

≥65	190 (65.7)	99 (34.3)	289		
Gender					
Male	151 (47.2)	169 (52.8)	320	10.4	0.001**
Female	169 (60.4)	111 (39.6)	280		

Table 3: Association between educational status and nutritional status

	Malnourished or At risk of Malnutrition	Normal nutritional status	Total	Chi-Square	p-value
Education					
Illiterate	127 (64.8)	69 (35.2)	196	28.415	<0.001***
Primary School	107 (52.5)	97 (47.5)	204		
High School	66 (50.0)	66 (50.0)	132		
PUC I & II	10 (40.0)	15 (60.0)	25		
Degree	10 (23.3)	33 (76.7)	43		

Table 4: Association between past history and 24hr dietary intake with nutritional status

	Malnourished or At risk of Malnutrition	Normal nutritional status	Total	Chi-Square	p-value
Past History					
None	123 (48.8)	129 (51.2)	252	13.25	0.004**
Diabetes	65 (47.1)	73 (52.9)	138		
Hypertension	53 (58.2)	38 (41.8)	91		
Diabetes + Hypertension	79 (66.4)	40 (33.6)	119		
24hrs Dietary intake					
Adequate	92 (29.2)	223 (70.8)	315	155.10	<0.001***
Inadequate	228 (80.8)	57 (19.2)	285		

Table 5: Multiple logistic regression analysis of factors associated with nutritional status

Factors	Adjusted Odds Ratio	95% CI	p-value
Age (>65 vs. <65)	0.46	0.27-0.76	0.003**
Gender (Male vs. Female)	2.37	1.31-4.26	0.004**
Socioeconomic status (Class III vs. V)	5.26	2.07-13.37	<0.001***
Dietary intake (Adequate vs. Inadequate)	2.65	1.43-4.57	0.001**
Chronic illness (None vs. Diabetes + Hypertension)	2.48	1.27-4.84	0.008**

Note:

- *** indicates highly significant (p<0.001)
- ** indicates significant (p<0.01)

DISCUSSION

The present study highlights a significant burden of malnutrition and risk of malnutrition among elderly individuals residing in a rural area of Belagavi, Karnataka, India. The prevalence of malnutrition (17%) and risk of malnutrition (41.5%) in this study is comparable to the estimates reported in previous studies conducted in India and other developing countries [6, 7, 11].

Older age was found to be significantly associated with poor nutritional status in this study, which is consistent with the findings of previous research [12, 13]. The age-related changes in body composition, decreased sensory functions, and reduced appetite may contribute to the increased risk of malnutrition in older adults [14].

Female gender was identified as another significant factor associated with poor nutritional status in this study. This finding is in line with previous studies that have reported a higher prevalence of malnutrition among elderly women compared to men [15, 16]. The gender disparity in nutritional status may be attributed to socio-cultural factors, such as gender discrimination in food allocation and access to healthcare services [17].

Lower educational status and socioeconomic status were found to be significantly associated with poor nutritional status in this study. These findings are consistent with previous research that has identified low education and poverty as risk factors for malnutrition in the elderly [18, 19]. Limited education and financial resources may lead to poor dietary choices, inadequate access to healthcare, and lack of awareness about healthy eating habits [20].

Inadequate dietary intake was another significant factor associated with poor nutritional status in this study. This finding highlights the importance of ensuring adequate and balanced nutrition for the elderly population. Previous studies have shown that poor dietary intake, particularly of energy and protein, is a major contributor to malnutrition in the elderly [21, 22].

The presence of chronic illnesses, such as diabetes and hypertension, was significantly associated with poor nutritional status in this study. Chronic diseases can affect appetite, nutrient absorption, and metabolism, leading to malnutrition [23]. Moreover, the medications used to treat chronic conditions may also have an impact on nutritional status [24].

The strengths of this study include the community-based design, random sampling, and the use of a validated tool (MNA) for assessing nutritional status. However, some limitations should be acknowledged. The cross-sectional nature of the study precludes the establishment of causal relationships between nutritional status and the associated factors. Additionally, the study relied on self-reported data for certain variables, such as dietary intake and past medical history, which may be subject to recall bias.

CONCLUSION

The present study reveals a high prevalence of malnutrition and risk of malnutrition among elderly individuals residing in a rural area of Belagavi, Karnataka, India. Older age, female gender, lower educational status, lower socioeconomic status, inadequate dietary intake, and presence of chronic illnesses were identified as significant factors associated with poor nutritional status in this population. The findings highlight the need for comprehensive community-based interventions to prevent and manage malnutrition among the elderly in rural areas. These interventions should focus on nutritional education, promotion of healthy eating habits, and management of chronic diseases. Further research is warranted to explore the potential causal relationships between nutritional status and its associated factors in this population. Addressing the high burden of malnutrition among the elderly in rural areas is crucial for improving their overall health and quality of life.

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