# Prevalence Of Malnutrition And Its Contributing Factors Among Geriatric Patients

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## Abstract

According to the World Health Organization (WHO), the population of worldwide elderly people aged ≥60 years is projected to reach 1.5 billion by 2050. India's elderly population is also growing rapidly and accounts for 8.1% of the total population in 2011. Undernutrition is common among older people over 60 years of age. **Objectives:** To determine the prevalence of malnutrition and to identify the contributing factors of malnutrition among geriatric population.
**Methodology:** A non-experimental descriptive survey conducted among 170 geriatric patients attending general OPD's at a tertiary care Centre, Kerala using Mini Nutritional Assessment tool (MNA). classify the respondents as having 'normal nutrition' (score 23.5 and above), 'at risk of malnutrition' (17-23.5), 'malnourished'.
**Results:** Nutritional assessment revealed that 34.2% were 'malnourished', 47.6% at 'risk for malnutrition' and 18.2% having normal nutritional status. Moderate to severe declined food intake over the three months (68.2%), taking only two meals daily (55. 3%) and less fluid consumption >5 cups (49.4%) were found to be the contributing factors. Age, marital status, economic dependency, type of family and education were found significantly associated with nutritional status in elderly. Malnutrition was higher with increase in age, in unmarried people, in dependent older adults and those living in extended families.
**Conclusion:** The findings of the study highlight the gravity of geriatric malnutrition in Kerala. Along with addressing the problem of malnourished. screening and training of primary care givers in identifying elderly at risk, and counseling on nutritional support need attention.

**Keywords:** Geriatric patients, Malnutrition, Mini nutritional assessment, Prevalence, contributing factors.

## Introduction

The number of elderly is on the increase, both in developed and developing countries. According to WHO, the proportion of the world's population over 60 years will nearly double from 12% to 22% between 2015 and 2050. The people aged 60 years and older are expected to outnumber children younger than five years by 2020.[1] Malnutrition affects 1 in 3 people worldwide making it a growing public health challenge (Global Nutrition Report 2016).[2] This rapid rise in elderly population will definitely give rise to several challenges for health care system. The major population burdens of disability and death in people over 60 arise from age related losses in hearing, seeing and moving and conditions such as dementia, heart disease, stroke, chronic respiratory disorder, diabetes and osteoarthritis. These are problems that not only affect the higher income countries but also is generally far higher in low and middle income countries.[3]

In India, geriatric age group (aged 60 years and above) constitute 8.6% of the total population as per 2011 census.[4] The magnitude of malnutrition among the elderly in India is under-reported. The few studies that have been done showed that more than 50% of the older population is underweight and more than 90% has an energy intake below the recommended allowance.[5]

Older persons are specifically susceptible to malnutrition as there are many practical issues encountered in providing adequate nutrition. With increasing age, though both lean body mass and basal metabolic rate declines that leads to reduction

in energy requirement, the necessity for other vital nutrients rises.[6]

The health status of the elderly has not been given due consideration by the National health policy. Since nutrition of the elderly affects immunity and functional ability, it is an important component of elderly care that warrants further attention. State-wise data reveal that Kerala has maximum proportion of elderly people in its population (12.6%).[7]

"The Hellenic Longitudinal Investigation in Ageing and Diet" conducted in Greece (2014) among 1,050 subjects was one among the significant studies that identified several factors related to the nutritional status of community-dwelling older adults. They were marital status, Body Mass Index (BMI), sex, level of education, cognitive performance, and adherence to the Mediterranean diet. Also, there was a high prevalence of moderate and high nutritional risks, with only around one third of the participants being well-nourished.[8] Other conditions increasing the risk of malnutrition were: use of medication (more than 3 drugs per day), an illness or condition that influenced food intake, dental or oral problems, eating few fruits and vegetables or milk products, and eating alone most of the time.[9]

Malnutrition is a state that results from a "lack of intake or uptake which can be caused by starvation, disease or advanced ageing (e.g. > 80 years), alone or in combination".[10] Consequences of malnutrition are deleterious and far reaching. While disease-related malnutrition is not limited to older adults, it is more frequent in higher age, and the consequences appear to be more severe in older persons due to their impaired regenerative capacity.[11]

Malnutrition plays an important role in the development of certain geriatric syndromes. Geriatric syndromes are complex multifactorial conditions occurring in higher age with serious implications for health. four shared risk factors—older age, baseline cognitive impairment, baseline functional impairment, and impaired mobility—were identified across five common geriatric syndromes (pressure ulcers, incontinence, falls, functional decline, and delirium.[12]

Involuntary weight loss, a hallmark of malnutrition, is inevitably associated with loss of skeletal muscle mass, which appears to occur at a greater extent in higher age. This increases the risk of developing sarcopenia, a phenomenon which is characterized by the loss of both muscle mass as well as muscle strength and function. As these two entities frequently occur together, this has led to the new term "sarcopenia malnutrition syndrome."[12]

Recent knowledge indicates that ageing is accompanied by slightly but chronically elevated inflammation levels. This sterile and silent inflammation in old adults has been termed "inflammaging."[13] Recently, in the pandemic of coronavirus disease 2019 (COVID-19), inflame-maging gained additional attention in view of the observed cytokine storm and autoimmunity during infection among older patients, which can result in multiple organ failure and is in general associated with a worse disease outcome.[14]

Malnutrition in general has serious implications for clinical outcome, for recovery from disease, trauma and surgery and is associated with increased morbidity and mortality both in acute and chronic disease. These can be prevented if nutritional status among elderly people is assessed with simple nutritional measures and treated malnutrition on time. Weight loss in older adults can be divided into three distinct types (Roubenoff): Wasting, Cachexia and Sarcopenia.[15]

Malnutrition is mostly modifiable and therefore it is important to develop and implement adequate intervention strategies for its prevention and control. Early identification of malnutrition should be the first step, but the problem is that there is no specific tool for assessment of elderly malnutrition.

## Objectives

The primary objectives of the study were to determine the prevalence of malnutrition and to identify the contributing factors of malnutrition among geriatric population. The secondary objective was to find the association of nutritional status in elderly with selected sociodemographic variables.

## Research Methodology

Quantitative, non-experimental descriptive survey conducted in general OPDs of a tertiary care hospital, Kerala. Patients above the age of 60 years available during the data collection period were included. Seriously ill and mentally unstable patients were excluded.

Non-probability purposive sampling technique was used to collect data. The sample size was calculated using the formula $n=4pq/d^2$. For the present study the sample size was approximated to 170.

p=11.6%(12%), Q=1-P, Q=1-0.12=0.88, d=0.05
n=4×0.12×0.88/0.0025, n=0.4224/0.0025, n=168.96

## Tools for the study

### Tool-1: Structured questionnaire to assess the socio demographic variables

It consisted of age, gender, education, marital, place of residence, economic dependency, type of family and living arrangements.

## Tool-II: Mini Nutrition Assessment Scale (MNA)

The MNA scale is a screening tool to identify elderly persons who are malnourished or at risk of malnutrition. It may provide additional information about the causes of malnutrition in persons identified as malnourished or at risk for malnutrition. The MNA was developed by Nestlé and leading international geriatricians.[16] Reliability was checked by test-retest method, according to the intra class correlation coefficient (ICC) and is found to be 0.89 for the total MNA score.[17]

The MNA questionnaire specifically formulated for elderly people comprised of 18 items in two sections: Screening and Assessment. Screening section consisted of six parts with a subjective assessment of decline in food intake and perceived psychological stress and weight loss during the past three months, mobility of the individual, subjective assessment of neuropsychiatric symptoms like dementia or depression, and anthropometric assessment, such as height, weight, and body mass index.

The assessment section consisted 12 parts with questions pertaining to independent living status of the elderly; presence of pressure sores; number of prescription drugs taken; frequency of meals; assessment of protein intake by frequency of intake of meat, fish, legumes, dairy products, consumption of fruits and vegetables, fluid intake; mode of feeding; self-assessment of health and nutritional status; and anthropometric measurements, such as mid arm circumference and calf circumference. A maximum score of 14 and 16 were given to the screening and assessment sections respectively. Based on the total scores obtained, the study subjects were classified as Normal/ Well nourished (Score >23.5), At risk of malnutrition (Score 17-23.5) or Malnourished (Score <17).

The validity assessment of MNA among an elderly population in Kerala, South India by Shilpa Jose and Kumari K.S. using clinical status of subjects as 'gold standard', demonstrated a sensitivity of 90.2% and specificity of 96.4% in identifying well-nourished and malnourished elderly. Use of BMI as a 'gold standard' also showed that MNA had excellent sensitivity (95.4 %) and specificity (93.9%) in identifying malnutrition and therefore recommended for use.[18]

## Results

**Table 1: -** Sample characteristics n - 170

| Socio Demographic variable | Category | f | % |
|---|---|---|---|
| Age in years | 60-70 | 94 | 55.3 |
| | 71-80 | 55 | 32.4 |
| | >81 | 21 | 12.4 |
| Gender | Male | 80 | 47.1 |
| | Female | 90 | 52.9 |
| | Transgender | 0 | 0 |
| Education | Primary Education | 102 | 60.0 |
| | High School/ Higher Secondary | 44 | 25.9 |
| | Professional/ Technical | 24 | 14.1 |
| Marital Status | Married | 114 | 67.1 |
| | Unmarried/ Single | 7 | 4.1 |
| | Widowed/ Divorced/ Separated | 49 | 28.8 |
| Place of Residence | Urban | 125 | 73.5 |
| | Rural | 45 | 26.5 |
| Economic Dependency | Self-dependent | 83 | 48.8 |
| | Dependent | 87 | 51.2 |
| Type of Family | Joint family | 93 | 54.7 |
| | Extended family | 77 | 45.3 |
| Living Arrangements | Alone | 15 | 8.8 |
| | With family members | 155 | 91.2 |

More than half of the study subjects were in the age group of 60-70 years and were females (55.3%, 52.9% respectively). Most of the subjects belonged to urban area (73.5%) and were living with family members 91.2%.

**Table 2: -** Distribution of subjects based on factors contributing to Malnutrition at MNA Screening

| Factors contributing to Malnutrition | Category | f | % |
|---|---|---|---|
| Extent of declined food intake over the three months | Severe | 39 | 22.9 |
| | Moderate | 77 | 45.3 |
| | No decrease | 54 | 31.8 |
| Weight loss during the last three months | > 3 kg | 36 | 21.2 |
| | 1 - 3 kg | 19 | 11.2 |
| | No weight loss | 42 | 24.7 |
| | Does not know | 72 | 42.4 |
| Mobility | Bed or chair bound | 9 | 5.3 |
| | Able to get out of bed/ chair but does not go out | 33 | 19.4 |
| | Goes out | 128 | 75.3 |
| Psychological stress or acute disease in the past three months | Yes | 63 | 37.1 |
| | No | 107 | 62.9 |
| Neuropsychological problems | Severe dementia or depression | 6 | 3.5 |
| | Mild dementia | 64 | 37.6 |
| | No psychological problems | 100 | 58.8 |
| Body mass index (BMI) in kg/m² | < 19 | 27 | 15.9 |
| | 19 - 20.9 | 37 | 21.8 |
| | 21 - 22.9 | 21 | 12.4 |
| | 23 or greater | 85 | 50 |

Moderate to severe declined food intake over the three months was found in the majority of study subjects (45.3% and 22.9% respectively). Nearly half of the study subjects (42.4%) were not knowing about their weight loss. Regarding mobility, most of the study subjects (75.3%) were going out. The BMI of 50% of the sample was below 23 kg/m$^2$.

**Table 3: -**Distribution of subjects based on the mean score at MNA screening

| Category of Screening score | f | % |
|---|---|---|
| Normal nutritional status (12-14 points) | 25 | 14.7 |
| At risk of malnutrition (8-11 points) | 79 | 46.5 |
| Malnourished (0-7 points ) | 66 | 38.8 |

**Table 4: -** Distribution of subjects based on factors contributing to Malnutrition at MNA Assessment.

| Factors contributing to Malnutrition | Category | f | % |
|---|---|---|---|
| Lives independently | Yes | 166 | 97.6 |
| | No | 4 | 2.4 |
| Takes > 3 prescription drugs per day | Yes | 141 | 82.9 |
| | No | 29 | 17.1 |
| Pressure sore or skin ulcers | Yes | 57 | 33.5 |
| | No | 112 | 65.9 |
| Number of meals taken daily | One | 5 | 2.9 |
| | Two | 94 | 55.3 |
| | Three | 71 | 41.8 |
| Protein intake servings | None / one | 29 | 17.1 |
| | Two | 86 | 50.6 |
| | Three | 55 | 32.4 |
| Consumes two or more fruits or vegetables per day | No | 12 | 7.1 |
| | Yes | 158 | 92.9 |
| Amount of fluid consumed per day | < 3 cups | 3 | 1.8 |
| | 3 - 5 cups | 81 | 47.6 |
| | > 5 cups | 86 | 50.6 |
| Mode of feeding | Unable to eat without assistance | 9 | 5.3 |
| | Self-fed with some difficulty | 34 | 20 |
| | Self-fed without any problem | 127 | 74.7 |
| Self-view of nutritional status | Views self as being malnourished | 26 | 15.3 |
| | Is uncertain about nutritional status | 93 | 54.7 |
| | Self-fed without any problem | 51 | 30 |
| In comparison with other people of the same age the patient considers his/ her health status as | Not good | 28 | 16.5 |
| | Good | 55 | 32.4 |
| | Better | 10 | 5.9 |
| | Does not know | 77 | 45.3 |
| Mid Arm Circumference (MAC) in cm | < 21.5 | 26 | 15.3 |
| | 21 - 22 | 81 | 47.6 |
| | > 22 | 63 | 37.1 |
| Calf Circumference in cm | < 31 | 76 | 44.7 |
| | 31 or greater | 94 | 55.3 |

Table 4 depicts that 82.9% of subjects were taking more than three prescribed drugs per day. Although 92.9% consumed two or more fruits or vegetables per day, only two meals were taken daily by more than half of the subjects (55. 3%).The fluid consumption of more than five cups per day was found only in 50.6%. Only 37.1% of the sample had

MAC of > 22 cm. 55.3% had Calf Circumference of 31 or greater.

**Table 5: -**Distribution of subjects based on mean score at MNA assessment

| Category of assessment score | f | % |
|---|---|---|
| Normal (12.5 to 16) | 42 | 24.7 |
| At risk of malnutrition (8.5 to 12) | 81 | 47.6 |
| Malnourished (<8.5) | 47 | 27.6 |

Table 5 shows that only 24.7% had a normal nutritional status on assessment with MNA. Most of the subjects were either malnourished or at risk of malnutrition (47.6%, 27.6% respectively).
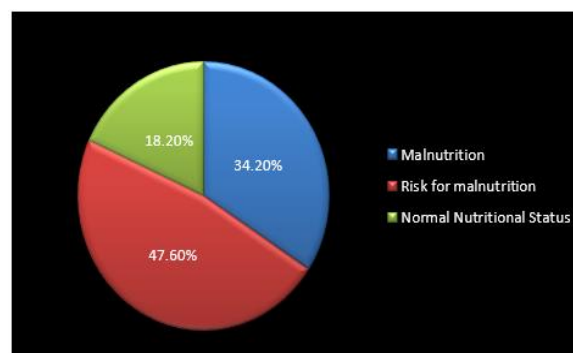


**Figure 1: -** Distribution of subjects based on MNA score.

**Table.6** Association of Nutritional status of elderly with selected socio demographic variables.

| Variable | Category | Malnourished | Risk For Malnutrition | Normal Nutritional Status | 'P' Value |
|---|---|---|---|---|---|
| Age in years | 60-70 (n=94) | 17 (18.1%) | 53 (56.4%) | 24 (24.5%) | 0.000* |
| | 71-80 (n=55) | 26 (47.3%) | 24 (43.6%) | 5 (9.1%) | |
| | >81 (n=21) | 15 (71.4%) | 4 (19.0%) | 2 (9.5%) | |
| Gender | Male (n=80) | 24 (30.0%) | 39 (48.8%) | 17 (21.3%) | 0.462 |
| | Female (n=90) | 34(37.8%) | 42 (46.7%) | 14 (15.6%) | |
| Educational Status | Primary Education(n=102) | 42 (41.2%) | 46 (45.1%) | 14 (13.7%) | 0.119 |
| | High school/ secondary education (n=44) | 10 (22.7%) | 22 (50.0%) | 12 (27.3%) | |
| | Professional education (n=24) | 6 (25.0%) | 13 (54.2%) | 5 (20.8%) | |
| Marital Status | Married (n=114) | 30 (26.3%) | 58 (50.9%) | 26 (22.8%) | 0.011* |
| | Unmarried (n=7) | 3 (42.9%) | 2 (28.6%) | 2 (28.6%) | |
| | Divorced/Widowed/ Separated (n=49) | 25 (51.0%) | 21 (42.9%) | 3 (6.1%) | |
| Place of Residence | Urban (n=125) | 44 (35.2%) | 58 (46.4%) | 23 (18.4%) | 0.851 |
| | Rural (n=45) | 14 (31.1%) | 23 (51.1%) | 8 (17.8%) | |
| Economic Dependency | Independent (n=83) | 22 (26.5%) | 40 (48.2%) | 21 (25.3%) | 0.027* |
| | Dependent (n=87) | 36 (41.4%) | 41 (47.1%) | 10 (11.5%) | |
| Type Of Family | Joint (n=93) | 24 (25.8%) | 48 (51.6%) | 21 (22.6%) | 0.031* |
| | Extended (n=77) | 34 (44.2%) | 33 (42.9%) | 10 (13.0%) | |
| Living arrangements | Alone(n=15) | 2(13.33%) | 7(46.6%) | 6(40%) | 0.021* |
| | With family members(n=155) | 28(18%) | 75(48.3%) | 52(33.5) | |

From figure 1, it is clear that only 18.20% of the subjects were having normal nutritional status. Majority of the subjects were either malnourished (34.20%) or at risk of malnutrition (47.60%).

From table 6, it is evident that there is a statistically significant association between five socio demographic variables such as age, marital status, economic dependency, type of family and living arrangements with the nutritional status of the subjects (p value < 0.05).

## DISCUSSION

The results of present study on 170 older adults showed 34.2% prevalence of malnutrition and 47.6% of subjects at risk of malnutrition. Similar studies in Kerala have shown a relatively lower prevalence of malnutrition but homogeneous related to the subjects at risk of malnutrition. A community based cross sectional study conducted among 1000 elderly (above 65 years) using MNA showed the prevalence of malnutrition reported during the period of 2 years (2016- 2018) as 17.3% with 36.8% of the subjects at risk of malnutrition.[19] Prevalence of malnutrition was 14.3% with 44.1% subjects at risk of malnutrition were the findings of a study conducted among 245 elderly (age ≥ 60 years) in Nemom block panchayath, Thiruvananthapuram, Kerala[20] whereas the research findings of Jose S & Kumari KS. conducted in Kerala found only 7% of the subjects as malnourished with 40% at risk of malnutrition.[18] The findings of the study done in West Bengal, had shown 29.4% prevalence of malnutrition and 60.4% at risk of malnutrition. There was a decrease in MNA score with increasing age, very similar to the present study.[21] The present study finding is also concordant with that of a cross sectional study conducted at a tertiary care public teaching hospital, Chandigarh. Among 246 patients, 46.4% were found to be malnourished and 50.2% were at risk of malnutrition.[22] A community based cross sectional study among 279 elderly subjects in four villages of rural Puducherry, India also reported that 17.9% of elderly as malnourished with 58.7%, at risk of malnutrition.[23] In another south Indian study by *Satyanarayana Konda, Ravi Kumar B. P., Purushottam A Giri* among 209 subjects, 9.1% were malnourished, 32.5% were at risk of malnutrition. [24]

A community based cross-sectional study to assess malnutrition among elderly population residing in urban and rural areas of a district in Karnataka, India has shown that malnutrition was prevalent in 18.6 %. Among 204 subjects, 42.6% were well nourished and 38.7% were at risk of malnutrition.

Elderly living in rural were more malnourished than urban areas.[25]

The findings were similar in the studies done outside India too. A community-based comparative cross-sectional study among 616 older adults (308 from urban and 308 from rural) from May to June 2021in Ethiopia using MNA showed an overall prevalence of malnutrition 17.5% (95% CI: 14.4%−20.7%). Malnutrition was more prevalent among older adults living in rural areas than in urban areas (25.2% and 9.9%) respectively.[26] A Chinese study in five provinces on malnutrition among 2323 elderly subjects with physical functional dependency showed a prevalence of 17·9 %.[27] In a systematic review and meta-analysis on undernutrition and associated factors among 4,628 older adults from eight studies in Ethiopia 2022, the pooled prevalence of undernutrition was 20.53% (95% CI: 17.39%, 23.67%).[28]

In contrast, a community based cross sectional study from West Bengal among 235 elderly individuals aged ≥ 60 years using MNA showed that 29.4% malnutrition was present in elderly and 60.4% were at risk of malnutrition.[29] A higher prevalence of overtly malnourished elderly was also found (29%) in a cross sectional study among 248 subjects at King Abdul-Aziz University Hospital, Jeddah, Saudi Arabia with nearly one half (47.6%) at risk of malnutrition.[30] An epidemiological study on the nutritional status of the elderly in rural population of Haryana state evidenced that 26% elderly had malnutrition and 64% were at risk of malnutrition.[31]

The second aspect of the present study was to identify the contributing factors of malnutrition among elderly. The literature review has already shown that in majority of studies the percentage of elderly at risk of malnutrition are quite high in India and abroad as well. Hence the contributing factors, though it may vary from place to place carry high significance in not only treating the malnourished elderly but also in preventing malnutrition among those at risk.

The present study has shown moderate to severe declined food intake over the previous three months as the major contributing factor to malnutrition (68.2%). Taking only two meals daily and fluid consumption less than five cups daily were the other contributing factors found (55. 3% and 49.4% respectively). The findings on contributing factors of malnutrition are similar to that of the study done in West Bengal and Haryana state, India in which older age, lower income of family, low literacy level, decreased food intake and fewer consumption of meals were observed.[29,31]

Congruent findings were found in Lebanese elderly subjects who reported lower financial status, poor

nutritional status and widowed & illiterate people. Age more than 85 years, females, elderly taking more than three drugs daily, poor oral health and depressive disorders were the other contributing factors.[32] Poor oral health has been found to be a contributory factor in a multicentre study among 252 subjects, New Jersey.[33]

Multiple risk factors were found in different studies done in India and abroad. A systematic review, Belgium, 2015 reported age, frailty in institutionalized persons, excessive polypharmacy, Parkinson disease, constipation, cognitive decline, dementia, eating dependencies, loss of interest in life and poor appetite as significant risk factors of malnutrition.[34]

A Brazilian study on 3,101 elderly people, of whom 28.3% (95%CI 25.3 - 31.4%) were at risk of malnutrition showed that the risk of malnutrition was significantly higher in women without formal education, high in individuals with no family income and smokers.[35] Economical vulnerabilities, depression, presence of chronic diseases, and hospitalization were the contributory factors in other studies too. [36,37]

A statistically significant association between five socio demographic variables such as age, marital status, economic dependency, type of family and living arrangements with the nutritional status of the subjects (p value < 0.05) was evident in the current study.

Contradictory findings were observed in a cross sectional study conducted in residents of Pathanamthitta district of Kerala, the nutritional status did not show any association with age, whereas in the present study nutritional status was highly significant with age.[12]  In their study, urban dwellers were seen to be nutritionally more stable than rural inhabitants. Whereas in the current study, place of residence did not show statistical significance ('p' value 0.851>0.5).

Kerala is a state of India known for its high literacy rate and many other health indicators. The present study was conducted in an urban area where mostly people are more wealthy and educated. Even then the high percentage of malnourished elderly and at risk of malnutrition evidenced in the present study seem to be alarming and requires elaborative studies to generalize the findings. Elderly education on nutrition and factors contributing to malnutrition must be a part of health education in the community and health care settings. The need to take care of the elderly in the busy schedule of life should be taught to the youngsters as part of their school education.

## Conclusion

The findings of the study highlight and reinforce the gravity of geriatric malnutrition in Kerala. Moreover, the risk for malnutrition in the subjects seems alarming. Addressing the problem of malnourished, opportunistic screening and training of primary care givers in identifying elderly at risk, and counseling on nutritional support need attention. The vulnerability of the elderly to dehydration, the frequency of meals etc. should be emphasized not only to the elderly but also to the youngsters. Further, studies are needed to determine effective multifactorial solutions to the problem of malnutrition among older adults.

## Conflicts Of Interest

There are no conflicts of interest.

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