

The burden of depression and malnutrition in the elderly population of Western Rajasthan

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ABSTRACT

With changing demography, developing countries will be outnumbered by the elderly and their associated chronic diseases. The geriatric population is at increased risk of malnutrition with multiple factors, especially depression. This study explored potential linkages between malnutrition and depression in the geriatric population. A cross-sectional study was conducted at tertiary healthcare facilities at Western Rajasthan, India from April to June 2018. After consent from 310 elderly patients attending out patient department, a pre-tested questionnaire was used to collect data. Assessment of malnutrition status using mini nutritional assessment (MNA), depression using geriatric depression scale (GDS), physical frailty using activities of daily living (ADL), and instrumental activities of daily living (IADL) was done. Chi-square, Fischer test, and unpaired t-test were employed for inferential statistics. Multiple logistic regression was used to compute the adjusted odds ratio. Out of 310 elderly, 192 (61.9%) participants were categorized as having poor nutrition and 99 (31.9%) were likely to suffer from depression. The elderly at risk of malnutrition among depressed was 75.8% (n=99) with a preponderance for females, and minor disabilities. Multivariate analysis suggested higher odds of malnutrition in the elderly with lower socioeconomic status and rural residence. Depression and malnutrition are linked in a destructive cycle but the causality remains elusive.

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1. INTRODUCTION

The world's population is aging rapidly and is estimated to almost double from the current 12% to almost 22-24% by 2050 [1]. Sooner, the demographic picture of the developing countries will be outnumbered by the elderly population with a rise in lifestyle-associated chronic diseases [2]. The geriatric population is known to be at an increased risk of malnutrition with multifactorial etiology. According to the world health organization (WHO), many of the diseases affecting the elderly are triggered by dietary variables that are then exacerbated by issues introduced through the aging process [3]. They may also endure significant psychosocial and socio-environmental changes, such as depression, insufficient financial resources, as well as physiological changes. These factors can have an impact on food consumption, which in response can have an influence on nutritional status [4]. Malnutrition, which is the collective product of the interplay between nutrition and aging changes, is frequently untreated.

A recent systematic review and meta-analysis estimated around 1/3rd of the elderly population are affected by depression with a female preponderance in the Indian population [5]. The complex combinations of hereditary vulnerabilities, diathesis, and age-related neurobiological changes, including the specific types of stressful events that occur more frequently in late life, put an individual at risk of depression [6]. Additionally, self-critical thinking might exacerbate and prolong depression. Furthermore, depression increases the probability of poor nutrition and malnourished patients had higher depression scores as revealed in a study [7].

There is an associative link between depression and malnutrition. Depression causes changes in appetite and weight, resulting in malnutrition, and poor nutrition predisposes elderly people to psychiatric problems [8]. As a result, effective geriatric care would necessitate a holistic view of elderly individuals that considers medical, educational, economic, and psychological variables. Malnutrition should be detected early since it is linked to impaired cognitive function, mobility, and the ability to care for oneself [9]. Similarly, to fight geriatric depression, a targeted intervention including nutritional assessment must be emphasized.

There is a lack of evidence on the interrelation between malnutrition and depression in the elderly population of western Rajasthan. This study aimed to explore the interaction between malnutrition and depression and the impact on geriatric patients. This will help the existing health care system to reorient its geriatric care services on this interrelated disorder.

2. RESEARCH METHOD

A cross-sectional study was undertaken at Tertiary care health facilities at Jodhpur, Western Rajasthan (India) from April to June 2018. The study was approved by the institutional ethics committee (IEC) of the All India Institute of Medical Sciences, Jodhpur (Ref: AIIMS/IEC/2018/513). After the interview, the participants of the study were recommended for nutritional and psychiatric counseling by the specialist as per their requirements.

All elderly people of age group 60 years or above (as defined under National Policy for Older Persons), attending out patient department either for seeking medical care or as a caregiver with a patient were included in the study. The study was conducted after taking written valid consent from the elderly. The sample size was calculated considering the proportion of low MNA score (<24) representing malnutrition or risk of malnutrition as 63%, based on Vedantam *et al.* it was estimated that a sample size of 277 will be required at a 97% confidence interval, 10% relative precision and 10% contingency. The data was finally collected from 310 elderly participants [10].

A pre-tested questionnaire was used to collect data from elderly participants [11]. The participant's socio-demographic profile included age, sex, occupation, education, type of family, type of residence, monthly income, and socioeconomic class based on the Modified Kuppaswami Scale [12]. Anthropometry measurements like body mass index, mid-arm circumference, and calf circumference were taken. Malnutrition status was determined using the mini nutritional assessment (MNA) [13] depression was assessed using the geriatric depression scale (GDS) [14] and physical frailty was measured using activities of daily living (ADL) [15] and instrumental activities of daily living (IADL) [16].

Data was entered in EpiInfo 7 [17] and analyzed using SPSS v. 23 [18]. Counts and percentages were used to characterize and describe data. For comparison of nominal data between two groups, the Chi-square test was used; except in those cases where the expected cell count was less than 5 in more than 20% of cells where the Fischer Exact test was used. Continuous data were described using mean and standard deviation and compared between the two groups using an unpaired t-test. On bivariate analysis, those variables which had significant associations were considered for multivariate analysis using multiple logistic regression. The corrected odd's ratio was calculated using multiple logistic regression. A p-value of less than 0.05 was considered significant.

3. RESULTS AND DISCUSSION

Malnutrition poses a threat to people of all ages. It refers to deficiencies, excesses, or imbalances in the intake of energy, protein, and/or other nutrients and includes both undernutrition and overnutrition. In India, anemia is the leading cause of malnutrition, particularly among children, women, and the elderly [19]. Aside from that, dietary changes have a significant impact as risk factors throughout a person's life, and they may have an even greater impact on the elderly. The gradual deterioration of health conditions and body function caused by aging often referred to as frailty, is thought to be a major cause of malnutrition in older people, rather than age [20]. Additionally, there are other factors like physical activity, constipation, cognitive decline, dementia, poor appetite, eating dependencies, and loss of interest in life that affect the nutritional status of the elderly [21].

According to previous findings, depression is a major contributor to weight loss in the elderly [6]. Literature suggests a strong association between malnutrition and depression in the geriatric

population [7], [22], [23]. Though, the causality of these two disorders remains elusive. It is not known whether depression causes or is a consequence of malnutrition. There seems to be a vicious circle between them; depression worsens the nutritional status and the nutritional condition increases the depression further.

Our study explores the linkages between malnutrition and depression in geriatric patients visiting one of the healthcare facilities of Western Rajasthan. Out of 310 participants, there was an almost equal representation of males (49.4%) and females (50.6%) with a mean age of 64.67 ± 3.63 years. Around 66.8% (n=207) belonged to lower socioeconomic status. Seven participants (2.3%) were found malnourished (MNA score <17), 185 (59.7%) were at risk of malnutrition (MNA score 17 to 24), and 118 (38.1%) were categorized as having good nutrition status (MNA score ≥ 24). For analysis, 192 (61.9%) subjects who scored less than 24 on the MNA scale were categorized as having poor nutrition. 118 (38.1%) subjects having higher MNA scores were categorized as having good nutrition. There were 99 subjects (31.9%) likely to be suffering from depression as presented in Table 1.

Table 1. Socio-demographic profile of the study subjects

Variables	Frequency	Percentage
Gender		
Female	153	49.35%
Male	157	50.64%
Socioeconomic status		
Lower class	207	66.77%
Upper class	103	33.22%
Type of family		
Nuclear	7	2.25%
Joint	303	97.74%
Type of residence		
Rural	161	51.93%
Urban	149	48.06%
Activities of daily living		
Minor disabilities/difficulties	106	34.19%
No disabilities	204	65.80%
Depression		
Present	99	31.93%
Absent	211	68.06%
MNA		
At the risk of malnutrition or malnourished	192	61.93%
Good nutrition	118	38.06%

More females (74.5%) were having poor nutrition as compared to males (49.7%) ($p < 0.001$). Around 68.1% of those belonging to the lower socioeconomic class were at risk of poor nutrition as compared to 49.5% in the upper socioeconomic class ($p < 0.001$). Among nuclear families, 57.1% reported being at risk for malnutrition or malnourishment whereas among joint families 62.0% reported the same. Elderly participants residing in the rural area (n=161) 81.4% were at risk for malnutrition or malnourishment as compared to the 40.9% (n=149, $p < 0.05$) living in the urban area as shown in Table 2.

The risk of poor nutrition was higher in those with minor disabilities (84.0%) as compared to those with no disabilities (50.5%) ($p < 0.01$). The risk of malnutrition or malnourishment among the depressed was 75.8% (n=99) while 55.5% were found at risk among non-depressed ($p < 0.01$). Elderly participants at risk of malnutrition or malnourishment have a significantly lower IADL (5.89 ± 1.24) score as compared to those with good nutrition status (6.82 ± 0.97). Among the participants who identified as malnourished or at risk of malnutrition (n=192), 50% (n=96) reported for back pain, 50% (n=96) as pain in limbs and joints, 10.9% (n=21) as chest pain, 45.8% (n=88) as nausea and 52.6% (n=101) as feeling tired which was significantly associated ($p < 0.001$).

The odds ratio was used to determine the risk factors associated with malnutrition. Higher odds for malnutrition were significantly associated with age, female gender, lower socioeconomic status, rural residence, minor disabilities in activities of daily living, depression, and lower IADL scores. On multiple logistic regression on adjusting for potential confounders, we found the following factors were significantly associated with at risk of malnutrition or malnourished, age [aOR 1.18; 95%CI: 1.06-1.31], gender [aOR 4.62; 95% CI: 2.43-8.77], type of residence [aOR 4.58; 95%CI: 2.40-8.74] and IADL score [aOR 0.62; 95% CI: 0.46-0.84].

Table 2. Factors associated with malnutrition in elderly

	Total (N=310)	Poor nutrition (n=192)	Good nutrition (n=118)	p-value	aOR [95%CI]
Age, mean±SD	310	65.47±3.73	63.37±3.05	<0.001 ^a	1.18 [1.06-1.31]
Gender					
Female	153	114 (74.5%)	39 (25.5%)	<0.001 ^b	4.62[2.43-8.77]
Male	157	78 (49.7%)	79 (50.3%)		Ref
Socioeconomic status					
Upper class	103	51 (49.5%)	52 (50.5%)	0.001 ^b	0.59 [0.30-1.18]
Lower class	207	141 (68.1%)	66 (31.9%)		Ref
Type of family					
Nuclear	7	4 (57.1%)	3 (42.9%)	1.0 ^c	-
Joint	303	188 (62.0%)	115 (38.0%)		
Type of residence					
Rural	161	131 (81.4%)	30 (18.6%)	< 0.001 ^b	4.58[2.40-8.74]
Urban	149	61 (40.9%)	88 (59.1%)		Ref
Activities of daily living					
Minor disabilities	106	89 (84.0%)	17 (16.0%)	< 0.001 ^b	1.73[0.81 - 3.67]
No disabilities	204	103 (50.5%)	101 (49.5%)		Ref
Depression					
Present	99	75 (75.8%)	24 (24.2%)	0.001 ^b	1.37[0.67- 2.78]
Absent	211	117 (55.5%)	94 (44.5%)		Ref
IADL, mean±SD		5.89 ± 1.24	6.82 ± 0.966	<0.001 ^a	0.62[0.46 - 0.84]

a: Unpaired t- test; b: Chi Square test; c: Fischer exact test; Ref= Reference categories; IADL= Instrumental activities of daily living
 Figures in parenthesis represent row-wise percentages

Further, risk factors associated with depression in the elderly were calculated. There was a significant association found with the age, lower socioeconomic class, rural residence, minor disabilities, poor nutrition (low MNA score), and lower IADL score. Multivariate analysis suggested a significant association of depression with lower socioeconomic status [aOR 4.52; 95% CI: 1.99-10.28], and rural residence [aOR 2.70; 95% CI:1.41-5.17] in the elderly as presented in Table 3.

Table 3. Factors associated with depression in elderly

	Total (n=310)	Depression present (n=99)	Depression absent (n=211)	p-value	aOR [95%CI]
Age, mean±SD	310	64.99 ±3.88	65.52 ±3.50	<0.001 ^a	1.01 [0.92-1.10]
Gender					
Male	157	46 (29.3%)	111 (70.7%)	0.313 ^b	0.93 [0.51-1.69]
Female	153	53 (34.6%)	100 (65.4%)		Ref
Socioeconomic status					
Lower class	207	90 (43.5%)	117 (56.5%)	<0.001 ^b	4.52 [1.99-10.28]
Upper class	103	9 (8.7%)	94 (91.3%)		Ref
Type of family					
Nuclear	7	2 (28.6%)	5 (71.4%)	1.0 ^c	-
Joint	303	97 (32.0%)	206 (68.0%)		
Type of residence					
Rural	161	77 (47.8%)	84 (52.2%)	<0.001 ^b	2.70 [1.41-5.17]
Urban	149	22 (14.8%)	127 (85.2%)		Ref
Activities of daily living					
No disabilities	204	55 (27.0%)	149 (73.0%)	0.009 ^b	0.89 [0.45-1.77]
Minor disabilities	106	44 (41.5%)	62 (58.5%)		Ref
MNA					
Poor nutrition	192	75 (39.1%)	117 (60.9%)	0.001 ^b	1.25 [0.61-2.56]
Good nutrition	118	24 (20.3%)	94 (79.7%)		Ref
IADL, mean±SD		5.73 ±1.26	6.49 ± 1.4	<0.001 ^a	0.80 [0.62-1.05]

a: Unpaired t- test; b: Chi Square test; c: Fischer exact test; Ref= Reference categories; IADL= Instrumental activities of daily living; Figures in parenthesis represent row-wise percentages.

Various scales such as MNA, ADL, IADL, and GDS were used and an assessment was made using the PHQ-15 questionnaire. The PHQ -15 (Patient Health Questionnaire) was used to examine physical symptoms [11]. The PHQ-15 consists of 15 somatic symptoms, each of which is rated on a scale of 0 ("not bothered at all") through 1 ("slightly troubled") and 2 ("very worried") ("bothered a lot"). In this study, we divided the participants into two groups. 0 ("not disturbed at all") and 1 ("bothered a great deal") are the two options. It's a reliable metric that's been utilized in several studies in a variety of healthcare settings.

The nutritional assessment was done using the MNA scale. This method can be used to detect older people who are malnourished or at risk of becoming malnourished. It significantly detects malnutrition even before indices such as weight, and waist-hip ratio change. It consists of 6 questions for the screening part and

12 questions for patient assessment. The scale includes questions on meals, body mass index, stress history, neurological disorder over the preceding three months, body mass index (BMI) measurement, mid-arm circumference, and calf circumference measurement. A maximum of 30 scores can be obtained. A score of ≥ 24 states a well-nourished status. A score of 17 to 23.5 represents at risk of malnutrition, and a score less than 17 indicates malnutrition. Numerous researchers like Kshetrimayum *et al.* and Saha *et al.* have used the mini nutritional assessment (MNA) Scale in their studies to assess the nutritional status among selected elderly participants [24], [25].

In our study, only 2.3% were malnourished, and 59% were at risk of malnutrition. This figure was comparatively lower than the other studies, particularly regarding malnourishment [25], [26]. The prevalence of malnutrition and risk of malnutrition in the elderly was 18.29% and 48.17% respectively in a systematic review and meta-analysis recently conducted in India [27]. However, malnutrition trends in NFHS surveys from 1992-1993 to 2019-21 show a significant decline in stunting and underweight, but wasting rates have remained stable [28]. This can be explained by the fact that our study setting was a tertiary health care facility, the participants visiting here are more concerned about their health. Contrary to previously published studies [29]–[33], our study showed that older people are at risk of malnutrition more than truly malnourished. This is due to the adoption of the MNA scale, which is more effective in identifying those at risk of malnutrition among those who are otherwise healthy [34].

The people living in rural areas lack facility-based care, transport, and availability of a nutritious diet. This accounts for higher malnutrition. Female preponderance can be explained by the fact that they are more economically and physically dependent and suffer greater neglect in their elderly life. Increasing age and low socioeconomic status are significantly associated with poor nutrition in our study. A similar association has been found in various studies [31], [33], [35].

In the present study, the significant association between lower socioeconomic class and at risk of malnutrition or malnourishment was found statistically significant ($n=141$; 68.1%) as compared to elderly of upper economic class ($n=51$; 49.5%). This result shows that dietary choices and patterns of eating are dependent on socioeconomic conditions hence, affecting the nutritional status of the elderly population. Various Indian authors have reported the elderly population at risk for malnutrition of lower socioeconomic status ranging from 24.5% to 42.3 [36]–[39].

ADL and IADL scores were used to measure the physical and cognitive decline of the elderly. ADL tool consists of 10 items with the total number of possible scores as 0–20, with lower scores signifying greater disability. Various researchers like Fillenbaum *et al.* and Banjare *et al.* have used the activities of daily living scale in their studies to assess the level of mobility and disability among elderly participants [40], [41]. Further, assessment of IADLs may reveal physical, cognitive, or both types of decline in an aged person who appears capable and healthy. IADL function loss typically occurs before ADL function loss (such as bathing, eating, and using the toilet). It consists of eight elements, each with a score ranging from 0 to 8. (Low-high function). The scale assigns a score depending on cognitive or physical function. Various researchers including Ng *et al.* and Mathuranath *et al.* have utilized the IADL scale in their studies to assess the level of ability to do fundamental activities among their aged participants [42], [43]. It is found in our study that the participants with low ADL and IADL scores were found to be proportionately more at risk of being malnourished. This was found to be statistically significant in a study conducted in Chittor by Swarnalatha economic dependency, loneliness, poor health, and depression are associated with a person with low ADL scores [44]. This severely hampers elderly nutritive needs and hence makes them more prone to poor nutrition.

Nutritional deficit and depression are interrelated. Geriatric depression scale -15 was used to assess depression. Normal scores range from 0-4, 5-8 represent mild depression; 9-11 represent moderate depression; and 12-15 state severe depression. Various researchers like Ganguli *et al.* have used the geriatric depression scale in their studies to assess the depression among their selected elderly participants [45]. In the present study, the elderly with a GDS score < 5 is categorized as depressed, and those who have a GDS score ≥ 5 as not depressed. In our study, a greater propensity for malnourishment was found in depressed individuals though it was not statistically significant. A similar finding with significant association (OR 4.38 [2.23-8.64], 95% CI) was found in a study conducted amongst elderly women in Kolkata [46]. A depressed individual loses interest in living, has decreased appetite, and decreased motivation in living. Thus, poor appetite, there is a detrimental effect on the individual's health leading to malnutrition.

4. CONCLUSION

This study highlighted the risk factors for malnutrition in the elderly population, like being a female, lower socio-economic status, nuclear family, rural residence, and minor disability. Additionally, older individuals with low ADL and IADL scores were found to be proportionately more at risk of being malnourished. A greater propensity for malnourishment was found in depressed elderly establishing a vicious

cycle. With India's aging population, geriatric health care programs must focus on multifactorial etiology ensuring easy access, availability, affordability, and effective, and high-quality care within the healthcare delivery system.

Malnutrition amongst the elderly is a multifaceted problem. Further, depression and malnutrition are linked in an intergenerational destructive cycle. In a nutshell, physicians must include multifactorial etiology associated with malnutrition and depression while treating the elderly. Though the study was an attempt to provide supportive evidence in the field of elderly malnutrition, it had certain limitations. This being a cross-sectional study, it is difficult to establish a causal effect relationship with certainty. Moreover, the study was carried out at a tertiary care center risking the external validity.




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