

# Association of Nutritional Status with Depression and Cognitive Function of Older Women Residing in Old-age Homes of Kolkata, India

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## Abstract

**Introduction:** Depression and cognitive function are said to be the foes of the nutritional status of the older adults. Depression is the most common psychological problem in old age, while deterioration of cognitive function is also observed in this age group. **Objectives:** The main objective of the study is to find out the association of nutritional status with depression and cognitive function of older women. **Materials and Methods:** A cross-sectional study was done among 196 older women, residing in old-age homes of Kolkata. Nutritional status of the participants was assessed by the long version of Mini Nutritional Assessment tool (MNA<sup>®</sup>). Level of depression was assessed by Geriatric Depression Scale (GDS 30). Cognitive function was checked by using the Folstein Mini-Mental State Examination (MMSE). Chi-square, Kruskal–Wallis test, and Spearman’s rho correlation coefficient was calculated using SPSS software. **Results:** About 38.3% and 14.8% participants were suffering from mild and severe depression. 13.2% and 9.2% older women were found with borderline impairment and impairment in cognitive function, respectively. Significant correlation of nutritional status was found with both depression and cognitive function ( $P < 0.05$ ), and this was supported by multinomial logistic regression model. **Conclusions:** Both depression and impairment in cognitive function can cause malnutrition or vice versa among older women.

**Keywords:** Cognitive function, depression, Kolkata, nutritional status, older women

## INTRODUCTION

Depression can be defined as a state of mental discomfort or suffering or loss of interest or pleasure in life and in free-time activities. Symptoms are change in appetite, insomnia or hypersomnia, loss of energy or fatigue or tiredness, psychomotor agitation or retardation, feelings of excessive guilt, lack of concentration, inability to think, and suicidal thoughts.<sup>[1-3]</sup> This is the most common psychological problem found in old age and female suffer more. Late-life depression is associated with various factors and its etiology differs to some extent in comparison to younger people. Sometimes, symptoms overlap with some other illnesses too, yet it is not a normal component of aging.<sup>[3]</sup> Older adults suffering from depression are more likely to develop malnutrition and vice versa. Depression is associated with poor food intake and weight loss and is an important psychological component for becoming malnourished in late life.<sup>[4,5]</sup>

Older adults are at a high risk of cognitive impairment, although it is no longer considered as a normal inevitable change of aging.<sup>[6]</sup> Dementia, mostly found in old age, is also not considered as a normal part of aging process, according to the “World Health Organization.”<sup>[7]</sup> Mild cognitive impairment is a preclinical phase of dementia which was reported to be associated with malnutrition among older people.<sup>[8]</sup> In country like India, women’s health is somehow a neglected matter in most of the families. As a result, their health and nutritional status may be at vulnerable state at old age. In India, old-age homes are fast-growing shelters for many older

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adults including the older women. Hence, these institutes, in particular, demand attention to study the health, nutrition, and psychological status of their inmates.

Keeping this background in mind, the present study was conducted with an objective to find out the association of nutritional status with depression and cognitive function of the older women, residing in old-age homes of Kolkata, West Bengal, India.

## MATERIALS AND METHODS

### Study type and design

A cross-sectional study was done among 196 older women (age  $\geq 60$  years) living in the old-age homes of Kolkata. Older women participants were free from any kind of severe cognitive impairment or severe illnesses or astasia. Study detail was explained thoroughly before the commencement of the data collection, and they signed the informed consent form.

The study was approved by the Bioethics Committee for Animal and Human Research Studies, University of Calcutta (No. BEHR/1099/2304).

### Sample size calculation

Sample size was calculated by taking the previous prevalence of malnutrition as 60%<sup>[9]</sup> and using formula  $n = 4pq/L^{2[10]}$  (where,  $p$  = prevalence of malnutrition,  $q = 100 - p$ ,  $L = 10\%$  of  $p$ ). It came out to be 267 ( $n = 4 \times 60 \times 40/36 = 266.66 \approx 267$ ). During the study period, 196 participants from 15 different old-age homes could be covered based upon their availability, willing to participate, and exclusion criteria.

### Assessment of nutritional status

Nutritional status of the participants was assessed by long version of Mini Nutritional Assessment (MNA<sup>®</sup>) tool. This tool was divided into five sections, namely, anthropometry, functionality, general assessment, dietary information, and subjective assessment. Nutritional status of the participants was determined according to the scores obtained by them as per the guidelines of the MNA tool.<sup>[11,12]</sup>

### Assessment of geriatric depression

Geriatric Depression Scale (GDS-30) was used to assess the possible depression among the participants. Participants were asked to answer few questions related to their psychological state and according to the answers scores were calculated to determine the level of depression.<sup>[13]</sup>

### Assessment of cognitive function

A thirty questionnaire Folstein Mini-Mental State Examination (MMSE) scale was used to assess the cognitive function of the older participants.<sup>[14]</sup>

### Statistical analysis

Collected data were entered first in the Microsoft Excel worksheet to check any possible error, and subsequently, statistical analysis was done using SPSS software, version 19.0. (Statistical Package for the Social Sciences Inc, Chicago, IL,

USA).  $P \leq 0.05$  was considered as statistically significant. Categorical data were expressed in percentages. For continuous data, normality distribution was checked through Kolmogorov–Smirnov test and significant  $P$  value indicated skewed distribution of data. Thus, continuous data were expressed in median and interquartile range (IQR). Association between categorical variables was tested by Pearson's Chi-square test. Relationship between two continuous variables was calculated by Spearman's rank correlation coefficient ( $\rho$ ). Kruskal–Wallis H test was performed to determine the differences between median values of the independent variables for the three groups of MNA. Multinomial logistic regression model was run by taking nutritional status as dependent variable while depression and cognitive function as independent variables.

## RESULTS

Median age of the older women was  $72.0 \pm 10.0$  (median  $\pm$  IQR) years.

According to GDS-30, 46.9% of participants were normal, in contrast to 38.3% and 14.8% having mild and severe depression, respectively. Median value of GDS was  $10.0 \pm 11.2$  (median  $\pm$  IQR).

In this regard, MMSE revealed that 77.6%, 13.2%, and 9.2% participants had normal, borderline impairment, and impairment, respectively. Median value of MMSE was  $26.0 \pm 6.0$  (median  $\pm$  IQR).

Significant negative correlation was found between MNA and GDS as shown by Spearman's  $\rho$  ( $P < 0.05$ ). Significant differences were also observed from Kruskal–Wallis H test among the median values of GDS scores ( $P < 0.05$ ). Significant positive correlation was observed between MNA and MMSE scores ( $P < 0.05$ ). Significant differences in the median values of MMSE were observed at different nutritional levels, as shown by Kruskal–Wallis H test ( $P < 0.05$ ) [Table 1].

Mild depression was found in 42.9% and 44.2% among the “at-risk” and malnourished participants, respectively. Severe depression was found in 13.3% and 30.2% in the “at risk

**Table 1: Association of Mini Nutritional Assessment scores With Geriatric Depression Scale scores and Mini-Mental State Examination scores of the older women ( $n=196$ )**

Parameters	Median $\pm$ IQR	
	GDS	MMSE score
Normal nutritional status	5.0 $\pm$ 7.0	29.0 $\pm$ 2.0
At risk of malnutrition	11.0 $\pm$ 10.0	25.0 $\pm$ 6.0
Malnourished	15.0 $\pm$ 10.5	23.0 $\pm$ 9.5
Statistical tests		
Spearman's $\rho$ ( $P$ )	-0.436* ( $<0.05$ )	0.361* ( $<0.05$ )
Kruskal-Wallis H test ( $P$ )	24.006* ( $<0.05$ )	18.943* ( $<0.05$ )

\*Statistically significant. MNA: Mini Nutritional Assessment, GDS: Geriatric Depression Scale, MMSE: Mini-Mental State Examination, IQR: Interquartile range

of malnutrition” and “malnutrition” group, respectively. Significant association of MNA scores and GDS score was observed ( $P < 0.05$ ) [Table 2].

Normal cognitive function was found among 93.8%, 79.0%, and 55.8% participants in normal nutritional status, at risk of malnutrition, and malnourished groups, respectively. Significant association was found between MNA and MMSE scores ( $P < 0.05$ ) [Table 3].

Multinomial logistic regression model was developed to test the relationship of nutritional status with depression and cognitive function. In both the cases, nutritional status was considered as dependent variable. Both models for depression and cognitive function were fitted significantly as evident from significant Omnibus Chi-square statistic (nutritional status and depression:  $\chi^2 = 26.115$ ,  $P < 0.05$ , nutritional status and cognitive function:  $\chi^2 = 19.482$ ,  $P < 0.05$ ) and nonsignificant Hosmer–Lemeshow statistic. Independent variables could explain 12.5%–14.4% variation of dependent variable for depression model and for cognitive function model independent variables could explain 9.5%–10.9% variation of dependent variable as shown from Cox and Snell  $R^2$  and Nagelkerke  $R^2$  value. Both models correctly predict 53.6% of the cases. Significant association ( $P < 0.05$ ) was found between depression and nutritional status. Among both “at risk of malnutrition” and “normal nutritional

status” groups, values of regression coefficient were found to increase from severe depression to mild depression and mild depression to normal.

Significant association ( $P < 0.05$ ) was also found between cognitive status and nutritional status. Among both the groups of “at risk of malnutrition” and “normal nutritional status,” values of regression coefficient were found to increase from impairment to borderline impairment and borderline impairment to normal.

## DISCUSSION

Nutritional status assessment of the same group of older women, in our earlier report, revealed that 75.5% elderly women were either “malnourished” or “at risk of malnutrition.”<sup>[15]</sup> In this study, depression and cognitive function were examined as psychological parameters. About 38.3% elderly women were found to have mild depression, while 14.8% participants were suffering from severe depression. Median value of GDS designates the presence of mild depression among the older participants. In a previous study, Gupta and Bose Banerjee reported the presence of mild or severe depression among all the studied older adults from Nimta and surrounding regions of West Bengal, India.<sup>[16]</sup>

Depression is a common mental disorder in old age.<sup>[1]</sup> This condition is more likely to develop malnutrition in late life.<sup>[5]</sup> Other researchers like Kaur and Kaur Mal,<sup>[17]</sup> Naidoo I *et al.*,<sup>[18]</sup> Boulos *et al.*,<sup>[19]</sup> Keshavarzi *et al.*,<sup>[20]</sup> German *et al.*,<sup>[4]</sup> and Smoliner *et al.*<sup>[21]</sup> found significant association between depression and malnutrition among elderly. In addition, Keshavarzi *et al.*<sup>[20]</sup> and Krzyminska-Siemaszko *et al.*<sup>[22]</sup> reported that the prevalence of malnutrition and depression was higher among the elderly women in comparison to men.

Results obtained from this study showed significant negative correlation ( $P < 0.05$ ) between GDS and MNA, indicating an inverse relationship between nutritional status and depression among the participants. Median values of depression were found to increase significantly with poor nutritional status. Mild and severe depression were found in significantly higher percentages among “at risk of malnutrition” and “malnourished” participants in comparison to older women having normal nutritional status. Significant association ( $P < 0.05$ ) between nutritional status and depression was also found from Chi-square test. Regression analysis revealed that nutritional status of the participants was normal in the absence of depression. It indicates depression was a potential cause of poor nutritional status for the participants or vice versa.

In cognitive function assessment, according to MMSE, 13.2% and 9.2% older women had borderline impairment and impairment in cognitive function, respectively, while median value falls in the normal range of the MMSE. Majority of them were found to have normal cognitive function. Cognitive decline may not a normal phenomenon of aging process.<sup>[6]</sup> Previous reports of Ramachandran *et al.*,<sup>[23]</sup> Yildiz *et al.*,<sup>[24]</sup>

**Table 2: Distribution of elderly women according to their Mini Nutritional Assessment scores and level of depression (n=196)**

Nutritional status according to MNA scores	Depression level according to GDS scores		
	Normal	Mild depression	Severe depression
Normal nutritional status (n=48)	35 (72.9)	11 (22.9)	2 (4.2)
At risk of malnutrition (n=105)	46 (43.8)	45 (42.9)	14 (13.3)
Malnourished (n=43)	11 (25.6)	19 (44.2)	13 (30.2)

Figures in the parenthesis indicate percentages. Pearson’s  $\chi^2=25.96$ ,  $df=4$ ,  $P<0.05$ . MNA: Mini Nutritional Assessment, GDS: Geriatric Depression Scale

**Table 3: Distribution of older women according to their Mini Nutritional Assessment scores and cognitive function (n=196)**

Nutritional status according to MNA scores	Cognitive function according to MMSE scores	
	Normal	Borderline impairment/impairment
Normal nutritional status (n=48)	45 (93.8)	3 (6.2)
At risk of malnutrition (n=105)	83 (79.0)	22 (21.0)
Malnourished (n=43)	24 (55.8)	19 (44.2)

Figures in the parenthesis indicate percentages. Pearson’s  $\chi^2=19.04$ ,  $df=2$ ,  $P<0.05$ , for  $\chi^2$  calculation borderline impairment and impairment are clubbed together. MNA: Mini Nutritional Assessment, MMSE: Mini-Mental State Examination

Roqué *et al.*,<sup>[25]</sup> and Tarazon *et al.*<sup>[26]</sup> indicated significant association of cognitive impairment and nutritional status of older adults. These reports show decline of cognitive function is associated with malnutrition among older adults.

In this study, we found significant positive correlation ( $P < 0.05$ ) between MNA and MMSE of the participants. This indicates a linear relationship between nutritional status and cognitive function. Significant association between nutritional status and cognitive function was also found from Pearson's Chi-square test ( $P < 0.05$ ) when tested categorically. Regression analysis revealed the presence of normal nutritional status when cognitive function was normal or vice versa.

This type of study is relatively rare at old-age home settings, and moreover, 15 different old-age homes from Kolkata were covered, this is the strength of the study, but the only limitation is that only 196 older adult women could be covered.

## CONCLUSIONS

Our study revealed that both depression and cognitive function are potential causes for malnutrition or vice versa among older women residing in old-age homes of Kolkata, West Bengal, India.

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## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- World Health Organization. Depression. Available from: <http://www.who.net/mediacentre/factsheets/fs369> en. [Last accessed on 2018 Oct 23].
- World Health Organization. Depression. Available from: <http://www.who.int/news-room/fact-sheets/detail/depression>. [Last accessed on 2018 Oct 23].
- Bulut S. Late life depression: A literature review of late-life depression and contributing factors. *Anales Psicol* 2009;25:21-6.
- German L, Kahana C, Rosenfeld V, Zabrowsky I, Wiezer Z, Fraser D, *et al.* Depressive symptoms are associated with food insufficiency and nutritional deficiencies in poor community-dwelling elderly people. *J Nutr Health Aging* 2011;15:3-8.
- German L, Feldblum I, Bilenko N, Castel H, Harman-Boehm I, Shahar DR. Depressive symptoms and risk for malnutrition among hospitalized elderly people. *J Nutr Health Aging* 2008;12:313-8.
- Kurlowicz L, Wallace M. The mini mental state examination. *Try This: Best Practices in Nursing Care to Older Adults*. Vol. 3. 1999. p. 1-2. Available from: <http://www.hartfordign.org>. [Last accessed on 2018 Oct 31].
- World Health Organization. Dementia. Available from: <http://www.who.int/mediacentre/factsheets/fs362/en>. [Last accessed on 2018 Oct 23].
- Irvin GF. Nutritional Status and Cognitive Function in Frail Elderly Subjects. A Thesis. Neurotec Department, the Division of Clinical Geriatrics, Karolinska Institute, Stockholm, Sweden; 2004.
- Agarwalla R, Saikia AM, Baruah R. Assessment of the nutritional status of the elderly and its correlates. *J Family Community Med* 2015;22:39-43.
- Mahajan BK. *Methods in Biostatistics for Medical Students and Researchers*. 7<sup>th</sup> ed. New Delhi: Jaypee Brothers; 2010.
- Vellas B, Villars H, Abellan G, Soto ME, Rolland Y, Guigoz Y, *et al.* Overview of the MNA – Its history and challenges. *J Nutr Health Aging* 2006;10:456-63.
- Hudgens JE. Better Nutritional Status as Measured by Mini Nutritional Assessment Tool is Associated with Increased Immune Response in Elderly Nursing Home Residents with Pressure Ulcers. A Thesis. University of Florida; 2003.
- Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey M, *et al.* Development and validation of a geriatric depression screening scale: A preliminary report. *J Psychiatr Res* 1982;17:37-49.
- Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975;12:189-98.
- Maity B, Chaudhuri D, Saha I, Sen M. Dietary practice of elderly women and its association with their nutritional status. *Indian J Gerontol* 2018;32:62-77.
- Gupta K, Bose Banerjee S. A cross sectional study on the nutritional status and the depression level of the elderly people of Nimta and surrounding regions of North 24 Parganas. *Indian J Gerontol* 2017;31:394-411.
- Kaur B, Kaur Mal H. Association between malnutrition and depression among elderly of selected rural area of district Faridkot, Punjab. *Int J Community Health Med Res* 2017;3:41-5.
- Naidoo I, Charlton KE, Esterhuizen TM, Cassim B. High risk of malnutrition associated with depressive symptoms in older South Africans living in KwaZulu-Natal, South Africa: A cross-sectional survey. *J Health Popul Nutr* 2015;33:19.
- Boulos C, Salameh P, Barberger-Gateau P. Factors associated with poor nutritional status among community dwelling Lebanese elderly subjects living in rural areas: Results of the AMEL study. *J Nutr Health Aging* 2014;18:487-94.
- Keshavarzi S, Ahmadi SM, Lankarani KB. The impact of depression and malnutrition on health-related quality of life among the elderly Iranians. *Glob J Health Sci* 2014;7:161-70.
- Smoliner C, Norman K, Wagner KH, Hartig W, Lochs H, Pirlich M. Malnutrition and depression in the institutionalised elderly. *Br J Nutr* 2009;102:1663-7.
- Krzyszynska-Siemaszko R, Chudek J, Suwalska A, Lewandowicz M, Mossakowska M, Kroll-Balcerzak R, *et al.* Health status correlates of malnutrition in the polish elderly population – Results of the polsenior study. *Eur Rev Med Pharmacol Sci* 2016;20:4565-73.
- Ramachandran R, Mundodan JM, Saju CR, Joshy VM. Nutritional status and cognitive impairment in elderly population in a rural area of Thrissur district, Kerala. *Int J Community Med Public Health* 2018;5:1218-23.
- Yildiz D, Büyükkoyuncu Pekel N, Kiliç AK, Tolgay EN, Tufan F. Malnutrition is associated with dementia severity and geriatric syndromes in patients with Alzheimer disease. *Turk J Med Sci* 2015;45:1078-81.
- Roqué M, Salvà A, Vellas B. Malnutrition in community-dwelling adults with dementia (NutriAlz trial). *J Nutr Health Aging* 2013;17:295-9.
- Tarazona Santabalbina FJ, Belenguer Varea A, Doménech Pascual JR, Gac Espínola H, Cuesta Peredo D, Medina Domínguez L, *et al.* Validation of MNA scale score as a nutritional risk factor in institutionalized geriatric patients with moderate and severe cognitive impairment. *Nutr Hosp* 2009;24:724-31.