Nutritional assessment in hospitalized elderly patients, its sociodemographic determinants and co-relation with activities of daily life

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ABSTRACT

Introduction: Present study was planned to identify various sociodemographic factors influencing nutritional status in elderly and impact of nutritional status on activities of daily living in them. **Methods:** Total of 177 patients were enrolled in a prospective observational study. Nutritional status was assessed at the time of discharge by using Mini Nutritional Assessment form (MNA). Kartz Activity of Daily Living was assessed at 3 months before admission, at the time of admission, at discharge and 3 months after discharge. After written informed consent and ethics clearance patients were enrolled in the study. Analysis was done using the SPSS version 23 and Chi Square test was used to find the association between different qualitative variables. Statistical significance was set at $P < 0.05$. **Results:** Mean age of the study participants was 68.64 ± 7.73 years. 40 patients (22.6%) were found to be malnourished. Higher age, living alone, high CCI score and low ADL at discharge were associated with malnutrition. Mean ADL score was 5.82 at - 3 months time point in well-nourished patients which decreased during admission and then increased to 4.94 at the 3 months after discharge. Mean ADL score was of 5.33 at -3 months time point which kept on decreasing during admission and at 3 months after discharge in malnourished group. All these changes were statistically significant ($P < 0.001$). **Conclusion:** Nutritional status is a modifiable risk factor in elderly so identifying and optimizing nutritional status of elderly will optimise their functional status and improve quality of life.

Keywords: Hospitalized, Kartz activity of daily living, malnutrition, mini nutritional assessment

Introduction

Nutrition is an important modifiable index of health and well-being in all age groups, especially in geriatric population.[1] Malnourishment is regarded as a contributing factor to sarcopenia and frailty in geriatric population, and both of these are determinants of quality of life and health outcomes in elderly.[2] Nutritional status is equally important in acute as well as chronic illnesses as it alters the disease course.[3] It can increase the susceptibility of infections, severity of diseases, length of stay in hospital, duration of complete recovery of the disease process, increase in dependence on multiple daily medications and dependence in activities of daily life. Malnutrition can also lead to increased incidence of depression due to health and health related issues, increased rate of readmissions, frequent falls and can reduce life expectancy.[4] If not looked specifically for, malnutrition may be missed in many elderly individuals. It has been seen that functional decline is a common presentation of many diseases/geriatric giants in elderly, malnutrition being one of them.[5]

To ensure the greatest possible autonomy of elderly and best possible quality of life in elderly, it is important to optimize the

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nutritional status of elderly. Thus this study was conducted to clarify the impact of sociodemographic factors on nutritional status of hospitalized elderly patients and to find the impact of nutritional status on improving functional status after discharge from the hospital.

Material and Methods

A prospective observational study was conducted over 18 months in general wards of department of Internal Medicine Department at a tertiary care hospital in North India. Sample size of 177 elderly patients was calculated by taking the prevalence of malnutrition in hospitalised elderly as 36% (based on the study on prevalence of malnutrition by Middleton *et al.*),[6] taking 80% as power of study and 95% as confidence interval.

Activity of daily living was evaluated by Kartz Index of Independence activity of Daily living Activity (Kartz ADL).[7] The index ranks adequacy of performance in the six functions of bathing, dressing, toileting, transferring, continence and feeding. A score of 6 indicates full function, 4 indicates moderate impairment and 2 or less indicates severe functional impairment. ADL was calculated at three months before admission, at admission, at discharge and three months after discharge in the study subjects.

Depression in the study subjects was evaluated at admission by using Geriatric Depression Scale (GDS). GDS is designed specifically for rating depression in elderly and represents a reliable and valid self-rating scale for elderly with the sensitivity of 84% and specificity of 95%.[7] Patients scoring between 0-9 were labelled as having no depression and those having score between 10-19, mild depression and patients with score >20 were labelled as having severe depression.

Assessment of comorbid conditions was done by Charlson comorbidity index (CCI). CCI is a well -established predictor of in-hospital mortality in non-surgical patients[8] and in those with specific diseases.[9] Each comorbidity has an associated weight (1 to 6), based on the adjusted risk of mortality or resource use. Sum of all the weights results in a single comorbidity score with score of zero depicting no co morbidity. CCI was also calculated at the time of admission.

Socioeconomic status was calculated by using Kupu-Swamy Scale.

Height and weight were measured by using stadiometer and standardized weighing machine. Height was measured to the nearest 0.1 cm and weight to the nearest 0.1 kg.

Nutritional assessment was done in all patients at the time of discharge by Mini Nutritional Assessment (MNA). MNA is a validated tool useful for assessing nutritional status in elderly with sensitivity of 96%, specificity of 97% and predictive value of 97%.[10] Patients whose MNA score came out to be more than equal to 24 were categorised as well nourished, those with score <17 as malnourished and patients with score in bet ween 17 and 23.5 as at risk. To find out the association of variables with nutritional status, patients who fell into the categories of the well-nourished and malnourished by the group of MNA scoring were included. "At risk" category were excluded from the analysis. Subjecta were enrolled after taking their written informrd consent and after taking Ethical clearance from the Institutional Ethics Committee.

Analysis was done using the SPSS version 23 and Chi Square test was used to find the association between different qualitative variables. Categorical variables were expressed as percentages. Statistical significance was set at $P < 0.05$.

Results

Out of 177 patients who were evaluated, 49 (27.7%) were found to be well nourished, 88 (49.7%) were at risk of malnutrition and 40 (22.6%) were found to be malnourished.

89 patients were included in the final analysis who were found to be either malnourished or well - nourished as per MNA tool. Mean age of the study participants was 68.21 ± 7.48 years. Table 1 shows the demographic and clinical characteristic features of the study population.

Table 1: Distribution of study participants according to their socio-demographic characteristics (*n*=89)

Variables	Categories	Frequency (*n*)	Percentage (%)
Age (in years)	60-69	56	62.92
	>69	33	37.07
Gender	Male	46	51.68
	Female	43	48.31
Socio-economic status	Upper Lower	72	80.89
	Lower Middle	17	19.10
Caretaker	Spouse	44	49.43
	Children	45	50.56
BMI (kg/m²)	<18.5	9	10.11
	18.5-24.9	67	75.28
	>24.9	13	14.60
Addictions	Smoking	36	40.44
	Alcohol	5	5.61
Comorbidity	Diabetes	23	25.84
	HTN	23	25.84
Mobility status	No aid used	70	78.65
	With aid	19	21.24
ADL (at discharge)	≤4	53	59.55
	>4	36	40.44
ADL (at end of 3 months)*	≤4	24	36.36
	>4	42	63.63
CCI	≤2	15	16.85
	3-5	41	46.06
	>5	33	37.07
Mortality at 3 months	Expired	23	25.58
	Alive	66	74.15
GDS	Depression	23	25.84
	No Depression	66	74.15

*Only 66 study participants' ADL at the end of 3 months was recorded as 23 had expired

Table 2 shows the association of various sociodemographic characteristics of the study population and their nutritional status.

Table 3 shows the association of various clinical parameters and the nutritional status of the study population.

The two groups differed significantly in terms of ADL score at the following time points: 3 months before hospitalisation (denoted as -3), at admission, at discharge and 3 months after discharge. In the well nourished group, mean ADL score decreased from a maximum mean of 5.82 at -3 months time point to a minimum at the time of admission time point and then increased to 4.94 at the 3 months after discharge time point. In malnourished group, the mean ADL score was of 5.33 at -3 months time point which kept on decreasing during admission and at 3 months after discharge. All these changes were statistically significant ($P < 0.001$) as shown in Table 4.

Table 2: Association between Sociodemographic variables and nutritional status of the study participants (*n*=89)

Variable	MNA score			Chi-square test value	
	Well nourished	Malnourished	Total	χ^2	P
Age (years)					
60-69	35	20	55	4.283	0.038
>69	14	20	34		
Gender					
Male	26	20	46		
Female	23	20	43	0.083	0.774
Socio-economic status					
Upper Lower	37	35	72		
Lower Middle	12	5	17	2.049	0.152
Caretaker					
Spouse	26	8	34	10.196	0.001
Children	23	32	55		

Table 3: Association between Clinical parameter and nutritional status of study participants (*n*=89)

Clinical variable	MNA score			Chi-square test value	
	Well nourished	Malnourished	Total	χ^2	P
Diabetes					
Present	14	9	23	0.424	0.515
Absent	35	31	66		
Hypertension					
Present	13	10	23	0.027	0.870
Absent	36	30	66		
Smoking					
Present	17	19	36	1.499	0.221
Absent	32	21	53		
Alcohol					
Present	3	2	5	0.052	1.00
Absent	32	21	53		
BMI					
<18.5	2	7	9	11.790	0.002
18.5-24.9	35	32	67		
>24.9	12	1	13		
GDS					
Depression	10	13	23	1.680	0.195
No depression	39	27	66		
CCI					
≤2	13	2	15	9.347	0.009
3-5	23	18	41		
>5	13	20	33		
ADL at discharge					
≤4	22	31	53	9.718	0.002
>4	27	9	36		
ADL at 3 months*					
≤4	7	17	24	20.513	<0.001
>4	36	6	42		

*n=66

Table 4: Comparison of two groups in terms of change in ADL score over time (*n*=89)			
ADL Score	MNA Score		*P*
	Well Nourished Mean (SD)	Malnourished Mean (SD)	
3 months before admission	5.82 (0.67)	5.22 (1.25)	0.009
At admission	3.52 (2.34)	2.07 (1.78)	0.001
At discharge	4.02 (2.21)	2.52 (2.06)	0.002
3 months after discharge*	4.94 (1.90)	2.02 (2.30)	<0.001
P for change in ADL score over time	<0.001	<0.001	

*n=66 (23 patients died during follow up)

Discussion

Present study was carried out to assess the nutritional status of hospitalized elderly patients and find out various correlates of nutritional status and impact of nutritional status on activities of daily living in them. The study revealed that higher age of the individual, absence of care taker and higher Charlson comorbidity Index are positively associated with the nutrition status. The study revealed that nutritional status also determines the recovery of patient after illness as was shown by improvement in ADL status of the patients at discharge and at 3 months after discharge. Nutritional status as assessed by MNA showed 49 (27.7%) patients were well nourished, 40 (22.6%) were malnourished and rest were in at risk category. In a community study conducted in West Bengal by Lahiri *et al*.,[11] MNA classified geriatric age group with 29.4% being malnourished, 60.4% being at risk of malnutrition and only 10.2% were well nourished. Their study showed that there were more number of high risk group og malroushed elderly (60.4% Vs 49.7%) as compared to our study. This shows that by the time patient requires hospitalisation, malnutrition in elderly shows the downward trajectory. Geriatric patients <70 years had a lesser frequency of malnutrition than that of patients >70 years (*P* < 0.003). This was consistent with other studies which showed consistently deteriorating nutritional status with age.[12] Increase in prevalence of malnutrition as age advances is attributed to the physiological changes in gastrointestinal system with age, like decrease in smell, taste, decreased saliva formation, edentulation, lax lower oesophageal sprinter, etc. We did not find any co relation between the gender and nutritional status of elderly, even though studies have shown that being female makes the individual more vulnerable to malnutrition. Studies done by Saeidlou *et al*.,[12] Donini *et al*.[13] and Boulos *et al*.[14] found significant association between gender and nutritional status.

Association between the Nutritional status and living arrangement in terms of primary care- taker of the elderly was found to be significant. Elderly who lived with their spouse only and had the spouse as primary caretaker were having better nutritional status than those who lived with their children and had children as their primary care- taker. However studies done by Boulos *et al*.[14] in Lebanon and Saikia and Mahanta in Guwahati,[15] Assam showed that there is no significant association of living arrangements and the nutritional status of the elderly. No association of socioeconomic status and malnutrition was observed in our study even though studies have shown that there is an association of financial and nutritional status, because amount and choice of food intake is determined by the purchasing power of food which intern is determined by the financial power of the individual.[16-19]

Functional status and nutritional status had a bidirectional association. It was observed in our study that those patients who were malnourished had lower ADL scores at baseline and at admission and their ADL never returned to baseline even after 3 months after discharge. Our study was concordant with the study done by Kiesswetter *et al*.,[20] in which MNA-LF could identify difference in one year functional decline, with a more pronounced functional decline in malnourished people. Increased incidence of disability was associated with malnutrition in the study by Esmayel *et al*.[21] and Oliveira *et al*.[22]

The limitation of present study is a small sample size and it does not reflect the true prevalence of malnutrition in this age group as it is a hospital based study. Actual prevalence may be more than this in our country as it is one of the geriatric giant which remains un identified in the community.

Conclusion

Nutritional and functional status are two important aspects for predicting better health outcomes in elderly population. Nutritional status is a modifiable risk factor in elderly and hence optimising the nutritional status of elderly optimises their functional status as well. According to our study approximately half of the subjects were found to be at risk of malnutrition and one fourth were found to be malnourished. Most of the patients had full ADL at baseline (-3 months) which deteriorated very significantly in malnourished group. As this was a hospital based study and did not reflect the true prevalence of malnutrition in the community so the need is to do large community based nutritional assessment studies which will help to develop dietary recommendations for elderly population and identify this hidden Geriatric Giant in the society.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Authors contribution

Minakshi Dhar -conceived the idea, formulated the methodology, wrote the protocol, edited the final manuscript, Megha - collected the data, wrote the final draft, did statistical analysis, Vartika Saxena & P K Panda- edited the manuscript and gave his scientific inputs, Nowneet K Bhat helped in reviewing the literature and helped in analysis of data.

Ethics approval No

Institutional Ethics committee approval has been taken via letter no AIIMS/IEC/18/544.

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Conflicts of interest

There are no conflicts of interest.

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