

Assessment of Nutritional Risk Index and Prevalence of Malnutrition in Elderly Hospitalized Patients at a Tertiary Care Center: A Prospective Study

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Abstract

With the increasing number of elderly populations, majorly in those living in low-income and middle-income countries, the health and quality of life of these people basically depends on the nutritional status. With progression in age, the focus shifts over to safety and security along with social and financial issues, while nutritional needs of them goes unnoticed, which in turn contributes to various problems and accelerates the age-related changes. A cross sectional study was conducted among the elderly patients admitted in a tertiary care hospital, excluding those under intensive, palliative care and nutritional support. Demographic profile, anthropometric indices along with signs and symptoms, lab parameter and diagnosis were documented. GNRI scores were calculated for all the patients and the nutritional risk was evaluated resulting evidence of 93% of the elderly patients admitted being either malnourished or at the risk of malnutrition. The risk of malnutrition was found to be higher in those being financially dependent on other compared to those being independent, and the prevalence was also higher in female patients compared to male. The length of hospital stay was found to be higher in those having low scores of GNRI compared to those having low risk of malnutrition and was found to be statistically significant. The BMI progressively increases with increase in GNRI scores. Thus, adequate knowledge and awareness regarding the prevention and management of the diseases along with ample nutrition, balanced diet and physical activity is required for proper effective functioning of the elderly. These intervention at the early stages helps in better quality of life among elderly patients.

Keywords: Low Income Countries, Nutritional Needs, Demographic Profile, GNRI, BMI.

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Introduction

The under-5 children have been outnumbered by the elderly population in 2020 and is assumed that the proportion of elderly population, between 2015 and 2050 will be doubled from 12% to 22%. Thus 2/3rd of the elderly will be living in low- and middle-income countries by the end of 2050. Nutrition is the major determinant of successful aging, when altered and not sufficient might lead to diseases like diabetes, coronary artery disease and malnutrition, resulting in impaired quality of life. The contribution of the elderly to the families and the communities are handful, yet these depends on the health which affects the contributions and the opportunities [1,2]. As age progresses safety and security, health, social life and financial issues are the most focused revolving around the elderly. Older people living alone go in for isolation and loneliness which is the most common cause of increased health risk due to negligence. The most common issue that goes unrecognized midst the innumerable problems of the elderly is the nutritional status of the elderly. It is said that with advancement in age the ability to tolerate and digest large meals reduces. Consumption of nutritionally adequate diet helps delaying the pathological and degenerative problems irrespective of the inevitable age-related changes [3]. Thus, prevention of majority of the age-related disorders can happen with maintaining adequate nutrition.

With majority of the national health policies and other nutritional program focusing on the adolescence, maternal and child health; there has always been a deficit in consideration towards the geriatric nutrition status. In order to maintain the optimal tissue function during the elderly period, there is a dire necessity of maintaining the nutritional needs of the elderly a bit early in life. In India there has been not many studies that focused on malnutrition assessment among the elderly

population. This study aims to investigate whether the **nutritional risk index** (Geriatric Nutritional Risk Index) has a value that links the nutritional status and outcomes of elderly patients. Objective of the study is to determine the prevalence of malnutrition among hospitalized elderly patients and to evaluate the malnutrition status using GNRI and outcomes of the same

Materials and Methods

A cross-sectional observational study was conducted among the elderly patients admitted in a tertiary care hospital in Trichy, Tamil Nādu. The study was done over a period of 2 months among all the elderly patients (>65 years) of both sexes admitted in all the major specialty departments of the institution. Those patients who underwent intensive care, palliative care treatment, nutritional support (such as patients on Ryle's tube feeding or oral nutritional supplementation) were excluded. Taking the prevalence value of malnutrition from previous studies [4] to be 18.29% and considering 95% confidence interval with 5% allowable error the sample size was determined to be 238. To account for non-response error of 10% a total of 261 patients were included in the study. Consecutive sampling of elderly patients admitted during the study period was done till the sample size was achieved. A case proforma comprising of Demographic profile, anthropometric indices like BMI calculated using quetelet index, clinical signs and symptoms, all clinical profile, lab parameters and diagnosis were collected form the patient. Under strict aseptic precautions, 3 mL of venous blood was collected from the subjects for estimating Serum Total Protein, Albumin, Globulin, A: G Ratio and GNRI. Geriatric Nutritional Risk Index (GNRI) = $(1.489 \times \text{albumin[g/dL]} + 41.7 \times [\text{current body weight/ideal body weight}])$.

The study was started after obtaining approval from the institutional ethical committee. All patients were explained about the purpose, benefits, procedure and confidentiality of the study.

An informed consent was obtained from all the patients before including them in the study and the option to withdraw without any penalty of loss of benefit were also explained. The data collected was entered in MS excel

and analysed using SPSS version 26.0. Descriptive statistics such as mean, SD and range valued was calculated and compared using ANOVA. Chi square test was used to find the association between variables.

Though the definition of malnutrition according to WHO includes undernutrition, over nutrition and obesity, in this study malnutrition is synonymously used with undernutrition.

Results

Table 1: Baseline characteristics of the study participants

Characteristics		Frequency N (%)
Age	65 years – 75 years	172(65.90)
	>75 years	89(34.10)
Sex	Male	111(42.53)
	Female	150(57.47)
Religion	Hindu	170(65.13)
	Christian	82(31.42)
	Muslim	9(3.45)
Occupation	Unemployed	216(82.76)
	Employed	45(17.24)
Personal habits	Smoking	42(16.09)
	Alcohol	78(29.89)
Length of hospital stay	<5 days	98(37.55)
	5 – 10 days	145(55.56)
	>10 days	18(6.89)

The mean age of the participants was observed to be 68.4 ± 5.3 years. Majority (65.90%) of the participants were less than 75 years old and majority of them were Hindu (65.13%). There were only a handful of (17.24%) employed participants. 55.56% of the study participants were admitted for 5-10 days duration and the mean duration of hospital stay was found to be 8.5 ± 4.2 days.

Table 2: Clinical and laboratory examinational findings of the study participants

Characteristics		Frequency N (%)
BMI	Underweight (<18.5)	26(9.96)
	Normal (18.5 – 24.9)	117(44.83)
	Over weight (25-29.9)	88(33.72)
	Obesity (>30)	30(11.49)
BP	Normal	68(26.05)
	Hypertensive	193(73.95)
Protein levels	High (>9g/dl)	28(10.73)
	Normal (6.5-9g/dl)	120(45.97)
	Low (<6g/dl)	113(43.30)

Albumin levels	High (>6g/dl)	9(3.45)
	Normal (3.5-5.5g/dl)	76(29.12)
	Low (<3g/dl)	176(67.43)
Albumin:Globulin ratio	High (>2)	68(26.05)
	Normal (0.8-2)	101(38.70)
	Low (<0.8)	92(35.25)
GNRI	High nutritional risk (<82)	83(31.81)
	Moderate nutritional risk (82-92)	119(45.59)
	Low nutritional risk (92-98)	52(19.92)
	No risk (>98)	7(2.68)

The mean value of BMI calculated was found to be 24.3 ± 4.1 , with 44.83% of the participants falling under normal BMI category and 33.72% being overweight. Only 9.96% of the participants were found to be underweight according to BMI classification. Around 67.43% of the participants had albumin level $<3\text{g/dl}$, with a mean albumin level of $3.8 \pm 3.4\text{g/dl}$. 43.40% of the participants had low level of serum protein($<6\text{g/dl}$) and only 10.73% had protein level $>9\text{g/dl}$, with a mean protein level of 6.5 ± 5.2 . In order to calculate GNRI, current body weight/ideal body weight was set to 1, when the current body weight is higher than the ideal weight which was fixed to be 22kg/m^2 [5]. The mean GNRI value was calculated to be 84.6 ± 11.3 , with majority (45.59%) of them having moderate nutritional risk followed by 31.8% having high nutritional risk. Only 2.68% had no risk.

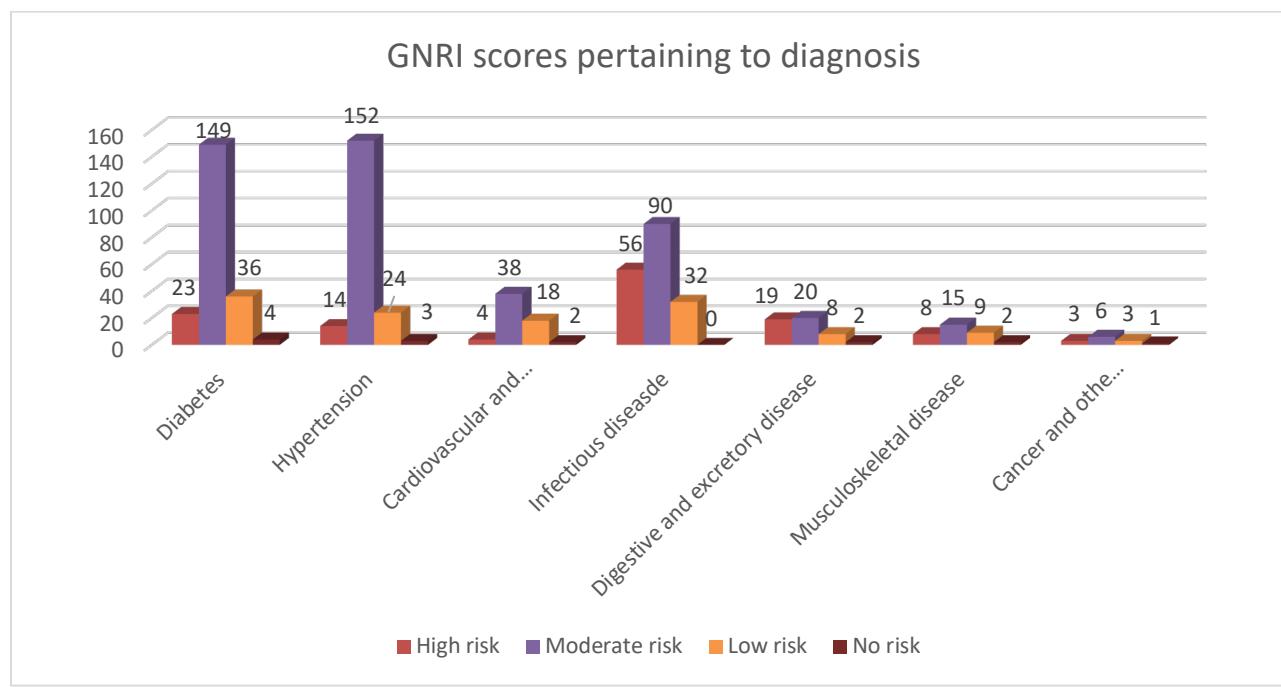


Figure 1: Diagnosis of elderly patients admitted during the study period and the distribution of GNRI among them.

Though majority of the patients with diabetes and hypertension had moderate nutritional risk; high nutritional risk was observed more among people diagnosed with infectious diseases. Higher proportion of people with digestive and excretory disease had equal distribution between high and moderate nutritional risk.

Table 3: Association between the GNRI and the baseline and clinical characteristics of the participants.

Characteristics	GNRI scores		p value
	High risk (<92)	Low risk (>92)	
Gender	Male	73(65.77)	0.0002*
	Female	129(86)	
BMI	Underweight	19(73.08)	0.289
	Normal and above	183(77.87)	
Employment status	Employed	26(57.78)	0.0018*
	Unemployed	176(81.48)	
Length of hospital stay	<5 days	47(47.96)	<0.0001*
	>5 days	155(95.09)	
		8(4.91)	

p value <0.05 is considered to be statistically significant.

The association of GNRI was statistically significant with gender, employment status and the duration of stay at the hospital. Among 202 patients having high nutritional risk, majority 129(63.86%) were female, 176(87.13%) were unemployed and 155(76.73%) had more than 5 days of hospital stay. The BMI did not have any significant association with the GNRI.

Table 4: GNRI scores in association with mean of hospital stay and BMI

Characteristics	GNRI Scores				p value
	<82	82-92	92-98	>98	
Mean length of hospital stay	13.4±6.2	10.8±5.2	8.2±4.2	5.6±2.3	0.002*
Mean BMI	23.5±2.8	24.2±4.2	26.4±4.8	25.3±5.4	0.0005*

p value <0.05 is considered to be statistically significant.

The mean length of hospital stay was found to be the highest 13.4±6.2 days in those with high risk of nutrition and was the lowest 5.6±2.3 days in those with no risk. Thus, the higher nutritional risk reduces the rate of recovery, extending the hospital stay and this association was found to be highly significant.

Discussion

By analysing the data obtained it is found that in our study majority of the elderly patients admitted in the ward during the study were less than 75 years old and had a mean age of about 68.4±5.3 years. This was almost similar to the finding in a study done by Simone Gartner *et al* [6], Varsha Yogesh Godbole *et al* [7], Eckart A *et al* [8] and Mathew AC *et al* [9], which showed a mean value of 75.8 years, 70.5±5.2 years, 71 years

and 71.09±7.93 years respectively. Though the studies done by Simone Gartner *et al* [6], Varsha Yogesh Godbole *et al* [7] and Eckart A *et al* [8] shows the frequency of male patients to be higher than the female, in our study there was a slight increase in number female patients compared to male (42.53%), which was similar to Mathew AC *et al* [9].

This difference could be because of the higher level of negligence in female patients compared to male. The mean BMI of the patients was calculated to be 24.3±4.1 kg/m², which was considered to be falling under the normal range, this finding was similar to the results done by Simone Gartner *et al* [6] showing 24.1 kg/m² and Varsha Yogesh Godbole *et al* [7] showing 22.26 kg/m² which also showed the mean values falling within the normal range. In a study done by PL V *et al* [10], Simone Gartner *et al* [6] and

Agarwalla R *et al* [11] more than 85%, 77% and 70% of the elderly patients were either at risk or malnourished which was almost similar to our study which showed 93% to be either malnourished or at the risk of nutritional deficiency. Though there were other studies conducted by Chern CJ *et al* [12] shows a wide range of prevalence 16% to 78% which was observed between 2005 to 2012. Varsha Yogesh Godbole *et al* [7] and Mathew AC *et al* [9] has shown only 52.3% and 44% were either at risk or malnourished. In our study of the 261 patients 31.81% had GNRI below 82, which was considered to be high malnutrition related risk; 45.59% had GNRI ranging 82 to 92, which was considered as moderate risk and 19.92% of patients had GNRI between 92 to 98 being at low risk of malnutrition and only 2.68% had GNRI above 98. These values were almost comparable with the study done by Simone Gartner *et al* [6] showing 48.8%, 28.2%, 15.6% and 7.4% respectively.

The study also showed the mean GNRI to be 82.2 ± 0.56 , which was similar to our study of 84.6 ± 11.3 . In a study done by Varsha Yogesh Godbole *et al* [7], female patients (61.6%) were more malnourished as compared to male patients (46.5%); these results were similar to our study which showed 86% of female and 65.77% of male were malnourished. In a study done by Agarwalla R *et al* [11], a significant association was found between the nutritional status and the older age groups, female gender, status of being financially dependent which was similar to our study. In addition to these studies done by Mathew AC *et al* [9] and Molly KT *et al* [13] also showed that the nutrition risk was lower in people who were financially independent compared to those being dependent on others, a finding similar to our study. Simone Gartner *et al* [6] also showed that higher BMI was found with increasing GNRI similar to our study. The study also showed 9.6 ± 1.6 days of mean

hospital stay and the length of stay increases with decreasing GNRI, which was similar to 8.5 ± 4.2 days of mean hospital stay in our study.

Conclusion

The elderly people should be processed with adequate knowledge and awareness regarding the prevention and management of the diseases along with ample nutrition, balanced diet and physical activity. Specific nutrition intervention studies to be performed to identify the health needs. The focus should be to evaluate the nutritional status of the elderly at their very first approach to medical help to improve their ability to overcome disease and enhance their clinical outcome. Though the main focus of this paper was on nutrition a holistic approach is necessary to improve the quality of life of the elderly. Introduction of supplements for elderly population would widely help in maintaining the nutritional status thus helping faster recovery and an additional support of immunity.

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