

A prospective study of nutritional status of hospitalised patients in urban corporate set up

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Abstract Malnutrition is quite common in hospitalised patients, with most studies indicating a prevalence of 20–62%. It is associated with length of stay and morbidity in developed countries. This study was performed to identify nutritional status of hospitalised patients in urban corporate setting by using primarily, the Mini Nutritional Assessment tool. This is a prospective study conducted in an urban tertiary care centre. 304 consecutive patients admitted to the hospital were studied, between the dates of July 2007 and September 2007. The study included the measurement of anthropometrics, global evaluation, dietary habits and subjective assessment score. Serum albumin level was used to assess visceral protein status. The study excluded Obstetrics & Gynaecology, paediatric and critical care cases. Out of the 304 patients, Females 41.55% and Male 42.55% were over nourished. Medical patients were more malnourished and at risk of malnutrition (15.08% and 70.85%) when compared to surgical patients (12.38% and 60.95%) respectively. This study shows that in an urban setting, the risk of malnutrition (overweight & underweight) is very real. Clinicians have to note that malnutrition has a direct impact on the outcome of treatment.

Keywords Nutritional assessment · Nutritional status · SGA · Albumin · Global evaluation

Introduction

As of 2007, malnutrition continues to be a worldwide problem. Malnutrition is common but frequently ignored problem in hospitals. In terms of absolute number of patients, most under nutrition exists in the community but the incidence is greater in hospital and nursing homes [1]. Malnutrition worsens the morbidity of disease and adds on to the risk of mortality.

Nutritional assessment is a measurement of dietary or nutrition-related indicators to identify the presence, nature and extent of impaired nutritional status of the cases and to obtain the information needed for intervention, planning and improvement of nutritional care [2]. Nutritional risk assessment is a proactive approach in evaluating patients' likelihood of protein calorie malnutrition and to identify patients who would normally be unrecognized and untreated. This may result in prolonged hospital stay and recovery process [3].

Aim

Our study was to document the nutritional status of hospitalised patients in a corporate urban tertiary care centre (hospital set up) catering to middle and upper middle class patients.

Recent studies in India have mainly emphasized community health status, focusing on people belonging to lower socio-economic group. It is a belief that patients from higher socio-economic group are not malnourished. But from studies in Western countries it has been found that the above conviction is not true.

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A prospective study on nutritional status of patients at Sagar Apollo Hospital, Bangalore, Karnataka State, an urban corporate tertiary care centre, was undertaken to assess the nutritional status of hospitalised patients, where patients mostly belong to upper middle class and middle class pre-sexual for treatment.

Material and methods

Consecutive 304 adult patients of age ≥ 18 (adult patients defined as greater than 18 years of age) were taken from both medical and surgical wards for the study. Paediatrics, Obstetrics and Gynaecology and ICU patients were not considered for the study.

Subjects were assessed by one to one conversation using the Mini Nutritional Assessment Form, which consisted of medical records of newly admitted patients to the hospital along with a questionnaire. The demographic data as detailed in Appendix - 1 were collected.

For anthropometric data, weight was measured using calibrated balance, height was recorded scaling in centimeters, (Body Mass Index – Appendix -2), mid arm circumference (MAC) in centimetres were taken by using standard measuring tape.

In global evaluation questions on patient's independence, mobility, prescribed drugs consumption, psychological and physiological stress history, and neuropsychological problems if any and presence of pressure sores or skin ulcers were ascertained.

Dietary assessment included patient's diet history, which consisted of questions on daily meal consumption, whether the patient was living alone or with family; intake of protein rich foods, fruits and vegetables and amount of beverages per day, patient appetite and mode of feeding.

Subjective assessment was done to assess the general nutritional status of patients from the above data.

For Biochemical assessment serum albumin was recorded. Albumin is a potential useful protein energy malnutrition marker because serum concentrations is closely related to changes in nutritional status. Blood sample was taken using vacutainer for albumin evaluation. Auto analyzer Vital Flexor [Test principle: The procedure is based on the binding of bromocresol green (BCG) to albumin. The intensity of the blue-green colour produced in the reaction is proportional to the concentration of albumin in the sample] was used to find the serum albumin level where the reference range was 3.5–5.2(g/dl) for adults to detect the albumin status.

The data were analysed using the 'Z' test and a 'p' value of <0.05 was considered significant.

Results and analysis

Significantly we more females found were undernourished than males, where as at risk of malnutrition and well nourished are comparatively not significant between males and females (Tables 1–5).

Table 1 The gender distribution and nutritional status of hospitalised patients with mean scores

Nutritional Status	Male	%	Female	%	Mean	*S.D	†S.E
Undernourished	22	11.7	21	18.1	‡14.3953	2.1959	0.3349
At Risk of Malnutrition	129	68.6	76	65.5	20.9756	1.8239	0.1274
Well nourished	37	19.6	19	16.3	24.8125	0.9845	0.1316
Total	188	100	116	100			

Note: *S.D: Standard Deviation, †S.E: Standard Error, ‡95% of the malnourished are likely to have scores between 13.74 and 15.05 (Mean \pm 1.96 SE)

Table 2 According to age

Age (years)	Undernourished		At risk of malnutrition		Well nourished		Total	Percent
	Male	Female	Male	Female	Male	Female		
18–20	1	2	2	6	1	0	12	3.95
21–30	7	5	41	10	5	2	70	23.02
31–40	2	0	24	9	7	2	44	14.47
41–50	0	5	12	21	3	5	46	15.13
51–60	4	3	23	16	11	5	62	20.4
61–70	4	4	18	9	7	4	46	15.13
71–80	3	1	8	5	2	1	20	6.58
81–90	1	1	1	0	0	0	3	0.99
>90	0	0	0	0	1	0	1	0.33
Total	22	21	129	76	37	19	304	100

Table 3 Nutritional status of surgical & medical patients

Nutritional Status	Medical Patients		Surgical Patients	
	Male	Female	Male	Female
Undernourished	12	18	10	3
At risk of malnutrition	86	55	43	21
Well nourished	17	11	20	8
Total	199	105		

Table 4 Statistical analysis of the medical and surgical patients

Nutritional status	Medical		Surgical		Difference in percentage	'Z' value computed	Significant/not significant	'P' probability value
	N0.	%	N0.	%				
Malnourished	30	15.08	13	12.38	2.70	0.6594	N.S	0.05*
At Risk	141	70.85	64	60.95	9.90	1.7222	Significant	0.10
Well nourished	28	14.07	28	26.67	12.60	2.5351	Significant	*0.05
Total	199		105					

Table 5 According to serum albumin levels

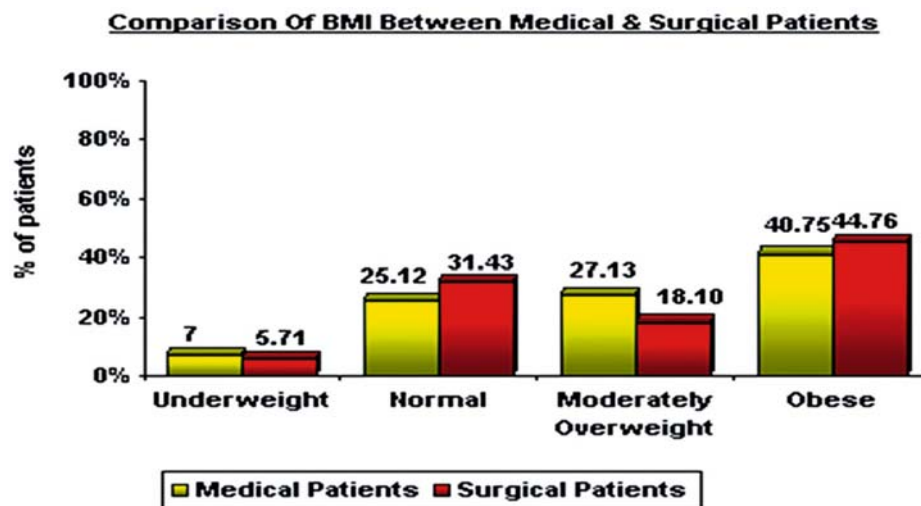
	<Normal	%	Normal	%
Female	23	19.83%	93	80.17%
Male	34	18.1%	154	81.9%
Total	57		247	

Canturk et al. showed in their study that "Incidence of nosocomial infections in overweight and obese patients are more when compared with normal-weight patients [7]."

Not many studies in India on hospitalised patients have documented malnutrition as primary concern and have not focused on correcting it before major therapeutic intervention.

Our prospective study is aimed at assessing the nutritional status of newly admitted patients at urban corporate tertiary

care hospital. Nutritional assessment of 304 patients of which 199 are medical patients and 105 surgical patients were assessed and statistical analysis has shown that prevalence of malnutrition is higher among females when compared to males (Fig. 1). Medical patients are more mal-

**Fig. 1** Comparison of BMI between medical and surgical patients

Discussion

Malnutrition (overweight or underweight) is quite common in hospitalised patients [4]. Obesity is an independent risk factor for death from coronary heart disease along with other medical hazards like insulin resistance, dyslipidemia, diabetes mellitus and cancer [5].

It is important to know the nutritional status of the patient because the level of malnourishment or over nutrition is directly correlated with both the severity and the frequency of complications [6].

nourished when compared to surgical patients. We have no specific explanation for this. This study has also shown that over weight and obesity is a public health problem affecting 40.8% and 44.3% of the medical and surgical patients, respectively. Out of 304 patients, 58 and 9 medical and surgical patients respectively, had serum albumin levels below 3.5 g/dl. Serum albumin levels are normal in more number of medical patients when compared to surgical patients. Low serum albumin may indicate protein calorie malnutrition. However, low values also are seen during

stress, infection, liver diseases, and cancer among the elderly [8].

Ibrahim A et al. in their study showed that the prevalence of malnutrition among surgical and medical patients was 33.8% at the time of admission to hospital. Bistran et al. reported malnutrition in 44% of general medical patients and approximately 50% of surgical patients, employing a series of anthropometric and laboratory measurements of nutrition status [9]. In Scandinavia, Symreng et al. reported that 28% of hospitalised surgical patients were malnourished [10].

A study by Kuzu et al. [11] states that any form of nutritional assessment technique based on Clinical and Subjective evaluation showed to improve the outcome of surgical care.

Our study used Mini Nutritional Assessment form for data collection, which consisted of general and specific questions. The advantage was it is a very simple, and cost effective validated tool for determining the nutritional status of hospitalised patients.

One of the limitations of this study was that only serum albumin value was taken as a biochemical parameter for assessment of visceral protein status. Several studies have shown that a low serum albumin concentration correlates with an increased incidence of medical complications. But, the long half life and the influence of factors other than nutritional status, like sepsis [12], bring down albumin levels and make it a relatively inferior marker for malnutrition. Further we have not evaluated treatment outcomes in this study.

This study shows that malnutrition is a real possibility even in an urban tertiary care hospital. Clinicians would do well to focus on the nutritional status in addition to the usual therapeutic intervention to ensure good recovery of their patients.

The role of the Nutritionist / Dietician in this regard is significant. Close cooperation between the clinician and the dietician would result in prompt recognition of malnutrition and proper institution of adjunctive nutritional therapy could be indicated.

Conclusion

The findings in this study point to a significant frequency of malnutrition in hospitalised patients. In urban population prevalence of malnutrition is significant – where overweight and obese patients are more when compared to underweight patients.

Malnutrition must be recognized and recognition carries with it responsibility. Determined efforts should be made to provide nutritional support to improve patients well being and quality of life.

Nutrition screening is an important step in establishing the patients need for nutritional care. Also, it is the first step

in establishing the value of clinical nutritional services. This may result in a greater use of service providers – the dietitians. Furthermore, the results of this study will lead to increased awareness of the importance of nutritional care among hospitalised patients.

Future studies should be targeted at developing a quick and cost effective nutritional assessment tool to aid in the diagnosis of malnutrition.

Conflict of interest The authors do not have any disclosable interest

References

1. Manson P, Pharms MR (2006) Under nutrition in hospital—causes and consequences volume 13, Fulltext (online) http://www.pharmj.com/pdf/hp/200611/hp_200611_causes.pdf (accessed 1st December 2007)
2. Nutritional Assessment “Center for Medicaid and State Operations/Survey and Certification Group” Department of Health and Human Services, Baltimore, Maryland [http://www.ascp.com/resources/nhsurvey/upload/CMS_F325_Nutrition_\(March_06\).PDF](http://www.ascp.com/resources/nhsurvey/upload/CMS_F325_Nutrition_(March_06).PDF)
3. <http://www.bec-kmancoulter.com/products/applications/diseasemgmt/nutritional.asp> (accessed 20 November 2007)
4. Waitzberga DL and Maria Isabel TD (2003) Correiab Nutritional assessment in the hospitalised patients Lippincott Williams and Wilkins pp 1363–1950
5. Xavier Pi-Sunyer F (1993) National institutes of health technology assessment conference, Medical Hazards of Obesity, 1 October 119 (Issue 7):655–660
6. Kylea UG, Kossovskyb MP, Veronique L (2006) Karsegarda, Claude Picharda Comparison of tools for nutritional assessment and screening at hospital admission: A population study *Clinical Nutrition* 25:409–417
7. Cantürk Z, Cantürk NZ, Çetinarslan B, Utkan NZ, Tarkun I (2003) Nosocomial Infections and Obesity in Surgical Patients, The North American Association for the Study of Obesity. *Obesity Research* 11:769–775
8. Bani Ibrahim A, Al-Kanhal, Mohammad A (1998) Malnutrition among hospitalised patients in King Khalid university hospital, Riyadh: Department of Community Health Sciences, College of Applied Medical Sciences, King Saud University, Riyadh, Saudi Arabia Year: 4(3):172–175
9. Bistran BR, Blackburn GL, Vitale J, Cochran D and Naylor J (1976) Prevalence of malnutrition in general medical patients. *JAMA* 235:1567–1570
10. Symreng T, Anderberg B, Kagedal B, Norr A, Schildt B and Sjodahl R (1983) Nutritional assessment and clinical course in 112 elective surgical patients. *Acta Chir Scand* 149:657–662
11. Kuzu MA, Terzioğlu H, Genç V et al. (2006) Preoperative Nutritional Risk Assessment in predicting postoperative outcome in patients undergoing major surgery. *World J Surg* 30:378–390
12. Gibney MJ, Elia M, Ljungqvist O, Dowsett J (2005) *Clinical Nutrition*, Black well Publishers pp 15–29

Appendix – 1

Mini Nutritional Assessment Form

Name: Age: Sex:
 O.P No: I.P No: Consultant:
 Dept: DOA: DOD:
 Present Complaints:
 Diagnosis:
 Height: Weight: BMI: Ideal Body Wt:
 Diet pattern: Vegetarian/Non Vegetarian/Mixed/Any other:
 Food Allergies:
 Food Preferences (likes/dislikes):
 Activity: Sedentary/Moderate/Heavy:
 Exercise: Daily/Weekly/Rarely/Nil
 Smoking: Yes/No Alcohol: Yes/No
 Fluid status:
 a. Evidence of dehydration – Positive Negative
 b. Presence of oedema - Positive Negative
 Specific nutritional deficiencies:
 a. Rashes - Positive Negative
 b. Stomatitis - Positive Negative
 c. Bitot's spots - Positive Negative
 Blood Albumin Level:
 Normal value – 3.5–5g/dl

I. Anthropometric Assessment

- BMI [$\text{Wt}/(\text{ht})^2$ in kg/m^2]
 0 = BMI < 19
 1 = $19 \leq \text{BMI} \leq 21$
 2 = $21 \leq \text{BMI} \leq 23$
 3 = BMI ≥ 23
- Mid arm circumference (MAC in cm)
 0 = MAC < 21
 0.5 = $21 \leq \text{MAC} \leq 22$
 1 = MAC > 22
- Weight loss during the last three months
 0 = Weight loss > 3 kg
 1 = doesn't know
 2 = Weight loss between 1 – 3 kg
 3 = No weight loss

II Global evaluation

- Does the patient live independently in contrast to a nursing home?
 0 = NO 1 = YES
- Does the patient take more than 3 prescription drugs/day?
 0 = NO 1 = YES
- In the past 3 months has the patient suffered from psychological stress or acute disease?
 0 = NO 1 = YES
- Mobility
 0 = Bed/chair bound
 1 = Able to get out of bed/chair but doesn't go out
 2 = goes out

8. Neuropsychological problem
 - 0 = severe dementia or depression
 - 1 = mild dementia
 - 2 = no psychological problems
9. Pressure sores or skin ulcers?
 - 0 = NO
 - 1 = YES

III Dietary assessment

10. How many full meals does the patient eat daily?
 - 0 = 1 meal
 - 1 = 2 meals
 - 2 = 3 meals
11. Place of stay
 - 0 = Not with family
 - 1 = Along with family
12. Does he consume
 - At least one serving of milk products (cheese, milk, yoghurt)/day?
 - Yes/No
 - Two or more servings of beans or eggs / week?
 - Yes/ No
 - Meat, fish, poultry every day?
 - Yes /No
 - 0 → if 0 or 1 yes
 - 1 → if 2 yes
 - 2 → if 3 yes
13. Has the patients' food intake declined over the past 3 months due to a loss of appetite, digestive problems, chewing or swallowing difficulties?
 - 0 = severe loss of appetite
 - 1 = moderate loss of appetite
 - 2 = no loss of appetite
14. Does he consume 2 or more servings of fruits or vegetables/ day?
 - 0 = NO
 - 1 = YES
15. How many cups/glasses of beverages (water, juice, coffee, tea, milk, wine.) does the patient consume /day?
 - 0 = less than three glasses
 - 0.5 = 3 – 5 glasses
 - 1 = more than 5 glasses
16. Mode of feeding
 - 0 = patient requires assistance
 - 1 = Self-fed with some difficulties
 - 2 = Self-fed without any problem

IV Subjective assessment

17. Does the patient consider having any nutritional problem?
 - 0 = Major malnutrition
 - 1 = Does not know or moderate malnutrition
 - 2 = No nutritional problem
18. In comparison with the other people of the same age, how would the patient consider his health status?
 - 0 = Not as good
 - 0.5 = doesn't know
 - 1 = As good
 - 2 = Better

Total → Maximum 30 points

Score if,

24 points = well nourished

17–23.5 points = at risk of malnutrition

<17 points = under nourished

Source- R. COHENDY 'et al.' Preoperative nutritional evaluation of elderly patients (edit):
The Mini Nutritional Assessment as a practical tool Clinical Nutrition (1999) 18(6): 345-348
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Appendix-2

According to the World Health Organisation, BMI grades in
identifying of nutritional status

Nutritional Status	BMI Grade
Underweight	<18
Normal	18-22.9
Risk of Overweight	23-24.9
Overweight	25-29.9
Obese I Grade	30-34.9
Obese II Grade	35-39.9
Obese III Grade	40 >