

COMPARISON OF NUTRITIONAL STATUS OF HOSPITALIZED PATIENTS IN GASTROENTEROLOGY WARD AT ADMISSION AND DURING DISCHARGE

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Abstract

Background : Malnutrition is a state of nutrition in which a deficiency and excess of energy, protein and other nutrients causes measurable adverse effects on tissue or body function and clinical outcome. The aim of study were to find out proportion of malnutrition during hospital admission and to observe the change of nutritional status of the patients during hospital stay.

Materials and methods: This is a serial cross sectional study performed at Gastroenterology Department of Bangabandhu Sheikh Mujib Medical University, Dhaka during a period of May to December 2009. The nutritional status was assessed using Body Mass Index (BMI) and Mid Arm Circumference (MAC). Statistical analysis was performed using SPSS program and simple frequency distribution table. 202 patients were included in this study, 114 were male and 88 were female. 32 patients were over 60 years of age.

Results: Out of 202 patients, 57 patients had chronic liver disease (28.2%) 44 patients had intestinal tuberculosis (21.8%) 18 patients had intestinal lymphoma (8.9%) 30 patients had GI malignancy (14.9%) and 53 patients had others gastrointestinal disorders (26.2%). Prevalence of malnutrition during hospital admission was 32.7%. Out of 202 patients, 66 patients (32.7%) were

found to be malnourished at 1st day of hospital admission whereas 83 patients (41.1%) were malnourished at the time of discharge. Lowest recorded BMI was 14.8 and highest was 28.4 (19.9 mean \pm 2.9 SD) whereas lowest recorded MAC was 15 and highest MAC was 34 (22.8 mean \pm 3.4SD) during hospital admission. 14% patients had very poor appetite. Out of 145 patients who were hospitalized for 14 days or less, 34 (23.4%) and 32 (22.1%) patients had significant decreased MAC and BMI respectively. Out of 57 patients admitted for more than 14 days, 24 patients (42.1%) had significant decrease in BMI whereas 14 patients (24.6%) had significant decrease in MAC.

Conclusion: Nutritional status of the patients during hospital stay has changed significantly in relation to disease pattern.

Key words

Gastrointestinal (GI) malignancy; BMI (Body Mass Index); MAC (Mid Arm Circumference).

Introduction

Malnutrition is a state of nutrition in a which a deficiency or excess (Orimbalance) of energy, protein and other nutrients causes measurable adverse effects on tissue or body from, body function and clinical outcome. Many patients present with malnutrition upon admission. Malnutrition in hospitalized adults contributes to poor health outcomes and increased health care costs¹. Currently, a BMI of 18.5 kg/m² is considered a marker of malnutrition². In adults, Body Mass Index (BMI) of less than 18.5 kg/m² is usually associated with significant loss of muscle and functional impairment.

An independent UK health think tank, the king's fund estimated that 50% of surgical and 44% of medical inpatients were malnourished and that 10% in inpatients could have their stay reduced by proper use of nutritional support³. A prospective survey of inpatients at Ninewells Hospital, Dundee, found that 40% of acute admission in five

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specialties were under nourished and that 75% of patients actually lost weight during their hospital admission⁴.

Acutely ill patients become catabolic and that their nutritional requirements can be very high, particularly in those with sepsis, trauma or burns, in the majority of inpatients especially in case of gastrointestinal disorders, however the most important single factor leading to malnutrition is probably loss of appetite and failure if intake.

The management of malnutrition does not require high technology or expensive intervention. The vast majority of the patients would be helped by ensuring that they receive adequate quantities of healthy food and beverages while in the hospital. There is no available data for the nutritional assessment in hospitalized patients in Bangladesh. Our study will try to assess the nutritional status as well as nutritional consequences due to prolong stay in hospital. The study result will help the authorities responsible for health system management to make future plan for preventing malnutrition of admitted patient in hospital.

Materials and methods

This serial cross sectional study done at Gastroenterology Department of Bangabandhu Sheikh Medical University (BSMMU) admitted patients during period of May to December 2009. After getting ethical clearance, 202 patients were included in this study got admitted in Gastroenterology Department of BSMMU, stayed 7 days or more at inpatient's gastroenterology care unit with different gastrointestinal diseases. Patients stayed at the inpatient unit less than 7 days and who were unwilling to give consent were excluded from this study.

After taking consent, height, weight and mid arm circumference were measured within 12 hours of admission. BMI was calculated using the standard formula [BMI = weight in kg / height in meter²]. Measuring tape was used to quantify Mid Arm Circumference (MAC). Heights were calculated using standard height measuring scale. Weights were taken using the weighing machine used in the hospital for all patients. Mid arm circumference was taken maintaining all the ideal protocol for measuring mid arm circumference. Patient's appetite and their sources of food were also recorded during admission. All parameters of patients were again recorded when discharged at

seven days or after seven days of hospitalization. All parameters during admission and discharge were compared. Statistical analysis was performed using SPSS program and simple frequency distribution table.

Results

There were 202 patients included in this study. Among them, 114 patients were male (56%) and 88 patients were female (44%), out of which most patients were aged 11 to 70 years. Out of 202 patients, 57 patients (28.2%) had chronic liver disease, 44 patients (21.8%) had Intestinal tuberculosis, 30 patients (14.9%) had malignancy in gastrointestinal tract, 18 patients (8.9%) had intestinal lymphoma whereas 53(26.2%) patients had others gastrointestinal disease. Lowest recorded BMI was 14.8 and highest was 28.4 (19.9 mean \pm 2.9 SD) whereas lowest recorded MAC was 15 and highest MAC was 34 (22.8 mean \pm 3.4SD) during hospital admission.

Table I : Demography and distribution of disease of 202 patients.

Variable	Number	Percentage
Age		
11 – 20 years	28	
21 – 30 years	42	
31 – 40 years	26	
41- 50 years	40	
51 – 60 years	34	
61- 70 years	26	
>70	06	
Sex		
Male	114	56%
Female	88	44%
Diseases		
Chronic Liver disease (CLD)	57	28.2%
Intestinal tuberculosis	44	21.8%
Intestinal Lymphoma	18	8.9%
Malignancy of G.I. Tract	30	14.9%
Others	53	26.2%
BMI	Mean	SD
	19.9	2.9
MAC	22.8	3.4

Prevalence of malnutrition during hospital admission was 32.7%. Out of 202 patients, 66 patients were found malnourished during their admission. 19 (43.2%) of intestinal tuberculosis patients, 11 (36.7%) patients with gastrointestinal malignancy, 17(29.8%) patients of chronic liver disease, 5 (27.8%) Intestinal lymphoma patients and 14 (26.4%) of other gastrointestinal disorders patients were found malnourished during their hospital admission.

Table II : Proportion of malnourished patients during hospital admission and during hospital stay [Patients with BMI less than 18.5 considered as malnourished].

Proportion of malnourished patients during hospital admission:			
Diseases	Number of patients	Malnourished patients	Percentage (%)
CLD	57	17	29.8
Intestinal TB	44	19	43.2
Lymphoma	18	5	27.8
Carcinoma	30	11	36.7
Others	53	14	26.4
Total	202	66	32.7

Proportion of newly malnourished patients during hospital stay:			
Disease	Number of patients	Newly malnourished patients	Percentage (%)
CLD	57	8	14.1
Intestinal TB	44	2	4.4
Lymphoma	18	0	0
GI malignancy	30	4	13.3
Others	53	3	5.7
Total	202	17	8.4

17 (8.4%) patients became malnourished during hospital stay whom had normal BMI during hospital admission. 8 (14.1%) patients, 2 (4.4%) patients and 4 (13.3%) patients of chronic liver disease, intestinal tuberculosis and GI malignancy became malnourished during hospital stay respectively. No change of BMI observed in GI lymphoma patients. 3 (5.7%) patients of others gastrointestinal diseases became malnourished during their hospital stay.

We divided the BMI and MAC changes into 5 categories which were increased BMI and MAC, no change (No change of BMI and MAC during stay in Hospital) mild decrease (BMI and MAC change 0-0.5) moderate decrease (BMI and MAC change 0.5 -1) significant decrease (BMI and MAC more than 1). Out of 202 patients, 56 patients (27.7%) had significant decreased in BMI. This was more observed in 26 (45.6%) patients, out of 57 patients of chronic liver disease. Out of 202 patients, 48 patients (23.8%) had significant decreased in MAC. This was also more observed in 20(35.1%) patients, out of 57 patients of chronic liver disease. Out of 145 patients who were hospitalized for 14 days or less, 3(2.1%) patients

had increased MAC whereas 72(49.7%) patients had no change in MAC. 12 (8.3%), 24 (16.6%) and 34 (23.4%) patients had mild, moderate and significant decreased MAC during their hospital stay of 14 days or less respectively. Out of 57 patients who were hospitalized for more than 14 days, 2(3.5%) patients had increased MAC whereas 17(29.8%) patients had no change in MAC. 24 (42.2%) and 14 (24.6%) patients had moderate and significant decreased MAC during their hospital stay of more than 14 days respectively. Out of 145 patients who were hospitalized for 14 days or less, 15(10.3%) patients had increased BMI whereas 19(13.1%) patients had no change in BMI. 32 (22.1%), 47(32.4%) and 32 (22.1%) patients had mild, moderate and significant decreased BMI during their hospital stay of 14 days or less respectively. Out of 57 patients who were hospitalized for more than 14 days, 6(10.5%) patients had increased BMI whereas 4(7%) patients had no change in BMI. 4(7%), 19 (33.3%) and 14 (24.6%) patients had mild, moderate and significant decreased BMI during their hospital stay of more than 14 days respectively.

Table III : MAC and BMI change according to hospital stay (n=202).

MAC	14 days and less	More than 14 days	Total
Increased	3	2	5
(%)	(2.1)	(3.5)	(2.5)
No Change	72	17	89
(%)	(49.7)	(29.8)	(44.1)
Mild Change	12	0	12
(%)	(8.3)		(5.9)
Moderate decreased	24	24	48
(%)	(16.6)	(42.2)	(23.8)
Significant decreased	34	14	48
(%)	(23.4)	(24.6)	(23.8)
Total	145	57	202
(%)	(100)	(100)	(100)
BMI			
Increased	15	6	21
(%)	(10.3)	(10.5)	(10.4)
No Change	19	4	23
(%)	(13.1)	(7)	(11.4)
Mild Change	32	4	36
(%)	(22.1)	(7)	(17.8)
Moderate decreased	47	19	66
(%)	(32.4)	(33.3)	(32.7)
Significant decreased	32	32	56
(%)	(22.1)	(42.1)	(27.7)
Total	145	57	202
(%)	(100)	(100)	(100)

The regression of BMI change and duration of hospital stay was moderately coefficient as R^2 was 0.197. (P value is less than 0.05, p value obtained through F test).

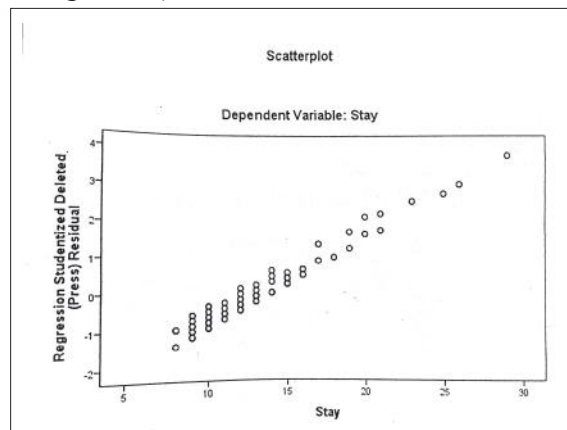


Fig 1: The regression of BMI change and duration of hospital stay. ($R^2 = 0.197$, R^2 obtained through linear regression).

During discharged from hospital, 83 (41.1%) patients was malnourished. 25 (43.9%) of CLD, 21 (47.7%) of Intestinal TB, 5 (27.8 %) of Lymphoma and 15 (50%) of GI malignancy patients and 17 (32.1%) of other gastrointestinal disorders patients were found to be malnourished respectively.

Table IV : Prevalence of malnourished patients during discharge from the hospital.

Diseases	Number of patients	Malnourished patients	Percentage (%)
CLD	57	25	43.9
Intestinal TB	44	21	47.7
Lymphoma	18	5	27.8
Carcinoma	30	15	50
Others	53	17	32.1
Total	202	83	41.1

Out of 202 patients, 40% had good appetite, 46% had poor and 14% had very poor appetite. 52% of patients having food theirfrom hospital source whereas 8% patients having their food from home made source. 40% of patients having their from both source. 14 (38.9%), 28(42.4%) and 32(57.1%) patients had mild, moderate and significant decreased of BMI with poor appetite respectively. 8(66.7%), 17(58.3%) and 28(58.3%) patients had mild, moderate and significant decreased of MAC with poor appetite respectively.

Discussion

The nutrition of an individual is often the result of interrelated factors. It is influenced by adequacy of food intake both in terms of quantity and quality and also by the physical health of the individual⁵. In the current study, we assessed the nutritional depletion of adult population during stay in hospital. In the current study, we found 28.2% patients had chronic liver disease, 21.8% patients had intestinal tuberculosis, 14.9% had GI malignancy, 8.9% had intestinal lymphoma and 26.2% patients had other disease of gastrointestinal tract who were admitted in BSMMU for their treatment. Disease condition may be worsening if there is any alarming incidence of undetected severe malnutrition occurred in hospitalized patients. Therefore to combat this unwanted and unnecessary morbidity and mortality, a thorough awareness of the nutritional and metabolic status of the hospitalized patients and a complete assessment of the body's various compartments should be adequately addressed and any nutritional must be quickly relieved⁶.

A review on the recent medical literature on the association between hospital length of stay and nutritional status revealed simple anthropometric parameters underestimate the nutritional risk in hospitalized patients, the malnutrition universal screening tool and nutritional risk screenings are simple screening tools that can identify patients requiring further monitoring. Recent weight loss appears to be the most important single indicator of nutritional status⁷. Using Body Mass Index (BMI) as a parameter, we found from our study that prevalence of malnutrition during hospital admission was 32.7%. Out of 202 patients, 66 patients were found malnourished during their admission. Proportion of malnutrition among the hospitalized patients were 29.8% in chronic liver disease patients, 43.2% in intestinal tuberculosis, 27.8% in lymphoma, 36.7% in GI malignancy and 26.4% in other gastrointestinal disorders. In our study intestinal tuberculosis (43.2%) patients had high prevalence of malnutrition during hospital admission. In one study, had been conducted in 202 hospitalized patients before gastrointestinal surgery to determine whether clinicians' SGA (Subjective Global Assessment) ratings were influenced by the individual clinical variables or not. To determine the variable which affected the rating most, multivariate analysis was done and it

showed that loss of subcutaneous tissue, muscle wasting, and weight loss were the variables affected the rating most⁸.

A study was conducted in Clinical Pathology Department in the University of Genoa for measuring the incidence of malnutrition and the effect of hospitalization in 100 consecutive admissions. Nutritional deficiencies were evaluated at the time of admission and discharge from the hospital, among patients hospitalized 2 weeks or longer, using the nutrition-related parameters to appetite decrease and to pathological status. The findings showed a high incidence (79%) of alterations in some nutritional parameters⁹. In patients with nutritional impairments they observed a worsening of most of the nutritional parameters during hospitalization, especially in patients with severe appetite decrease and those affected by sepsis, neoplastic, gastric and renal disease^{9,10}.

In our study, we found that among the admitted patients with normal nutritional status, 17 (8.4%) patients become malnourished during their stay in hospital. Chronic liver disease patients became malnourished most (14.4%) in proportion followed by GI malignancy (13.3%). This is probably underlying chronic illness as systemic inflammation may not subside completely, and the patient enters chronic disease related malnutrition. Hospital stays for a long period did not produce any effect on the nutritional status change in case of lymphoma which was probably due to treatment adherence.

Malnutrition is frequently observed at hospital, concerning 30 to 50% of hospitalized patients. Increased length of stay and cost of care have made this problem a major economic stake. Malnutrition results from unbalanced nutritional requirement and intake. It associates weight, protein and functional loss. Its diagnosis and evaluation need body mass index determination¹¹⁻¹³. In our study regression analysis showed that there is a linear relationship (R^2 was 0.197) between longer hospital stay and body mass index which is supported by literatures.

In our study, considering Body Mass Index (BMI) with Mid Arm Circumference (MAC) we found that change of mid arm circumference was not correlate to the change of body mass index. In most of the cases (44.1%), mid arm circumference had no change at all during the staying in the hospital in defined period of time. Among them,

49.7% had no change who stayed less than 14 days in the hospital whereas 29.8% patients who stayed more than 14 days had no change of MAC. Moderate decreased of MAC was found in 24 (42.2%) patients who stayed longer than 14 days and 24 (16.6%) patients who stayed less than 14 days in the hospital. So we did not get any relationship between the hospital stay and mid arm circumference changes which was probably due to no loss of muscle mass. But if we compare, hospital stay with body mass index, it can imply a linear relationship in regression analysis. One prospective observational study, conducted over a 7-month at a University hospital to assess the association between changes in nutritional status in hospitalized patients and the occurrence of infections, complications and length of stay in hospital^{14,15}. The authors came to the conclusion that declines in patients' nutritional status while they are hospitalized, regardless of their nutritional status at admission, were associated with significantly higher likelihood of complications. Practicing clinicians should make reducing declines in patients' nutritional status a priority, regardless of patients' nutritional status at admission^{14,16}.

Appetite and source food had some effect on depletion of nutritional status of the patients. If we assessed relationship with body mass index with appetite of the patients we found changes occurred in the patients but not according to linearity of the contest of their appetite and no co-efficiency was observed in the relationship. Similar result was observed in the relationship of mid arm circumference changes and the appetite of the patients. Source of food also had the same consequences. There were some change according to the source of food and the change in body mass index, but no linearity or coefficient observed in our study as we considered the relationship of source of food and the change of body mass index. In our study, there was also no linearity and coefficient in the source of food and change in mid arm circumference.

Limitation

It was a single centre study with small sample size. In this study, only gastrointestinal disorders patient were taken. To comment on hospital admitted patient's nutrition, patient from other department needs to be included. No highlight about the complications of malnutrition on patient's morbidity outcome was described.

Conclusion

Malnutrition during hospital stay is a major concern now as days. Duration of stay also has an important role in development of malnutrition. Longer stay of hospital increases the chance of making a normo nutritional patients into a malnourished patient. Appetite and source of food also has some effect on the malnutrition but in our study we cannot come to conclusive pattern.

Body mass index is good indicator of nutritional status for hospital staying patients. There is definite relation between the long stay in hospital and diminution of mass index. Body mass index will be a good indicator of the future studies. Inclusion of mid arm circumference for assessing the depletion of nutritional status of the patients need more exploration. Use of triceps skin fold thickness to measure nutritional status can also be considered.

Recommendations

To assess the better outcome of patients, all hospital should possess nutritional unit who will be responsible for the dietary and physical status of patients. Especially gastrointestinal unit should give more emphasis on liaison with nutritional unit as they have more perilous patients. We can suggest that clinicians and Hospital should need to develop a dietary and nutritional assessment protocol which should be strictly followed for all the inpatients for their betterment

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Contribution of authors

SMAH – Conception, design, acquisition data, interpretation of data and final approval.

BP-Data analysis, interpretation of data and final approval.

MNM-Acquisition of data, manuscript writing and final approval.

SMUI-Data analysis, manuscript writing and final approval.

EUH-Critical revision, interpretation of data and final approval.

MKS-Data analysis, interpretation of data and final approval.

ASMAR- Critical revision, interpretation of data and final approval.

Disclosure

All the authors declared no competing interests.

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