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Pre-operative Serum Albumin and Body Mass Index as Predictors of Post-Operative Morbidity and Mortality in Major Open Abdominal Surgeries

Aneez Sadhik*

Department of Universal Surgery, University of Delhi, India

***Corresponding author:** Aneez Sadhik, Department of Universal Surgery, University of Delhi, India, Tel: 8281232141,Email:aneezsadhik@gmail.com

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Abstract

Background: Healing is a catabolic process needing energy. Any malnutrition leads to impaired wound healing. Some of the markers of the nutritional status of the body that are routinely used are the BMI and the levels of serum albumin of the patients. In the current study we evaluated the role of serum albumin and Body Mass Index as predictors of postoperative morbidity and mortality both in elective and emergency major surgeries.

Aims and objectives: To determine the role of low serum albumin and abnormal BMI and to observe those developing any morbidity and mortality post operatively.

Materials and methods: The study evaluated a total of 82 patients and undergoing major abdominal surgeries. Those pregnant, having significant co-morbidities were excluded. Pre-operative serum albumin measurements were done, BMI was calculated and post-operative morbidity & mortality were recorded. The data was compiled and standard statistical tests applied to analyze the data.

Results: The study was male preponderant with 53 males and 29 females. Mean duration of stay in ICU and ward in those with normal albumin levels was 2.158 days and 8.68 days respectively compared to 4.984 days and 11.06 days in the hypoalbuminemia. There were higher complications in the post-operative period in those patients with hypoalbuminemia and abnormal BMI.

Conclusion: Pre-operative Serum albumin and BMI are significant predictors of post-operative morbidity.

Keywords: Serum albumin; BMI Major abdominal operation s; Post-operative morbidity

Introduction

The process of wound healing is a catabolic process which for its completion consumes energy [1,2]. Having said that the patients who present with various abdominal conditions necessitating surgery are most often in a state of catabolism owing to inadequate intake as a result of various reasons like nausea, vomiting or loss of nutrients as a result of diarrhoea [3-5].

Patients who are severely malnourished demonstrate impaired wound healing and predisposition to infection, usually as a result of abnormality or deficiency of the various immune mechanisms that act as a defense mechanism [6-8]. Some of the markers of the nutritional status of the body that are routinely used are the BMI and the levels of serum albumin of the patients [9-13]. BMI and the serum levels of albumin when deranged may potentially result in surgical complication.

In the current study we evaluated the role of serum albumin and Body Mass Index as predictors of postoperative morbidity and mortality both in elective and emergency major surgeries.

Materials and methods

The current study evaluated a total of 82 patients who underwent major abdominal surgeries under the Department of General Surgery, in a tertiary referral hospital in South India. In this Descriptive Analytical Observational Study, the patients were selected by simple random sampling. Informed consent was obtained from all the participants.

All major surgeries involving opening the abdominal cavity, elective surgery as well as emergency cases, both male and females patients older than 18 years of age were included in study. Pregnant women, those on immunosuppressive drugs and who had chronic disease such as chronic liver disease, chronic kidney disease was excluded from the study. Pre-operative serum albumin measurements were done, and BMI was calculated. Data was compiled and standard statistical tests applied to analyse the data.

The comparison was done after segregating the patients in to those with normal albumin levels vs. those with hypoalbuminemia and those with normal BMI vs. those with abnormal BMI (Tables 1-3).

Results

Table 1: Duration of ICU stay.

ICU days	Normal albumin levels	Hypoalbuminemia	P value
Mean	2.158 days	4.984	0.002
Mode	1 days		1.0 days
Std. Deviation	0.9416 days		1.3336 days
Variance	9.251 days		11.113 days
Minimum	1 days		1 days
Maximum	4 days		19 days

Table 2: Duration of Ward stay.

Duration of ward stay	Normal albumin levels	Hypoalbuminemia	P value
Mean	8.684	11.063	0.049
Median	4	9	
Mode	2	2	
Std. Deviation	3.6035	4.4132	
Minimum	3	3	
Maximum	12	39	

Table 3: Age evaluation.

Age	Normal albumin	Low albumin	P value
Mean	46.93	41.53	0.08
Sd	12.92	16.92	
Bmi	Mean age	SD	
Less than 18.5 kg/m^2	47.09	18.85	
18.5 - 25 kg/m^2	42.76	14.5	
25.1-30 kg/m^2	45.83	20.06	
More than 30 kg/m^2	46	16.78	

Discussion

We noted that with the decrease in albumin levels, the post-operative complications increased and there was a negative co relation between serum albumin and complications. Serum albumin levels of less than 3.5 g/dl had a higher association with post-operative morbidity according to the study [14,15,16]. In the present study we noted similar findings in those patients who have a low serum albumin level lesser than 3.5 g/dl they have a higher rate of complications in the form of lower respiratory tract and urinary tract infections when compared with patients having normal albumin levels. Evaluated the relationship between the BMI levels and the morbidity observed 40% patients who had complications had mean BMI value of 21.44 kg/m$_2$ respectively and 60% patients who had no complications had a mean BMI value 20.30 kg/m$_2$ p<0.05. [18] Observed that in 45.5% of hypoalbuminemia cases had complications as compared to 5.5% with normal albumin levels. Chest infections, (25% *versus* 6%), Mortality of 14 (18% *versus* 3%), Skin and soft tissue infections were observed in (28 cases versus 5 (15%) (Figures 1-3).

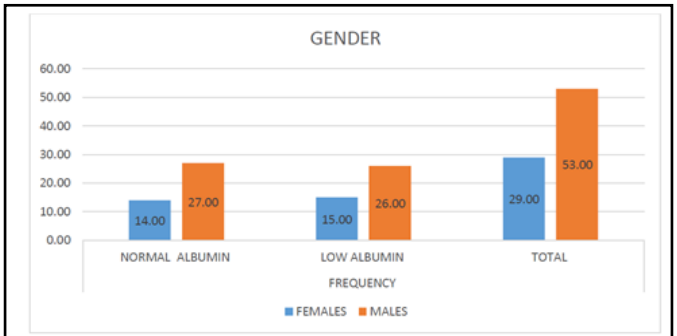

Figure 1: Gender distribution.

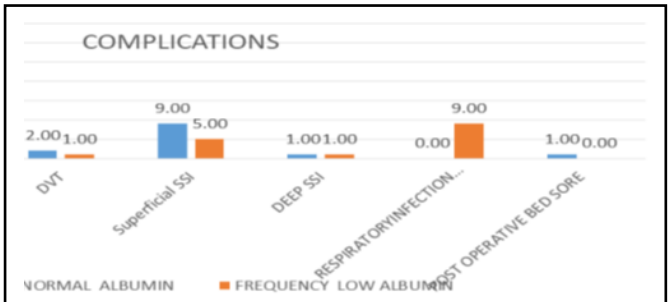

Figure 2: Complications in the post-operative period.

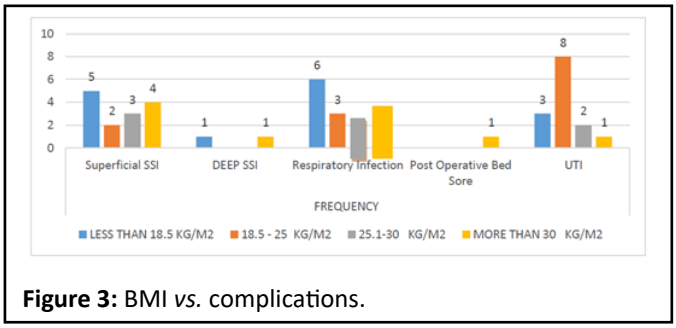

Figure 3: BMI *vs.* complications.

In the present study there was significant difference in the complications in the post-operative period, between the two groups. Respiratory Infection was noted in 9 cases (10.97%) of those patients with low albumin levels. UTI was seen higher in those with low albumin i.e., 13 cases and one case of UTI with normal albumin. (92.85% in the low albumin and 7.1% in the high p<0.0001). We noted similar findings in those patients who have a abnormal BMI have a higher rate of complications in the form of SSI and respiratory tract infections (Figure 4).

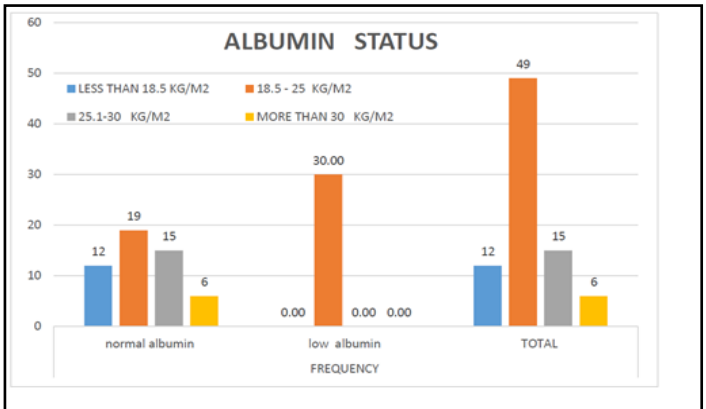

Figure 4: Albumin status vs. BMI.

Limitations of our study included a smaller sample size that cannot be extrapolated to regional and national level trends. A long term follow up was not performed and the effect of correcting albumin & BMI levels prior to surgery was not estimated.

Conclusion

Based on findings o f o ur study following points can be concluded:

- Low albumin and abnormal BMI are associated with higher duration of stay in ICU and ward in patients undergoing major abdominal surgeries.
- Low albumin and abnormal BMI are associated with higher risk of complications in post-operative period in patients undergoing major abdominal surgeries.
- Low albumin and abnormal BMI are to be considered as reliable factors for predicting post-operative morbidity in patients undergoing major abdominal surgeries.

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