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A STUDY TO EVALUATE PRE OPERATIVE SERUM ALBUMIN AS PREDICTOR OF POST OPERATIVE MORBIDITY

General Surgery

Dr. Pratik | Resident, Dept of Surgery, Armed Forces Medical College, Pune-40

Dr. Nilanjan Roy* | Assoc Prof, Dept of Surgery, Armed Forces Medical College, Pune-40 *Corresponding Author

ABSTRACT

The assessment of nutritional status of surgical patients is important as malnourishment is a risk factor for morbidity and mortality.1 The pre operative status of a patient can be assessed with anthropometric measurements and laboratory parameters. Serum albumin is one such easily accessible parameter. This study evaluated pre operative serum albumin levels as predictor of post operative morbidity and complications in the patients undergoing elective surgeries and assessed association between preoperative serum albumin concentration and surgical outcomes.

Method: This is a prospective observational study conducted between July 2017 and July 2019, on 200 patients undergoing elective major surgeries at a tertiary care centre.

Result: The mean serum albumin levels of patients with complications (3.09 ± 0.62mg/dl) was significantly lower compared to the mean serum albumin levels of patients without complications (3.77 ± 0.83mg/dl) as per Student t-test.

Conclusion: Proper assessment of pre- operative serum albumin can be used to predict the post-operative outcome and complications in major surgeries and thereby prevent it.

KEYWORDS

INTRODUCTION

The assessment of nutritional status of surgical patients is important as malnourishment is a risk factor for morbidity and mortality.[1] With the prevalence of protein energy malnutrition in surgical patients ranging from 10 to 54 % , the importance of clinical and laboratory parameters which may identify malnourishment and thereby point out higher risk for post operative complications are important.[2]

Protein energy malnutrition affects every organ system of the body, with the most obvious results being loss of body weight, skeletal muscle mass and poor wound healing due to changes in immunological status.[3]

The pre operative status of a patient can be assessed with a detailed dietary history and physical examination, anthropometric measurements and laboratory parameters. Serum albumin is one such parameter which can be easily assessed across various centers.

Albumin is a protein synthesised by liver with a half life of 20 days. Normally, it is more than 50% of the total proteins present in serum, but it is affected by nutritional status of a patient and presence of inflammation. Some studies show that serum albumin lower than 3 gm/dL is associated with an increased risk of developing serious complications within 30 days of surgery including sepsis, acute renal failure, pneumonia, wound infection.[4,5,6].Aim is to evaluate pre operative serum albumin levels in patients undergoing elective major surgeries and its correlation with post operative morbidity and complications.

MATERIALS AND METHODS

This is a prospective observational study conducted between July 2017 and July 2019, on 200 patients undergoing elective major surgeries at a tertiary care centre. After approval from the Institutional Ethics Committee a valid informed consent was taken. Once the patients were enrolled for the study, a thorough history and physical examination was done. An informed consent was taken in written from patients or patient's attendant and pre operative Serum albumin levels were measured. Follow up was done till patient was discharged from hospital.

Efficacy of serum albumin as screening test to predict the occurrence of complications in patients was compared.

Association among the study groups was assessed with the help of Fisher test, student 't' test and Chi-Square test. 'p' value less than 0.05 was taken as significant.

SPSS ver. 20 was used for statistical analysis

INCLUSION CRITERIA: Patients undergoing elective major surgeries.

EXCLUSION CRITERIA: Children<15 yrs of age, Hb<8 gm %,Chronic liver disease and Chronic kidney disease patients, patients undergoing chemotherapy/radiotherapy.

RESULTS
Patient demographics
Majority of the patients (20.5%) were from the age group of 51-60 years followed by 18.5% from the age group of 21-30 years, 18% from the age group of 41-50 years, 17% from the age group of 61-70 years, 13% from the age group of 31-40years, 9% from the age group of 15-20 years and 4% from the age group of 71-80 years. The mean age of the patients was 45.07 ± 17.10 years. There was male preponderance (60%) while female patients constituted 40% of the study group.

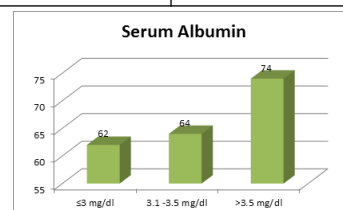### Distribution of patients according to BMI
Our study group consisted of 144 (72%) patients with normal BMI while 42 (21%) and 14 (7%) patients were underweight and overweight respectively. The mean BMI of patients was 19.57 ± 3.52kg/m².

Distribution of patients according to Serum Albumin Levels
The serum albumin level in 62 (31%) patients was <3 mg/dl while 64 (32%) and 74 (37%) patients had serum albumin levels in the range of 3.1-3.5 mg/dl and >3.5 mg/dl respectively. The mean serum albumin levels of patients was 3.52 ± 0.82mg/dl.

Table 1: Distribution of patients according to Serum Albumin Levels

| Serum Albumin	N	%
≤3 mg/dl	62	31%
3.1 -3.5 mg/dl	64	32%
>3.5 mg/dl	74	37%
Total	200	100%
Mean ± SD	3.52 ± 0.82	

Graph 1 : Distribution of patients according to Serum Albumin Levels

Distribution of patients according to Complications

75 (37.5%) patients developed complications while 125(62.5%) patients had an uneventful recovery.

Table 2: Distribution of patients according to Complications

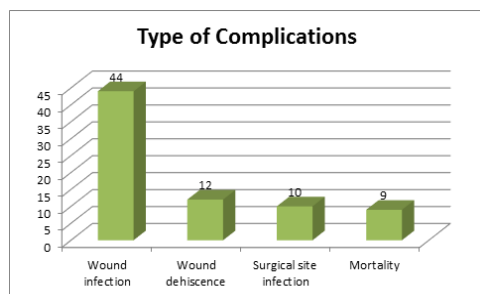| Complications	N	%
Yes	75	37.5%
No	125	62.5%
Total	200	100%
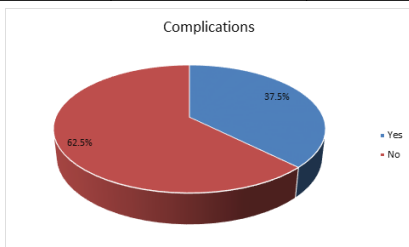
Graph 2: Distribution of patients according to Complications

Distribution of patients according to Type of Complications (n=75)

The most common type of complication was Wound infection (22%) followed by Wound dehiscence (6%) and Surgical site infection (5%). 9 (4.5%) patients died in our study.

Table 3: Distribution of patients according to Type of Complications (n=75)

Type of Complications	N	%
Wound infection	44	22%
Wound dehiscence	12	6%
Surgical site infection	10	5%
Mortality	9	4.5%
Total	75	37.5%

Graph 3: Distribution of patients according to Type of Complications (n=75)

Association of Complications and Age of patients

The maximum number of complications was observed in the age group of 41-50 years (25/75; 33.4%) followed by 51-60 years (20/75; 26.7%), 31-40 years (15/75; 20%), 21-30 years (7/75; 9.3%), 61-70 years (4/75; 5.3%) and 71-80 years (4/75; 5.3%). The mean age of patients with and without complications was comparable as per Student t-test (47.16 ± 12.67 years vs. 43.81 ± 19.21 years; p>0.05).

Association of Complications and Sex of patients

42 (56%) male and 33 (44%) female patients developed complications. There was no significant association of complications and sex of patients as per Chi-Square test.

Association of Complications and BMI of patients

The mean BMI of patients with complications (21.63 ± 3.06 kg/m^2) was significantly higher compared to the mean BMI of patients without complications (20.51 ± 2.53 kg/m^2) as per Student t-test (**p<0.05**).

Association of Complications and Serum Albumin Levels of patients

The mean serum albumin levels of patients with complications (3.09 ± 0.62mg/dl) was significantly lower compared to the mean serum albumin levels of patients without complications (3.77 ± 0.83mg/dl) as per Student t-test (**p<0.05**).

Table 4: Association of Complications and Serum Albumin Levels of patients

Serum Albumin	Complications				Total		p Value
	Yes		No				
	N	%	N	%	N	%	
≤3 mg/dl	41	54.7%	21	16.8%	62	31%	<0.05
3.1 -3.5 mg/dl	18	24%	46	36.8%	64	32%	
>3.5 mg/dl	16	21.3%	58	46.4%	74	37%	
Total	75	100%	125	100%	200	100%	
Mean ± SD	3.09 ± 0.62		3.77 ± 0.83		3.52 ± 0.82		

DISCUSSION

Nutritional assessment is essential for identifying patients who are at an increased risk of developing post-operative complications. A variety of nutritional indices have been found to be valuable in predicting patient outcome. Even when patients are segregated by type of surgery or stress, albumin remains a strong predictor of outcome.

In the present study, majority of the patients (20.5%) were from the age group of 51-60 years followed by 18.5% from the age group of 21-30 years, 18% from the age group of 41-50 years, 17% from the age group of 61-70 years, 13% from the age group of 31-40years, 9% from the age group of 15-20 years and 4% from the age group of 71-80 years. The mean age of the patients was 45.07 ± 17.10 years. There was male preponderance (60%) while female patients constituted 40% of the study group. This is similar to the studies of Bhagvat VM et al[7], Sharma L et al[8] and LalhruaizelaS et al[9].

Our study group consisted of 144 (72%) patients with normal BMI while 42 (21%) and 14 (7%) patients were underweight and overweight respectively. The mean BMI of patients was 19.57 ± 3.52kg/m^2.This is comparable to the studies of Bhagvat VM et al and LalhruaizelaS et al.

In our study, the serum albumin level in 62 (31%) patients was <3 mg/dl while 64 (32%) and 74 (37%) patients had serum albumin levels in the range of 3.1-3.5 mg/dl and >3.5 mg/dl respectively. The mean serum albumin levels of patients was 3.52 ± 0.82mg/dl. This is concordant to the studies of Bhagvat VM et al, Sharma L et al and LalhruaizelaS et al.

It was observed in the present study that 75 (37.5%) patients developed complications while 125(62.5%) patients had an uneventful recovery.This is consistent with the studies of Bhagvat VM et al, Sharma L et al and Roshan R et al[10].

The most common type of complication in the present study was Wound infection (22%) followed by Wound dehiscence (6%) and Surgical site infection (5%). 9 (4.5%) patients died in our study. Bhagvat VM et al, Sharma L et al and Roshan R et al noted similar observations in their studies.

It was observed in our study that the maximum number of complications was observed in the age group of 41-50 years (25/75; 33.4%) followed by 51-60 years (20/75; 26.7%), 31-40 years (15/75; 20%), 21-30 years (7/75; 9.3%), 61-70 years (4/75; 5.3%) and 71-80 years (4/75; 5.3%). The mean age of patients with and without complications was comparable as per Student t-test (47.16 ± 12.67 years vs. 43.81 ± 19.21 years; p>0.05). 42 (56%) male and 33 (44%) female patients developed complications. There was no significant association of complications and sex of patients as per Chi-Square test. This is in concordance to the studies of Bhagvat VM et al, Sharma L et al and LalhruaizelaS et al.

In the present study, the mean BMI of patients with complications (21.63 ± 3.06 kg/m^2) was significantly higher compared to the mean BMI of patients without complications (20.51 ± 2.53 kg/m^2) as per Student t-test (**p<0.05**). This finding was consistent with the studies of Bhagvat VM et al, and LalhruaizelaS et al.

Bhagvat VM et al[7] study reported 40% patients who had complications had mean serum albumin and mean BMI value of 2.98 gm/dl and 21.44 kg/m2 respectively and 60% patients who had no mean serum albumin and mean BMI value of 3.50 gm/dl and 20.30 kg/m2with p value for sr albumin and BMI < 0.01 and < 0.05 which were statistically significant. Area under the curve for BMI was 0.612 with p value of < 0.05 which was statistically significant with sensitivity of 84.6% and specificity of 51.8% for BMI of 25 kg/m2.

In our study, the mean serum albumin levels of patients with complications (3.09 ± 0.62mg/dl) was significantly lower compared to the mean serum albumin levels of patients without complications (3.77 ± 0.83mg/dl) as per Student t-test (**$p<0.05$**). Similar observations were noted in the studies of Bhagvat VM et al, Sharma L et al, Roshan R et al[108] and LalhruaizelaS et al[111].

CONCLUSION

Serum albumin is a good prognostic indicator because of its ability to detect protein energy malnutrition, which is not necessarily accompanied by lower body weight and may not be clinically recognizable, but is associated with significant increased risk of morbidity and mortality. Proper assessment of pre- operative nutritional status by measurement of pre operative serum albumin is important to predict the post-operative outcome and complications in major surgeries.

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