

## ROLE OF PREOPERATIVE SERUM ALBUMIN LEVEL IN POST-OPERATIVE OUTCOME FOLLOWING EMERGENCY EXPLORATORY LAPAROTOMY

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### ABSTRACT:

**Objective:** To study occurrence of major post-operative outcomes like surgical site infection, wound dehiscence and anastomotic leak in patients with hypoalbuminemia and normal serum albumin level.

**Materials and Methods:** Hundred patients who underwent emergency exploratory laparotomy in the Department of Surgery, Krishna Institute of Medical Science Karad from January 2021 to June 2022 were taken for this study and preoperative albumin level was checked. Complications occurring post-operatively were noted

**Results:** Of the 100 patients who underwent emergency laparotomy, hypoalbuminemia was seen in 85% of patients, while 15% had normal albumin level. Total 60 patients had post-operative complications. Percentage of complication in patients with hypoalbuminemia was 65.88%, while it was 26.87% in patients with normal albumin level. Hypoalbuminemia had positive correlation with adverse post operative outcome following emergency laparotomy.

**Conclusion:** It can be concluded from the study that serum albumin is an effective and simple marker for predicting post-operative outcome in patients undergoing emergency laparotomy.

**Keywords:** Hypoalbuminemia, exploratory laparotomy

### INTRODUCTION:

Laparotomy is one of the most common surgical procedures. By definition it is defined as gaining the access to abdominal cavity through incision on the abdominal wall which is performed under general or regional anesthesia. Abdominal surgeries are performed as elective procedures or emergency procedures. The underlying conditions for abdominal surgeries can vary in nature, they can range from emergency situations such as blunt or penetrating injuries, peritonitis secondary to hollow viscus perforation, acute intestinal obstruction to elective surgeries which are planned for malignancies of gastrointestinal tract or other abdominal pathologies. These underlying conditions which lead to abdominal surgeries can cause stress to the body tissues along with the surgical stress which is an additional factor that may cause body to trigger corrective response<sup>1</sup>.

The nutritional status of the human body before the surgery play a very important role in faster healing and recovery of the patient. The major risk factors which are most commonly studied with respect to the adverse postoperative outcomes in laparotomy patients are intra-abdominal sepsis, old age, obesity, and co-morbidities such as Diabetes Mellitus, Coronary Artery Disease, Jaundice and Pulmonary diseases. Serum albumin is a major protein present in the plasma. This contributes as plasma protein up to 60% of the total plasma protein. Hypoalbuminemia has been linked to mortality and postoperative complications such as surgical site infection and reoperations of the patients which can lead to increased hospital stay<sup>2</sup>. Emergency exploratory laparotomy is one of major surgery performed in our hospital, prevalence of patients having

hypoalbuminemia undergoing emergency exploratory laprotomy will be noted and complications occurring postoperatively will be studied.

### MATERIALS AND METHODS:

This is a prospective study. Patients who fulfilled inclusion criteria and underwent emergency exploratory laparotomy in Krishna Hospital and Medical Research Centre, Karad from January 2021 to June 2022 were included in the study.

#### Inclusion Criteria:

Patients with age group of 18 to 60 years of age , who underwent emergency exploratory laparotomy.

#### Exclusion criteria:

1. All elective cases for exploratory laparotomy
- 2 .History of previous abdominal surgery.
- 3.Patients diagnosed for chronic liver disease , chronic kidney disease , diabetes, immunosuppressive states like long term steroids or chemotherapy

Data was collected regarding indication for which laparotomy was done , pre-operative serum albumin level and post-operative complications that developed.

Prevalence of hypoalbuminemia was estimated , albumin level < 3.5 g/dl was considered as hypoalbuminemia.Patients were evaluated upto discharge and follow up was taken on post-operative day 15 , 30 for any complication

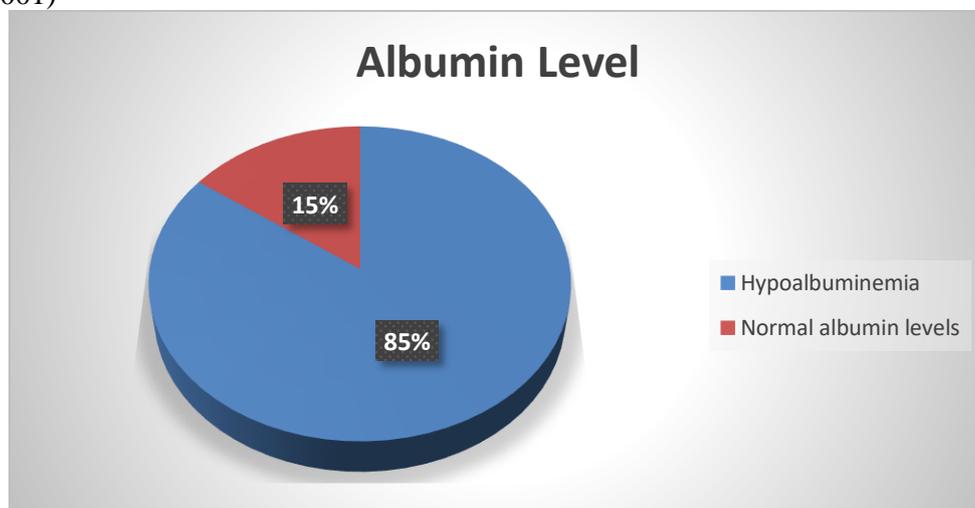
### RESULT:

#### Prevalence of hypoalbuminemia in the study

Table -01: Prevalence of hypoalbuminemia

Albumin Levels	n	%
Hypoalbuminemia	85	85%
Normal albumin levels	15	15%
Total	100	100%

The above table - 01 shows that the total number of patients enrolled in the study is 100 . Majority of the patients have shown prevalence of hypoalbuminemia 85 (85%) and small proportion of patients with normal albumin level 15(15%).This was statistically significant (p value<0.001)



**Graph 01:** Prevalence of hypoalbuminemia

**Table 02: Gender-wise distribution and prevalence**

Gender	Male	Female
Hypoalbuminemia	54	31
Normal albumin	12	3
<b>Total</b>	66	34

The above table 02 shows total number of Male patients is 66 (66%). Total number of Female patients is 34 (34%). There was a definite male predilection in the study patients. Prevalence of hypoalbuminemia in males is 54 out of 66.(81.82%%). Prevalence of hypoalbuminemia in females is 31 out of 34(91.18%). The prevalence of hypoalbuminemia was higher in males.

**Table-03: Number of patients in various age groups of hypoalbuminemia and Normal albumin.**

Age group	Hypoalbuminemia	Normal albumin level	Chi-square test	
			t value	p value
18-30 years	16	7	<b>7.852</b>	<b>0.049(S)</b>
31-40 years	18	4		
41-50 years	22	3		
51-60 years	29	1		
<b>Total</b>	85	15		

In the above table Prevalence of hypoalbuminemia was more as the age increased as shown. Prevalence was maximum in the age group of 51-60 years. Hence, the prevalence of hypoalbuminemia and normal albumin found in age group was statistically significant

**Table 04: Indications for laparotomy**

Indications for laparotomy	Hypoalbuminemia	Normal albumin levels
Hollow viscus perforation	43	6
Intestinal obstruction	36	5
Hemoperitoneum	6	4
<b>Total</b>	85	15

Hollow viscus perforation (49%) due to various causes was the commonest indication for performing emergency laparotomy. Prevalence of hypoalbuminemia was 87.75% (43 patients) and normal albumin 12.25% (6 patients). Intestinal obstruction (41 patients) due to various causes was second common indication for performing emergency laparotomy. Prevalence of hypoalbuminemia was 87.80% (36 patients) and normal albumin 12.20% (5 patients). In 10 patients hemoperitoneum was indication for performing emergency laprotomy. Prevalence of hypoalbuminemia was 60%(6 patients) and normal albumin seen in 40% (4 patients).

**Table 05: Hypoalbuminemia and complications**

Complication	Total	Hypoalbuminemia	Normal Albumin
Surgical site infection	51	50	01
Wound dehiscence	7	4	03
Anastomotic leak	1	1	0
Burst Abdomen	1	1	0

Above table 05 shows that surgical site infection was the commonest complication encountered. 51% had surgical site infection; 50 of these patients had hypoalbuminemia. Wound dehiscence was encountered in 7 patients and 4 patients had hypoalbuminemia. Resection anastomosis was done in 14 patients and anastomotic leak was seen in 1 patient and that one patient had hypoalbuminemia and also burst abdomen was seen in 1 patient and that patient had hypoalbuminemia. So total 60 patients had some post operative complication it was statistically significant (p=0.001).

**Table 06: Patients complications in albumin level**

Complications	Albumin levels				Chi-square test
	<2.5g/dl	2.5-2.9g/dl	3-3.4g/dl	≥3.5g/dl	
NO	1	11	16	11	t=33.99
YES	28	23	6	4	p<0.0001
<b>Total</b>	<b>29</b>	<b>34</b>	<b>22</b>	<b>15</b>	<b>100</b>

**Table no. 6** shows that majority of the patients who developed complications were 28 patients out of 29 i.e. 96.5% with albumin <2.5g/dl developed complications. 23 out of 34 patients, i.e. 67.65% developed complications in 2.5-2.9g/dl albumin level group. In patients with albumin in range of 3.0-3.4g/dl, 6 (27.27%) patients out of 22 had complications. In patients with albumin level ≥3.5g/dl, 4 patients (26.67%) out of 15 had complications. So maximum percentage of complications were seen in patients with albumin level <2.5g/dl while minimum percentage of complications were seen in patients with albumin level of ≥3.5g/dl.

## DISCUSSION

### Prevalence of hypoalbuminemia

In present study it was found that the prevalence of hypoalbuminemia is 85% (p value <0.05) which was statistically significant. Compared to normal albumin levels which were present in only 15% of the study population.

In a study done by Vinod Madhwa Warriar et al<sup>3</sup>, out of 91 patients 56 (61.6%) had hypoalbuminemia. In a study done by Harishankar.R et al<sup>4</sup> out of 225, hypoalbuminemia was present in 188 (83.6%) patients. In a study done by Sharath.Kumar et al<sup>5</sup> out of 190 hypoalbuminemia was seen in 120(63.1%) of patients.

Authors	Percentage of hypoalbuminemia
Present Study	85%
Vinod Madhwa Warriar et al	61.6%

Harishankar et al	83.6%
Sharath Kumar et al	63.1%

### Gender distribution

In the present study according to the gender distribution it was observed that there was male predominance in the study with 66 males and 34 females.

In a study done by Lohsiriwat et al<sup>6</sup> included total 240 patients of which 139 patients were male (57%) and 105 were females (43%). In a study done by Devaprashanth Mohan Kumar et al<sup>7</sup>, out of 50, 32 (64%) of patients were male while 18 (36%) were females. So it was observed that majority of patients were males in most of the studies.

### Age wise distribution

The age range in the present study population was from 18 years to 60 years. Prevalence of hypoalbuminemia was found to be increasing as the age increased. The prevalence of hypoalbuminemia was 69.57% in the 18-30 years, 81.82% prevalence in 31-40 years. Whereas it was relatively on the higher as the age increased with 88% in 41-50 years and 96.67% in 51-60 year age group. The mean age in present study population was 41.91 years. In a study done by Harishankar.R et al<sup>4</sup> mean age was 34 years while in a study done by Vinodh Madhwa Warriar et al<sup>3</sup> mean age was 52.14 years.

### Indications for surgery

In the present study laparotomy was performed for various conditions before which serum albumin was measured. Most common indication for the laparotomy was hollow viscus perforation with 49 patients. Second most common indication was intestinal obstruction with total 41 patients. And the third common indication for the laparotomy was found to hemoperitoneum due to blunt or penetrating trauma to abdomen, solid organ injury (liver, spleen) including road traffic accidents accounted for 10% cases (10 patients).

In a study done by Sahista Hetamkhan Belim et al<sup>8</sup> following observations were noted. Out of total 84 patients, 40 (47.62%) presented with hollow viscus perforation, and 22 patients (26.19%) presented with intestinal obstruction. In a study done by Devaprashanth Mohan Kumar et al<sup>7</sup> out of total 50 patients 25 (50%) patients were of hollow viscus perforation, 14 (28%) patients were of intestinal obstruction, 4 (8%) patients had splenic injury.

In a study done by Harishankar .R et al<sup>4</sup> out of 225 patients, hollow viscus perforation was indication for laparotomy in 118 (52.4%) patients followed by intestinal obstruction in 59 (26.2%) patients. It was observed that in most of the studies hollow viscus perforation and intestinal obstruction were the most common indications for emergency laparotomy.

### Complications

During the post-surgical period patients were assessed for post operative complications and it was observed that there was high post operative complication rate in the hypoalbuminemia patients .

In present study surgical site infection was the commonest complication encountered. 51 had surgical site infection .Wound dehiscence was encountered in 7 patients .Resection anastomosis was performed in 14 patients and 1 patient had anastomotic leak. Burst abdomen was seen in 1 patient .Most of the patients who developed post operative complications had albumin levels in the range <2.5g/dL .

Surgical site infection was most common complication seen in our study. This was similar to studies done by Arun et al<sup>9</sup>, Sarath Kumar et al<sup>5</sup>, Sahista et al<sup>8</sup> and Harishankar.R et al<sup>4</sup>. In present study incidence of surgical site infection was 51%. In a study done by Arun et al<sup>9</sup> incidence of surgical site infection was 41.3%. In a study done by Sarath Kumar et al<sup>5</sup> incidence

of surgical site infection was 59%. In studies done by Sahista et al<sup>8</sup> and Harishankar et al<sup>4</sup> the incidence of surgical site infection was 52.38% and 77.7% respectively.

Wound dehiscence was seen in 7% of patients in our study. In a study done by Vinodh Madhwa Warriar et al<sup>3</sup> wound dehiscence was seen in 9.9% of patients. In a studies done by Harishankar et al<sup>4</sup> and Sahista et al<sup>8</sup> the incidence of wound dehiscence was 24.89% and 5.95% respectively.

In present study out of 14 patients who underwent resection anastomosis of bowel; leak was seen in 1 patient (7.14%). In a study done by Devprashanth Mohan Kumar et al<sup>7</sup> incidence of leak was 14%. In a study done by Vinodh Madhwa Warriar et al<sup>3</sup> incidence of leak was 3.3%. In similar type of studies done by Sarath Kumar et al<sup>5</sup> and Harishankar.R et al<sup>4</sup> incidence of anastomotic leak was 28% and 27.27% respectively.

Incidence of burst abdomen is not common as other complications like surgical site infection, wound dehiscence and anastomotic leak. Only one incidence of burst abdomen was reported out of 100 patients in present study. In a study done by Sharath Kumar et al<sup>5</sup> incidence of burst abdomen was 3.2%. Studies done by Sahista et al<sup>8</sup> and Vinod Madhwa Warriar et al<sup>3</sup> showed no incidence of burst abdomen.

#### **Complications in patients with hypoalbuminemia and normal serum albumin level:**

In present study 85 patients had hypoalbuminemia out of which complications were seen in 56 (65.88%) patients, whereas 15 patients had normal serum albumin level of which 4 (26.87%) patients developed complications post operatively. In a study done by Arun et al<sup>9</sup> complication rate in patients with hypoalbuminemia was 60% whereas in patients with normal serum albumin was 32.5%. In a study done by Sharath Kumar et al<sup>5</sup> complication rate in patients with hypoalbuminemia was 72.5% and that in patients with normal serum albumin was 8.57%. In a study done by Vinodh Madhwa Warriar et al<sup>3</sup> complication rate in patients with hypoalbuminemia was 87.50% and that in patients with normal serum albumin was 51.4%.

Author	Percentage of complication in patients with hypoalbuminemia	Percentage of complication in patients with normal albumin
Present Study	65.88%	26.87%
Arun et al	60%	32.5%
Sarath Kumar et al	72.5%	8.57%
Warriar et al	87.50%	51.4%

#### **CONCLUSION**

- From the study it can be observed that hypoalbuminemia is an independent prognostic risk factor which had positive correlation with adverse post operative outcome which was statistically significant.
- Further studies can be carried out to determine whether early intervention to correct hypoalbuminemia would improve the overall outcome by decreasing the incidence of complications.
- Therefore it can be concluded from the study that serum albumin is an effective, easy and simple marker for predicting postoperative outcome in patients undergoing emergency laparotomy.

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