

## “Efficacy of serum prealbumin as monitoring tools for patients with fascial space infections of odontogenic origin- A clinicobiochemical study”

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### Abstract:

The present study include 25 patients with diagnosis of fascial space infections of odontogenic origin and 25 healthy individuals with the objectives to assess efficacy of serum prealbumin as monitoring tools for determining severity of infections ,severity of malnutrition and nutritional status,length of hospital stay,and efficacy of treatment regime.

**Method :** All the patients were treated on in patients basis. The blood samples of the patients were taken on day 1 for measuring serum levels of the markers. Simultaneously clinical parameters like swelling size, mouth opening, pain etc. analyses were done to find correlation between markers and clinical and paired test.

**Result:** The statistical analysis found there is no strong correlation lab value of markers and clinical parameters used to measure severity of infection. The result shows No statistically significant difference was observed between healthy and infected group with respect to the mean pre-albumin level. The findings of this prospective analysis indicate that prealbumin are not effective markers for determining severity of infection ,efficacy of treatment regime and length of hospital stay for patients with fascial space infections of odontogenic origin.Prealbumin having no additional advantage of being a sensitive marker for nutritional status of the patient.

**Conclusion:** It has being concluded that prealbumin should not be incorporated as monitoring tools for patients with fascial space infections of odontogenic origin.

## INTRODUCTION

Patients with fascial space infections of odontogenic origin were at a risk of life threatening situations due to anatomical connectivity of potential spaces to one another, Presence of critical structures in the vicinity of fascial spaces and very fast mode of spread of these infections. Lethal complications like upper airway obstruction, Descending mediastinitis, thrombosis of jugular vein, venous septic emboli, rupture of carotid artery, Adult respiratory distress syndrome, Pericarditis, septic shock and disseminated intravascular coagulopathy may become inevitable for making vigilant scrutiny and monitoring of such patient.

Although conventional measures to estimate infections such as WBC count and ESR values are valuable in determining state of patient at testing time, the predictability of these is limited. The quest for a clinical crystal ball is not new. The desirability of serum derived surrogate predictor behaviour and outcome can not be under estimated, arousing interest in identifying substances which could function as prospective monitor of disease progression thus various inflammatory markers came into existence.

Advocates of inflammatory markers narrate numerous advantage for their usage. According to them, quantitative determination of serum markers can be used for determining the therapeutic efficacy of different treatment regimens of infection, For monitoring post operative infections, and investigating various levels of infections. Use of prophylactic antibiotics and duration of antibiotic usage become more appropriate. Thus keeping various advantages of serum inflammatory markers in mind, many authors suggested use of prealbumin for assessment of infection.

Prealbumin also known as transthyretin, which is 54 KD hepatic protein. Small amount of prealbumin are detected in human fetus. At birth, Prealbumin levels are still low but they rise with age. At the end of puberty, quantitative values are approximately same as of adults that is between 14-36 mg per 100 ml with mean values around 22mg. Prealbumin levels vary in different genders, pregnancy and pathological conditions such as viral hepatitis, Laennec's cirrhosis and other non thyroidal conditions. Low prealbumin levels are common in stress, Inflammation, Infection, Malnutrition and in trauma. Prealbumin has a half life of 1.9 days and value decreases with infection making it a negative acute phase reactant.

## Objectives

To assess efficacy of serum prealbumin levels as monitoring tools for patients with fascial space infections of odontogenic origin for determining: Severity of infections, malnutrition, nutritional status, Length of hospital stay and Efficacy of treatment regime.

## PROCEDURE

Method of collection of blood samples : Blood samples of patients with diagnosis of facial spaces infection of odontogenic origin were taken for estimating serum levels of prealbumin before starting the treatment. Blood samples were collected by applying a tourniquet and

puncturing antimicrobial vein using a vaccutainer 2ml of blood is withdrawn out of which 1 ml each was used for estimation of prealbumin.

### Results

This was randomized prospective study conducted on 50 patients visiting department of oral and maxillofacial surgery ,oxford dental college and hospital ,banglore. A total of 25 dental emergency patients with odontogenic space infection were participated in the present study and their level of serum prealbumin were assessed and compared with 25 healthy individuals ( Control group ). The patients with age group of 17 to 57 years including 50% male and 50% female (graph-1) .The mean age of healthy individuals(control group) is  $36.92 \pm 8.31$  and infected group was  $36.92 \pm 12.69$  years (table-2). There was no statistical difference in case of gender distribution. ( Table – 1)

The severity of infection and effectiveness of treatment regime was determined using various clinical parameters like size of the swelling ,pain etc and correlation between clinical parameters and laboratory values of serum prealbumin were done on day one.

Day one:- The regression equation on day one was the first visit explained inverse relation between prealbumin and size of the swelling .Prealbumin found to be significant predictor of swelling size (Graph 4) .contrary to swelling mouth opening was directly proportional to prealbumin and prealbumin was found to be significant predictor of mouth opening (graph 5). Higher mean mouth opening was recorded in moderate swelling group compared to severe swelling group and the difference between them was found to be statistically significant ( $P < 0.01$ ).Table-5

Assessment of nutritional status:-

Mean value of prealbumin at day one was found to be  $30.79 \pm 10.98$  mg/dl.. The result shows No statistically significant difference was observed between healthy and infected group with respect to the mean pre-albumin level ( $P > 0.05$ ) (Insignificant). In control group 25 healthy patient were evaluated for serum prealbumin .The level of serum prealbumin was  $30.44 \pm 5.12$  in 25% of healthy individuals (table-3)

*Statistical test used:* Mann-Whitney test

*As Per Null Hypothesis:* There was no significant difference in the score between two groups i.e.  $\eta_1 = \eta_2$

*Alternate Hypothesis:* There was a significant difference in the score recorded between two groups i.e.  $\eta_1 \neq \eta_2$

*Level of Significance:*  $\alpha = 0.05$

*Decision Criterion:* We compare the P-Value with the level of significance. If  $P < 0.05$ , we reject the null hypothesis and accept the alternate hypothesis. If  $P \geq 0.05$ , we accept the null hypothesis.

*Computations:* The tables below give us the various computations and the P-Value.

(Table -1)

Gender distribution:

Group	Male		Female	
	N	%	N	%
Healthy	15	54%	10	45%
Infected	13	46%	12	55%
Total	28	100%	22	100%

(Table -2)  
 Mean Age (yrs):

Group	Mean	Std dev	SE of Mean	Median	Min	Max
Healthy	36.92	8.31	1.66	37.0	18	56
Infected	36.92	12.69	2.54	35.0	12	60
Overall	36.92	10.61	1.50	36.0	12	60

(Table-3)  
 Comparison of Pre-Albumin levels between healthy & infected group:

Group	Mean	Std dev	SE of Mean	Mean Difference	Z	P-Value
Healthy	30.44	5.12	1.02	-0.350	-0.535	0.592
Infected	30.79	10.98	2.20			

No statistically significant difference was observed between healthy and infected group with respect to the mean pre-albumin level ( $P > 0.05$ ).

(Table -4)  
 Types of swelling in infected group and Mean mouth opening (mm) in the infected group according to swelling:

Swelling	N	%	Mean	Std dev	SE of Mean	Mean Difference	Z	P-Value
severe	9	36%	15.44	11.31	3.77	-14.993	-2.826	0.005*
Moderate	16	64%	30.44	3.05	0.76			
Total	25	100%						

\*denotes significant difference

Higher mean mouth opening was recorded in moderate swelling group compared to diffuse swelling group and the difference between them was found to be statistically significant ( $P < 0.01$ ).

## **DISCUSSION**

The acute phase response is a complex set of systemic and metabolic reactions elicited by infections or other causes of injury. Besides other physiological, metabolic and biochemical changes, the acute phase response is characterized by alteration in the hepatic synthesis and serum levels of some proteins. Thus, while the levels of acute phase proteins such as CRP, complement 3, serum amyloid A, alpha-1 and glycoprotein etc. increases due to stimulation of hepatic synthesis simultaneously there is depression of hepatic production of visceral transport proteins (negative acute phase proteins) like albumin, transferrin, thyroxin binding prealbumin and retinol binding proteins etc occurs. Several reports have indicated that visceral transport proteins, mainly those with low turnover rate, like Thyroxin binding prealbumin, Retinol binding protein are useful to evaluate protein and protein energy malnutrition as well as to monitor nutritional recovery during treatment. However the presence of infection results in depression of their hepatic production as well as in increased passage to the extra vascular space, consequently diminishing their serum levels making them markers for acute phase conditions. In this study, the prealbumin concentrations in the space infection patients and healthy patients

were almost normal or above the normal range. Low concentration of prealbumin seemed to result from the anorexia and malnutrition associated with trismus, pain and discomfort due to swelling, hoarseness of voice, dysphagia and discharge, in addition to the systemic effect of infection. The no. Of facial space involved in odontogenic infection is also an indicator of infection but in this study prealbumin was almost normal when no. Of spaces involved were more than two. The result is different with the study conducted by Cunningham L L, Madson J M and Sickels J A V on patients with deep space infections. In the present study, it was observed that prealbumin had no correlation with severity of infection. The result shows that No statistically significant difference between healthy and infected group with respect to the mean pre-albumin level ( $P > 0.05$ ). For assessment of nutritional status, prealbumin levels were used. Mean value of prealbumin in first preoperative day or day one was found to be  $30.44 \pm 5.12$  mg/dl respectively. Prealbumin levels on day one found to be statistically insignificant ( $p > 0.005$ ).

#### BIBLIOGRAPHY

- 1) Sann L et al. Evolution of serum prealbumin, C reactive protein and orosomucoid in neonates with bacterial infection. *J pediatr* 1984;105: 977-981.4.
- 2) Herman FR, Safran C, Levcoff FC and Minakker KL serum prealbumin level on admission as a predictor death, length of hospital stay, and readmission. *Arch intern med.* 1992;152(1):125-130.
- 3) Goldwasser P et al prealbumin and lipoprotein (a) in hemodialysis; relationships with patient and vascular access survival. *American J kidney disease* 1993; 22(1):215-225.
- 4) Torney WP, Brian PAO. clinical association of an increased transthyretin band in routine serum and urine protein electrophoresis. *ann clin biochem* 1993;30: 550-554.
- 5) Avram MM, Goldwasser P, Erora M, Fein PA, predictor of survival in continuous ambulatory peritoneal dialysis patients: the importance of prealbumin and other nutritional and metabolic markers. *American J of kidney disease* 1994;23(1):91-98.
- 6) Sreedhara R et al. prealbumin is a best nutritional predictor of survival in hemodialysis and peritoneal dialysis. *American journal of kidney disease* 1996;28(6):937-942.
- 7) Gidley PW, Ghorayeb B Y, Steinberg CM, Contemporary management of deep neck space infections, *J otolaryngeal head neck surgery* 1997;116;16-22.
- 8) Haupt W et al association between preoperative acute phase response and postoperative complications. *EUR J surg* 1997;163:39-44.
- 9) Kirchgessner TG et al TNF-alpha contributes to obesity related hyperleptinemia by regulating leptin release from adipocytes, *J clin invest* 1997;100: 2777-2782
- 10) El-sayed A, Hassanein MD, Hala M. study of plasma albumin, transferrin and fibronectin in children with mild to moderate protein-energy malnutrition. *journal of tropical paediatrics* 1998;44:362-364.