

# Risk Markers Of OSMF, Serum Albumin, Hemoglobin And Iron Binding Capacity? A Review Of Literature

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## Abstract

The risk markers for oral sub-mucous fibrosis were taken as serum albumin, hemoglobin percentage and iron binding capacity whose values were calculated after the condition was diagnosed by means of biopsy report.

## INTRODUCTION

Oral Submucous fibrosis (OSMF) is a pre-cancerous condition, J. J. Pindborg in 1980 defined pre-cancerous condition as a "Generalized state associated with significantly increase risk of cancer".

Oral Leukoplakia (leuko= white; plakia= patch) is a pre-cancerous lesion and is defined by the WHO in 1978 as "a white patch or plaque that cannot be characterized clinically or pathologically as any other disease

Chellacombe et al in 1986 reported hematological abnormalities in oral leukoplakia.

A total serum protein test measures the total amount of protein in the blood. It also measures the amounts of two major groups of proteins in the blood: albumin and globulin.

Albumin is made mainly in the liver. It helps keep the blood from leaking out of blood vessels. Albumin also helps carry some medicines and other substances through the blood and is important for tissue growth and healing.

Globulin is made up of different proteins called alpha, beta, and gamma types. Some globulins are made by the liver, while others are made by the immune system. Certain globulins bind with hemoglobin. Other globulins transport metals, such as iron, in the blood and help fight infection. Serum globulin can be separated into several subgroups by serum protein electrophoresis. For more information, see the medical test Serum Protein Electrophoresis. A test for total serum protein reports separate values for total protein, albumin, and globulin. The amounts of albumin and globulin also are compared (albumin/globulin ratio). Normally, there

is a little more albumin than globulin and the ratio is greater than 1. A ratio less than 1 or much greater than 1 can give clues about problems in the body.

Total iron-binding capacity (TIBC) is a medical laboratory test that measures the blood's capacity to bind iron with transferrin. It is performed by drawing blood and measuring the maximum amount of iron that it can carry, which indirectly measures transferrin since transferrin is the most dynamic carrier. TIBC is less expensive than a direct measurement of transferrin.

Hemoglobin :- also rendered as haemoglobin and abbreviated Hb or Hgb) is the iron-containing oxygen-transport metallo-protein in the red blood cells of allvertebrates (with the exception of the fish family Channichthyidae) as well as the tissues of some invertebrates. Hemoglobin in the blood carries oxygen from the respiratory organs (lungs or gills) to the rest of the body (i.e. the tissues) where it releases the oxygen to burn nutrients to provide energy to power the functions of the organism, and collects the resultant carbon dioxide to bring it back to the respiratory organs to be dispensed from the organism.

## REVIEW OF ARTICLE

James E.Hammer et al in 1974 supported the fact of changes in Serum Iron, TIBC, Protein total, Albumin in patients suffering from Oral submucous fibrosis. The positive laboratory findings e.g. mild anemia, Serum Iron deficiency, Increased ESR and esinophillia were noted.

Rajendran R. in 1994 postulated the mechanism of how does areca nut alter the mucosa. It is commonly believed that the

pathogenic mechanism in oral submucous fibrosis begins in the connective tissue and the epithelium responds secondarily to it. An immune- complex mediated reaction at the basal laminar zone in oral submucous fibrosis seems unlikely owing to the integrity of this layer even in advanced stages of the disease. The effect of araca nut alkaloids and/or tannins on the oral mucosa may be secondary to the initial immunologically mediated tissue alteration. They may act as a potential carcinogen on the already weakened and atrophic oral epithelium, which is itself the result of an altered connective tissue interaction.

The study was done to substantiate the above done study.

## **MATERIAL AND METHOD**

The present study was done in the Department of Oral Pathology, Microbiology & Forensic Odontology, Rama Dental College, Hospital & Research Center, Lakhanpur, Kanpur.

The number of patients recorded for normal/controlled group was 13 males and 2 females. The oral submucous fibrosis patient taken for estimation of serum iron, serum albumin and serum globulin were 15 and in that 13 were males and 2 were females. The oral leukoplakia patient taken for estimation of serum iron, serum albumin and serum globulin were 15 and in that 14 were males and 1 was female. The patients were selected after the biopsy report had confirmed the diagnosis as oral sub mucous fibrosis and oral leukoplakia.

The parameters that were compared were Serum Iron, Hemoglobin, Total Iron Binding Capacity, Total Protein, Serum Albumin and Serum Globulin.

## **BIOPSY PROCEDURE**

Biopsy is defined as the removal of tissue from a living organism for the purpose of microscopic examination and diagnosis.

The Incisional biopsy was taken from the areas of the lesion under local anesthesia. The routine haematoxylin and eosin staining of the section was done and they were examined under light microscope.

## **BLOOD COLLECTION**

Venous blood is preferred and obtained blood from vein puncture.

## **SERUM IRON ESTIMATION**

The quantitative estimation of serum iron was done with the help of Serum Iron kit (IRON FS FERENE-DIA SYS, Diagnostic Systems International, Germany).

## **SERUM PROTEIN ESTIMATION**

Burette method: (Auto Analyzer method)

## **ESTIMATION OF SERUM ALBUMIN**

Serum Albumin is estimated by the dye binding method. Dyes, such as bromocresol green, bind very specifically to albumin. On addition of alkali, color of Bromocresol green is changed from green to blue, intensity of which is proportional to the amount of albumin present in serum.

The normal range of Serum albumin is: 3.0-5.0g/dl

## **ESTIMATION OF SERUM GLOBULIN**

Globulins can be calculated by estimating albumin and then subtracting its value from value of total serum protein.

Globulin=total serum protein-albumin.

## **RESULTS AND OBSERVATIONS**

Comparison of serum iron t-value between normal and OSMF & normal and Leukoplakia

**Figure 1**

|         | Normal & OSMF | Normal & Leukoplakia |
|---------|---------------|----------------------|
| t-value | 6             | 2.4                  |

Comparison of total protein t-value between normal and OSMF & normal and Leukoplakia

**Figure 2**

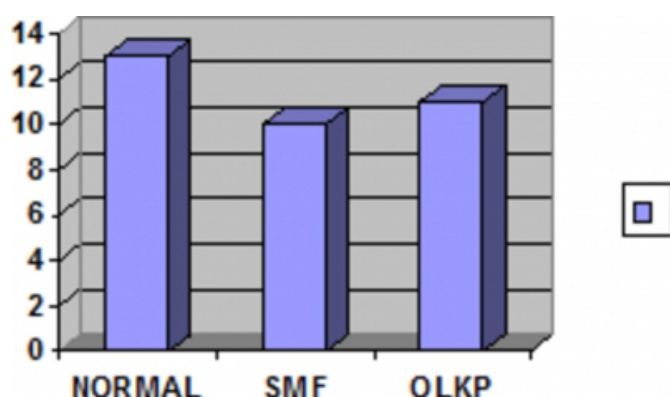
|         | Normal & OSMF | Normal & Leukoplakia |
|---------|---------------|----------------------|
| t-value | 0.63          | 0.03                 |

Comparison of haemoglobin t-value between normal and OSMF & normal and Leukoplakia

**Figure 3**

|         | Normal & OSMF | Normal & Leukoplakia |
|---------|---------------|----------------------|
| t-value | 5.4           | 6                    |

**Figure 4**



Comparison of serum albumin t-value between normal and OSMF & normal and Leukoplakia

**Figure 5**

|  | Normal & OSMF | Normal & Leukoplakia |
|--|---------------|----------------------|
|  |               |                      |

Comparison of serum globulin t-value between normal and OSMF & normal and Leukoplakia

**Figure 6**

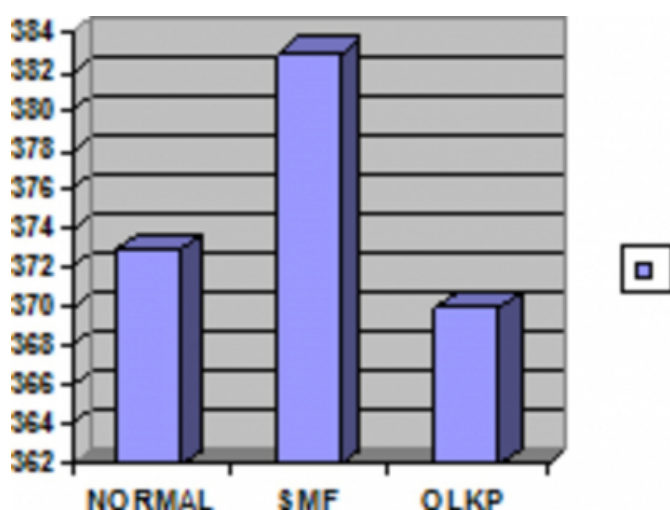
|         | Normal & OSMF | Normal & Leukoplakia |
|---------|---------------|----------------------|
| t-value | 0.3           | 1.03                 |

Comparison of total iron binding capacity t-value between normal and OSMF & normal and Leukoplakia

**Figure 7**

|         | Normal & OSMF | Normal & Leukoplakia |
|---------|---------------|----------------------|
| t-value | 4.9           | 2.8                  |

**Figure 8**



## DISCUSSION

Sonali S. Khanna in 2006 has noted the iron deficiency in oral submucous fibrosis and in leukoplakia.

In our study we have tried to note down the heamatological and bio-chemical changes in oral submucous fibrosis and leukoplakia. Since, protein plays an important role in the metabolism of iron an attempt was also made to study the serum protein profile of these patients. The normal range of serum iron is 50-150 µg/dl, the normal range of total iron binding capacity is 240-450µg/dl, the normal level of serum total protein is 6-7.5g/dl, the normal level of serum globulin is 2.5-3.5g/dl, the normal value of serum albumin is 3.0-5.0g/dl, the normal level of haemoglobin is 14-16g/dl in males and in females is 12-14g/dl.

The present study was done to evaluate the serum iron, total iron binding capacity, Hb %, total serum protein, serum globulin and serum albumin in 15 control group (13 male and 2 female), 15 patients with oral submucous fibrosis (13 male and 2 female) and 15 leukoplakia patients (14 male and 1 female) and their age between 25-60 years.

The mean value of serum iron was found to be 116.9 µg/dl in control group, 68.9 µg/dl in oral submucous fibrosis patients and 102.3 µg/dl in oral leukoplakia patients. The mean of total serum iron was found to be significantly reduced in oral submucous fibrosis patients when compared with controlled group and in oral leukoplakia when compared with control group.

Statistically t-value was calculated between normal and oral submucous fibrosis, and between normal and Leukoplakia and was  $6 \pm 2.4$  and  $2.4 \pm 2.1$  respectively. These values show that there was significant change in serum iron in oral sub mucous fibrosis as compared to oral leukoplakia.

The study done by Sunali S. Khanna in 2006 also has showed the significant change in serum iron in oral sub mucous fibrosis than oral leukoplakia.

The mean value of total serum protein was 6.4 g/dl in controlled group, 5.9g/dl in oral submucous fibrosis, which showed slight significant reduction compared to control group and the mean value in leukoplakia was 6.3 g/dl which was not so significant when compared to control group.

Statistically when t-value was calculated between control and oral submucous fibrosis, and between control and Leukoplakia it was  $0.6 \pm 0.9$  and  $0.03 \pm 0.8$  respectively. These values show that there was no significant change in

total serum protein in oral sub mucous fibrosis and in oral leukoplakia.

The study was done by James E. Hammer in 1974, which concluded that there was no significant change in serum total protein.

The mean value of haemoglobin in control group was found to be 14.4 g/dl, 11.5 g/dl in oral submucous fibrosis patients and 12.4 g/dl in leukoplakia patients. The haemoglobin level was found to be decreased in oral submucous fibrosis as compared to control group but in leukoplakia the mean haemoglobin was decreased but was nearer to control group.

Statistically t-value was calculated between normal and oral submucous fibrosis, and between normal and Leukoplakia it was  $5.4 \pm 1.6$  and  $6 \pm 0.8$  respectively. These values show that there was slight significant change in haemoglobin level in oral sub mucous fibrosis as compared to oral leukoplakia.

The study done by James E. Hammer in 1974 conducted a study and concluded that there was anemia in patients with oral sub mucous fibrosis and leukoplakia.

The mean value of serum albumin in control group was found to be 3.7 g/dl, 3.4 g/dl in oral submucous fibrosis and 4.1 g/dl in oral leukoplakia patients.

The mean serum albumin in oral submucous fibrosis and leukoplakia when compared to controlled group was found to be not highly significant.

Statistically t-value was calculated between normal and oral submucous fibrosis, and between normal and Leukoplakia and was noted  $0.8 \pm 0.7$  and  $3.1 \pm 0.4$  respectively. These values show that there was slight significant change in serum albumin in oral sub mucous fibrosis as compared to oral leukoplakia.

The study done by Rajendran R. in 1994 and in 2003 found that there was slight change in the total serum albumin.

The mean total serum globulin level in controlled group was found to be 2.65 g/dl, 2.42 g/dl in oral submucous fibrosis and 2.26 g/dl in leukoplakia patients. The mean value of total serum globulin was slightly significant when compared to controlled group.

Statistically t-value was calculated between normal and oral sub mucous fibrosis, and between normal and Leukoplakia and was found  $0.3 \pm 1.2$  and  $1.03 \pm 3$  respectively. These values show that there was slight significant change in serum

globulin in oral sub mucous fibrosis as compared to oral leukoplakia.

The mean value of total iron binding capacity in control group was 349.3 µg/dl, 336.5 µg/dl in oral submucous fibrosis patients and 301.3 µg/dl in leukoplakia patients. The mean value of total serum iron binding capacity was not significant when compared to controlled group.

When the t-value was calculated between normal and oral submucous fibrosis and between normal and Leukoplakia it was  $4.9 \pm 5.4$  and  $2.8 \pm 6.0$  respectively. These values show that there was slight significant change in total iron binding capacity in oral sub mucous fibrosis as compared to oral leukoplakia.

The study done by James E. Hammer in 1974 concluded that there was slight significant change in total iron binding capacity.

## CONCLUSION

This study was done on 15 normal and 15 oral sub mucous fibrosis patients and 15 oral leukoplakia patients which were a group of male and female patients.

In this study the results were found as decrease in serum iron but there were slight decrease in the values of serum total protein, serum albumin and hemoglobin levels but there was slight increase in globulin and total iron binding capacity.

So, if there is a change in the serum iron and in other hematological factors and this could be just a marker of oral sub mucous fibrosis and oral leukoplakia in which the biopsies have confirmed the diagnosis as oral sub mucous fibrosis and oral leukoplakia, but they can be a land mark for diagnosis of the pre cancerous condition or pre cancerous lesion if longer studies are done.

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