

COMPARATIVE EVALUATION OF SERUM TRANSAMINASES AND SERUM CREATININE IN SMOKERS AND NON SMOKERS WITH PERIODONTITIS

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ABSTRACT

Background: Periodontitis is an inflammatory disease of periodontal structures which was influenced by several factors like smoking and systemic disorders. Smoking impairs the immune response and compromises the periodontal tissue health following a period of disease activity. Systemic disorders like renal and liver malfunctioning also alters the immune responses in the body.

Aim: To compare and evaluate the levels of serum transaminases and serum creatinine in smokers and non smokers before and after Scaling and Root planing (SRP).

Materials and methods: 20 subjects were assigned into 2 groups, Group A (nonsmokers), Group B (smokers). All clinical parameters, biochemical parameters (serum transaminases & serum creatinine) levels were evaluated at baseline and 3 months after SRP.

Results: The present study showed a significant reduction in mean values of serum transaminases and increase in serum creatinine in both the groups with a greater reduction of transaminases and increase in creatinine in group A compared to group B.

Conclusion: Transaminases showed a direct relationship and creatinine showed an inverse relationship with periodontitis.

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INTRODUCTION

Periodontitis is a chronic inflammatory disease of supporting tissues of teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with periodontal pocket formation, gingival recession or both¹. Chronic subclinical inflammation in periodontitis plays an important role in the pathogenesis of systemic diseases². Some of these conditions may in turn increase the incidence and severity of periodontal disease by modifying the body's immune response to periodontal bacteria and their by-products⁴. Evidence suggests a bi-directional relationship between periodontitis and systemic diseases. In hepatic diseases, marked increase in transaminases was observed. Transaminases are a group of enzymes which catalyze the reversible transfer of the amino group from an α -amino acid to an α -keto acid⁵. Presence of any liver abnormality was detected by measuring the serum level of enzymes like alanine transaminase (ALT), aspartate transaminase (AST) and alkaline phosphatase (ALP)⁶. The serum creatinine concentrations of patients with renal dysfunction increase as a result of a reduction in creatinine clearance. High serum

creatinine concentrations and glomerular filtration rates (GFRs) are often used as indicators of renal function. Studies done by Yoshihiro Shimazaki *et al*² and Caula *et al* (2015)³ have demonstrated a relationship between periodontal disease and renal dysfunction, as evaluated by GFR and serum creatinine concentration.

Smoking causes a variety of adverse effects on organs that have no direct contact with the smoke itself such as the liver. The liver is an important organ that has many tasks. Among other things, the liver is responsible for processing drugs, alcohol and other toxins to remove them from the body. Heavy smoking yields toxins which induce necro-inflammation and immune responses as well as decreased proinflammatory cytokines playing an important role in the etiology of liver, kidney disorders⁷.

This study compared and evaluated the levels of serum transaminases (serum glutamic oxalo acetic transaminase, serum glutamic pyruvic transaminase) and serum creatinine in smokers and non smokers before and after Scaling and Root planing [SRP].

MATERIALS AND METHODS

Study population included a total of 20 patients who attended the department of periodontics, St Joseph dental college with chronic periodontitis of age group 35 to 55 years. Patients were categorized into 2 groups based on the history of habit

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of smoking: Group A included 10 patients with periodontitis without habit of smoking ,Group B included 10 patients with periodontitis and with habit of smoking. The patients were otherwise healthy, with no history of major illness and consumption of antioxidants, antibiotics, anti-inflammatory or any other drugs and had not received any periodontal therapy for at least 3 months prior to the study. Ethical committee clearance from research committee and Informed consent from the patients were taken for all the patients before commencement of the study. All the individuals selected for this study underwent clinical examination of the oral cavity and periodontal indices such as plaque index (PI) ,gingival index(GI), probing depth (PD) and clinical attachment level(CAL).5ml of blood was collected from the anticubital fossa by venipuncture using 20 gauge needle. The collected serum was evaluated for transaminases and creatinine by the method, spectrophotometry.

All the patients including group A and group B underwent clinical examination, serum evaluation, periodontal therapy (scaling and root planning) and recalled after 3 months for clinical and serum evaluation .

Statistical Analysis

All data was expressed as mean, standard division (SD) at baseline, 3 months. Paired t-test was applied for intra group comparison and significance was tested by calculating p value (<0.005). Unpaired t-test was applied to test the significance of the parameters under study between non smokers and smokers groups (inter group comparison). Statistical analysis was carried out using statistically available graph pad prism7

RESULTS

The mean values of Plaque Index, Gingival Index, Clinical Attachment Level, Probing Pocket Depth showed significance in both the groups as shown in table 1 and 2. The mean values of serum transaminases showed significance in both the groups A,B with P values [$<0.0001, 0.0006$] respectively and the mean values of serum creatinine showed significance in both the groups A,B with P values [$<0.0001, <0.0001$] respectively as shown in table 1 and 2. Group A showed slight increase in transaminases post operatively than group B which is non significant(>0.005), group A showed more and significant decrease in serum creatinine levels post operatively than Group B as shown in tables1 and 2.

Table1 Comparison of mean, standard deviation and P values of PI, GI, PPD, CAL, serum transaminases and creatinine in group A (non smokers)

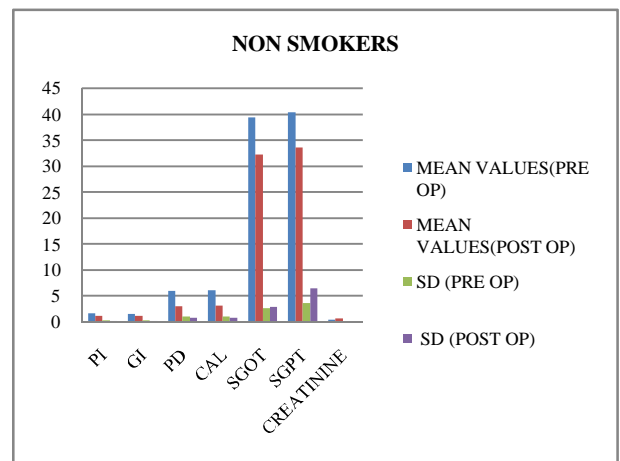
Clinical Parameters	Mean (Base Line)	Mean (3months)	SD (Base Line)	SD (3 Months)	P Value
PI	1.561	1.144	0.3671	0.20565343	0.0002
GI	1.458	1.167	0.3024	0.178391	0.0027
PD	5.9	3	0.99443	0.816497	<0.0001
CAL	6	3.1	1.054093	0.875595	<0.0001
SGOT	39.39	32.243	2.66185	2.870896	<0.0001
SGPT	40.39	33.6	3.597978	6.494955	0.0006
Creatinine	0.37	0.59	0.067495	0.073786	<0.0001

Table 2 Comparison of mean, standard deviation and P values of PI, GI, PPD, CAL, serum transaminases and creatinine in group A (non smokers)

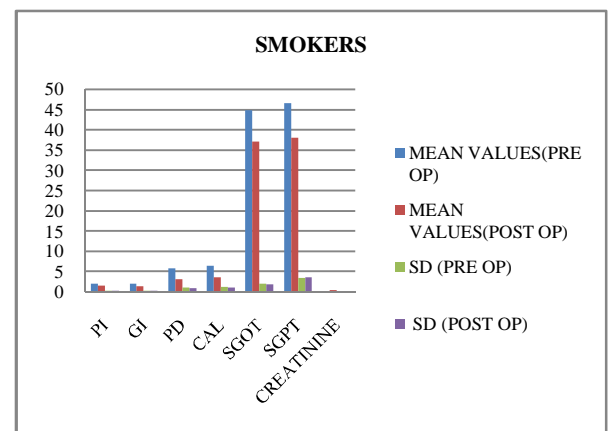
Clinical Parameters	Mean (base line)	Mean (3 Months)	SD (Base Line)	SD (3 Months)	P Value
PI	2	1.53	0.221108	0.245175674	<0.0001
GI	2.06	1.45	0.2319	0.177951304	<0.0001
PD	5.9	3.1	0.994429	0.875595036	<0.0001
CAL	6.5	3.7	1.178511	1.05935	<0.0001
SGOT	44.94	37.16	2.063546	1.784626	<0.0001
SGPT	46.6	38.11	3.359563	3.61953	<0.0001
Creatinine	0.16	0.46	0.084327	0.069921	<0.0001

Table 3 Inter group comparison of mean, standard deviation and P values of PI, GI, PPD, CAL, serum transaminases and creatinine in group A (non smokers) and group B (smokers)

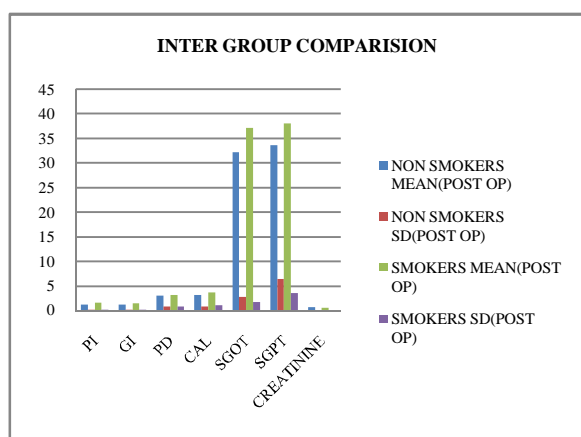
Clinical parameters	Non smokers (post op)		Smokers (Postop)		P Value
	Mean	SD	Mean	SD	
PI	1.144	0.20565343	1.53	0.2451756	0.0013
GI	1.167	0.178391	1.45	0.1779513	0.0023
PD	3	0.816497	3.1	0.8755950	0.7947
CAL	3.1	0.875595	3.7	1.05935	0.1843
SGOT	32.243	2.870896	37.16	1.784626	0.0002
SGPT	33.6	6.494955	38.11	3.61953	0.0711
Creatinine	0.59	0.073786	0.46	0.069921	0.0008



Graph 1 comparison of mean and standard deviation and P values of PI, GI, PPD, CAL, serum transaminases and creatinine in group A (non smokers) at baseline [BL] & 3months



Graph 2 comparison of mean and standard deviation of PI, GI, PPD, CAL, serum transaminases and creatinine in group B (smokers) at baseline [BL] & 3months [3M]



Graph 3 Intergroup comparison of mean, standard deviation and P values of PI, GI, PPD, CAL, serum transaminases and creatinine in group A (non smokers) and group B (smokers)

DISCUSSION

Local factors are majorly responsible for the pathogenesis of periodontitis. In the present study there was a significant reduction in GI & PI values in both the groups, 3 months after SRP, which could be attributed to constant reinforcement of oral hygiene and Hawthorne effect¹¹. There was significant reduction in the PPD and gain in CAL in Group A compared to Group B. The reduced improvement in PPD and CAL following therapy in smokers compared with non-smokers may reflect the effects of smoking on both the host response and the healing process which was in accordance to the study done by Darby IB *et al*¹².

At the baseline, the levels of transaminases are increased in both the groups, with Group B showing a more inflated value which could be due to the fact that LPS-induced periodontitis has been suggested as a contributing factor of functional disorder in various organs such as liver and kidney. Periodontitis could also stimulate liver damage that leads to higher levels of serum transaminases which was in accordance with studies done by Tomofuji⁹ *et al*. At baseline, the serum creatinine levels are decreased in both the groups with much decreased values in group B than group A which indicated the high creatinine clearance of the kidneys. In spite of significantly higher serum creatinine levels in patients with periodontitis as compared to controls, in a study done by Kshirsagar *et al*⁸ and Hattato_glu-Seonmez *et al*, the present study showed a significant inverse association between normal serum creatinine concentration and periodontal disease which was in accordance with the study done by Shimazaki *et al*².

The higher values of transaminases were recorded in smokers which may be attributed to the fact that smoking increases the production of pro-inflammatory cytokines (IL-1, IL-6 and TNF- α) involved in liver cell injury. Cigarette smoke propagates lipid peroxidation, which damage the biological cell membrane of the liver and serum aminotransferases are enzymes that act as sensitive indicators of hepatocellular damage which were markedly increased in smokers compared to non smokers which was in accordance to the studies done by El -Zayadi AR *et al*⁷, Khaled Salem Alsalhen *et al*¹⁰, Sangar Najat Abdul-Razaq *et al*¹³. The lower levels of serum creatinine were recorded in smokers which may be due to higher creatinine clearance in smokers than non smokers this

was in accordance with the study done by Jean-michel Halimi *et al*¹⁴.

There was a significant reduction in serum transaminases values in both the groups after SRP, which can be explained by a mechanism that transaminases are found in serum and erythrocytes of healthy individuals but their concentrations in active periodontal pockets of patients with periodontitis are higher. They are also measured as enzymes associated with cell injury and cell death and change in this enzymatic activity reflecting the metabolic changes in the gingiva and periodontium, in the inflammation. So the improvement in periodontal condition after periodontal therapy resulted in a significant reduction in transaminases levels which was in accordance with the study done by Pradnya Rajendra Khatavkar *et al* in 2016¹⁵.

There was a significant increase in serum creatinine values in both the groups after SRP, which could be due to the impact of periodontal treatment on GFR suggesting that periodontal treatment could have an important role in reducing inflammatory mediators, kidneys are important for the clearance of cytokines which was in accordance with study done by Hilana Paula Carillo Artese *et al*¹⁶.

Although there was a significant improvement in the levels of transaminases and creatinine in both the groups, there was a slight difference in the improvement which was less in group B (smokers) compared to group A (non smokers). This slight, non significant difference is due to the fact that smoking acts as a contributing factor for aggravating the liver, kidney malfunctioning and periodontitis which was in accordance with the studies done by Khaled Salem Alsalhen *et al* in 2014¹⁵ and Jean-michel Halimi *et al* in 2000¹⁴, Darby IB *et al*¹².

The main limitation of the study is small sample size.

CONCLUSION

There was a direct positive relation of transaminases and periodontitis with high values of transaminases in periodontitis and their decreased values after SRP. The low values of creatinine in periodontitis and their increased values after SRP showed an inverse relationship. Smoking acts as a confounding factor since increased values of transaminases and decreased values of creatinine are high in smokers compared to non smokers in periodontitis. However studies with larger sample size are required.

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