Clinical and Experimental Health Sciences

Evaluation of Serum Cortisol Level, Hepatitis B and C Virus Infection and Elevated Aminotransferase Enzymes in a Group of Patients with Oral Lichen Planus

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Received: 28.05.2024 **Accepted:** 23.07.2024

ABSTRACT

Objective: Oral Lichen planus (OLP) is a common oral disease that can be caused by a variety of circumstances, including the hepatitis B and C virus (HCV). Stress, as a psychological component, raises cortisol levels, which is linked to a cytokine imbalance that may predispose to the development of autoimmune disorders. An association between OLP and serum cortisol levels has been also widely established. In this study, we aimed to evaluate the relationship of serum cortisol levels, hepatitis B/C virus infections and alanine transaminase (ALT), aspartate transaminase (AST) in patients with oral lichen planus and to compare to healthy controls.

Method: Forty adult patients with OLP and 40 age gender matched healthy controls were participated in the study. All patients were subjected to routine blood test and the estimation of serum cortisol levels, detection of anti-HCV antibody, hepatitis B surface antigen (HBsAg), alanine transaminase (ALT), aspartate transaminase (AST) by using the enzyme immunoassay. The data were statistically analyzed using Student-t, Mann-Whitney U, Chi-Square and Fischer's Exact test.

Results: Serum cortisol level of OLP patients was found to be 13.38±5.93, and that of the control group was 12.80±3.93. The OLP patients' ALT-AST levels were 19.91±10.66, 20.81±9.85, and those of the control group were 19.91±10.66, 20.81±9.85, respectively. There was no statistical difference of serum cortisol levels, hepatitis B/C virus infections and ALT-AST levels in OLP patient compared to the healthy control group (p>.05).

Conclusion: This study identified that there was no association between OLP and healthy controls regarding elevated serum cortisol levels, hepatitis B/C virus infection and aminotransferaze enzymes.
Keywords: Oral lichen planus, oral mucosal diseases, hepatitis, serum cortisol.

1. INTRODUCTION

Oral lichen planus (OLP) is a chronic inflammatory condition that primarily affects middle-aged and older female, with an estimated global incidence of 0.1-2%. The etiology is still unknown (1-6). The disease is classified as reticular/plaque, erythematous/erosive, or ulcerative, and a patient may exhibit many clinical forms (7). OLP is distinguished by a reticular white line pattern (Wickham striae), which occurs bilaterally and symmetrically. It is a condition that is often asymptomatic, and its frequency varies with age and is more prevalent in female than in male (7–10). Although the specific etiology is unknown, the lesions are thought to be the result of a T cell reaction to epithelial cells in response to a variety of stimuli, including psychological, viral factors and some diseases (7, 11,12).

Stress as a psychological factor causes an increase in cortisol levels and this alteration is associated with a cytokine imbalance that may predispose to the development of autoimmune diseases in which cytokines may play a role in its progression and etiology (13-17). Cortisol is the major glucocorticoid in humans and has a wide range of effects on metabolism, vascular reactivity, immune regulation, cognition and behavior (18,19). Salivary cortisol levels have been linked to psychological alterations in OLP patients, and cortisol has been identified as a biological marker of stress and anxiety (20, 21). However, the findings of the studies have been inconsistent. A further psychological condition that might raise cortisol levels is anxiety (22). It is known that in around 10–68% of instances, stressful events take place prior to the beginning of OLP. Furthermore, during times of stress,

DOI: 10.33808/clinexphealthsci.1491324

symptoms may worsen or intensify (23-25). In situations like pain and anxiety, there are several metabolic and endocrine changes that take place. High anxiety has been employed as an indication in anxiety assessment studies since it can increase the production of cortisol, often known as the stress hormone (26-29). Numerous studies have looked at the association between OLP instances and salivary and serum cortisol levels (18,26,30).

Various completely unrelated conditions, including diabetes mellitus, lupus erythematosus, primary biliary cirrhosis, and chronic active hepatitis, have been linked to OLP (31,32). Hepadnaviruses include the Hepatitis B virus (HBV). Hepatitis B surface antigen (HBsAg)-positive people may have twice the chance of getting LP compared to HBsAg-negative patients, suggesting a possible link between LP and HBV infection. Furthermore, after receiving several HBV vaccinations, LP patients with lichenoid eruption have been shown to have anti-HBV antibodies (31-33).

In 1989, the single-stranded ribonucleic acid (RNA) virus known as Hepatitis C virus (HCV) was discovered (34). Since OLP was originally associated with HCV in 1991 (35), several studies have demonstrated a favorable correlation between OLP and HCV infection; in fact, some have even suggested that OLP patients should be screened for HCV (36-39). Lichen planus has been connected to the hepatitis C virus (HCV), particularly when the oral cavity is affected and it is a condition that affects 20% of people with C hepatitis (37,40,41). OLP patients with liver illness associated to HCV had a worse quality of life, according to a few publications (18,30). Several studies in the literature have examined the relationship between OLP and chronic liver disease (42-46).

Liver disease is diagnosed by measuring the levels of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) (47,48). Studies investigating the association between OLP and liver disease have also searched for ALT and AST levels (36,47,48). They claimed that more information is needed to understand the association between OLP exacerbations (48). The relationship between OLP, the etiology of which is not clearly known, and chronic liver diseases, is still uncertain and controversial.

Therefore, the aim of this study was to compare the serum cortisol levels, prevalence of Hepatitis B, C and hepatic amino transferase levels of individuals with OLP with the control group.

2. METHODS

A total of 40 individuals between the ages of 18 and 75, who applied to Marmara University, Faculty of Dentistry, Department of Oral and Maxillofacial Radiology were included in the study as a patient group, who were diagnosed with "OLP" as a result of clinical and histopathological evaluation in accordance with the WHO criteria updated by the American Academy of Oral and Maxillofacial Pathology in 2016 and who had not undergone any treatment related to this diagnosis (Figure 1a,b; Figure 2a,b,c). The study protocol was approved by the Ethics Committee of Marmara University, Faculty of Medicine with protocol number 09.2022.999. Biopsies were obtained from all patients with a preliminary diagnosis of OLP, and the diagnosis was confirmed.

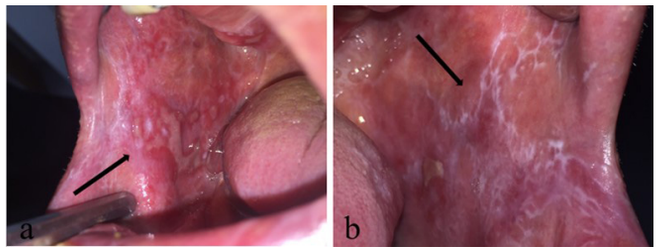

Figure 1a,b. *Widespread erosive and reticular lesion involvement on bilateral buccal mucosa*

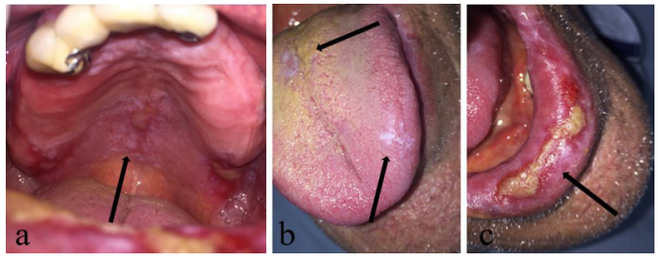

***Figure* 2a, b, c. a.** *Reticular type lesions in the palatal mucosa b. Reticular type lesions on the dorsum of the tongue c. Fibrin-coated areas on the severe erosive type lesions on the lower lip mucosa (Note all images belong to an HBsAg positive male patient)*

As a result of the Power analysis performed using the G*Power programme to determine the sample size, when the effect size d (effect size): 0.956 and SD: 11.86 were taken, the minimum sample size for Power: 0.80 and α: 0.05 was determined as n=19 for each group.

Forty age-gender matched individuals who agreed to participate in the study, who had applied to our clinic for any reason, who did not have any mucosal changes (hyperkeratinisation, erythema, ulceration, erosion, atrophy, etc.) and related complaints in the oral mucosa during or before the intraoral examination, and who did not have any autoimmune disease were evaluated as a healthy control group. Routine hematological values of all patients who agreed to participate in the study were examined and serum cortisol level, hepatitis B/C markers and ALT-AST were noted just before the biopsy procedure.

2.1. Statistical Analysis

While evaluating the study's findings, statistical analyses were performed using the IBM SPSS Statistics 22 software. The Kolmogorov-Smirnov test was used to determine if the parameters were suitable for normal distributions. In addition to descriptive statistical methods (minimum, maximum, mean, standard deviation, median, and frequency), the Student t test was used for comparisons between two groups of parameters with normal distribution, and the

Mann Whitney U test was used for comparisons between two groups of parameters without normal distribution. The qualitative data was compared using the chi-square test, Fisher's exact test, and continuity (Yates) correction. Significance was determined at p<.05 level.

3. RESULTS

The study was conducted with a total of 80 patients, 22 (27.5%) males and 58 (72.5%) females, aged between 33 and 80 years. The mean age was 59.32±11.37 years. The cases were evaluated in two groups of 40 patients each as "Case" and "Control" groups. In our study, no statistically significant difference was found between the groups in terms of cortisol levels (Table 1) (p>.05).

Table 1. *Evaluation of groups in terms of cortisol levels*

	Cortisol level	
	Mean±SD	**p**
Case(n=40)	13.38±5.93	.657
Control (n=40)	12.80±3.93	

Student t Test

HBsAg was positive in 2.7% of the case group and 12.9% of the control group, with no statistically significant difference (p>.05) (Table 2). Anti-HBs was positive in 35.1% of the case group and 35.5% of the control group, with no statistically significant difference (p>.05). Moreoever, Anti-HBC IgG was positive in 16.2% of the case group and 12.9% of the control group, with no statistically significant difference (p>.05). Both groups were not positive for anti-HBC IgM or anti-HCV (Table 2).

Table 2. *Evaluation of groups in terms of Hepatitis markers*

	Case (n=37)	Control (n=31)	
	n (%)	**n (%)**	**p**
HBsAg	1 (2.7%)	4 (12.9%)	[1].170
Anti – HBs	13 (35.1%)	11 (35.5%)	[2].000
Anti-HBC IgG	6 (16.2%)	4 (12.9%)	[1].745
Anti-HBC IgM	0 (0%)	0 (0%)	-
Anti-HCV	0 (0%)	0 (0%)	-

[1] *Fisher's Exact Test* [2] *Continuity (yates) correction*

There was no statistically significant difference between the groups in terms of AST and ALT levels (p>.05) (Table 3).

Table 3. *Evaluation of groups in terms of AST and ALT levels*

	Case (n=40)	Control (n=40)	p
	Mean±SD (median)	**Mean±SD (median)**	
ALT (SGPT)	19.91±10.66 (16.3)	18.85±10.57 (18)	.592
AST (SGOT)	20.81±9.85 (19)	20.60±6.67 (18.5)	.924

Mann Whitney U Test

4. DISCUSSION

The etiology of OLP, which mostly affects adults and has a worldwide distribution, is not known for certain (1-3,49). Various studies have indicated that stress and psychological situations (especially depression and anxiety) and liver diseases are among the important etiological factors, but their role in the pathogenesis of the disease is controversial (26,27).

Cortisol is one of the most important glucocorticoids in humans, influencing metabolism, vascular reactivity, immunological control, cognition, and behavior (18,19). In literature, cortisol levels were evaluated in serum, saliva and urine samples of OLP patients and healthy control groups (6,26,30). Chaitanya et al. (26) evaluated the serum cortisol levels of 30 symptomatic OLP cases and 30 healthy control groups without a history of depression and anxiety by chemiluminescent method in the morning hours (08:00-09:00). They found that OLP cases had higher serum cortisol levels than the healthy control group. Moreover, Nadendla et al. (30) aimed to analyze salivary cortisol levels in 20 OLP cases and the twenty age-gender matched healthy control groups and collected samples in the morning hours (09.00:09.15) to prevent daily variations. They found that salivary cortisol level was significantly increased compared to the control group. Lopez-Jornet et al. (18) examined the salivary cortisol levels of 33 OLP cases in comparison with 32 healthy control groups and reported higher cortisol levels in OLP cases compared to the healthy control group.

Koray et al. (12) investigated anxiety and salivary cortisol levels in their study involving 40 OLP cases and 40 control groups. Saliva samples were collected in the morning hours (09.00-09:15). They found that salivary cortisol, state and trait anxiety levels were significantly higher in the OLP group than in the control group. Researchers have stated that psychological support may be beneficial in addition to treatments in cases of OLP.

Despite these studies, there are studies reporting that there is no significant change in cortisol levels in serum and saliva samples (6,21). Pekiner et al. (6) measured blood cortisol levels in 30 OLP patients and 30 control groups and found no statistically significant differences between the groups. In addition, Girardi et al. (21) showed no statistically significant difference in salivary cortisol levels between 31 OLP patients and 31 age and sex-matched controls. Similarly, our research discovered no significant differences between the groups.

Therefore, the findings from studies investigating blood cortisol levels in OLP patients are debatable. The data provided in the cortisol level comparison may be influenced by patient selection, disease type, collection time of the samples and analyzed bodily fluid cortisol levels. Different methods utilized in various research may explain varied outcomes.

It has been reported in literature studies that the risk of developing LP is increased in HBsAg-positive patients compared to HBsAg-negative patients, and that anti-HBV

antibodies are seen in LP patients who develop lichenoid lesions after different HBV vaccines (33). Tozun et al. (50) investigated the seroprevalence of hepatitis B/C in urban and rural areas in the Turkish population in 5460 individuals. Researchers found the prevalence of HBV in the Turkish population as 4% in their study and stated that it may vary according to regions, for example, this rate was 3.8% in the Marmara region. In our study, in parallel with Tozun et al., 3.4% of the individuals who participated in the study were found to be HbsAg positive and the rate was 2.7% in the patient group. The authors also reported that there was no significant relationship between OLP and hepatitis B infection. Moreover, Anti-HBV antibodies have been reported in OLP patients with lichenoid eruption after receiving several HBV vaccinations (33).

After the identification of hepatitis C virus (HCV), the most important cause of chronic liver disease, the association of OLP with hepatitis C has been reported in various studies (42-44, 46-48). It has been reported that the prevalence of chronic hepatitis C in patients with OLP may vary between 0.5-35% according to different geographical regions (45).

Ali and Suresh (47) evaluated Anti HCV, ALT and AST values in 40 OLP patients and 40 healthy control groups with routine hematological test and found higher ALT-AST ratios in OLP cases, while anti-HCV value was negative in all individuals participating in the study. Geraylı et al. (46) evaluated liver function tests and HCV infection in 134 OLP patients and 134 healthy control subjects and found that ALT-AST levels were higher in the healthy control group compared to the study group. While 2.23% of OLP patients were anti-HCV and HCV-RNA positive, none of the individuals in the control group were positive and no statistically significant difference was found. In our study, no statistically significant difference was found between ALT-AST and hepatitis B and C values in the patient and control groups.

It should be highlighted that our findings are based on a small but statistically significant cohort, as determined by the power analysis, and should be validated by a larger multicenter investigation in Türkiye. Given our study's prevalence, future research should alter sample size calculations accordingly.

5. CONCLUSION

This study could not find a correlation between OLP and serum cortisol levels, aminotransferaze enzymes and hepatitis B/C virus infection in a group of patients. This might be due to a decreased incidence of hepatitis viruses in comparison to countries with high endemicity, genotypic variation of the viruses, or other etiological variables affecting the current patient population. To get more accurate results, future research should use a larger sample size.

Acknowledgements: *We would like to thank Marmara University for providing access to academic databases.*
We would like to thank Prof. Gülderen Yanıkkaya Demirel from Department of Immunology, Yeditepe University and her team for their support in evaluation of serum parameters.
This research is based on PhD thesis of Dr. Hakan Yülek and supported by TUBİTAK with Project number 123S550.
Funding: *The author(s) received financial support from TÜBİTAK for the research.*
Conflicts of interest: *The authors declare that they have no conflict of interest.*
Ethics Committee Approval: *This study was approved by Ethics Committee of Marmara University, Faculty of Medicine, Clinic Ethics Committee (Approval date: 28.07.2022; Number: 09.2022.999)*
Peer-review: *Externally peer-reviewed.*
Author Contributions: (Initials only)
Research idea: FNP
Design of the study: FNP, HY
Acquisition of data for the study: FNP, HY
Analysis of data for the study: HY
Interpretation of data for the study: FNP, HY
Drafting the manuscript: HY, FNP
Revising it critically for important intellectual content: FNP
Final approval of the version to be published: FNP

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How to cite this article: Yülek H, Pekiner Namdar F. Evaluation of Serum Cortisol Level, Hepatitis B and C Virus Infection and Elevated Aminotransferase Enzymes in a Group of Patients with Oral Lichen Planus. Clin Exp Health Sci 2024; 14: 889-894. DOI: 10.33808/clinexphealthsci.1491324