Original Research

Comparing Oral Hygiene, Periodontal Health and Decayed, Missing and Filled Teeth Indexes in Patients with Oral Lichen Planus and Healthy Individuals

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Abstract

Background: Oral lichen planus (OLP) is considered a chronic autoimmune inflammatory disease. The current research intends to compare oral hygiene, periodontal health, and decayed, missing, and filled teeth **(**DMFT) indexes in patients with OLP and healthy individuals.

Methods: A case/control study was carried out on patients with oral lichen planus referred to Tabriz Dental Faculty. The sample population of the present investigation was 46 patients and 46 healthy individuals (control group) whose demographic characteristics were similar. Clinical and histopathologic examinations were resorted to select the patients. Using the availability sampling method, a similar healthy person was selected for each lichen planus patient. The five indexes of OHI-s, PI, GI, BOP, and DMFT were measured for each group, and the statistical analysis was run using SPSS version 21 and the Mann-Whitney U test.

Results: Both groups consisted of 97.8% female and 2.2% male. The average age and standard deviation of lichen planus patients were 44.13 and 9.83, respectively, and for healthy subjects, 44.22 and 10.30, respectively. The average index of OHI-s in lichen planus patients was 1.44, and in healthy subjects, it was 1.28. The average bleeding on probing (BOP) was 5.47 in patients and 2.78 in healthy subjects. The study revealed significantly higher BOP rates in patients. The average PI was 0.78 in patients and 0.77 in healthy subjects. The average GI was 0.69 in patients and 0.64 in healthy subjects. The average DMFT index was 15.63 in patients and 16.69 in healthy subjects.

Conclusion: The results show that there is a significant difference only in the BOP index between patients with oral lichen planus and healthy subjects.

Keywords: Oral Lichen Planus, Oral Hygiene, Periodontal Index, DMFT, BOP.

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Introduction

Oral lichen planus (OLP) is taken into account as one of the most common oral mucosal lesions that was initially described and named by Dr. Wilson in 1896 (1). OLP is a chronic autoimmune inflammatory disease of the oral mucosa. A recent study demonstrated that the prevalence of this disease in the world was 1.01%, more among females than males (2). The cause of OLP is not known yet. However, cell-mediated immunodeficiency is involved in the etiopathogenesis of this disease. The immunological process contributes to the aqueous degeneration of basal cells (3). Thus, genetic, infectious, medicinal, immunological, neurological, and psychological causes are discussed as the cause of a disease stemming from T cells in which CD8+ cells provoke apoptosis of the basal cell layer of the oral epithelium (4). The clinical features of OLP might range from hardly visible small white lesions to large lesions that involve the entire oral mucosa (5). OLP might undergo symptomatic exacerbation and remission periods and be prolonged for many years. The disease often hurts the buccal mucosa, tongue, gums, and rarely the lips, palate, and floor of the mouth (6). In OLP patients with erythematous gingival lesions, a biopsy is needed as lines or papules may be difficult to find. Direct immunofluorescence is advantageous in differentiating the types of OLP from pemphigus, pemphigoid, and linear bullous dermatosis (LABD) (7). Dental caries, as one of the most prevalent human diseases, influences more than 99% of people. The prevalence of caries has decreased in many developed countries, while its intensity and prevalence are anomalous in many developing countries (8). Rai et al. showed that Gingival Index (GI), Russell's Periodontal Index (PI), and Bleeding on Probing (BOP) index were higher in lichen planus patients; that is, there is a relationship between the patient's periodontal conditions and lichen planus (9). In another study, Nishi et al.investigated the DMFT index in Jamaica, Senegal, Sweden, England, Sri Lanka, the United States, North Africa, Scotland, France, Nicaragua, Honduras, Bolivia, Costa Rica, and a state of Mexico, and found the median of DMFT index as a suitable criteria of the oral hygiene (10). Kamel et al. demonstrated that oral lichen planus reduces oral hygiene and has a negative influence on periodontal health (11). In an investigation, Holmstrup et al. stated that controlling oral hygiene can decrease symptoms of gingival lichen planus (12). The medical diagnosis is often predicated on clinical findings. The reticular and white lines (Wickham striae) and wounds, which are often bilateral and symmetrical, are the main characteristics of the disease. However, diagnosis without histopathological findings might be impossible; for example, the lesions on the dorsal surface of the tongue are difficult to distinguish from leukoplakia (13). Furthermore, in the case of unilateral erosive or atrophic lichen planus or plaque-like lichen planus and Wickham's lines not being clear, performing histopathology tests might be necessary (14). Due to the significance of the problem, the present study was carried out to compare the indexes of oral hygiene, periodontal health, and DMFT in patients with oral lichen planus and healthy individuals.

Methods

The present case-control type of study was conducted on oral lichen planus patients referred to Tabriz Dental Faculty. According to the results of Soares et al., the mean (standard deviation) of the DMFT index in patients and healthy people was found to be 4.18±4 and 3.3±1.88, respectively (15). Using a Type I error equal to 5 percent and a power of 80 percent, the sample size of 41 for each group was obtained. To increase the validity of the study, 10% was added to the sample size, upon which 46 samples were taken into account.

The subjects in the case and control groups were similar in terms of some characteristics, such as demographic characteristics (age, gender, etc.). Among the inclusion criteria, age above 12 years, white lesions in clinical examinations, and positive histopathologic results of lichen planus were taken into account. On the other hand, the exclusion criteria were age below 12 years, reaction to medicinal lichenoids, having infectious diseases, and absence of lichen planus microscopically.

Methodology

In the present study, the patients' OHI-s, PI, GI, BOP, and DMFT indexes were calculated and

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recorded. Finally, the relationship between oral lichen planus lesions and the mentioned indexes in the patients under study was investigated. Simplified Oral Hygiene Index (OHI-s): The Simplified Oral Hygiene Index (OHI-s) differs from the original OHI in the number of tooth surfaces scored (6 instead of 12). The method of selecting the surfaces to be scored and the scores are different. The criteria used to assign scores to tooth surfaces are similar to those used for the OHI (Oral hygiene Index). OHI-s like OHI has two components: Debris Index and Calculus Index. Each index is based on the numerical indices that indicate the amount of debris or mass on the pre-selected surfaces of the tooth. The OHI-s examines the six surfaces of four posterior and two anterior teeth (16). Russell's Periodontal Index (PI): Russell developed the PI criteria (0, 1, 2, 6, and 8) according to the signs of periodontitis and the sequence in which they usually appear, that is, inflammation, pocket formation, and no function. Although PI is often considered a scaled categorical scoring system, it is, in fact, a weighted categorical scoring system.

In 1967, Russell reformulated the therapeutic needs model based on PI. For instance, PI scores in the range of 0.1-1.0 require simple prophylaxis, 0.5-1.9 require minimal periodontal treatment, 1.5-5.0 require complex and prolonged treatment, and 4.0-8.0 require complete tooth extraction. As PI was the first periodontal index, it has been widely used in epidemiological studies of multiple populations, among which the first two national surveys in the United States can be enumerated. The principal advantages of PI are that calibration of the tester is easy, the method is expeditious, and minimal equipment is needed (17). Gingival Index (GI): The gingival index (GI) scores each oral area on a scale of 0 to 3, in which 0 is normal, and 3 is severe inflammation, determined by edema, redness, swelling, and spontaneous bleeding. Upon the presence or absence of bleeding on probing, this measurement is mild. Each tooth is scored in four sites, the average of which can be determined for a single tooth (13). Bleeding on Probing (BOP): To test BOP, the probe is carefully introduced to the bottom of the pocket and slowly goes laterally along the pocket wall. However, sometimes, bleeding happens when the probe is removed. In other cases, it occurs within a few seconds. Thus, the physician should examine bleeding again 30 to 60 seconds later. However, as a single test, BOP might not be a good predictor of progressive loss of continuity. Nevertheless, its absence is a supreme predictor of periodontal stability. When bleeding is present at multiple sites in an advanced illness, BOP is a good indicator of progressive loss of continuity (14). Decayed, missing, and filled teeth(DMFT): DMFT is an index to measure the level of oral hygiene and dental caries. It is defined as "the total of decayed permanent teeth, to be missed because of caries or restored because of caries" (8). To measure this index, the number of missing, decayed, and restored teeth was calculated and recorded.

Data analysis

SPSS version 21 software was utilized to analyze the data. Mann-Whitney U tests were used to compare the case and control groups.

Results

In the current study, 46 healthy individuals and 46 patients with oral lichen planus were investigated. For both groups, 97.8% were female and 2.2% were male. The average age in lichen planus patients was 44.13±9.83 years, and in healthy subjects, 44.22±10.3 years. Diagram 1 demonstrates the results of the comparison of oral hygiene index (OHI-s) in patients with oral lichen planus and healthy subjects. The diagram below shows that the OHI-s index is 1.44±0.59 in the lichen planus group and 1.28±0.76 in healthy subjects. According to the Mann-Whitney test, there is no significant difference in OHI-s index between patients with oral lichen planus and healthy subjects.

The results of comparing the periodontal health indexes (PI, GI and BOP) in patients with oral lichen planus and healthy subjects are shown in Table 1.

The results of the above table represent that BOP in the lichen planus group is 5.47±4.30 and in healthy people 2.78±3.37. According to Mann-Whitney test, the BOP level in patients with oral lichen planus is significantly higher compared to healthy subjects. PI index is 0.78±0.50 in lichen planus group and 0.77±0.7 in healthy subjectse. Mann-Whitney test unravels no significant difference in PI index in

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patients with oral lichen planus and healthy subjects. GI index is 0.69±0.40 in lichen planus group and 0.64±0.47 in healthy subjects. Comparing the case and control groups, the Mann-Whitney test shows no significant difference in GI index.

The DMFT index was 15.63±4.562 in the lichen planus group and 16.69±6.89 in healthy subjects. Upon the Mann-Whitney test, there is no significant difference in the DMFT index between patients with oral lichen planus and healthy subjects (Table 2).

Discussion

Oral lichen planus lesions are achy and can constrain the patient's capacity to maintain good oral hygiene, making them susceptible to periodontal disease in the long run. The results of the current research unravel that, among the periodontal health indexes, the amount of BOP was significantly higher in the lichen planus group. However, despite the higher average in the Lichen planus group, the PI and GI indexes were not significantly different when comparing the case and control groups. Along with the present study, the meta-analysis study of Sanadi et al. (2023) also revealed that bleeding on probing (BOP) and pocket depth (PD) were significantly higher in lichen planus patients. Still, there was no significant difference in other indexes between healthy subjects and lichen planus patients. (18). The systematic study and meta-analysis of Nunes et al. (2022) found a significant relationship between the severity of periodontal disease and PI, GI, PD, and CAL indexes with oral lichen planus (19). The contradictory results might be due to the severity and type of lichen planus disease. Although in Arya et al. (2024) study, the plaque index, gingival index, and BOP index were higher in lichen planus patients than in healthy subjects, in reviewing the type of lichen planus, it was observed that the difference between reticular oral lichen planus group (a less severe form of oral lichen planus) and control group in terms of gingival index, plaque index, BOP, probing pocket depth and clinical adhesion score is not statistically significant (20). Conducting a study on the risk factors of oral precancerous lesions in lichen planus patients with and without chronic periodontitis, Huang et al. (2024) found that in patients with lichen planus, the odds ratio of periodontal disease is higher (OR=2.24). Therefore, periodontal disease increases the possibility of developing precancerous lesions in patients with OLP (21). The small sample size of the patients under study is one of the limitations of the study, which can also influence the results. There was no significant difference in the caries index of lichen planus and healthy subjects in the present study. According to the investigation by Nishi et al. (2002), the median index of DMFT is a suitable criterion for oral hygiene (10). In the present study, there was no significant difference in oral hygiene index (OHI-s) between lichen planus and healthy subjects. However, the severity and type of lichen planus disease are different in diverse studies. The erosive lichen planus (ELP) is persistent and painful for patients, thus they cannot maintain their regular oral hygiene, leading to the deposition of plaque and calculus; this can aggravate the condition and increase the likelihood of long-term periodontal disease (18). Contrary to the current study, Soares et al. (2011) underscored a statistically significant difference in OHI-S and DMFT of lichen planus patients and healthy individuals (15). Albaghli et al. (2021) revealed a significant relationship between plaque index and clinical manifestations and brushing frequency. However, there was no statistically significant difference in terms of gingival index and brushing frequency (22). In a case study of a patient with lichen planus and active periodontal therapy, Chang et al. (2022) stated that OHI-s should be recorded at all regular visits as a criterion of oral hygiene to test the patient's ability to manage oral hygiene. These researchers emphasized that plaque control can improve the prognosis of OLP (23). Holmstrup et al. demonstrated that controlling oral hygiene can decrease the symptoms of gingival lichen planus (12). In another research, Antonenko et al. showed a relationship between oral hygiene and erosive lichen planus (24). Oral lichen planus alone might not be responsible for the deterioration of the periodontal condition. However, the accumulation of plaque and calculus makes it worse in cases of OLP due to lack of proper oral hygiene. Therefore, the primary treatment should be controlling the accumulation of plaque and calculus and improving the oral and

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dental hygiene practices of patients, which leads to the healing of the lesion and can relieve the condition (19). Ulcerated areas make oral hygiene practices such as brushing complicated, as they can lead to severe pain, discomfort, and bleeding gums. Poor oral hygiene also deteriorates periodontal health and negatively influences the process and result of OLP. Therefore, oral hygiene practices followed by patients should be effective and efficient but mild to promote the recovery of periodontal health (15). Plaque control, proper brushing techniques, and periodontal treatments when necessary seem rational. Thus, regular follow-up visits for early diagnosis and treatment of gum and periodontal diseases will be useful in improving the patient's quality of life (21). It needs to be noted that many mediating variables like gender, age, smoking and alcohol consumption, systemic diseases, genetics, and oral hygiene influence oral lichen planus disease and, as such, might change the results of studies. Thus, further studies need to be carried out in order to research more controlled sample populations based on the above variables (smoking and alcohol consumption, systemic diseases, genetics) and based on the types of lichen planus, removing potential confounding variables (19).

Conclusion

BOP was significantly higher in the lichen planus group, but the PI and GI indexes in the lichen planus group did not differ significantly from healthy subjects. Besides, there was no significant difference in dental caries index between lichen planus and healthy subjects. Oral hygiene index (OHI-s) was not significantly different between lichen planus and healthy subjects.

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Ethical considerations

The study was conducted after getting the ethical approval from the regional ethics committee (code: IR.TBZMED.REC.1402.486) on 2 - 10 – 2023). All relevant ethical standards were observed in all stages of implementation.

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Authors Contributions

The author contributed to the data analysis. Drafting, revising and approving the article, responsible for all aspects of this work.

References

1. Booghani, M., et al., Oral lichen planus: clinica features, etiology, treatment and manaement; a review of literature. J Dent Res Dent Clin Dent Prospects, 2010. 4(1): p. 3-9.
2. González-Moles, M.Á., et al., Worldwide prevalence of oral lichen planus: A systematic review and meta-analysis. Oral diseases, 2021. 27(4): p. 813-828.
3. Greenberg M,Glick M,Ship J.Burket's oral medicine 13th edi.BC Decker INC,Hamilton.2015;p41-106
4. Gupta, S. and M.K. Jawanda, Oral lichen planus: An update on etiology, pathogenesis, clinical presentation, diagnosis and management. Indian journal of dermatology, 2015. 60(3): p. 222.
5. Cheng, Y.-S.L., et al., Diagnosis of oral lichen planus: a position paper of the American Academy of Oral and Maxillofacial Pathology. Oral surgery, oral medicine, oral pathology and oral radiology, 2016. 122(3): p. 332-354.
6. Ismail, S.B., S.K. Kumar, and R.B. Zain, Oral lichen planus and lichenoid reactions: etiopathogenesis, diagnosis, management and malignant transformation. Journal of oral science, 2007. 49(2): p. 89-106.
7. Sugerman, P.B. and N. Sabage, Oral lichen planus: causes, diagnosis and management. Australian dental journal, 2002. 47(4): p. 290-297.
8. Marthaler, T.M., Changes in Dental Caries 1953–2003. Caries Research, 2004. 38(3): p. 173-181.
9. Parkash Rai, N.P., et al., Relation Between Periodontal Status and Pre-Cancerous Condition (Oral Lichen Planus): A Pilot Study. Adv Clin Exp Med, 2016. 25(4): p. 763-6.
10. Nishi, M., et al., Caries experience of some countries and areas expressed by the Significant Caries Index. Community dentistry and oral epidemiology, 2002. 30(4): p. 296-301.
11. Kamil, M.A., et al., Oral lichen Planus; potential relation to oral hygiene practices

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and oral hygiene status, Jazan, Kingdom of Saudi Arabia. , IOSR-JDMS, 2016; 15(11):83-88
12. Holmstrup, P., A.W. Schiøtz, and J. Westergaard, Effect of dental plaque control on gingival lichen planus. Oral Surg Oral Med Oral Pathol, 1990. 69(5): p. 585-90.
13. Cappelli, D.P. and J.D. Shulman, Chapter 2 - Epidemiology/Biology of Periodontal Diseases, in Prevention in Clinical Oral hygiene Care, D.P. Cappelli and C.C. Mobley, Editors. 2008, Mosby: Saint Louis. p. 14-26.
14. Newman, M.G., et al., Newman and Carranza's Clinical periodontology E-book. 2018: Elsevier Health Sciences.
15. Soares, M.S.M., et al., Condições Bucais em Pacientes com Líquen Plano Oral. Pesquisa Brasileira em Odontopediatria e Clínica Integrada, 2011. 11(4): p. 507-510.
16. Greene J.C., Vermillion J.R. The Simplified Oral Hygiene Index. J. Am. Dent. Assoc. 1964;68:7–13.
17. Dhingra, K. and K.L. Vandana, Indices for measuring periodontitis: a literature review. Int Dent J, 2011. 61(2): p. 76-84.
18. Sanadi RM, Khandekar PD, Chaudhari SR, Javali MA, Gurav NU. , Association of periodontal disease with oral lichen planus: A systematic review and meta analysis. J Oral Maxillofac Pathol. 2023 Jan-Mar;27(1):173-180.
19. Nunes G.P , Pirovani B.O , Nunes L.P, Silva A.N.A, Dias M.J.SMorábito 3 , Nunes-Júnior N.A , Delbem A.C.B , Ferrisse T.M , Does oral lichen planus aggravate the state of periodontal disease? A systematic review and meta-analysis, Clin Oral Investig , 2022 Apr;26(4):3357-3371.
20. Arya R, Sharma RK, Tanwar N, Gupta A. , Assessment of periodontal status in patients with oral lichen planus. Quintessence Int. 2024 Jan 23; 55(1):4-16.
21. Huang H.Y, Lin P.Y, Chen CH.CH, Chen Y.K, Risk factors for the development of oral precancerous lesions in a cohort of 293 oral lichen planus patients with or without chronic periodontitis in southern Taiwan, J Dent Sci , 2024 Jan;19(1):594-600.
22. Albaghli, F., et al., The effect of plaque control in the treatment of Oral Lichen Planus with gingival manifestations: a Systematic Review. Community Dent Health, 2021. 38(2): p. 112-118.
23. Chang H.Y. Shim [Y.J], Management of Gingival Oral Lichen Planus with Free Gingival Graft: 10-Year Follow-Up Case Report, J Oral Med Pain 2022;47:161-166
24. Antonenko, M.Y., et al., THE STATE OF ORAL HYGIENE AS A RISK FACTOR FOR ORAL LICHEN PLANUS: THE IMMUNO-GENETIC ASPECT. The Unity of Science: International Scientific Periodical Journal, 2017(3): p. 67-71.

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Tables & Figures

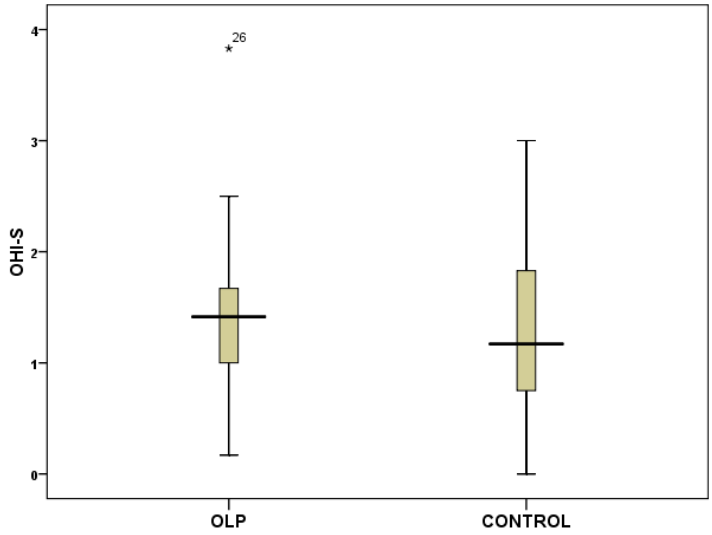


Diagram 1. Comparison of Oral hygiene Index (OHI-s) in patients with oral lichen planus and healthy subjects

Table 1. Comparison of periodontal health indexes in patients with oral lichen planus and healthy subjects

		N	M	SD	P value
BOP	oral lichen planus	46	5.4783	4.30885	<.001
	healthy subjects	46	2.7826	3.37252	
PI	oral lichen planus	46	.7815	.50707	0.417
	healthy subjects	46	.7743	.70733	
GI	oral lichen planus	46	.6993	.40048	.319
	healthy subjects	46	.6413	.47054	

P VALUE: Mann-Whitney U

Table 2. Comparison of DMFT index in patients with oral lichen planus and healthy subjects

	N	M	SD	P value
oral lichen planus	46	15.6304	4.56245	0.212
healthy subjects	46	16.6957	6.89563	

P VALUE: Mann-Whitney U

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