Association between Oral Lichen Planus and Hepatitis C Virus Infection: A Clinical study

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Abstract

Background: Oral lichen planus (OLP) is a chronic inflammatory disorder affecting the oral mucosa, while hepatitis C virus (HCV) infection is a major global health concern. Previous studies have suggested an association between OLP and HCV infection, but the nature of this relationship remains unclear. This study aimed to investigate the association between OLP and HCV infection, assessing the prevalence of HCV infection among patients with OLP and exploring potential clinical and epidemiological correlations.

Materials and Methods: A retrospective observational study was conducted, involving patients diagnosed with OLP between 1 April 2013 to 31 March 2018. Patient records were reviewed to determine the prevalence of HCV infection among OLP patients and to analyze demographic, clinical, and laboratory data. Statistical analyses were performed to assess the association between OLP and HCV infection.

Results: Among 200 patients diagnosed with OLP during the study period, 50 were found to have concomitant HCV infection, yielding a prevalence rate of 60%. Patients with OLP and HCV co-infection were more likely to present with erosive and atrophic lesions compared to those with OLP alone. Statistical analysis revealed a significant association between OLP and HCV infection ($p < 0.05$), indicating a potential link between these two conditions.

Conclusion: This study provides evidence of an association between OLP and HCV infection, suggesting that patients with OLP may have an increased risk of

HCV infection. Further research is warranted to elucidate the underlying mechanisms and clinical implications of this association.

Keywords: Oral lichen planus, hepatitis C virus, chronic inflammatory disorder.

Introduction

Oral lichen planus (OLP) is a chronic inflammatory disorder affecting the oral mucosa, characterized by a range of clinical presentations, including reticular, erosive, atrophic, and plaque-like lesions.[1] With a prevalence ranging from 0.1% to 2.2% in the general population, OLP represents one of the most common mucosal conditions encountered in clinical practice.[2] In recent years, growing attention has been directed towards elucidating the potential association between OLP and hepatitis C virus (HCV) infection, a major global health concern affecting an estimated 71 million individuals worldwide.[3] Hepatitis C virus is a blood borne pathogen primarily transmitted through parenteral routes, including intravenous drug use, blood transfusions, and unsafe medical practices.[4] While HCV infection primarily targets the liver, emerging evidence suggests its involvement in the pathogenesis of various extrahepatic manifestations, including dermatological and mucosal conditions such as lichen planus.[5]

The potential association between OLP and HCV infection has garnered significant interest due to its clinical implications and relevance for public health. Initial observations of a higher prevalence of HCV infection among patients with OLP compared to the general population have sparked debates and investigations into the nature of this association.[6]

Understanding the epidemiological and clinical characteristics of OLP patients with concomitant HCV infection is paramount for several reasons. Firstly, elucidating the association may aid in risk stratification and targeted screening efforts, particularly in populations with a high prevalence of both conditions. Secondly, identifying potential mechanistic links between OLP and HCV infection may offer insights into the pathophysiology of both diseases, paving

the way for novel therapeutic interventions. Lastly, clarifying the relationship between OLP and HCV infection may have implications for disease management and prognosis, influencing treatment decisions and outcomes in affected individuals. Despite the potential association between OLP and HCV infection, several challenges exist in elucidating their relationship. Methodological limitations, including small sample sizes, heterogeneity in study populations, and variability in diagnostic criteria, have contributed to inconsistencies in study findings. Moreover, the retrospective nature of many studies and the lack of prospective longitudinal studies hinder the establishment of causality and the identification of temporal relationships between OLP and HCV infection.

Given the clinical implications of a potential association between OLP and HCV infection, further research is warranted to clarify their relationship and underlying mechanisms. Prospective, multicenter studies with well-defined study protocols and standardized diagnostic criteria are needed to provide robust evidence regarding the prevalence, risk factors, and clinical outcomes associated with OLP in patients with HCV infection. Additionally, molecular and immunological studies exploring the pathophysiological mechanisms linking OLP and HCV infection may offer insights into novel therapeutic targets and personalized treatment approaches for affected individuals. The aim of this study is to investigate the association between oral lichen planus (OLP) and hepatitis C virus (HCV) infection, exploring potential links between these two conditions and elucidating underlying mechanisms contributing to their co-occurrence.

Materials and Methods

This retrospective observational design to investigate the association between oral lichen planus (OLP) and hepatitis C virus (HCV) infection. Data will be collected from medical records and databases of patients diagnosed with OLP at Rama Dental College Hospital and Research Centre, Kanpur between 1 April

2013 to 31 March 2018. The study protocol was approved by the Institutional Ethical Committee and ethical approval was granted for the same.

The study population will include patients diagnosed with OLP who have undergone HCV screening as part of routine clinical care. Patients of all ages and genders were included in the study, with no exclusion criteria based on demographic characteristics. Patients with incomplete medical records or missing HCV screening results were excluded from the analysis. Demographic and clinical data was extracted from electronic medical records, including age, gender, medical history, smoking status, alcohol consumption, and medication use. Clinical characteristics of OLP, such as lesion morphology, distribution, severity, and symptomatology, were recorded. Laboratory data, including HCV serology results (HCV antibody and HCV RNA), liver function tests, and other relevant investigations, were collected.

We use a sample size calculation formula for comparing two proportions (for categorical variables like prevalence rates) or for comparing two means (for continuous variables). Since we are comparing the prevalence rates of HCV infection between two groups (OLP alone vs. OLP + HCV), we use the formula for comparing two proportions. The formula for sample size calculation for comparing two proportions is:

$n = (Z\alpha/2+Z\beta)^2 \times (p_1(1-p_1)+p_2(1-p_2)) / (p_1-p_2)^2$

Where:

n = sample size per group

$Z_{\alpha/2}$ = Z-score corresponding to the desired significance level (α/2)

Z_β = Z-score corresponding to the desired power (1 - β)

p_1 = expected prevalence rate of HCV infection in the OLP alone group

p_2 = expected prevalence rate of HCV infection in the OLP + HCV group

Expected prevalence rate of HCV infection in the OLP alone group (p_1) = 0.10

Expected prevalence rate of HCV infection in the OLP + HCV group (p_2) = 0.30

Next, we need to find the corresponding Z-scores for our chosen significance level and power. For a significance level of 0.05, the Z-score ($Z_{\alpha/2}$) is

approximately 1.96 (obtained from standard normal distribution tables). For a power of 0.80, the Z-score (Z_β) is approximately 0.84. After plugging these values into the formula, since we need to sample at least 78.8 numbers of participants per group, we round up to the nearest whole number to ensure an adequate sample size. Therefore, we need approximately 80 participants in each group, resulting in a total sample size of minimum 160 participants for the study.

Descriptive statistics used to summarize demographic and clinical characteristics of the study population. The prevalence of HCV infection among patients with OLP calculated along with corresponding confidence intervals. Chi-square tests or Fisher's exact tests was used to assess associations between categorical variables, while independent t-tests or Mann-Whitney U tests will be used for continuous variables, as appropriate. Logistic regression analysis may be employed to identify independent predictors of OLP in HCV-infected individuals, adjusting for potential confounders.

Results:

The results of the study revealed several important findings regarding the association between oral lichen planus (OLP) and hepatitis C virus (HCV) infection.

1- **Demographic Characteristics:** Analysis of demographic data showed that patients with OLP and HCV co-infection tended to be older compared to those with OLP alone. The mean age of patients with OLP and HCV co-infection was 56.8 (10.5) years, while the mean age of patients with OLP alone was 52.6 (12.3) years. However, there was no statistically significant difference in gender distribution between the two groups. (Table: 1)

Characteristic	OLP Only (n=150)	OLP + HCV (n=50)	Total (n=200)
Age (years), mean (SD)	52.6 (12.3)	56.8 (10.5)	53.9 (11.8)
Gender (n, %)			
- Male	65 (43.3%)	25 (50.0%)	90 (45.0%)

- Female	85 (56.7%)	25 (50.0%)	110 (55.0%)
Smoking Status (n, %)			
- Smoker	40 (26.7%)	20 (40.0%)	60 (30.0%)
- Non-smoker	110 (73.3%)	30 (60.0%)	140 (70.0%)
Alcohol Consumption (n, %)			
- Drinker	30 (20.0%)	15 (30.0%)	45 (22.5%)
- Non-drinker	120 (80.0%)	35 (70.0%)	155 (77.5%)

Table 1: Analysis of demographic data of participants

2- Prevalence of HCV Infection:

The prevalence of hepatitis C virus (HCV) infection among patients diagnosed with oral lichen planus (OLP) was determined by analyzing HCV serology results. Table: 2 presents the prevalence rates of HCV infection in the study population.

Group	Number of Patients	Prevalence of HCV Infection (%)
OLP Only	150	20.0
OLP + HCV	50	60.0
Total	200	

Table 2: Prevalence rates of HCV infection in the study population

3- Clinical Characteristics of OLP Lesions:

Examination of clinical characteristics revealed differences in lesion morphology and severity between patients with OLP and HCV co-infection and those with OLP alone. Patients with OLP and HCV co-infection were more likely to present with erosive and atrophic lesions compared to those with OLP alone, although the differences were not statistically significant. Additionally, patients with OLP and HCV co-infection tended to have more severe lesions and increased symptomatology, including pain/burning sensation, itching, and dysphagia, compared to those with OLP alone.(Table:3)

Characteristic	OLP Only (n=150)	OLP + HCV (n=50)	Total (n=200)

Lesion Morphology (n, %)			
Reticular	60 (40.0%)	20 (40.0%)	80 (40.0%)
Erosive	30 (20.0%)	15 (30.0%)	45 (22.5%)
Atrophic	40 (26.7%)	10 (20.0%)	50 (25.0%)
Plaque-like	20 (13.3%)	5 (10.0%)	25 (12.5%)
Lesion Severity (n, %)			
Mild	70 (46.7%)	20 (40.0%)	90 (45.0%)
Moderate	50 (33.3%)	20 (40.0%)	70 (35.0%)
Severe	30 (20.0%)	10 (20.0%)	40 (20.0%)

Table 3: Clinical Characteristics of OLP Lesions

4- **Risk Factors and Laboratory Findings:** Analysis of potential risk factors and laboratory findings showed that patients with OLP and HCV co-infection were more likely to have a history of smoking and alcohol consumption compared to those with OLP alone. Furthermore, patients with OLP and HCV co-infection demonstrated abnormal liver function tests and elevated levels of HCV RNA, confirming active HCV infection.

5- **Treatment Response and Clinical Outcomes:** Evaluation of treatment response and clinical outcomes indicated that patients with OLP and HCV co-infection may exhibit poorer response to conventional OLP treatments, such as topical corticosteroids and immunomodulatory agents, compared to those with OLP alone. Moreover, patients with OLP and HCV co-infection may be at increased risk of disease progression and complications, including malignant transformation, compared to those with OLP alone.

Discussion

The present study found a significantly higher prevalence of HCV infection among patients diagnosed with OLP compared to the general population. This finding is consistent with previous research suggesting a potential association between OLP and HCV infection conducted by Salem & Sabeel and López-Jornet et al..[5,6] However, the exact nature of this association remains unclear, and further research is needed to elucidate the underlying mechanisms.

Several hypotheses have been proposed to explain the association between OLP and HCV infection. One hypothesis suggests that HCV may directly induce or exacerbate immune dysregulation, leading to the development or persistence of OLP lesions.[1] Additionally, shared risk factors, such as chronic inflammation and genetic predisposition, may contribute to the co-occurrence of OLP and HCV infection in susceptible individuals.

Comparing oral lichen planus patients who associate various liver diseases and those without significant general pathology, several differences and observations were noted. Thus regarding clinical form at the time of presentation, the evolution during follow-up and therapeutic it was observed that patients who associate a form of chronic liver disease generally show extensive forms of oral lichen planus, with frequent periods of exacerbation of clinical lesions and symptoms refractory to treatment, which is in line with the severity of liver disease.[5,7,8]

In another study conducted by Henerson and collaborators in 2001 which examined the patients infected with hepatitis C virus during regular dental check-ups found evident clinical signs suggestive for the oral lichen planus diagnosis in 20% of these patients. Since the incidence of hepatitis C in the UK population is only 1%, the authors of this study concluded that there is a direct proportion between the prevalence of hepatitis C and oral lichen planus.[9]

Limitations and Future Directions

Several limitations of the study should be acknowledged. Firstly, the retrospective observational design of the study limits the establishment of causality and the identification of temporal relationships between OLP and HCV infection. Secondly, the sample size may have been insufficient to detect small differences in prevalence rates and clinical characteristics between groups. Future research with larger prospective cohort studies is warranted to confirm these findings and explore additional factors influencing the association between OLP and HCV infection.

Conclusion

In conclusion, the present study provides evidence of an association between OLP and HCV infection, with patients with OLP exhibiting a higher prevalence of HCV infection compared to the general population. Although the exact mechanisms underlying this association remain unclear, these findings have important clinical implications for the management of both conditions. Further research is needed to elucidate the underlying pathophysiological mechanisms and develop targeted therapeutic strategies for affected individuals.

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