

Original Article

# Analysis of Correlation of Periodontal Disorders with Hepatitis C Virus Infection

Shagufta Shoukat<sup>1</sup>, Rehmatullah Kandhro<sup>2\*</sup>, Ali Asghar Jafferi<sup>3</sup>, Muhammad Gohar<sup>4</sup>, Kulsoom Brohi<sup>5</sup>, Amanullah Siddiqui<sup>6</sup>

<sup>1</sup>Community Dentistry Department, Liaquat University of Medical & Health Sciences Jamshoro-Sindh

<sup>2</sup>Community Dentistry Department, Liaquat University of Medical & Health Sciences Jamshoro-Sindh

<sup>3</sup>Lecturer, Community Dentistry Department, Dr Ishrat Ul Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences-Karachi-Sindh

<sup>4</sup>MDS Trainee, Community Dentistry Department, Dr Ishrat Ul Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences-Karachi-Sindh

<sup>5</sup>Physical Therapist, Dow Institute of Physical Medicine & Rehabilitation Department, Dow University of Health Sciences-Karachi-Sindh

<sup>6</sup>Assistant Professor, Oral Biology Department, Bhitai Dental & Medical College Mirpur Khas.

\*Corresponding Author: Rehmatullah Kandhro; Email: drjani34@gmail.com

**Conflict of Interest: None.**

Shoukat S., et al. (2024). 4(1): DOI: <https://doi.org/10.61919/jhrr.v4i1.336>

## ABSTRACT

**Background:** Periodontal disease is caused by pathological damage to periodontal tissues, evident through increased gingival sulcus depth and bleeding gums. Its etiology includes local factors such as plaque, calculus, cavities, and poor dental hygiene, as well as systemic causes like hormonal shifts, diabetes, and blood disorders.

**Objective:** This study aims to correlate periodontal disorders with Hepatitis C infection.

**Methods:** A descriptive cross-sectional study was conducted at the Institute of Dentistry, LUMHS Jamshoro. Two hundred participants were selected using non-probability convenient sampling, comprising 100 cases infected with the Hepatitis C virus and 100 controls without Hepatitis C. Data analysis was performed using SPSS version 26.0, employing Chi-square test.

**Results:** The Mean± SD of cases and controls was 41.7±7.31 and 40.9±5.6 years respectively ( $p=0.076$ ). Of the 100 cases, 57% were male and 43% female, while in the control group, 61% were male and 39% female. Seventy-one percent of cases reported not brushing their teeth. The frequency of brushing techniques such as straight, circular, and up-down motions was observed in 34% and 45%, 54% and 47%, & 12% and 8% of cases and controls, respectively ( $p=0.001$ ).

**Conclusion:** This study indicates a high prevalence of periodontal disease among individuals infected with Hepatitis C. Given the prevalence of Hepatitis C infection in the population, further research is recommended regarding the oral health of HCV-infected patients.

**Keywords:** Analysis, Dental hygiene, HCV infection, Oral health, Periodontal disorders, Periodontology, Public health.

## INTRODUCTION

Periodontal disease, characterized by increased gingival sulcus depth and bleeding gums, is often a result of local factors like plaque, calculus, cavities, and poor dental hygiene. However, it can also stem from systemic causes such as hormonal shifts, diabetes, and blood disorders (1, 2). This condition holds particular relevance for patients with liver disease, given the liver's critical role in metabolic functions and the synthesis of essential components like vitamin K. Among viral liver diseases, Hepatitis C Virus (HCV) infection stands out as a major global health issue, infecting approximately 170 million people annually and leading to around one million deaths due to its complications (3-5).

In Pakistan alone, HCV has affected ten million individuals, primarily due to a lack of public awareness about its transmission (6). Notably, the presence of HCV in saliva poses a significant risk for the disease (7, 8). Oral manifestations, such as hemorrhagic changes, petechiae, hematoma, jaundiced mucosal tissue, and gingival bleeding, can be indicators of liver dysfunction. Therefore, dentists play a crucial role in identifying these symptoms, particularly in patients with Hepatitis C, who may also be more susceptible to drug toxicity and increased bleeding (9-11).

Periodontal disease often remains unnoticed until it progresses to more severe stages, marked by symptoms like tooth loosening, bleeding during brushing, and discomfort. HCV-infected individuals face heightened risks of tooth loss, poor oral aesthetics, and

dietary challenges due to compromised oral health (12, 13). Various studies have underscored the diminished quality of life in HCV patients with poor periodontal health, highlighting the profound impact of Hepatitis C on the oral cavity (14, 15).

The objective of this study is to assess the periodontal health of HCV patients, aiming to enhance understanding and awareness of the link between dental hygiene and periodontal status in these individuals. This research is crucial at the community level for identifying the relationship between HCV and periodontal health, thereby aiding in the development of better health strategies. Ultimately, this study seeks to establish a clear correlation between periodontal disorders and Hepatitis C infection, providing valuable insights for healthcare professionals and patients alike.

## MATERIAL AND METHODS

This study, a descriptive cross-sectional analysis, was undertaken over six months at the Department of Dentistry, Liaquat University of Medical and Health Sciences, in both Jamshoro and Hyderabad. The recruitment of participants employed a non-probability consecutive sampling technique, focusing on individuals diagnosed with Hepatitis C. The study encompassed 200 subjects, with an age range of 20 to 60 years, who demonstrated a willingness to participate in the research. Inclusion criteria were stringent, requiring patients to practice good oral hygiene through regular brushing twice daily. Exclusions applied to those with mental handicaps, underlying medical illnesses, or diabetes.

Prior to data collection, ethical clearance was obtained from the university's Ethical Review Committee (ERC). The study cohort consisted of 200 patients, evenly divided into two groups: 100 individuals who tested positive for HCV, and 100 non-HCV patients, with diagnoses confirmed via ELISA testing. Both groups were evaluated for periodontal changes, using the Community Periodontal Index of Treatment Needs (CPITN) as recommended by the World Health Organization (WHO). Oral examinations adhered to WHO diagnostic criteria, utilizing a mouth mirror and the WHO-specified CPITN probe. To ensure consistency and prevent cross-contamination, each patient was examined by the same operator and examiner, with each using a freshly sanitized set of instruments.

For the data analysis, the Statistical Package for Social Sciences (SPSS) version 26 was employed. Simple descriptive statistics facilitated the calculation of the subjects' age and gender distribution. Continuous variables were analyzed using mean and standard deviation, while categorical variables were assessed through frequency and percentages. The study compared non-HCV and HCV patients in terms of gum problems' prevalence and patterns. To establish a correlation between periodontal disease and Hepatitis C infection, Spearman's tests were utilized, setting the significance threshold at 0.05.

## RESULTS

In this study, the sample comprised 200 subjects, evenly divided into 100 Hepatitis C positive cases and 100 controls, all assessed for periodontal diseases. The age distribution of both cases and controls is detailed in Table 1. The average age, represented as mean $\pm$ SD, was 41.7 $\pm$ 7.31 years for cases and 40.9 $\pm$ 5.6 years for controls, yielding a non-significant p-value of 0.076, which indicates that the subjects were well-matched in terms of age.

Gender distribution among the cases revealed that 57% were male and 43% were female, whereas in the control group, 61% were male and 39% were female, as depicted in Table 2. Notably, regular brushing habits were observed in 37% of cases and 63% of controls, as indicated in Graph 1. Graph 2 illustrates the timing of brushing habits, showing that a majority of the cases (79%) brushed for  $\leq$ 30 seconds. Interestingly, only one subject in the control group reported a brushing time of 5 minutes.

The frequency of brushing techniques, categorized as straight, circular, and up-down motions, was documented. In the case group, these techniques were used by 34%, 54%, and 12% of subjects, respectively, while in the control group, they were employed by 45%, 47%, and 8% of subjects, respectively. This difference was statistically significant ( $p=0.001$ ), as shown in Table 3.

The assessment of periodontal disorders, using the CPITN index, revealed significant differences between the Hepatitis C positive cases and controls ( $p=0.0001$ ), as detailed in Table 4. Only 30% of cases and 47% of controls had healthy periodontal tissues. Among the cases, 19% showed bleeding after probing, 21% had supra or subgingival calculus, 17% had 4-5 mm pockets, and 13% had  $\geq$ 6mm pockets.

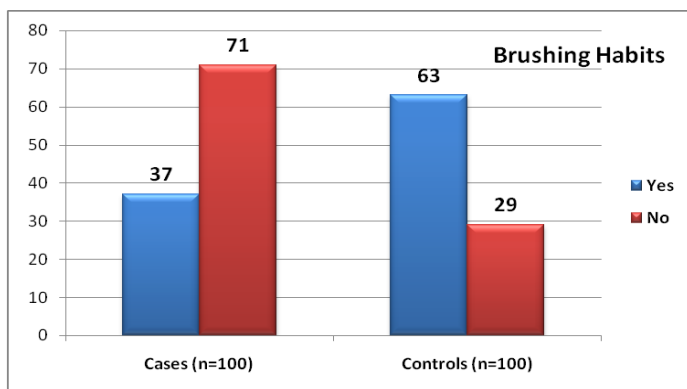
Finally, the correlation between periodontal disorder and Hepatitis C was examined using Spearman's rho correlation, as displayed in Table 4 and Scatter Graph 3. A strong correlation coefficient ("r-value") of 0.870 and a p-value of 0.000 indicated a significantly strong positive correlation between Hepatitis C positivity and periodontal disorders.

**Table 1. Age distribution of study population**

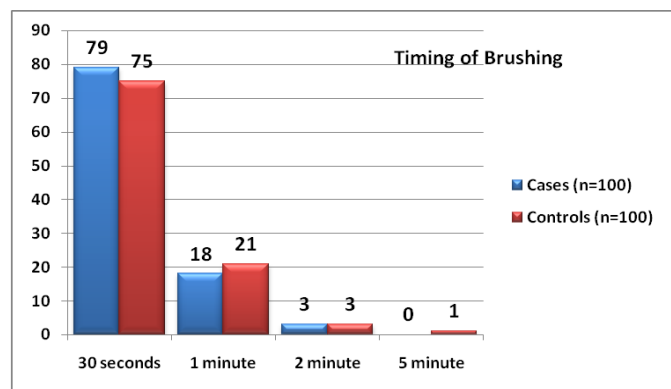
Age categories	Cases (n=100)	Controls (n=100)	p-value
20-29 years	11	13	0.076
30-39 years	27	11	
40-49 years	46	43	
50-59 years	13	26	
≥60 years	3	7	
Mean ±SD	41.7±7.31	40.9±5.6	

**Table 2: Gender distribution & Brushing habits of study subjects**

Gender	Cases (n=100)	Controls (n=100)
Male	57	61
Female	43	39
<b>Brushing habits</b>		
Yes	37	63
No	71	29



Graph 1. Brushing habits of study population



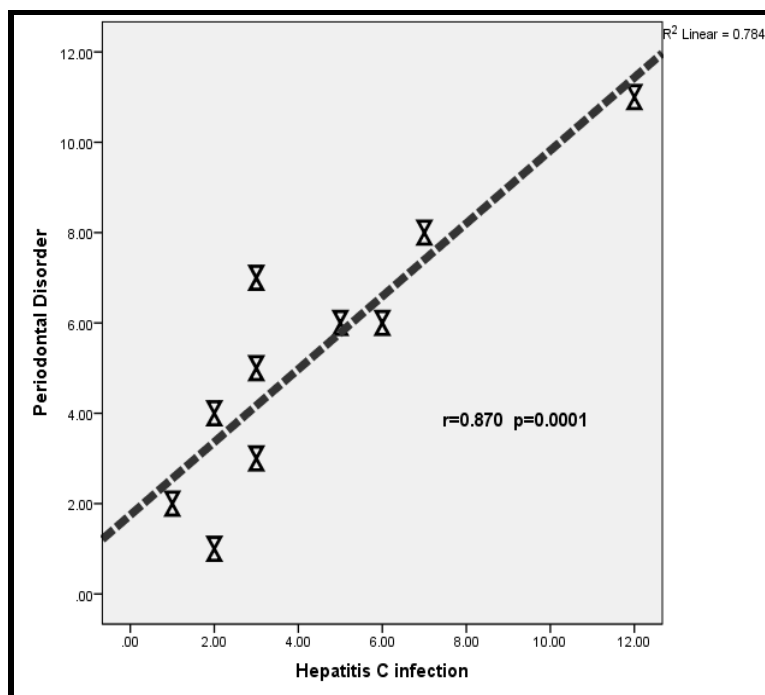
Graph 2. Timing of brushing of study population

**Table 3. Technique of brushing in study population**

	Cases (n=100)	Controls (n=100)	p-value
Straight	34	45	0.001
Circular	54	47	
Up down	12	8	

**Table 4. CPITN index noted in study population**

	Cases (n=100)	Controls (n=100)	p-value
0- Healthy Periodontal tissue	30	47	0.0001
1- Bleeding after gentle probing	19	27	
2- Supra- or subgingival calculus	21	19	
3- 4-5 mm Pocket	17	6	
4- ≥6 mm Pocket	13	1	



Graph 3. Spearman's rho correlation of Periodontal disorder with hepatitis C infection

## DISCUSSION

This study, conducted at the Dental Department of LUMHS in Jamshoro, aimed to compare the periodontal hygiene and abnormalities in Hepatitis C positive patients against healthy controls. The findings align with previous research, indicating that HCV positive cases are more susceptible to poor oral hygiene, periodontal disease, tooth decay, and overall compromised oral health (16-17). Chronic conditions like Hepatitis C infection are known risk factors for dental and oral diseases, exacerbated by weakened immune responses and diminished liver function. Notably, HCV infection and its treatment can impair salivary secretion, leading to dryness of oral tissues and xerostomia, further complicating oral health (18-20).

The study revealed a prevalence of oral health issues such as cheilitis, gingivitis, petechiae, mucosal bleeding, and tooth decay among HCV infected subjects, consistent with previous findings (21-22). Noble JS's study on periodontal disease in HCV and HBV positive subjects also supports these findings, highlighting the high frequency of periodontal disease in patients with detectable HCV in saliva (23).

In this study, the age and gender distribution of cases and controls were well-matched, with 57% males and 43% females in the cases, and 61% males and 39% females in the controls. Regular brushing habits were significantly less prevalent in cases (37%) compared to controls (63%). Most of the cases (79%) reported brushing for less than 30 seconds, indicating a lack of awareness and reluctance towards improving oral hygiene (24).

The study employed the Community Periodontal Index of Treatment Needs (CPITN), as recommended by WHO, to assess periodontal disorders, revealing a high prevalence of periodontal disease among HCV positive subjects (25). This significant difference in the CPITN index between cases and controls ( $p=0.0001$ ) was further supported by Spearman's rho correlation, showing a strong positive correlation between Hepatitis C positivity and periodontal disorders.

The study's strengths include its systematic approach and the use of the validated CPITN index for periodontal assessment. However, limitations include the potential for selection bias and the lack of longitudinal data to assess changes over time. Moreover, the study was limited to one geographical area, which may restrict the generalizability of the findings.

This research underscores the need for greater awareness and improved dental care facilities to address periodontal disorders, particularly in communities with high HCV prevalence. The study suggests that Hepatitis C may be a significant risk factor for periodontal disorders, echoing findings from an Australian study reporting a high frequency of tooth loss and poor periodontal hygiene in HCV-infected patients (20). The current findings, with 70% of HCV positive cases exhibiting periodontal disease compared to 53% in healthy controls ( $p=0.0001$ ), highlight the need for further research in this area. With the projected rise in HCV infection, local studies are crucial for improving oral health and hygiene practices in affected populations.

## CONCLUSION

The study concludes that there is a notably high prevalence of periodontal disease among individuals infected with Hepatitis C, with a strong positive correlation established between HCV infection and periodontal disorders. This finding highlights a significant public health concern, particularly in areas with prevalent HCV infection. The study underlines the challenges posed by inadequate awareness of oral hygiene practices and the disparities in dental care facilities. Given the widespread nature of Hepatitis C infection in the population studied, it becomes imperative to conduct further research focused on the oral health of HCV-infected patients. Such research is essential for developing targeted interventions to improve oral health outcomes in this vulnerable group.

## REFERENCES

1. French SW, Lee J, Zhong J, Morgan TR, Buslon V, Lungo W, French BA. Alcoholic liver disease-Hepatocellular carcinoma transformation. *J Gastrointest Oncol*. 2012;3:174-81.
2. Punjabi SK, Mehdi H, Rehman HU, Haider SM. High risk patients in minor oral surgery practice. *J Pak Dent Assoc*. 2011;20:39-42.
3. Ahmed A. Viral hepatitis affecting about 400 million people, with one third cases due to hepatitis C virus alone. [Internet]. 2011 Nov 28 [cited YYYY Mon DD].
4. Pan S, Rao Y, Li J, Yang H, Tang J, Zhong R, et al. Hepatitis C virus genotype diversity in Shanghai, China. *Arch Virol*. 2013;158:187-91.
5. Dominguez-Moreira S, Liena-Puy C. Gingival bleeding. *J Clin Exp Dent*. 2011;3:452-5.
6. Fadel HT. Studies on the Associations between Dental Caries, Periodontal Disease and Different Systemic Conditions. [Thesis]. Gothenburg, Sweden: Sahlgrenska Academy, University of Gothenburg; 2012.
7. Hugoson A, Sjödin B, Norderyd O. Trends over 30 years, 1973-2003, in the prevalence and severity of periodontal disease. *J Clin Periodontol*. 2008;35:405-14.
8. Löe H, Theilade E, Jensen SB. Experimental gingivitis in man. *J Periodontol*. 1965;36:177-87.
9. Van der Velden U, Abbas F, Armand S, Loos BG, Timmerman MF, Van der Weijden GA, Van Winkelhoff AJ, Winkel EG. Java project on periodontal diseases. *J Clin Periodontol*. 2006;33:540-8.
10. Paster BJ, Olsen I, Aas JA, Dewhirst FE. The breadth of bacterial diversity in the human periodontal pocket and other oral sites. *Periodontol 2000*. 2006;42:80-7.
11. Tonetti MS, Claffey N. Advances in the progression of periodontitis and proposal of definitions of a periodontitis case and disease progression for use in risk factor research. *J Clin Periodontol*. 2005;32 Suppl 6:210-3.
12. Schatzle M, Löe H, Ramseier CA, Burgin W, Anerud A, Boysen H, Lang NP. Clinical course of chronic periodontitis: Effect of lifelong light smoking on loss of attachment and teeth. *J Investigat Clin Dent*. 2010;8-15.
13. Kuo LC, Polson AM, Kang T. Associations between periodontal diseases and systemic diseases: A review of the inter-relationships and interactions with diabetes, respiratory diseases, cardiovascular diseases and osteoporosis. *Public Health*. 2008;122:417-33.
14. Khader YS, Dauod AS, El-Qaderi SS, Alkafajei A, Batayha WQ. Periodontal status of diabetics compared with nondiabetics: A meta-analysis. *J Diabetes Complications*. 2006;20:59-68.
15. Osztovis J. Autonomic nervous system functions in patients with chronic hepatitis C virus infection. [Ph.D Dissertation]. Budapest, Germany: Semmelweis University; 2011.
16. Averhoff FM, Glass N, Holtzman D. Global burden of Hepatitis C: Considerations for healthcare providers in the United States. *CID*. 2012;55(1):S10-15.
17. Qureshi H, Bile KM, Jooma R, Alam SE, Afridi HUR. Prevalence of hepatitis B and C viral infections in Pakistan: findings of a national survey appealing for effective prevention and control measures. *East Mediterr Health J*. 2010;16(1):S15-23.
18. Panov VE. Oral manifestations of hepatitis C virus. *J IMAB- Annu Proceeding (Sci Papers)*. 2013;19(4):377-9.
19. Coates EA, Brennan D, Logan RM, Goss AN, Scopacasa B, Spencer AJ, et al. Hepatitis C infection and associated oral health problems. *Aust Dent J*. 2000;45(2):108-14.
20. Australasian Society for HIV Medicine. Dental and orofacial health and hepatitis C. ASHM; 2012.
21. Carrozzo M. Oral diseases associated with hepatitis C virus infection. Part 1. sialadenitis and salivary glands lymphoma. *Oral Dis*. 2008 Mar;14(2):123-130.
22. Nobles J, Wold C, Fazekas-MayM, Gilbert J, Friedlander PL. Prevalence and epidemiology of hepatitis C virus in patients with squamous cell carcinoma of the head and neck. *Laryngoscope*. 2004;114(12):2119-22.

23. Sorensen HT, Friis S, Olsen JH, Thulstrup AM, Mellekjær L, Linet M, et al. Risk of liver and other types of cancer in patients with cirrhosis: a nationwide cohort study in Denmark. *Hepatology*. 1998 Oct;28:921–925.
24. Jaber MA, Porter SR, Bain L, Scully C. Lack of association between hepatitis C virus and oral epithelial dysplasia in British patients. *Int J Oral Maxillofac Surg*. 2003;32(2):181–183.
25. Alavian SM, Mahboobi N, Mahboobi N, Karayiannis P. Oral conditions associated with hepatitis C infection. *Saudi J Gastroenterol*. 2013;19(6):245–51.
26. Griffin SO, Barker LK, Griffin PM, Cleveland JL, Kohn W. Oral health needs among adults in the United States with chronic diseases. *J Am Dent Assoc*. 2009;140:1266–74.