THE RELATIONSHIP BETWEEN GINGIVITIS AND DEPRESSION IN ADULT FEMALE

ROHANA REHMAN[1], MUHAMMAD USMAN CHISHTI[2], ATIQ UR REHMAN[3], NOUSHEEN KHAN[4], MEHR-UN-NISA[5], NAIMA JABEEN[6]

[1]Assistant Professor, Multan Medical & Dental College, Multan, [2,5,6]Demonstrator, Multan Medical & Dental College, Multan, [3]Associate Professor, Gomal Medical College, Dera Ismail Khan, [4]Associate Professor, Multan Medical & Dental College, Multan,

ABSTRACT

Background: Gingivitis is a common and reversible inflammatory condition affecting gingival tissues, primarily initiated by plaque accumulation due to poor oral hygiene. Increasing evidence highlights its potential associations with systemic and psychological health conditions, including depression.

Objectives: To assess the association between gingivitis and depression, while also evaluating oral hygiene behaviors and dietary habits among adult female patients.

Methods: A cross-sectional, questionnaire-based study was conducted at the Department of Periodontics, Multan Medical and Dental College, over a period of four months. A total of 267 adult females aged 20–45 years were included using non-probability purposive sampling. Data on oral hygiene practices, depression scores, and gingivitis severity (using the Gingival Index) were collected. Statistical analysis was performed using SPSS version 22, with chi-square tests applied to assess associations between variables.

Results: The mean age of participants was 33.52 ± 6.78 years. Most were housewives (70.8%) and had low to medium education levels. Brushing once daily was the most reported habit (66.7%), while 80.5% of participants did not use dental floss. There was no significant association between brushing or flossing frequency and gingivitis severity ($p = 0.654$ and $p > 0.05$, respectively). Dietary analysis showed a highly significant association between snack intake and gingivitis, though soft drink intake showed no such link. Notably, 65.9% of participants exhibited some level of depression, and the Chi-square test revealed a statistically significant association between depression scores and gingivitis severity ($p = 0.020$), suggesting that as depressive symptoms increased, so did gingival inflammation.

Conclusion: This study confirms a significant association between depression and gingivitis among adult females, emphasizing the bidirectional connection between psychological well-being and oral health. Despite adequate awareness of brushing frequency, clinical signs of gingivitis persisted, indicating that frequency alone is not a reliable predictor of oral health. These findings support the need for integrated dental and mental health care strategies, particularly for women in Pakistan, to address the multifactorial nature of oral disease.

Key words: Gingivitis; Depression; Oral Hygiene; gingival Index.

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Correspondence to: *Rohana Rehman*
Assistant Professor In Oral Pathology,
Multan Medical and Dental College, Multan.

Email: *rohanakhan88@gmail.com*

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INTRODUCTION

Gingivitis is a worldwide common gum bleeding disorder affecting gingival tissues.[1] This is a reversible disease which is initiated by plaque accumulation on teeth and around gingival margins due to improper oral hygiene.[2] To notice gingivitis dentists uses gingival index which is a broadly accepted tool.[3] Many factors like poor oral hygiene, use of tobacco, hormonal

imbalance contribute to enhance bacterial colonization mainly porphyromonas gingivalis which initiates gingivitis by initiating immune responses.[4]

In Pakistan, recent epidemiological studies confirm the widespread prevalence of gingivitis. A 2023 cross-sectional study conducted at the District Headquarter (DHQ) Hospital in Landikotal, Khyber Pakhtunkhwa, reported that 44% of adult dental patients (>15 years) presented with clinical signs of gingivitis, compared to 38.3% with periodontitis.[5] Similarly, a study from Mirpurkhas found gingival bleeding in 39.1% of outpatient dental attendees, while the prevalence in the Rawalpindi Dental Institute was 35%.[6,7] These findings indicate that gingivitis remains a substantial public health concern in various regions of Pakistan.

Apart from local inflammatory effects, there is a close association of gingivitis with systemic conditions like diabetes, respiratory disorders and obesity which is increasing significantly.[8] Another research highlights connection between periodontal disease severity and cardiometabolic risk factors such as hypertension, elevated BMI, and advancing age.[9]

Among these systemic associations, the relationship between depression and gingival disease is gaining particular attention. Depression, a pervasive psychological disorder, adversely affects individual motivation, daily self-care routines, and health-seeking behavior. This often leads to poor oral hygiene, thereby increasing susceptibility to gingival inflammation and plaque accumulation.[10] Conversely, the discomfort and stigma associated with oral disease may contribute to or worsen psychological distress, potentially creating a bidirectional feedback loop.[11]

In the Pakistani context, a study at the Nishtar Institute of Dentistry in Multan reported that 65.8% of patients presenting with dental caries and periodontal disease exhibited symptoms of depression. This study emphasizes a significant psychosocial burden associated with oral conditions.[12] A study conducted by Folayan et al in 2021 proved an association between gingivitis and depression in adolescents of Nigerian population.[10]

Women may be particularly vulnerable due to intersecting hormonal changes, caregiving responsibilities, and limited access to preventive care. Given these interlinked physical and psychological health factors, this article aims to explore the association between gingivitis and depression, with a particular focus on adult women in Pakistan. By integrating global findings with local epidemiological data, this review underscores the need for interdisciplinary collaboration between dental and mental health professionals to develop comprehensive care strategies aimed at improving both oral and psychological well-being.

METHODS

A sample size of patient was 267 adult female who visited periodontics department of Multan medical and dental college. Female patients of 20 40 years were included in this research. Females of this age who came for scaling were asked to fill a questionnaire attached to proposal. Pregnant as well as females with other systemic diseases were excluded in this study. After evaluation of depression score patients were checked for gingivitis scoring. Gingival index GI) was used to evaluate the gingival tissue quality. Score 0-3 is given to each surface of tooth (mesial, distal, buccal and lingual).This index is for the area. GI score per tooth was calculated by adding value of all surfaces and dividing it by four. The GI for the subject was obtained by adding the indices of each tooth and dividing them into the number of teeth that were examined. Score 0 represent no bleeding. Score 1 represent mild bleeding on probing. Score 2 represent moderate bleeding and score 3 will represent severe bleeding.GI Score was calculated by a faculty member and was counter checked by senior most faculty member to omit any error. Patients were informed about the research purpose questionnaire filling and were assured of the confidentiality of collected information. All the data was entered and analyzed on SPSS version 22. The quantitative variables like age will be presented in mean and standard deviation were calculated. Qualitative variable like brushing, use of floss, dietary intake and occupation will be presented in percentage and frequency. All categorical and quantitative variables will be analyzed by chi square test. Relation of depression with gingivitis will be analyzed by chi-square test. Confidence interval will kept at 95%, and margin of error will be 5%, while p- value of < 0.005 % is considered significant. Patients were informed about the research project. Written Informed consent will be taken from all patients according to Helsinki declaration.[13]

RESULTS

The study included 267 adult female participants with ages ranging from 20 to 45 years (Mean = 33.52, SD = 6.78). Regarding occupation, the majority were housewives (70.8%), followed by job holders (12%), teachers (8.6%), and students (8.6%). Educational status varied. Education level was divided into 3 levels. 5^{th} to 10^{th} low level education, up to bachelor's medium level education, masters and PHD considered as high level education. Most participants were in low level education group 113 (42.3%).medium level education was seen in 97(36.3) participants while high level of education was completed by only 57 participants (21.3%). Chi square test reveals no significant association between education level and gingivitis.

Table 1.1Frequency and percentage of occupation

Occupation	Frequency	% age
House wives	189	70.8%
Teachers	23	8.6%
Jobians	32	12%
Students	23	8.6%

Table 1.2 Frequency and percentage of education level

Education level	Frequency	% age
Low education level	113	42.33%
Medium education level	97	36.34%
High education level	57	21.33%

Table 2.1 brushing frequency and its percentage

Brushing frequency	Patients	%age
Once	178	66.6%
Twice	74	27.7%
Thrice	4	1.4%
Occasionally	11	4.1%

Table 2.2flossing frequency and percentages

Flossing frequency	Patients	%age
never	215	80.5%
always	5	1.9%
Occasionally	47	17.6%

Brushing frequency among participants was predominantly once daily in 178 patients (66.6%), Occasional brushing was present in 11 patients (4.1%). 74 (27.7%). patents brush their teeth twice daily. And only 4 (1.4%) patents reported with thrice daily brushing. Frequencies also reported. Most participants 215 (80.5%) patients never did flossing while 47 patients (17.6%) occasionally floss their teeth and only 5 patients (1.9%) uses floss to clean their interdental spaces. According to chi-square test there is no association between gingivitis with frequency of brushing. P-value came out to be 0.65 which is insignificant. Same is the case for chi square test applied for frequency of flossing association with gingivitis came out to be insignificant.

Out of a total of 267 respondents, the majority (n = 213, 79.8%**)** reported consuming soft drinks "Sometimes"**.** A smaller portion (n = 34, 12.7%**)** indicated that they do "not at all" consume soft drinks. Only a few participants reported more frequent soft drink consumption**:** "Once" (n = 7, 2.6%**),** "Twice" (n = 7, 2.6%**)**, and "Thrice" (n = 6, 2.2%**).** The majority of participants (79.8%) reported that they sometimes snack. A smaller group (13.5**%**) said they do not snack at all. Only 6.7% of respondents reported that they always snack. This suggests that occasional snacking is the most common behavior in this group. According to chi square test association between soft drink intake and gingivitis is insignificant while there is highly significant association between snacks intake and gingivitis. Analysis of gingivitis severity across different brushing frequencies revealed no statistically significant association (χ^2 (9) = 6.84, p = 0.654). Participants who brushed once or twice daily exhibited varying levels of gingivitis, with moderate gingivitis being the most common across brushing frequencies.

Table 3.1 soft drink frequency and its percentage

Soft Drink frequency	No of patients	%age
not at all	34	12.72%
Sometimes	213	79.77%
Once	7	2.64%
Twice	7	2.64%
Thrice	6	2.24%

Table 3.2 snack intake frequency and its percentage

Snack intake frequency	No of patients	%age
not at all	36	13.48%
Sometimes	213	79.77%
Always	18	6.74%

Table 4.1 cross tabulation of gingivitis and depression (no of respondents = 267)

Depression level	Gingivitis score			
	No bleeding (0)	Mild bleeding (1)	Moderate bleeding (2)	Severe bleeding (3)
No depression	2	26	30	3
Minimal depression	1	24	79	3
Mild depression	0	12	53	4
Moderate depression	0	4	12	0
Moderately severe depression	0	2	6	1
Severe depression	1	1	4	0
Total	4	69	182	11

p value = 0.02

The Pearson Chi-Square test indicated a statistically significant association between depression and gingivitis severity (χ^2 (20) = 35.06, p = 0.020). This suggests that depression levels are related to the degree of gingival bleeding observed in this sample of adult females.

The depression scores ranged from no depression to severe depression, with the majority experiencing minimal (40.1%) or mild (25.8%) depression. Gingivitis severity was categorized based on bleeding on probing scores: no bleeding, mild, moderate, and severe.

A cross-tabulation between depression and gingivitis scores showed varying distributions. Notably, among participants with no depression, mild gingivitis (bleeding on probing) was reported in 26 cases, while moderate gingivitis was found in 29 cases. Among those with minimal depression, 24 had mild gingivitis and 79 had moderate gingivitis. Higher depression levels generally corresponded to fewer participants but showed presence across all gingivitis categories.

DISCUSSION

This study included 267 adult females aged between 20 and 45 years, with a mean age of 33.52 years (SD = 6.78). In comparison, a study by Buzinin et al. (2023) investigating the prevalence of gingivitis among Libyan females reported a slightly lower mean age of 29.59 years (SD = 6.82), suggesting demographic similarities in regional studies on oral health among women.

The majority of participants in the present study were housewives (70.8%). However, the association between occupation and gingivitis was found to be statistically insignificant (p = 0.06), indicating no meaningful relationship. This aligns with findings from Patil et al. (2018) in India, which showed a higher prevalence of gingivitis among homemakers and individuals with lower educational levels. Conversely, a study conducted in Germany by Ehlers et al. (2014) revealed that working women demonstrated better oral hygiene practices but were more prone to periodontal issues, possibly due to occupational stress. This disparity highlights the complex and context-dependent nature of the relationship between occupation and oral health, as well as the growing evidence supporting a bidirectional link between mental and oral health.

Despite theoretical expectations that higher education levels correlate with improved oral health due to greater health literacy and awareness, this study did not find a statistically significant association between education and gingivitis severity. This observation is consistent with findings by Petersen and Yamamoto (2005), who reported that while education may influence oral health knowledge and behaviors, it does not consistently translate into improved clinical outcomes, such as reduced gingival bleeding.

Oral hygiene practices were also evaluated, with 66.7% of participants reporting brushing once daily. However, brushing frequency did not show a statistically significant association with gingivitis severity (p = 0.065). This suggests that brushing frequency alone may not be an adequate predictor of periodontal health. Similar conclusions were drawn by Rehman et al. (2023), who observed that even among patients brushing twice daily—particularly those undergoing fixed orthodontic treatment—gingivitis was still prevalent. These findings underscore the importance of a comprehensive oral hygiene regimen that includes proper brushing technique, flossing, and possibly professional cleanings, rather than merely increasing brushing frequency.

A notable finding from this study was the high prevalence of depressive symptoms among participants, with 65.9% exhibiting some level of depression, ranging from minimal to severe. Concurrently, most participants showed clinical signs of gingivitis, with moderate gingival bleeding being the most common (68.2%). The association between depression and gingivitis was statistically significant (p = 0.020), indicating that higher levels of depressive symptoms were linked with increased severity of gingival inflammation. This finding is consistent with previous literature, including Folayan et al. (2021), who found a positive association between depression and gingivitis in adolescents, and Kareem et al. (2021), who reported high rates of depression among dental patients in Multan, Pakistan. These results support the hypothesis that psychological well-being plays a significant role in oral health and further advocate for the integration of mental health assessments in dental care settings.

LIMITATIONS

Several limitations should be acknowledged. The use of non-probability purposive sampling may limit the generalizability of results. Moreover, the cross-sectional nature of the study prevents any causal inference. Although the association is evident, it remains unclear whether depression leads to gingivitis or vice versa. Further longitudinal studies are needed to clarify the temporal sequence and directionality of this relationship.

Additionally, the depression assessment relied on questionnaire-based scoring, which, while practical for large samples, may not be as robust as clinical psychiatric evaluations. Factors such as dietary habits, hormonal status, and stress levels — known confounders in both depression and gingivitis — were not extensively controlled for.

CONCLUSION

This study demonstrates a statistically significant association between depression and gingivitis in middle-aged women in Pakistan. The findings highlight the need for interdisciplinary care and integrated screening protocols that include both oral and mental health

assessments. Addressing psychological well-being may be a vital component in managing and preventing periodontal disease, particularly in vulnerable female populations.

ETHICAL APPROVAL

Ethical approval of article was granted by the Institutional Review Board of Sahiwal Medical College vide reference No. 202IRB/SLMC/SWL dated 13 March, 2025.

AUTHOR'S CONTRIBUTIONS

RR: Conceived idea, manuscript writing, data collection
UC: Data collection, data analysis
AUR: Data interpretation, Sample size calculation
NK: Manuscript writing, proof reading
MUN: Data collection, critical review
NJ: Manuscript writing, data analysis
All Authors: Approval of the final version of the manuscript to be published

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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