RESEARCH PAPER

Observational Study of Oral Hygiene Practices, Periodontal Status, and Dental Caries Experience Among Adults in an Urban Community

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ABSTRACT

Background: Oral hygiene practices play an important role in maintaining periodontal health and preventing dental caries among adults. Inadequate plaque control, irregular dental visits, tobacco use, and poor interdental cleaning habits may contribute to gingival inflammation, periodontal destruction, and increased dental caries experience. Assessment of oral hygiene behavior along with clinical oral health status is important for planning preventive strategies in urban communities.

Aim: The aim of the present study was to assess oral hygiene practices, periodontal status, and dental caries experience among adults attending a tertiary care hospital in an urban community.

Materials and Methods: This observational study was conducted among 115 adult participants attending a tertiary care hospital. Participants were selected using a convenient sampling method. Data were collected using a structured questionnaire and clinical oral examination. Oral hygiene practices assessed included brushing frequency, type of cleaning aid, toothbrush replacement, interdental cleaning, mouthwash use, tobacco use, and dental visit pattern. Periodontal status was evaluated using clinical parameters such as plaque accumulation, bleeding on probing, calculus deposits, periodontal pocket depth, clinical attachment loss, and overall periodontal condition. Dental caries experience was assessed using the Decayed, Missing, and Filled Teeth index. Data were entered in Microsoft Excel and analyzed using IBM SPSS Statistics version 27.0. Descriptive statistics were expressed as frequency, percentage, mean, and standard deviation. Associations were assessed using appropriate statistical tests, and a p-value of less than 0.05 was considered statistically significant.

Results: Among 115 participants, the highest proportion belonged to the 31–45 years age group, 41 (35.65%), and males constituted 62 (53.91%). Brushing once daily was reported by 69 participants (60.00%), while only 27 (23.48%) practiced interdental cleaning. Moderate to severe plaque accumulation was observed in 72 participants (62.61%), bleeding on probing in 64 (55.65%), and calculus deposits in 71 (61.74%). Overall, 70 participants (60.87%) had moderate gingivitis or periodontitis. Dental caries experience was present in 76 participants (66.09%). Brushing frequency, interdental cleaning, tobacco use, and dental visit pattern showed statistically significant associations with periodontal disease and dental caries experience.

Conclusion: The study revealed a high burden of periodontal problems and dental caries among adults. Poor oral hygiene practices, tobacco use, and irregular dental visits were significantly associated with adverse oral health outcomes, emphasizing the need for preventive oral health education and routine dental care

Keywords: Oral hygiene practices; Periodontal status; Dental caries; DMFT index; Urban adults.

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INTRODUCTION

Oral health is an essential component of general health, functional well-being, nutrition, communication, appearance, and quality of life. In adults, poor oral health can affect chewing efficiency, speech, social confidence, work productivity, and overall health-seeking behavior.

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Oral diseases are largely preventable, yet they continue to remain common because of inadequate oral hygiene practices, high sugar exposure, tobacco use, limited preventive dental visits, and delayed treatment-seeking. In urban communities, changes in diet, lifestyle, occupational routine, stress, and dependence on symptomatic dental care may further increase the risk of plaque accumulation, periodontal inflammation, and dental caries. Therefore, assessment of oral hygiene practices, periodontal status, and dental caries experience among adults is important for identifying disease patterns and planning preventive oral health strategies.[1] Dental plaque is one of the key biological factors linking oral hygiene behavior with both dental caries and periodontal disease. When plaque is not adequately removed through regular brushing and interdental cleaning, it can act as a reservoir for microorganisms and their metabolic products. In the presence of fermentable carbohydrates, acid production by cariogenic bacteria contributes to enamel demineralization and caries initiation. Similarly, plaque accumulation near the gingival margin can initiate gingival inflammation and, if persistent, may progress toward periodontal tissue destruction in susceptible individuals. Thus, oral hygiene behavior is not only a personal habit but also an important determinant of oral disease prevention.[2] Dental caries is a multifactorial disease influenced by tooth susceptibility, microbial biofilm, dietary sugar exposure, saliva, fluoride availability, socioeconomic background, and oral hygiene practices. Although commonly perceived as a childhood disease, caries continues throughout adulthood and may affect coronal surfaces as well as exposed root surfaces, particularly with increasing age and gingival recession. Untreated caries can lead to pain, food lodgment, difficulty in mastication, pulpal involvement, infection, and eventual tooth loss. The Decayed, Missing, and Filled Teeth index remains one of the most widely used epidemiological measures to assess cumulative caries experience in adult populations.[3] Periodontal disease represents another major public health concern among adults. It includes a spectrum of conditions ranging from reversible gingivitis to irreversible periodontitis involving periodontal pocket formation, clinical attachment loss, alveolar bone destruction, tooth mobility, and tooth loss. Periodontal disease develops through complex interactions between microbial dysbiosis and host inflammatory response. Poor plaque control, calculus deposits, tobacco use, systemic conditions, advancing age, and irregular dental attendance are important contributors to periodontal breakdown. Clinical assessment of plaque, bleeding on probing, calculus, pocket depth, and attachment loss provides useful information regarding periodontal health and treatment needs.[4] Oral hygiene practices vary widely among adults and are shaped by education, awareness, affordability, cultural habits, availability of oral hygiene aids, and previous dental experiences. Brushing frequency, brushing technique, type of dentifrice, toothbrush replacement, interdental cleaning, tongue cleaning, use of mouthwash, and professional oral prophylaxis are important parameters for evaluating oral hygiene behavior. Brushing with fluoride toothpaste remains central to caries prevention, but brushing alone may not adequately clean interproximal areas. Interdental cleaning aids such as dental floss and interdental brushes help remove plaque from areas that are difficult to reach with a toothbrush and may contribute to better periodontal maintenance.[5] Urban adults may have better physical access to dental facilities than rural populations, but access alone does not ensure regular utilization of preventive care. Many adults seek dental treatment only when pain, swelling, mobility, or functional difficulty occurs. Such symptom-oriented attendance can result in delayed diagnosis, progression of dental caries, advanced periodontal involvement, and greater need for invasive treatment. Preventive dental visits allow early detection of carious lesions, professional plaque and calculus removal, counseling for tobacco cessation, dietary advice, reinforcement of oral hygiene practices, and risk-based recall planning. Hence, dental visit pattern is an important behavioral indicator in oral health assessment.[6] Tobacco use is a major modifiable risk factor affecting oral and periodontal health. Both smoking and smokeless tobacco can influence gingival tissues, alter host response, impair healing, contribute to staining and calculus accumulation, and increase the risk of periodontal destruction. In addition, tobacco-related habits may coexist with poor oral hygiene, high-risk dietary patterns, and reduced preventive dental attendance. Assessment of tobacco use in adult oral health studies is therefore necessary, particularly in community and hospital-based settings, because it provides insight into behavioral risk clustering and helps guide targeted preventive counseling.

MATERIALS AND METHODS

This observational study was conducted among adults attending a tertiary care hospital in an urban community. The study was designed to assess oral hygiene practices, periodontal status, and dental caries experience among the study participants. A hospital-based observational approach was used to obtain clinical and behavioral information without introducing any intervention. A total of 115 adult participants were included in the study. Participants were selected from individuals visiting the outpatient department of the tertiary care hospital. Adults who were willing to participate and provided informed consent were included. Participants with a history of recent periodontal therapy, ongoing orthodontic treatment, systemic conditions severely affecting oral health assessment, or those who were unwilling to undergo oral examination were excluded from the study

METHODOLOGY

A convenient sampling method was used to recruit eligible participants from the tertiary care hospital. Participants who fulfilled the inclusion criteria were enrolled until the required sample size of 115 was achieved. Each participant was informed about the purpose of the study before data collection. Data were collected using a structured questionnaire and clinical oral examination. The questionnaire included information on sociodemographic

details and oral hygiene practices, including frequency of tooth brushing, type of cleaning aid used, use of toothpaste, interdental cleaning practices, mouth rinse use, tobacco habits, dietary sugar exposure, frequency of dental visits, and reason for the last dental visit. Clinical examination was carried out under adequate illumination using standard diagnostic instruments.

Assessment of Oral Hygiene Practices: Oral hygiene practices were assessed based on self-reported responses from the participants. Parameters included brushing frequency, brushing technique, duration of brushing, type of toothbrush used, frequency of toothbrush replacement, use of fluoridated toothpaste, use of dental floss or interdental brushes, tongue cleaning habit, mouthwash use, and history of professional oral prophylaxis. These parameters were recorded to evaluate the pattern and adequacy of oral hygiene behavior among the participants.

Assessment of Periodontal Status: Periodontal status was assessed clinically using standard periodontal examination parameters. The parameters included gingival condition, presence of bleeding on probing, plaque accumulation, calculus deposits, periodontal pocket depth, clinical attachment loss, and tooth mobility where applicable. Periodontal findings were recorded using a periodontal probe, and the overall periodontal condition of each participant was categorized based on clinical signs of gingival inflammation and periodontal destruction.

Assessment of Dental Caries Experience: Dental caries experience was assessed using the Decayed, Missing, and Filled Teeth index. The number of decayed teeth, missing teeth due to caries, and filled teeth were recorded for each participant. The total DMFT score was calculated by adding the decayed, missing, and filled components. Dental caries was diagnosed clinically based on visible cavitation, softened enamel or dentin, and evidence of restoration or tooth loss due to caries.

Clinical Examination: All participants underwent an intraoral examination by a trained dental examiner. The examination included assessment of teeth, gingiva, periodontal tissues, oral hygiene status, and caries experience. Disposable mouth mirrors, periodontal probes, explorers, tweezers, and gloves were used during examination. Infection control measures were followed throughout the procedure.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 27.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the data. The association between oral hygiene practices, periodontal status, and dental caries experience was assessed using appropriate statistical tests such as the Chi-square test, independent t-test, or analysis of variance where applicable. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The present observational study included a total of 115 adult participants attending a tertiary care hospital in an urban community.

Table 1 shows the sociodemographic distribution of the study participants. The highest proportion of participants belonged to the 31–45 years age group, with 41 participants (35.65%), followed by 32 participants (27.83%) in the 18–30 years age group. Participants aged 46–60 years accounted for 28 (24.35%), while those above 60 years formed the smallest group, with 14 participants (12.17%). Males were slightly more represented than females, with 62 males (53.91%) and 53 females (46.09%). Regarding education, 42 participants (36.52%) were graduates and above, 39 (33.91%) had education up to secondary level, and 34 (29.57%) had higher secondary education. Tobacco use was reported by 36 participants (31.30%), while 79 participants (68.70%) did not report tobacco use.

Table 2 describes the oral hygiene practices among the participants. Most participants, 69 (60.00%), reported brushing once daily, while 46 (40.00%) brushed twice or more daily. Toothbrush and toothpaste were the most commonly used cleaning aids, reported by 101 participants (87.83%), whereas 14 participants (12.17%) used other aids. Toothbrush replacement within three months was reported by 48 participants (41.74%), while 67 participants (58.26%) replaced their toothbrush after more than three months. Interdental cleaning practices were low, with only 27 participants (23.48%) reporting use of interdental cleaning aids, while 88 participants (76.52%) did not use them. Mouthwash use was also limited, with 22 participants (19.13%) reporting its use. Regular dental visits were reported by only 31 participants (26.96%), whereas 84 participants (73.04%) visited the dentist irregularly or only when symptomatic.

Table 3 presents the periodontal status of the study participants. Moderate to severe plaque accumulation was observed in 72 participants (62.61%), while 43 participants (37.39%) had absent or mild plaque accumulation. Bleeding on probing was present in 64 participants (55.65%), indicating gingival inflammation, while it was absent in 51 participants (44.35%). Calculus deposits were present in 71 participants (61.74%) and absent in 44 participants (38.26%). Periodontal pocket depth of less than 4 mm was seen in 78 participants (67.83%), while 37 participants (32.17%) had pocket depth of 4 mm or more. Clinical attachment loss was present in 34 participants (29.57%) and absent in 81 participants (70.43%). Overall, 70 participants (60.87%) had moderate gingivitis or periodontitis, while 45 participants (39.13%) had healthy periodontal status or mild gingivitis.

Table 4 shows the dental caries experience among the study participants. Dental caries experience was present in 76 participants (66.09%), while 39 participants (33.91%) had no caries experience. Decayed teeth were found in 68 participants (59.13%), whereas 47 participants (40.87%) had no decayed teeth. Missing teeth due to caries were present in 31 participants (26.96%), while 84 participants (73.04%) had no missing teeth due to caries. Filled teeth were reported in 24 participants (20.87%), while 91

participants (79.13%) had no filled teeth. Based on DMFT score, 39 participants (33.91%) had a score of 0, 48 participants (41.74%) had a score between 1 and 3, and 28 participants (24.35%) had a DMFT score greater than 3.

Table 5 shows the association of oral hygiene practices with periodontal disease and dental caries experience. Among participants who brushed once daily, periodontal disease was present in 49 participants (71.01%) and dental caries was present in 52 participants (75.36%). In comparison, among those who brushed twice or more daily, periodontal disease was seen in 21 participants (45.65%) and dental caries in 24 participants (52.17%). This association was statistically significant with a p-value of 0.018. Participants who did not use interdental cleaning aids showed higher periodontal disease, 60 participants (68.18%), and higher dental caries experience, 64 participants (72.73%), compared to those who used interdental aids, where periodontal disease and dental caries were observed in 10 value was 0.006.

(37.04%) and 12 (44.44%) participants, respectively. This association was statistically significant with a p-value of 0.009.

Tobacco use was also significantly associated with poor oral health outcomes. Among tobacco users, periodontal disease was present in 28 participants (77.78%) and dental caries in 27 participants (75.00%), compared with non-users, among whom periodontal disease was present in 42 participants (53.16%) and dental caries in 49 participants (62.03%). The association was statistically significant with a p-value of 0.021. Dental visit pattern also showed a statistically significant association with oral health status. Participants with irregular or symptom-based dental visits had higher periodontal disease, 58 participants (69.05%), and higher dental caries experience, 62 participants (73.81%), compared to those who visited the dentist regularly, among whom periodontal disease and dental caries were seen in 12 (38.71%) and 14 (45.16%) participants, respectively. The p-

Table 1: Sociodemographic distribution of study participants

Variable	Category	Frequency (n=115)	Percentage (%)
Age group	18–30 years	32	27.83
	31–45 years	41	35.65
	46–60 years	28	24.35
	>60 years	14	12.17
Gender	Male	62	53.91
	Female	53	46.09
Education	Up to secondary	39	33.91
	Higher secondary	34	29.57
	Graduate and above	42	36.52
Tobacco use	Present	36	31.30
	Absent	79	68.70

Table 2: Oral hygiene practices among study participants

Oral hygiene practice	Category	Frequency (n=115)	Percentage (%)
Frequency of brushing	Once daily	69	60.00
	Twice or more daily	46	40.00
Type of cleaning aid	Toothbrush and toothpaste	101	87.83
	Other aids	14	12.17
Toothbrush replacement	≤3 months	48	41.74
	>3 months	67	58.26
Interdental cleaning	Yes	27	23.48
	No	88	76.52
Mouthwash use	Yes	22	19.13
	No	93	80.87

Dental visit pattern	Regular	31	26.96
	Irregular/only when symptomatic	84	73.04

Table 3: Periodontal status of study participants

Periodontal parameter	Category	Frequency (n=115)	Percentage (%)
Plaque accumulation	Absent/mild	43	37.39
	Moderate/severe	72	62.61
Bleeding on probing	Present	64	55.65
	Absent	51	44.35
Calculus deposits	Present	71	61.74
	Absent	44	38.26
Periodontal pocket depth	<4 mm	78	67.83
	≥4 mm	37	32.17
Clinical attachment loss	Present	34	29.57
	Absent	81	70.43
Overall periodontal status	Healthy/mild gingivitis	45	39.13
	Moderate gingivitis/periodontitis	70	60.87

Table 4: Dental caries experience among study participants

Dental caries parameter	Category	Frequency (n=115)	Percentage (%)
Dental caries experience	Present	76	66.09
	Absent	39	33.91
Decayed teeth	Present	68	59.13
	Absent	47	40.87
Missing teeth due to caries	Present	31	26.96
	Absent	84	73.04
Filled teeth	Present	24	20.87
	Absent	91	79.13
DMFT score	0	39	33.91
	1–3	48	41.74
	>3	28	24.35

Table 5: Association of oral hygiene practices with periodontal status and dental caries experience

Variable	Category	Periodontal disease present n (%)	Dental caries present n (%)	p-value
Brushing frequency	Once daily (n=69)	49 (71.01)	52 (75.36)	0.018
	Twice or more daily (n=46)	21 (45.65)	24 (52.17)	
Interdental cleaning	Yes (n=27)	10 (37.04)	12 (44.44)	0.009
	No (n=88)	60 (68.18)	64 (72.73)	
Tobacco use	Present (n=36)	28 (77.78)	27 (75.00)	0.021
	Absent (n=79)	42 (53.16)	49 (62.03)	
Dental visit pattern	Regular (n=31)	12 (38.71)	14 (45.16)	0.006
	Irregular/symptomatic (n=84)	58 (69.05)	62 (73.81)	

DISCUSSION

The present study showed that the largest proportion of participants belonged to the 31–45 years age group, 41 (35.65%), followed by 18–30 years, 32 (27.83%), suggesting that the study population mainly represented young and middle-aged adults. Males were slightly higher, 62 (53.91%), than females, 53 (46.09%). This pattern is comparable with the study by Handa et al. (2016), in which adult oral health status was assessed in Gurgaon district and a considerable burden of oral disease was reported across adult age groups. In their study, dental caries was present in 44.90% of the population and periodontal disease in 65.00%, while the present study showed a higher dental caries experience of 66.09% and a comparable overall periodontal disease burden of 60.87%. The slightly higher caries experience in the present study may be due to hospital-based sampling, where patients attending a tertiary care hospital may have higher existing treatment needs.[7]

In the present study, 36 participants (31.30%) reported tobacco use, while 79 (68.70%) did not report tobacco use. This finding is important because tobacco is a recognized behavioral risk factor for periodontal destruction and poor oral health outcomes. Malakar et al. (2021), in an epidemiological study from Kancheepuram district, reported that periodontal disease was widely prevalent, with 50.00% of participants having gingivitis and 36.00% having periodontitis, while only 14.00% had no periodontal disease. In comparison, the present study showed that 60.87% of participants had moderate gingivitis or periodontitis, which is lower than the combined gingivitis and periodontitis burden reported by Malakar et al., but still indicates a high level of periodontal morbidity among urban adults.[8]

Regarding brushing practices, the present study found that 69 participants (60.00%) brushed once daily and 46 (40.00%) brushed twice or more daily. This indicates that once-daily brushing was still the dominant practice among the study participants. Oberoi et al. (2014) also reported that brushing once daily was the most common practice among patients attending a dental institution in New Delhi, with 54.80% brushing once daily. The proportion of once-daily brushing in the present study was slightly higher than that reported by Oberoi et al., while twice-daily brushing was comparatively lower, suggesting a continued need for oral health education emphasizing brushing twice daily with proper technique.[9]

Toothbrush and toothpaste were the most commonly used cleaning aids in the present study, reported by 101 participants (87.83%), while only 14 (12.17%) used other aids. However, adjunctive oral hygiene practices were poor, as only 27 participants (23.48%) used interdental cleaning aids and only 22 (19.13%) used mouthwash. Similar findings were reported by Kim et al. (2022), who analyzed 11,614 Korean adults and found that non-use of dental floss and interdental brushes was associated with significantly higher odds of periodontitis; participants not using dental floss had an adjusted odds ratio of 1.41 and those not using interdental brushes had an adjusted odds ratio of 1.16 for periodontitis. The present study also supports this association, as participants who did not use interdental aids had higher periodontal disease, 60 (68.18%), compared with interdental aid users, 10 (37.04%).[10]

The periodontal findings in the present study showed that moderate to severe plaque accumulation was present in 72 participants (62.61%), bleeding on probing in 64 (55.65%), calculus deposits in 71 (61.74%), periodontal pocket depth ≥4 mm in 37 (32.17%), and clinical attachment loss in 34 (29.57%). Janakiram et al. (2020), in a systematic review and meta-analysis on periodontal disease among Indian adults, highlighted that periodontal disease is highly prevalent in India, with gingival bleeding and calculus being among the common periodontal findings. The present study is in agreement with this national pattern, as calculus deposits and bleeding on probing were seen in more than half of the participants, indicating that plaque-retentive factors and gingival inflammation remain major contributors to poor periodontal status.[11]

Dental caries experience was present in 76 participants (66.09%) in the present study, while 39 (33.91%) had no caries experience. Decayed teeth were present in 68 participants (59.13%), missing teeth due to caries in 31 (26.96%), and filled teeth in only 24 (20.87%). Pandey et al. (2021), in a systematic review on dental caries in the Indian population, reported an overall dental caries prevalence of 54.16%, with age-specific prevalence of 62.00% among individuals above 18 years. The present study showed a slightly higher caries experience of 66.09%, which may be attributed to the tertiary care hospital setting and possible delayed dental attendance among the participants.[12]

The DMFT distribution in the present study showed that 39 participants (33.91%) had a DMFT score of 0, 48 (41.74%) had a score of 1–3, and 28 (24.35%) had a score greater than 3. This indicates that nearly two-thirds of the participants had some degree of cumulative caries experience. Patro et al. (2008), in an urban resettlement colony of New Delhi, reported dental caries prevalence of 82.40% among adults and 91.90% among elderly participants. Compared with Patro et al., the present study showed a lower caries experience of 66.09%, which may be due to differences in age composition, as only 12.17% of participants in the present study were above 60 years, whereas caries burden tends to increase with age due to cumulative exposure and tooth retention patterns.[13]

The present study found a statistically significant association between brushing frequency and oral health outcomes, with periodontal disease present in 49 participants (71.01%) and dental caries in 52 (75.36%) among those brushing once daily, compared with 21 (45.65%) and 24 (52.17%) respectively among those brushing twice or more daily; this association was statistically significant with a p-value of 0.018. Akhionbare et al. (2016), in a study of 894 adults, reported that 58.30% brushed twice daily and that frequency of brushing was significantly associated with periodontal status, with once-daily brushers showing more periodontal pockets. The present study supports this observation, as twice-daily

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brushing was associated with lower periodontal disease and lower caries experience.[14]

Tobacco use and dental visit pattern were also significantly associated with poor oral health outcomes in the present study. Among tobacco users, periodontal disease was present in 28 (77.78%) and dental caries in 27 (75.00%), compared with 42 (53.16%) and 49 (62.03%) among non-users, with a p-value of 0.021. Similarly, participants with irregular or symptom-based dental visits had higher periodontal disease, 58 (69.05%), and higher dental caries, 62 (73.81%), compared with regular dental visitors, with a p-value of 0.006. Beklen et al. (2022), in a large study of 7028 patients, reported that smoking significantly influenced periodontal disease severity and DMFT values, with $p<0.001$, and former smokers showed high severe periodontal disease levels, including PS3 in 29.70% and PS4 in 18.90%, with a mean DMFT of 16.4 ± 7.4. The present study is consistent with these findings and reinforces that tobacco use and delayed dental attendance are important modifiable risk factors for both periodontal disease and dental caries.[15]

CONCLUSION

The present observational study showed that inadequate oral hygiene practices were common among adults attending a tertiary care hospital in an urban community. A high proportion of participants had plaque accumulation, bleeding on probing, calculus deposits, periodontal disease, and dental caries experience. Poor oral hygiene habits, lack of interdental cleaning, tobacco use, and irregular dental visits were significantly associated with poorer periodontal status and higher dental caries experience. The findings emphasize the need for regular oral health education, promotion of twice-daily brushing, interdental cleaning, tobacco cessation counseling, and routine preventive dental visits

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