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Original Research Article

Impact of tooth wear on oral health symptoms and quality of life: a population-based study

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ABSTRACT

Background: Tooth wear is an increasingly prevalent oral health condition with a multifactorial etiology, affecting functional performance as well as psychological and social well-being. The aim of the study was to determine the prevalence of tooth wear, identify associated behavioral risk factors, and assess its impact on oral health–related quality of life (OHRQoL).

Methods: A cross-sectional study was conducted at the dental unit of Chattogram Maa-O-Shishu Hospital Medical College between July and November 2025. A total of 150 patients attending the outpatient department were recruited. Data were collected using structured interviewer-administered questionnaires covering sociodemographic characteristics, oral health behaviors, clinical symptoms, and OHRQoL indicators. Statistical analyses were performed using SPSS version 25. Chi-square tests and logistic regression analyses were applied to evaluate associations between tooth wear and potential risk factors.

Results: The prevalence of tooth wear among participants was 85.3%. Significant associations were observed between tooth wear and aggressive tooth brushing ($p<0.001$), betel nut chewing (OR=3.54, $p=0.013$), and clenching or grinding of teeth ($p=0.031$). Participants with tooth wear reported significantly greater difficulties in social interaction ($p=0.028$), smiling or laughing ($p=0.047$), and performing major work activities ($p=0.003$) compared to those with no or minimal wear. Localized tooth sensitivity (70.6%) and fractured teeth (50.0%) were the most commonly reported clinical conditions.

Conclusions: Tooth wear was highly prevalent and had a significant negative impact on functional and psychosocial aspects of OHRQoL. Aggressive tooth brushing and betel nut chewing emerged as key modifiable risk factors, underscoring the need for targeted preventive strategies and early behavioral interventions.

Keywords: Tooth wear, Oral health, Quality of life

INTRODUCTION

Tooth wear, understood as the non-carious, progressive loss of dental hard tissue, has been increasingly recognized as a global public health concern owing to its multifactorial nature and its significant consequences for oral function and quality of life.[1] It results from three basic mechanisms- attrition, erosion, and abrasion- that pertain to pathological wear when they exceed physiological limits.[2] Although generally considered an age factor, there is burgeoning evidence that marked or rapidly progressing wear can contribute to profound functional and aesthetic, even psychosocial, detriments with clear implications for daily living.[3] Worldwide estimates suggest that up to 75% of adults have some degree of tooth wear, of which about 7.5% are severe.[4] This increasing trend seems to be related to a change in dietary habits, high consumption of acidic drinks, and, especially, parafunctions like bruxism, combined with improper oral hygiene habits.[5] Particularly alarming is the increase in severe tooth wear among the young, in whom early-onset disease often signifies aggressive disease and significant long-term effects.[6]

Apart from its clinical manifestations, tooth wear has a significant impact on Oral Health Related Quality of Life (OHRQoL), which is a broad concept that encompasses functional ability, psychological well-being, and social interaction.[7] There are reports that individuals with severe tooth wear have impairments to their OHRQoL comparable to completely edentulous patients.[8] Functional impacts common in tooth wear patients include difficulties with chewing and speech, as well as changes in dental aesthetics, while psychological consequences may be in the form of low self-esteem, social embarrassment, and avoidance of interpersonal interaction.[9] The risk factors for tooth wear are varied and interact in complex ways. Dietary exposure to acidic beverages remains a major contributor, since low-pH drinks demineralize enamel and increase susceptibility to surface loss. Gastroesophageal reflux disease (GERD) is another well-established intrinsic factor, the gastric acid resulting in characteristic erosive changes, particularly on palatal tooth surfaces. Behavioral habits such as aggressive brushing-perhaps especially following acid exposure-further compound wear processes, emphasizing the role of oral hygiene techniques in disease progression. Bruxism, associated with psychological stress and sleep disturbances, is also recognized as a major cause of attritional wear due to repeated occlusal loading. More specific to South Asian groups are the risks associated with betel nut chewing, prominent in Bangladesh, India, Pakistan, and Myanmar. In addition to its well-documented links with oral malignancies and mucosal conditions, betel nut contributes to tooth wear both mechanically and chemically.[3] Due to its very culturally ingrained nature, it is thus harder to quit, which also calls for culturally sensitive public health approaches.

Despite this, tooth wear is recognized globally as a major oral health problem, while population-based studies assessing its prevalence and quality-of-life impacts remain surprisingly limited in resource-constrained settings. Understandably, because of the variable nature of access to dental healthcare in Bangladesh and various cultural risk behaviors, estimating the burden of tooth wear is important to guide both preventive and therapeutic efforts. Therefore, the objectives of the present study were to measure the prevalence of tooth wear, investigate its main behavioral determinants, and describe its impact on oral symptoms and overall quality of life in dental patients. The goal was to inform clinical practice and public health initiatives targeting the reduction of tooth wear and its greater consequences in South Asian populations.

METHODS

Study design

This was a cross-sectional observational study conducted at Chattogram Maa-O-Shishu Hospital Medical College (Dental Unit) from July to November 2025. A convenience sample of 150 adults attending the outpatient departments was recruited.

Inclusion and exclusion criteria

Eligible participants included those who were aged 11 years or older, had at least one natural tooth, had effective communication, and gave verbal informed consent. Those who were completely edentulous, had cognitive impairment, systemic conditions that affect tooth wear, acute dental emergencies, or refused to participate, were excluded from the study.

Data collection

Data were collected by means of an interviewer-administered structured questionnaire that was specially developed for this study. The instrument covered sociodemographic information, oral health habits, clinical symptoms, functional problems, and perceived impact on daily life. A pre-testing of the questionnaire was carried out before its administration and revised for better clarity, cultural appropriateness, and logical sequencing. Although the participants initially received the questionnaire for self-completion, most preferred to respond verbally; thus, the data collection process administered the questionnaires directly to them to ensure that the data collected were uniform and accurate. The completed responses were rigorously edited, numerically coded, and cross-checked with the original entries for quality control.

Statistical analysis

The data analyses used SPSS version 25.0 and Microsoft Excel. Means, frequencies, and percentages described key variables, while chi-square tests examined the association of tooth wear with selected behavioral, clinical, and quality-of-life parameters. Logistic regression tests were used to predict independent predictors of tooth wear and the functional and psychosocial consequences of this condition, with statistical significance accepted at $p<0.05$.

Ethical consideration

The aim and objective of the study were explained to the participants in easily understandable local language. Ethical considerations were taken into account, ensuring that participants were fully informed regarding the study procedures, assured of confidentiality, and provided informed verbal consent before participation.

RESULTS

Table 1 shows a slight male predominance (54.7% males vs. 45.3% females). Age distribution shows that the age groups 31-40 years have 26%, 41-50 years (24.7%), 51-60 years (20.7%), and 21-30 years (17.3%), while only a small percentage fell into the youngest (11-20 years, 1.3%) and oldest (≥ 71 years, 2.0%). Occupation consisted of private sector employment (31.3%), followed closely by unemployment (26.0%), business (23.3%), smaller representation by government jobs (6.7%), and students, consisting of 8.0%. Higher secondary education or above

was found in almost half of the sample (48.7%), while secondary and primary education made up 29.3% and 18.0%, respectively, and only 4.0% were reported as illiterate.

Table 1: Sociodemographic characteristics of participants (n=150).

Variables	Category	N (%)
Gender	Male	82 (54.7)
	Female	68 (45.3)
Age group (years)	11-20	2 (1.3)
	21-30	26 (17.3)
	31-40	39 (26.0)
	41-50	37 (24.7)
	51-60	31 (20.7)
	61-70	12 (8.0)
	≥71	3 (2.0)
Occupation	Student	12 (8.0)
	Business	35 (23.3)
	Private job	47 (31.3)
	Govt. job	10 (6.7)
	Unemployed	39 (26.0)
	Others	7 (4.7)
Education	Primary	27 (18.0)
	Secondary	44 (29.3)
	Higher secondary and above	73 (48.7)

Table 2 depicts that the prevalence of tooth wear was high, with 85.3% of the participants having some degree of tooth wear, indicating this as a very common condition in this population. Traditional toothbrush use was most prevalent (49.3%), though reasonably high proportions used finger (20.7%), miswak (8.7%), or other methods (14.7%), while 6.7% reported no cleaning method. Aggressive brushing behavior, representing the main behavioral risk factor, was reported by 60.7% of participants. Carbonated drink consumption had a wide variation, with 35.3% reporting none, while 26.7% consumed a single can per week, 22.7% consumed ≤1 liter, and 15.3% consumed >1 liter per week. Swilling drinks with the mouth was done by 37.3%. The prevalence of betel nut/leaf chewing was high at 52.7%. Smoking was reported by 36.7%. Gastroesophageal symptoms were common, with only 14.7% reporting no heartburn, and others reported a variety of frequencies.

Table 3 demonstrates that oral conditions have a considerable variation of impacts on daily life, in which the most common impact was moderate effect (25.3%), followed by fairly severe (20.7%), very severe (17.3%), fairly minor (17.3%), and very minor (14.0%), while only 4.7% of the respondents reported no effect. Physical pain: Half the participants 50.0% reported no physical pain, while others experienced jaw pain 32.7%, headache 15.3%, or neck pain 2.0%. Specific oral conditions causing them difficulty were tooth sensitivity 70.6%, yellowish teeth 47.3%, fractured tooth 50%, lack of tooth function 43.3%, toothache 40.6%, loss of tooth 38.6%, and tooth decay 36.6%. Activities that are most impaired with oral conditions were eating 61.3%, followed by socializing 52.6%, smiling/laughing/showing teeth 51.3%, relaxing 46%, becoming upset 32%, performing major work 24.6%, speaking clearly 23.3%, and sleeping 20%.

Table 2: Oral health behaviors and habits.

Variables	Category	N (%)
Tooth wear	Yes	128 (85.3)
	No	22 (14.7)
Brushing methods	Toothbrush	74 (49.3)
	Finger	31 (20.7)
	Miswak	13 (8.7)
	Other	22 (14.7)
	None	10 (6.7)
Aggressive brushing	Yes	91 (60.7)
	No	59 (39.3)
Carbonated drink intake (weekly)	None	53 (35.3)
	A single can	40 (26.7)
	≤1 l	34 (22.7)
	>1 l	23 (15.3)
Swilling drinks	Yes	56 (37.3)
	No	94 (62.7)
Betel nut/leaf chewing	Yes	79 (52.7)
	No	71 (47.3)
Smoking	Yes	55 (36.7)
	No	95 (63.3)
Heartburn frequency	Daily/nearly daily	28 (18.7)
	3-4 times/week	24 (16.0)
	1-2 times/week	28 (18.7)
	1-2 times/month	29 (19.3)
	<1/month	19 (12.7)
	None	22 (14.7)
Acidic taste	≥Daily	15 (10.0)
	3-4 times/week	19 (12.7)
	1-2 times/week	21 (14.0)
	1-2 times/month	39 (26.0)
	<1/month	27 (18.0)
	Can't say	29 (19.3)
Clenching/grinding	Daily	36 (24.0)
	3-4 times/week	28 (18.7)
	1-2 times/week	28 (18.7)
	1-2 times/month	15 (10.0)
	<1/month	25 (16.7)
	Can't say	18 (12.0)

Figure 1 illustrates that the duration of oral problems was relatively evenly distributed across time periods, with the most common being 1-2 months at 21.3%, followed by 5 days to 1 month at 18.7%, and ≤5 days at 18.7%. This means that about 58.7% had experienced problems for less than two months. Chronic conditions lasting 2-3 months affected 17.3%, while 16.0% reported problems lasting beyond 3 months. Quite importantly, 8.0% of participants were unable to estimate the duration of their problems, which may reflect either intermittent symptoms or ignorance about symptom onset.

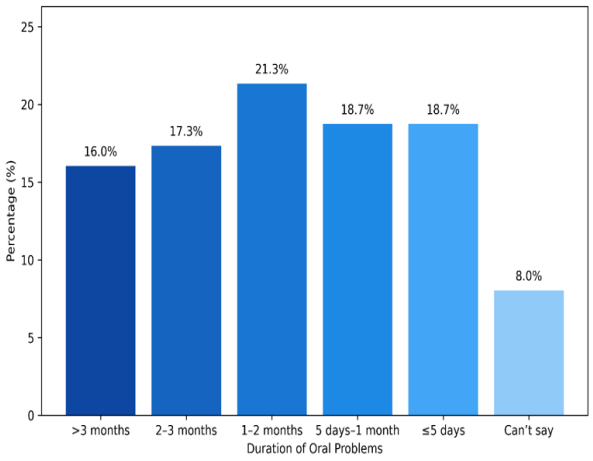

Figure 1: Duration of oral problems.

Table 3: Oral symptoms and functional complaints.

Variables	Category	N (%)
Effect on daily life	No effect	7 (4.7)
	Very minor	21 (14.0)
	Fairly minor	26 (17.3)
	Moderate	38 (25.3)
	Fairly severe	31 (20.7)
	Very severe	26 (17.3)
	Cannot say	1 (0.7)
Physical pain	None	75 (50.0)
	Jaw pain	49 (32.7)
	Headache	23 (15.3)
	Neck pain	3 (2.0)
Oral conditions causing difficulty	Toothache	61 (40.6)
	Sensitive tooth	106 (70.6)
	Tooth decay	55 (36.6)
	Fractured tooth	75 (50)
	Loss of a tooth	58 (38.6)
	Lack of tooth function	65 (43.3)
	Yellowish teeth	71 (47.3)
Activities most impacted	Eating	92 (61.3)
	Speaking clearly	35 (23.3)
	Sleeping	30 (20)
	Relaxing	69 (46)
	Smiling/laughing/showing teeth	77 (51.3)
	Becoming upset	48 (32)
	Performing major work	37 (24.6)
	Socializing	79 (52.6)

Table 4: Association between tooth wear and oral health behaviors.

Variables	χ^2	df	P value
Aggressive brushing	34.03	1	<0.001
Swilling drinks	5.22	1	0.022
Cleaning method	5.97	4	0.201
Betel nut/leaf chewing	6.67	1	0.01
Smoking	0.86	1	0.354
Clenching/grinding	12.27	5	0.031

Table 4 revealed a number of significant associations between tooth wear and oral health behaviors. The strongest association was aggressive brushing, χ^2=34.03, p<0.001, indicating vigorous brushing practices are strongly associated with the development of tooth wear. Similarly, betel nut/leaf chewing showed a strong association, χ^2=6.67, p=0.010, confirming it as a risk factor in this population. There was a significant association of clenching/grinding, χ^2=12.27, p=0.031, which suggests that parafunctional habits contribute to wear patterns. Swilling drinks was significantly associated, χ^2=5.22, p=0.022, likely reflecting the prolonged contact of acids with tooth surfaces.

Table 5: Association between tooth wear and symptoms/quality-of-life indicators.

Variables	χ^2	df	P value
Smiling, laughing or showing teeth without embarrassment	3.93	1	0.047
Socializing difficulty	4.85	1	0.028
Toothache	5.65	1	0.018
Tooth sensitivity	4.87	1	0.027
Fractured tooth	5.37	1	0.020
Tooth decay	1.97	1	0.160
Carrying out major work	8.88	1	0.003
Relaxing	0.27	1	0.604

Table 5 shows significant relations between tooth wear and several quality-of-life dimensions. Psychosocial effects included associations of tooth wear with difficulty smiling, laughing, or showing teeth (χ^2=3.93, p=0.047) and socializing difficulty (χ^2=4.85, p=0.028), reflecting large effects on social self-confidence and social interactions. With respect to oral symptoms, significant associations were observed for toothache (χ^2=5.65, p=0.018), tooth sensitivity (χ^2=4.87, p=0.027), and fractured tooth (χ^2=5.37, p=0.020). Functional effects were strong, with tooth wear associated with difficulty undertaking major work (χ^2=8.88, p=0.003).

Table 6: Logistic regression models predicting outcomes- predictors of tooth wear.

Variables	OR	P value
Aggressive brushing	1.52	<0.001
Carbonated drinks (Within 1 l)	1.187	0.800
Carbonated drinks (More than 1 l)	1.633	0.551
Swilling drinks	0.35	0.026
Betel nut chewing	3.54	0.013
Smoking	0.65	0.357
Betelnut	3.539	0.013

Table 6 reveals several risk factors for tooth wear. Aggressive brushing demonstrated the strongest

association-OR 1.52, p<0.001-and confirmed it as a major modifiable risk factor. Betel nut chewing emerged as a significant predictor 3.54, p=0.013-indicating that betel nut chewers are more than three times as likely to develop wear. Swilling drinks revealed a protective effect-OR 0.35, p=0.026-which seems counterintuitive but perhaps reflects that swillers are more likely to be careful with all aspects of oral hygiene, or may swill with water after drinking acid. Carbonated drinks showed nonsignificant associations regardless of volume≤1 l: or 1.187, p=0.800; >1 l: or 1.633, p=0.551-suggesting that frequency may well be more important than volume. Table 7 quantified the impact of tooth wear on several dimensions of quality of life. Most notably, it had a strong impact on difficulty undertaking major work (OR=2.29, p=0.003). Socializing presented difficulty and was significantly associated (OR=2.74, p=0.032), which is indicative of how tooth wear impairs social contact and self-confidence. The effects that approached significance included difficulty smiling/laughing (OR=2.59, p=0.053), indicative of borderline impact on facial expression and social confidence, and becoming more upset (OR=3.43, p=0.057), suggesting potential psychological distress.

Table 7: Logistic regression models predicting outcomes- predictors of tooth wear.

Outcomes	OR	P value
Difficulty carrying out major work	2.29	0.003
Difficulty smiling/laughing	2.59	0.053
Difficulty socializing	2.74	0.032
Becoming more upset	3.43	0.057

DISCUSSION

This study demonstrates robust evidence on the high prevalence and multidimensional impact of tooth wear on oral health and quality of life among dental patients. The 85.3% prevalence of tooth wear in this sample is higher than reports by Kanaan et al and Masood et al.[12,13] The high prevalence in our study could be considered to reflect cultural habits like betel nut chewing and the clinical nature of the sample; persons seeking dental care may already be in more advanced dental conditions. The age distribution indicates that middle-aged adults aged 31-60 years were predominantly affected, in line with Ahmed et al. that the age-related increase in tooth wear is well established.[14] However, notable levels among younger adults indicate that the need for early preventive strategies cannot be underestimated.

Behavioral factors identified in the study make a significant contribution to etiological pathways. Thus, aggressive brushing was significantly associated with tooth wear (OR=1.52, p<0.001), in line with Oudkrek et al that heavy-tooth brushing mechanically abrades the enamel, particularly when combined with abrasive toothpaste formulations.[15] This suggests targeted education in proper brushing practice is warranted. The habit of betel nut chewing turned out to be one of the major risk factors for tooth wear (OR=3.54, p=0.013), confirming that this factor links with the abrasive and chemical nature of the mixture containing areca nut and slaked lime.[16] In our study, a high prevalence (52.7%) points to wider cultural practice in Bangladesh, reinforcing literature about its deep roots in sociocultural behaviors and relating it to oral health risks.[17,18] Parafunctional habits, notably clenching and grinding, proved to be significantly related to tooth wear (χ^2=12.27, p=0.031), supporting that bruxism is a strong mechanical factor in occlusal wear.[19] Gastroesophageal reflux symptoms concurrently experienced by respondents indicate interaction of mechanical attrition with acid-mediated erosion, a combination known to accelerate tooth wear.[20] Carbonated drink consumption did not show an independent association in regression analysis, but its association with swilling behavior (p=0.022) suggests that behavioral aspects in beverage consumption, particularly time-based acid exposure, may prove more relevant to tooth wear than the quantity consumed alone.[21]

A study by Buzalaf et al supports low-pH beverages as sources of erosive actions and illustrates erosive challenges being enhanced when combined with mechanical abrasion or bruxism.[22] Our study showed significant effects on oral health-related quality of life; participants with tooth wear reported significant problems with daily functioning, in particular those regarding eating (61.3%), smiling or laughing (51.3%), and socializing (52.6%), Zelig et al indicating the link of tooth wear to decreased OHRQoL in several dimensions.[23] Using the OHIP conceptual framework, such problems can be mapped across domains of psychological discomfort, functional limitation, physical disability, and social disability. Strong associations with embarrassment when smiling (p=0.047) and difficulties in social interaction (p=0.028) are consistent with prior research indicating the influence of dental appearance on psychological well-being and self-esteem.[24]

The near-significant association between tooth wear and reported upsets (OR=3.43, p=0.057) reflects further psychological distress attributed to oral conditions. Other functional consequences included that highly significant Dentin wear was associated with difficulty undertaking major work (OR=2.29, p=0.003), pointing to the occupational and resultant economic implications.[25] Other clinical features include hypersensitivity attributed to the dentin exposure of 70.6%, fractured teeth of 50%, which therefore indicates the physiological burden of advanced wear. These conditions often need complex restorative management, and, as such, point out the importance of early detection and prevention.

Limitations

Convenience sampling from dental institution limits generalizability, while the cross-sectional, self-reported nature of the data introduces potential recall and selection

biases. Clinical grading of the severity of tooth wear was not done; thus, correlating specific wear patterns with impacts on the quality of life is restricted.

CONCLUSION

This study demonstrated a very high prevalence of tooth wear among dental patients, which was strongly associated with modifiable behavioral factors like aggressive brushing, betel nut chewing, and parafunctional clenching or grinding. Tooth wear subjects had significant functional impairment in the form of increased sensitivity and fractured teeth, which negatively impacted daily activities and social interactions. Significant psychosocial consequences of this condition included reduced confidence in smiling and difficulties in socializing. These results emphasize that tooth wear is not only a clinical problem but also an important determinant of oral health-related quality of life. Early prevention, behavioral counseling, and timely intervention are thus of utmost importance to prevent its consequences as long-term as possible.

Recommendations

Future studies should employ population-based sampling and longitudinal designs to monitor the progression of tooth wear and the effectiveness of preventive interventions at the regional level, tailored to behavioral and cultural practices.

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