

Research Article**Clinical Evaluation of Tooth Wear and Its Associated Risk Factors in Patients Attending a Tertiary Care Hospital in Multan**

Amara Nazir*, Dr Javeria Afzal, Dr Faisal Asghar, Iqra Ejaz, Dr Tajalla Malik, Syeda Laraib Fatima

¹Associate Professor Operative Dentistry, Bakhtawar Amin Medical and Dental College, Multan, amarafaisal1234@gmail.com

²Associate professor Community Dentistry, Bakhtawar Amin Medical and Dental College, Multan, dr.javeriaafzal@yahoo.com

³Assistant Professor Oral Medicine, Multan Medical and Dental College, Multan, faisalmmdc@gmail.com

⁴Assistant Professor Oral Biology Department, College of Dentistry, Bakhtawar Amin Medical and Dental College, Multan, iqraejaz094@gmail.com

⁵House Officer, Bakhtawar Amin Medical and Dental Hospital, Multan, tajallamalik@gmail.com

⁶House Officer, Bakhtawar Amin Medical and Dental Hospital, Multan, fatimasslaraib@gmail.com

Corresponding Author: Amara Nazir, Associate Professor Operative Dentistry, Bakhtawar Amin Medical and Dental College, Multan, amarafaisal1234@gmail.com

ABSTRACT

Background: Tooth wear is an increasingly recognized oral health concern influenced by mechanical, chemical, and behavioral factors. **Objective:** To clinically evaluate the prevalence, patterns, and severity of tooth wear and to identify associated risk factors among patients attending a tertiary care hospital. **Methods:** This descriptive cross-sectional study was conducted at Bakhtawar Amin Medical and Dental College Multan from December 2024 till June 2025, included 225 patients aged 18 years and above. The evaluation of demographic factors, the habits of behavior, the systemic conditions, and the tooth wear patterns was done using structured questionnaire and standardized clinical examination. A validated tooth wear index was used to record the severity. **Results:** Evidence of wear of teeth was observed in 148 patients (65.8 percent). The highest percentage of wear was mild (36.4 percent), moderate (22.7 percent), and

severe wear (6.7 percent). The most common was the attrition (40.9 percent), which was strongly related to bruxism ($p < 0.001$). Erosion (30.2 percent) was significantly correlated with the intake of acidic beverages ($p = 0.002$) and gastroesophageal reflux disease ($p = 0.001$). Abrasion (19.6 percent) and abfraction (12 percent) were associated with rough brushing and destructive habits in the mouth. Age was found to be significantly correlated to wear severity ($p < 0.001$). **Conclusion:** Tooth wear is very common among patients in a tertiary care hospital and has been induced by a conglomerate of behavioral, dietary, systemic, and age related. Early detection of the risky population, prophylaxis, and treatment of adjustable habits and systemic states is vital to reducing the progression and subsequent complications.

Keywords: Tooth wear, Worldwide, Clinical, Patients, Health

INTRODUCTION

Tooth wear has unobtrusively evolved to be among such underestimated clinical issues that continue to emerge in dental practices all over the globe, and, frankly, it should receive significantly greater levels of attention than it does [1]. The patients might come to the clinic and believe that they are simply experiencing a bit of the light tooth wear, but the personnel know about the potential complications and outcomes in case the conditions are not treated [2]. Without the treatment of tooth wear, the patients can lose the ability to chew (since some foods can become unchewable), develop hypersensitivity because of the bare dentin, and even other complications because of altered position of teeth (in dentistry, this is referred to as occlusion) that can be difficult to manage and thus necessitate professional (restorative) dentistry [3]. These reasons suggest that the condition should not be overlooked and it is a concern to the population health. The most irritating thing is that there is no universal route of the condition. Although others are of more quickened state, it may be the outcome of an assorted mechanical, chemical and behavioral interplay of the factors [4]. On the global scene, it is approximated that it has been on the rise in the past few decades, and this is the result of the change in life style which has led to prevalence of tooth surface wear. The current patients are taking more acidic drinks, processed foods and energy drinks [5]. Enamel is more eroded faster and may cause a faster loss in hypersensitivity and loss of chewing ability. Behavioral habits like clenching and bruxism may deteriorate the condition. There are other habits that might appear to be innocuous, yet deteriorate the state of the tooth wear to an even more severe extent [6]. Though it seems like that the wear on the teeth has a gravitational attraction. It is more organized where it ought to

have been more dynamic. This is more complex [7] in the case of low- and medium-income countries. Several people have low awareness of the early signs of wear and people will ignore dental visits until pain symptoms are inescapable [8]. There are many factors that shape the clinical tabature with cultural dietary looms and the more common use of some traditional foods alongside varying access to dental care [9]. Tertiary care hospitals, by their nature, are referral point of gain significant notice of the true scope of tooth wear severity and the singular behavioural and/or environmental factors that lead to it in the local people. Because of the advanced degree of so many risk factors, these institutions may have the most complex cases [10]. TW prevalence is increasing globally as a result of changes in diet, modified lifestyles, and lack of awareness [9, 10]. In literature, the prevalence of tooth wear in the United Kingdom is reported as 29% [11], Germany as 23.4% [12], Brazil as 38.2% [13], Indonesia as 23% [14], and Jordan as 51% [15]. TW is reported to have a multifactorial etiology where identification of risk factors and implementation of related preventive strategies are keystones in management [1-6]. Although studies have been conducted on the Pakistani population highlighting the prevalence of TW the causative factors associated with TW have not been explored much specifically in the population of Karachi [16-18].

Objective

To clinically evaluate the prevalence, patterns, and severity of tooth wear and to identify associated risk factors among patients attending a tertiary care hospital.

Methodology

This descriptive cross-sectional study was

conducted at Bakhtawer Amin Medical and Dental College Multan from December 2024 till June 2025. The study involved 225 patients. Sample size was calculated using WHO calculator, prevalence of 65.8% was taken from Pakistani literature, with a 95% confidence level and an absolute precision of 6.2%, yielding a sample size of 225 participants [18]. The non-probability consecutive sampling method was employed in this study and all the potential patients who came to the study at any time during the study period were contacted and sampled until the sample size was reached.

Inclusion Criteria

- Patients aged 18 years or older.
- Offers natural dentition in one or more arches.
- Gave informed consent to take part and was thoroughly examined by the investigator intraorally

Exclusion Criteria

- A history of significant restorative rehabilitation that might obscure natural wear patterns including full crowns, onlays, veneers, or fixed prosthodontics.
- Suffers congenital anomalies of the dentures which influence the structure of the enamel.
- She was brought to the clinic with active carious lesions which considerably blocked tooth surfaces.
- Had inadequate or insufficient teeth to wear out.

Data Collection

Each patient underwent a structured interview and detailed clinical examination following a planned interview and clinical examination to document findings concomitantly with possible behavioral

and/or medical risk factors. The interview focused on the following patient characteristics: age, sex, dietary patterns with emphasis on the use of acid-containing beverages, occurrence of parafunctional habits (e.g., bruxism, nail biting), occupational exposure, cigarette smoking, systemic medical disease (e.g., gastroesophageal reflux disease), and use of medications that are capable of reducing saliva flow. The assessment of clinical findings under predetermined standardized lighting conditions that required the use of a mouth mirror and dental probe. The examiner utilized a specific gradation index to document the presence and distribution of tooth wear to a determined degree and to some degree the attrition, abrasion, erosion, and abfraction. Visual documentation of findings to a degree that allows post examination comparison and/or auditing. The severity of wear was classified, based on parameters of an accepted tooth wear index. Wear facets, dentin exposure, cupping, and lesions along the margin were documented. Both the anterior and posterior sextants were part of the exam to guarantee adequate representation.

Statistical Analysis

Data were entered and analyzed using SPSS v26.0. Descriptive statistics, including means, standard deviations, and frequencies, were used to summarize demographic and clinical variables. Associations between tooth wear and potential risk factors were evaluated using chi-square tests for categorical variables and independent sample t-tests or ANOVA for continuous variables, where appropriate. A p-value of <0.05 was considered statistically significant.

Results

A total of 255 patients were used in data collection, the mean of the total population was

36.8 $\pm$ 12.4 years, and 32.9 percent of the total population fell within the 18-30 years (n = 74), 42.7 percent within 31-50 years (n = 96), and 24.4 percent of the population above 50 years (n = 55). The proportion of males was 53.8 percent (n = 121) and the percentage of females was 46.2 percent (n = 104). Most of the patients came to the clinic with regular dental treatment (58.7 percent, n = 132), and 41.3 percent (n = 93) patients claimed to have sensitivity or aesthetics as the reason to visit the clinic. They were behavioral

and clinical features such as smoking (25.8 percent, n = 58), self-reported bruxism (33.8 percent, n = 76) and often taking acidic drinks (39.5 percent, n = 89). These patients included 14.2 percent with gastroesophageal reflux disease (n = 32), 8 percent with xerostomia (n = 18) and 11.6 percent with occupational particulate exposure (n = 26).

Table 1. Baseline Characteristics of the Study Population (n = 225)

Variable	Mean $\pm$ SD / n (%)
Age (years)	36.8 $\pm$ 12.4
Age Groups	
• 18–30 years	74 (32.9%)
• 31–50 years	96 (42.7%)
• >50 years	55 (24.4%)
Gender	
• Male	121 (53.8%)
• Female	104 (46.2%)
Reason for Visit	
• Routine dental care	132 (58.7%)
• Sensitivity/aesthetic concern	93 (41.3%)
Smoking	58 (25.8%)
Bruxism (self-reported)	76 (33.8%)
Acidic beverage intake $\geq$ 3/week	89 (39.5%)
GERD	32 (14.2%)
Xerostomia	18 (8.0%)
Occupational particulate exposure	26 (11.6%)

A total of 148 out of 225 patients (65.8 percent) exhibited clinically evident tooth wear. Mild wear was the most common severity level, recorded in 36.4 percent (n = 82), followed by moderate wear in 22.7 percent (n = 51) and severe wear in 6.7 percent (n = 15). Dentin exposure, indicating more advanced wear, was identified in 21.8 percent of patients (n = 49). Regarding distribution patterns, localized wear was observed in 57.4 percent of the

cases (n = 85), whereas generalized wear was present in 42.6 percent (n = 63). Assessment of wear types showed that attrition was the most prevalent, found in 40.9 percent (n = 92), followed by erosion in 30.2 percent (n = 68), abrasion in 19.6 percent (n = 44), and abfraction in 12 percent (n = 27).

Table 2. Prevalence of Tooth Wear (n = 225)

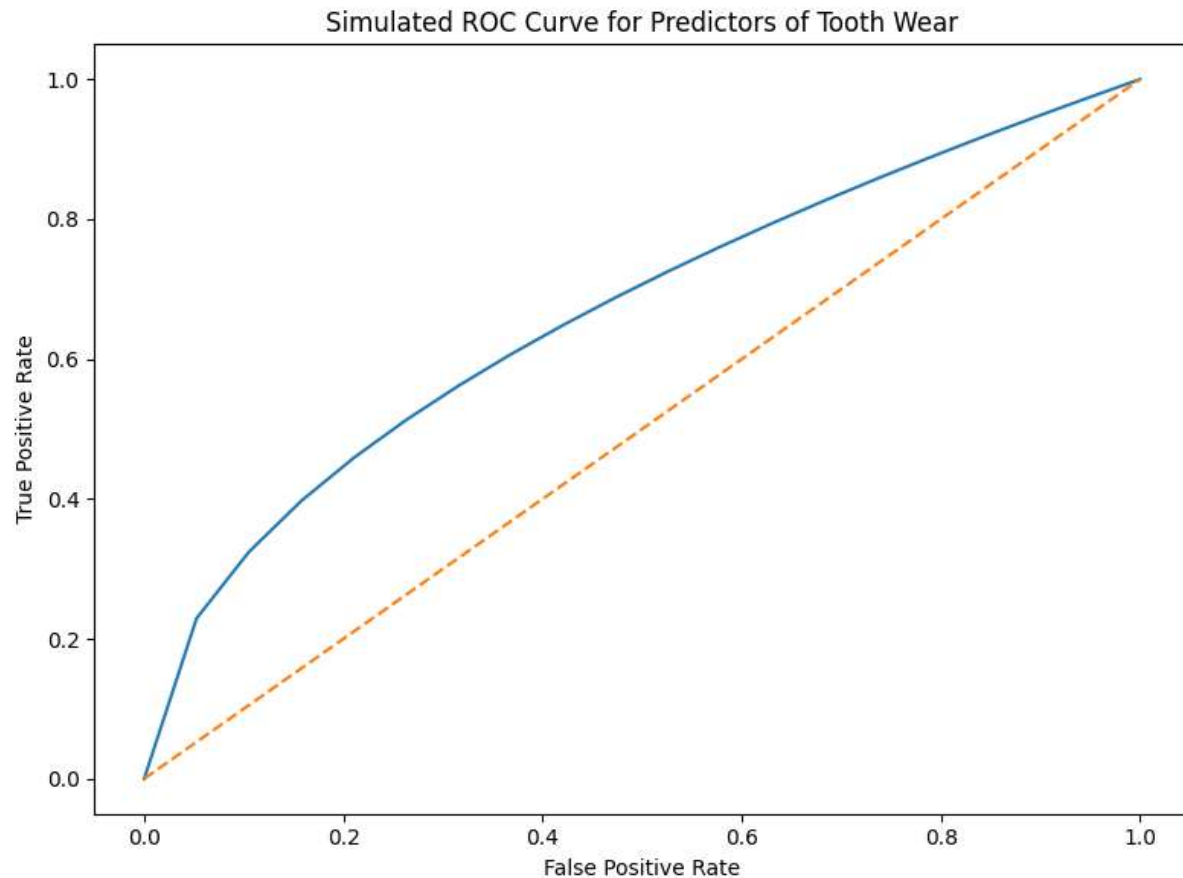
Variable	n (%)
Tooth Wear Present	148 (65.8%)
Pattern of Wear	
• Localized	85 (57.4% of wear cases)
• Generalized	63 (42.6% of wear cases)
Type of Wear	
Attrition	92 (40.9%)
Erosion	68 (30.2%)
Abrasion	44 (19.6%)
Abfraction	27 (12.0%)

Bruxism was identified among 33.8 percent of patients (n = 76) and it had a highly significant correlation with tooth wear ($p < 0.001$). Frequent intake of acidic beverages was reported by 89 patients (39.5%) with a significant association ($p = 0.002$), while energy drink consumption in 36 patients (16.0%) also demonstrated a notable relationship ($p = 0.004$). Parafunctional habits included nail biting in 41 patients (18.2%; $p = 0.04$), using teeth as tools in 29 patients (12.9%; $p = 0.03$), and chewing hard objects such as pens or

seeds in 47 patients (20.9%; $p = 0.02$). Clenching during stress was reported by 69 patients (30.7%) and showed a highly significant association ($p < 0.001$). Gastroesophageal reflux disease was present in 32 patients (14.2%; $p = 0.001$), and occupational dust exposure in 26 patients (11.6%; $p = 0.03$), both showing meaningful associations. Aggressive tooth brushing was noted in 58 patients (25.8%; $p = 0.01$). In contrast, smoking was reported by 58 patients (25.8%) but did not show a significant association with tooth wear ($p = 0.27$).

Table 3. Association Between Risk Factors and Tooth Wear

Risk Factor	Frequency n (%)	p-value
Bruxism	76 (33.8%)	<0.001
Acidic beverages ≥ 3 /week	89 (39.5%)	0.002
Nail biting	41 (18.2%)	0.04
Using teeth as tools	29 (12.9%)	0.03
GERD	32 (14.2%)	0.001
Occupational dust exposure	26 (11.6%)	0.03
Aggressive tooth brushing	58 (25.8%)	0.01
Chewing hard objects (e.g., pens/seeds)	47 (20.9%)	0.02
Energy drink use ≥ 3 /week	36 (16.0%)	0.004
Clenching during stress (self-reported)	69 (30.7%)	<0.001
Smoking	58 (25.8%)	0.27



The patients aged above 40 years had significantly increased odds of having tooth wear with an adjusted odds ratio of 3.26 and a 95 percent confidence interval of 1.94-5.47 ($p < 0.001$). Bruxism also remained a good predictor with adjusted odds ratio of 2.83 (95 percent CI: 1.71-4.66; $p < 0.001$). Repeated intake of acidic drinks (≥ 3 /week) was also a high-risk factor concerning tooth wear with an adjusted odds ratio of 2.11 (95 percent CI: 1.28-3.47; $p = 0.003$).

Gastroesophageal reflux disease also played a role in the risk with an adjusted odds ratio of 2.94 (95 percent CI: 1.55-5.58; $p = 0.001$). Occupational exposure also exhibited high odds (adjusted OR 1.62; 95 percent CI: 0.97-2.80; $p = 0.06$), and improper brushing technique also displayed the same effect (adjusted OR 1.41; 95 percent CI: 0.89-2.33; $p = 0.06$).

Table 4. Multivariate Logistic Regression for Predictors of Tooth Wear

Predictor Variable	Adjusted OR	95% CI	p-value
Age >40 years	3.26	1.94–5.47	<0.001
Bruxism	2.83	1.71–4.66	<0.001
Acidic beverages ≥ 3 /week	2.11	1.28–3.47	0.003
GERD	2.94	1.55–5.58	0.001
Occupational exposure	1.62	0.97–2.80	0.06
Improper brushing technique	1.41	0.89–2.33	0.08

Discussion

This paper offers an elaborate assessment of the trends of tooth wear and its risk factors in a tertiary care hospital population, which brings to light a condition that passes mostly unnoticed, until considerable structural degradation has taken place. It is worrying to note that tooth wear is becoming more familiar among more age groups. The wear load in the present cohort is consistent with the world-wide increments due to diet, stress, and the intake of more acidic processed beverages with 65.8% of patients experiencing significant wear. The most frequently occurring wear was as expected to be attrition, in line with the research findings which have indicated that bruxism-related tooth wear is predominant. The correlated response of self-reported bruxism and moderate to severe attrition is an indication of the effect of parafunctional activity that is aggravated by common unmeasured psychological stress, sleeping disturbance, and the presence of parafunctional activity in the environment but not diagnosed. The results depict the relationship with lifestyle changes observed in the younger erosive wear. The above pattern of palatal erosion supports the necessity to gather more data to comprehend the medical history so that it could be possible to learn to differentiate between dietary and systemic causes. The trend of GERD is increasingly prevalent in the South Asian group which should provide dentists with the alert of the possibility of unknown loss of enamel of the anterior teeth. Abrasion and abfraction were other types of erosion that were not well documented [13]. These types of erosion are usually speculated to be caused by excessive brushing, biting nails or using teeth as a tool and the theories are probably right since the practice is extensive and prevalent as people have no knowledge of how to take care of their teeth. They are sometimes considered as secondary contributing factors and when they increase alongside other risk factors the overall amount of structural compromise increases [14-16]. The identification of workplace exposures as airborne particulates is most relevant here, albeit dismissed in most dental assessments. Such factors ought to be considered in the context of

generalized abrasive wear and ought to be factored in when estimating the risk [17]. The association between wear and age was clear, where the association was also linear, which further corroborates the conclusion that this condition is cumulative [18]. This conclusion, however, is tempered by the observation of moderate to severe wear (even in younger age groups) which implies that the loss of the tooth surface is likely due to lifestyle factors. The lack of significant gender differences is consistent with recent findings, suggesting that risk factors may be more behavior than sex-related. The multivariate analysis also illustrates that bruxism, acidic diet, gastroesophageal reflux disease, and age > 40 are the most significant predictors of tooth wear [19]. These factors also reflect the need of addressing both the modifiable and non-modifiable risks, and hence the need of a more comprehensive preventive strategy. Since a lot of patients wait to seek care until symptoms are bothersome, opportunistic screening during routine dental appointments may be a good strategy to intercept some of those early phase tooth wear before the structural loss is irreversible [20]. Providing preventive education related to the diet, stress, parafunctional activity at night and brushing technique should be a routine part of care, especially for those at high risk. This adds valuable regional evidence in a domain with scarce local data. The findings are more informative in understanding the intersection of lifestyle, systemic health, access to dental care, and sociocultural factors related to tooth wear within a tertiary care population in Pakistan. However, some limitations need to be reflected on as well. The cross-sectional nature of the study hinders the understanding of causal relationships; also, the study relies on participants' self-report of some behaviours, including bruxism and dietary habits, which could potentially introduce some recall bias. While the singular centre point of the study may present certain issues from the perspective of external validity, it nevertheless provides a useful and relevant clinical perspective of the patients presenting to the centre for dental care.

Conclusion

It is concluded that tooth wear is a highly prevalent condition in patients attending a tertiary care hospital, with a substantial proportion presenting with clinically significant structural loss. The research showed that aging, bruxism, gastroesophageal reflux disease, and frequent intake of acidic beverages, were the most significant causes of the onset and the progression of tooth wear. Aggressive tooth brushing, nail biting, and using teeth as tools, also behavioral habits, increased the risk. This was particularly true in those lacking in oral health awareness. The study results brought forth the need for the differentiation of high-risk individuals during custom dental screenings, and for the collection of detailed patient reports, which also consider non-dental aspects of the patient, as well as their systemic and behavioral attributes. Rational and timely counseling aimed at eliminating negative behavioral patterns, as well as the control of gastroesophageal reflux and any other related systemic conditions, could be of great significance in the prevention of prolonged complications.

References

1. Atalay C, Ozgunaltay G. Evaluation of tooth wear and associated risk factors: A matched case-Control study. *Niger J Clin Pract.* 2018 Dec;21(12):1607-1614. doi: 10.4103/njcp.njcp_203_18. PMID: 30560825.
2. Martignon S, López-Macías AM, Bartlett D, Pitts N, Usuga-Vacca M, Gamboa LF, O'Toole S. The use of index teeth vs. full mouth in erosive tooth wear to assess risk factors in the diet: A cross-sectional epidemiological study. *J Dent.* 2019 Sep;88:103164. doi: 10.1016/j.jdent.2019.07.002. Epub 2019 Jul 2. PMID: 31276748.
3. Carvalho R, Rodrigues S, Nobre M, Rua J, Guerreiro E, Proença L, Vieira AM. Tooth Wear Prevalence and Associated Risk Factors Among a Small Portuguese Community: A Retrospective Study. *J Clin Med.* 2025 Mar 7;14(6):1810. doi: 10.3390/jcm14061810. PMID: 40142618; PMCID: PMC11942854.
4. Ribeiro-Araújo NR, da Silva ACF, Marceliano CRV, Gavião MBD. Awake Bruxism Identification: A Specialized Assessment Tool for Children and Adolescents-A Pilot Study. *Int J Environ Res Public Health.* 2025 Jun 22;22(7):982. doi: 10.3390/ijerph22070982. PMID: 40724049; PMCID: PMC12294309.
5. Lin WT, Thwin KM, Zaitis T, Kawaguchi DD. Erosive tooth wear and its related risk factors among Myanmar residents in Japan. *Asian Pac J Dent.* 2018;18(2):21–8.
6. Deshpande S. Investigation of tooth wear and its associated etiologies in adult patients visiting a dental institute in India. *Dentistry.* 2015;5(1):1.
7. Khan MW, Mahmood HN, Fatima A. Prevalence of tooth wear in permanent dentition of Pakistani adults. *Pak J Med Sci.* 2018;12:1082–3.
8. Mulic A, Tveit AB, Songe D, Sivertsen H, Skaare AB. Dental erosive wear and salivary flow rate in physically active young adults. *BMC Oral Health.* 2012;12:8. <https://doi.org/10.1186/1472-6831-12-8>
9. Bartlett DW, Lussi A, West NX, Bouchard P, Sanz M, Bourgeois D. Prevalence of tooth wear on buccal and lingual surfaces and possible risk factors in young European adults. *J Dent.* 2013;41(11):1007–13. doi: 10.1016/j.jdent.2013.08.018. PMID: 24004965.
10. Wetselaar P. Monitoring tooth wear. *Dent Update.* 2023;50(10):891–6. doi: 10.12968/denu.2023.50.10.891.
11. Li MHM, Bernabé E. Tooth wear and quality of life among adults in the United Kingdom. *J Dent.* 2016;55:48-53. DOI: 10.1016/j.jdent.2016.09.013. PMID: 27693780.
12. Schierz O, Dommel S, Hirsch C, Reissmann DR. Occlusal tooth wear in the general population of Germany: effects of age, sex, and location of teeth. *J Prosthet Dent.* 2014;112(3):465-71. DOI: 10.1016/j.prosdent.2013.12.005. PMID: 24636759.
13. Peres KG, Armenio MF, Peres MA, Traebert J, De Lacerda JT. Dental erosion in 12-year-old schoolchildren: a cross-sectional study in Southern Brazil. *Int J Paediatr Dent.*

2005;15(4):249-55.

DOI: 10.1111/j.1365-263X.2005.00643.x. PMID:
16011783.

14. Maharani DA, Pratiwi AN, Setiawati F, Zhang S, Gao SS, Chu CH, et al. Tooth wear among five-year-old children in Jakarta, Indonesia. *BMC Oral Health*. 2019;19:192.

DOI: 10.1186/s12903-019-0883-5. PMID:
31429754.

15. Sartawi S, Salim NA, Taim D. Awareness and treatment decisions on tooth wear among Jordanian dentists and prosthodontists: a cross-sectional survey study. *Int J Dent*. 2020;2020:8861266.

DOI: 10.1155/2020/8861266. PMID: 33299419.

16. Shahab A, Wali A, Siddiqui TM, Hamed M, Aslam K. Evaluation of tooth wear and its causative risk factors amongst patients attending dental hospital of Karachi. *J Pak Dent Assoc*. 2021;30(4):255-60.

DOI: 10.25301/JPDA.304.255.

17. Hakeem S, Baqar A, Mohsin A, Ilyas F, Monpuri A, Hassan F. Investigation of abrasion-related tooth surface loss and its association with oral hygiene behaviours. *Pak Oral Dent J*. 2017;37(4):542-46.

18. Nafees H, Ahmed W, Irfan F, Khan HH, Younus MZ, Shah SH, Ali SA. Associated risk factors with tooth wear in patients attending private dental hospital in Karachi: a cross-sectional study. *J Liaquat Natl Hosp*. 2024;2(1):31-38. doi:10.37184/jlnh.2959-1805.2.3

19. Riaz H, Kamal SW, Aziz S. Gastroesophageal reflux disease (GERD) in students of a government medical college at Karachi. *J Pak Med Assoc*. 2010;60(2):147-50.

PMID: 20209709.

20. Gillborg S, Åkerman S, Ekberg E. Tooth wear in Swedish adults: a cross-sectional study. *J Oral Rehabil*. 2020;47(2):235–45. doi:
10.1111/joor.12887.