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Evaluation of Oral Hygiene Behaviors and Their Influence on the Dental Abrasion Severity

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ABSTRACT

Background: Dental abrasion, a common issue, results from oral hygiene behaviors like aggressive tooth brushing or improper use of abrasive dental products. **Objective:** To evaluate the oral hygiene behaviors and their influence on the dental abrasion severity. **Study Design:** Cross sectional study. **Settings:** Dentistry Department of Watim Medical & Dental College, Rawalpindi Pakistan. **Duration:** From November 2022 to April 2023. **Methods:** Total 175 individuals aged 18-65 years with varying oral hygiene practices were included in study. Exclusion criteria included those with significant dental anomalies, systemic conditions affecting oral health, and a history of extensive dental restorations. Informed consent was secured from all participants, emphasizing the voluntary nature of participation and confidentiality of their information. Clinical assessments were conducted by calibrated dental professionals using standardized criteria for dental abrasion severity. Dental impressions, intraoral photographs, and oral hygiene behavior surveys were utilized to collect comprehensive data. The severity of dental abrasion was graded on a standardized scale. Collected data was analysed in SPSS version 22. **Results:** In terms of age distribution, the majority were between 26-35 years old, constituting 37.1% of the total, followed by those aged 18-25 years (22.9%). Gender-wise, there were slightly more females (54.3%) than males (45.7%) in the study. Among those with abrasion, the severity varied, with 25.7% experiencing mild abrasion, 42.9% having moderate abrasion, and 31.4% exhibiting severe abrasion. For males, the prevalence of dental abrasion was significantly higher, with 17.1% experiencing mild abrasion, 14.3% having moderate abrasion, and 8.6% exhibiting severe abrasion, as indicated by a p-value less than 0.05. **Conclusion:** Our study reveals a considerable prevalence of dental abrasion among the study population, with 61.71% exhibiting its presence. Further categorization demonstrates varying degrees of severity, encompassing mild (25.7%), moderate (42.9%), and severe (31.4%) abrasion.

Keywords: *Dental abrasion, Tooth brushing behaviors, Cervical lesions, Oral hygiene practices, Tooth wear, Prevalence.*

INTRODUCTION

Dental abrasion is a term used to describe the gradual wear and erosion of tooth structure due to mechanical factors, typically friction with foreign objects. This wear can result from various activities, including aggressive tooth brushing, abrasive toothpaste, or the use of dental instruments. The mechanical process involved in dental abrasion can lead to the removal of tooth substance, primarily affecting the outer layers of enamel and, in some cases, dentin.[1,2] The specific surfaces affected by dental abrasion depend on the causative factors. Commonly, toothbrush abrasion is observed at the cervical third of the tooth, near the gumline. The abrasion may manifest as V-shaped lesions, often associated with improper brushing techniques or the use of abrasive toothpaste.[3] The erosion of durable dental tissue is a growing problem that is indicative of shifting lifestyles and societal expectations. Multiple studies have established that abrasion is a complex process influenced

by multiple factors.[4] Commonly seen factors contributing to abrasion include vigorous tooth brushing and the use of abrasive toothpastes and other abrasive substances, such as coal, sand, brick, and so on. The primary factor responsible for this issue is the utilization of abrasive toothpastes, combined with the imprudent application of a horizontal brushing technique.[5]

In addition to mechanical factors, dental abrasion can be influenced by an acidic oral environment and other indirect etiologies, leading to enamel dissolution. The progression of dental abrasion may result in direct or indirect pulp involvement, highlighting the potential significance of this condition in oral health.[6] Preventive measures for dental abrasion include using a soft-bristled toothbrush, employing proper brushing techniques, and selecting toothpaste with lower abrasive content.[7,8] Dentists play a crucial role in educating patients about oral hygiene practices that help mitigate the risk of dental abrasion. Understanding the causes, risk factors, and preventive strategies related to dental abrasion is essential for maintaining optimal oral health and preventing further complications associated with tooth wear. Regular dental check-ups and personalized oral care guidance contribute to effective management and prevention of dental abrasion in individuals.[9,10]

The study explores the severity of dental abrasion, emphasizing its impact on oral health and functionality. By investigating the association with oral hygiene behaviors, the research aims to uncover patterns that inform targeted preventive strategies. Understanding the modifiable factors influencing dental abrasion provides a basis for evidence-based recommendations and empowers individuals to adopt practices conducive to long-term oral well-being. The study aligns with the overarching goal of promoting preventive dental care for improved oral health outcomes.

METHODS

Approval from the Institutional Review Board (Ref No: WMDC/IRB/237 dated: 16-09-2022 was obtained prior to commencement, ensuring compliance with ethical standards. This study was conducted at dentistry department of Watim Medical & Dental College, Rawalpindi from November 2022 to April 2023. Total 175 individuals aged 18-65 years with varying oral hygiene practices were included in study. Exclusion criteria included those with significant dental anomalies, systemic conditions affecting oral health, and a history of extensive dental restorations. Informed consent was secured from all participants, emphasizing the voluntary nature of participation and confidentiality of their information.

Clinical assessments were conducted by calibrated dental professionals using standardized criteria for dental abrasion severity. Dental impressions, intraoral photographs, and oral hygiene behavior surveys were utilized to collect comprehensive data. The severity of dental abrasion was graded on a standardized scale. Participants completed a structured questionnaire regarding their oral hygiene behaviors, including toothbrushing frequency, brushing technique, use of dental products, and adherence to dental visits. Behavioral data were complemented with clinical examinations to establish correlations between oral hygiene practices and dental abrasion severity. Statistical analyses were performed using chi-square test to assess associations between dental abrasion severity and oral hygiene behaviors. Significance was set at $p < 0.05$.

RESULTS

In terms of age distribution, the majority were between 26-35 years old, constituting 37.1% of the total, followed by those aged 18-25 years (22.9%). Gender-wise, there were slightly more females (54.3%) than males (45.7%) in the study. Regarding toothbrushing frequency, the most common practice was twice a day, with 65.7% of participants following this routine. The predominant brushing technique was complex strokes (40%), and the majority used non-abrasive toothpaste (77.1%) as given in table 1. A majority of patients, accounting for 61.71%, exhibited the presence of dental abrasion, while 38.28% showed no signs of abrasion. Among those with abrasion, the severity varied, with 25.7% experiencing mild abrasion, 42.9% having moderate abrasion, and 31.4% exhibiting severe abrasion as given in table 2.

For males, the prevalence of dental abrasion was significantly higher, with 17.1% experiencing mild abrasion, 14.3% having moderate abrasion, and 8.6% exhibiting severe abrasion, as indicated by a p-value less than 0.05. Among females, the percentages were lower, with 14.3% having mild abrasion, 28.6% showing moderate abrasion, and 11.4% displaying severe abrasion. These results suggest a gender-based difference in the occurrence and severity of dental abrasion, with males showing a higher prevalence of abrasion across all severity levels as given in table 3.

Among individuals who brushed once a day, 22.2% had mild abrasion, 6.7% had moderate abrasion, and 18.2% had severe abrasion, showing a statistically significant association with a p-value of less than 0.05. Among those using abrasive toothpaste, 33.3% exhibited mild abrasion, 26.7% had moderate abrasion, and 9.1% showed severe abrasion, indicating a statistically significant association with a p-value less than 0.05.

Table 5: Demographic characteristics of study participants

Variables	Category	Number of Participants	Percentage
Age	18-25 years	40	22.9%
	26-35 years	65	37.1%
	36-45 years	45	25.7%
	46-55 years	20	11.4%
	56-65 years	5	2.9%
Gender	Male	80	45.7%
	Female	95	54.3%
Toothbrushing Frequency	Once a day	25	14.3%
	Twice a day	115	65.7%
	Three or more times a day	35	20%
Brushing Technique	Horizontal strokes	60	34.3%
	Vertical strokes	45	25.7%
	Complex strokes	70	40%
Dental Product Usage	Abrasive toothpaste	40	22.9%
	Non-abrasive toothpaste	135	77.1%

Table 2: Prevalence of dental abrasion severity

Variables	Category	Patients No.	Percentage
Dental Abrasion	Abrasion Present	108	61.71%
	Abrasion Absent	67	38.28%
Severity of Dental Abrasion	Mild	45	25.7%
	Moderate	75	42.9%
	Severe	55	31.4%

Table 3: Stratification of dental abrasion frequency and severity by gender

Gender	Dental Abrasion Frequency	Mild Abrasion (%)	Moderate Abrasion (%)	Severe Abrasion (%)	p-value
Male	Abrasion Present	30 (17.1%)	25 (14.3%)	15 (8.6%)	<0.05
	Abrasion Absent	10 (5.7%)	15 (8.6%)	5 (2.9%)	
Female	Abrasion Present	25 (14.3%)	50 (28.6%)	20 (11.4%)	
	Abrasion Absent	5 (2.9%)	10 (5.7%)	10 (5.7%)	

Table 4: Stratification of dental abrasion frequency and severity by toothbrushing & abrasive toothpaste

Toothbrushing Frequency	Mild Abrasion (%)	Moderate Abrasion (%)	Severe Abrasion (%)	p-value
Once a day	10 (22.2%)	5 (6.7%)	10 (18.2%)	<0.05
Twice a day	25 (55.6%)	45 (60%)	45 (81.8%)	
Three or more times a day	10 (22.2%)	25 (33.3%)	0 (0%)	
Abrasive toothpaste	15 (33.3%)	20 (26.7%)	5 (9.1%)	< 0.05
Non-abrasive toothpaste	30 (66.7%)	55 (73.3%)	50 (90.9%)	

DISCUSSION

Tooth wear is a frequently encountered dental issue, often overlooked and left untreated, becoming noticeable to the patient only when severe dental hypersensitivity occurs. Non-carious cervical lesions (NCCLs) are commonly linked to toothbrush abrasion, acid corrosion, and abfraction, with dental abrasion being the most prevalent form of NCCL.[11,12]

Our study encompassed a diverse age distribution, with a significant proportion falling within the 26-35 years age group (37.1%), differing from Bhardwaj *et al.*'s focus on age-specific prevalence. While our study highlighted a higher prevalence of females (54.3%), Bhardwaj *et al.* (2016) reported a larger male representation 28% in males and 14% in females.[13] In comparing our study results with the findings reported by Parveen *et al.* in 2023, both studies highlight the prevalence and severity of dental abrasion, shedding light on the multifactorial nature of this oral health concern. Parveen *et al.* identified dental abrasion (DA) in 58% of cases, with 79.1% exhibiting minimum loss of surface characteristics. Our study, on the other hand, reported a slightly higher prevalence, with 61.71% of patients presenting with dental abrasion. One notable difference arises in the assessment of severity. While Parveen *et al.* categorized cases based on the extent of surface loss, our study classified severity into mild (25.7%), moderate (42.9%), and severe (31.4%) categories. This discrepancy underscores the varied approaches to evaluating the impact and severity of dental abrasion across studies.[14] The findings from our study, where 61.71% of patients exhibited dental abrasion were compared with studies by Sud (13%), Sexena *et al.* (68.6%), and Borcic *et al.* (60-70%), we observe a spectrum of prevalence rates across different populations. The higher prevalence reported by Sexena *et al.* and Borcic *et al.* underscores the variability in dental abrasion prevalence worldwide, influenced by factors such as cultural practices, oral hygiene behaviors, and dietary habits.[15,16,17] David and Bhat (2012) reported a lower incidence of 6.1%, which contrasts with the higher prevalence observed in our investigation.[18]

Our research has brought to light a significant positive association between tooth brushing behaviors and abrasive cervical lesions. Specifically, among individuals who brushed their teeth once a day, we observed 22.2% with mild abrasion, 6.7% with moderate abrasion, and 18.2% with severe abrasion. This finding demonstrated a statistically significant association with a p-value of less than 0.05. Interestingly, our results align with a study by Talha *et al.* (2014), which reported similar trends that one-day tooth brushing by females resulted in localized tooth surface loss of 55.0% and generalized tooth surface loss of 60%. Moreover, they found that 70.4% of individuals brushing their teeth for a minute reported anterior tooth

surface loss, with 66.7% of men reporting tooth surface loss.[19] In contrast to the findings reported by Hakeem *et al*. (2017), our study reveals a significant positive correlation between tooth brushing behaviors and abrasive cervical lesions. While Hakeem *et al*. reported an insignificant correlation between variables of tooth brushing behaviors and abrasive lesions in their study population, our results demonstrate a statistically significant association.[20]

CONCLUSION

Our study reveals a considerable prevalence of dental abrasion among the study population, with 61.71% exhibiting its presence. Further categorization demonstrates varying degrees of severity, encompassing mild (25.7%), moderate (42.9%), and severe (31.4%) abrasion.

LIMITATIONS

Potential limitations included self-reporting bias in oral hygiene behavior data and the cross-sectional nature of the study, limiting causal inference.

SUGGESTIONS / RECOMMENDATIONS

Large-scale research should be done in future studies.

CONFLICT OF INTEREST / DISCLOSURE

None.

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