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ORIGINAL ARTICLE

Effects of Dental Crowding on Oral Hygiene Index-Simplified (OHI-S) Score in Adult Population of Lahore: An Analytical Study

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ABSTRACT

Aim: To investigate the impact of dental crowding on oral hygiene in adult populations using the Simplified Oral Hygiene Index (OHI-S) as a reference indicator.
Methods: The study is designed as an analytical cross-sectional study with a comparison group and was done in multiple dental settings in Lahore, including orthodontic department of a dental college. The sample includes 456 adult patients with or without dental crowding. The oral hygiene of the participants was assessed using the OHI-S, which measures plaque and calculus on six tooth surfaces. The study statistically determined if there is a difference in oral cleanliness between patients with crowding and the control group, and if there is a difference in oral cleanliness between genders among patients with crowding.
Results: 55% of the patients were females and 45% of the patients were males. The patients without crowding, there was 11% higher risk observed of getting Moderate OHI-S score as compared to Good OHI-S. Similarly, 13% higher risk was observed to have Poor OHI-S among patients without dental crowding. This risk was markedly increased among patients with dental crowding. Patients with dental crowding were at 57% (P-value <0.05) higher risk of getting Moderate OHI-S score and 89% (P-value <0.05) higher risk of getting Poor OHI-S.
Conclusion: Dental crowding is significantly connected to the accumulation of calculus and debris in the crowded areas of dental arches in young people. Crowding has been shown to make it more difficult to maintain appropriate oral hygiene routines. This raises the probability of young adults developing periodontal disease.
Keywords: Dental Crowding, Malocclusion, Oral Hygiene.

INTRODUCTION

Malocclusion, including and especially dental crowding, may increase the risk of caries and periodontal disease. This risk is exacerbated among communities with limited access to oral healthcare services, stressing the importance of preventative and therapeutic oral health activities[1]. Maintaining good oral hygiene and attending the schedules of routine dental visits are two of the best ways to reduce the risk of dental plaque buildup. Raising public awareness of the condition, promoting healthy eating and hygiene habits, and instructing children on how to maintain good dental hygiene from an early age are the only ways to successfully treat gingivitis[2].

However, even with consistent teeth brushing, dental crowding among these young individuals can represent a barrier to maintaining appropriate oral hygiene. In a recent study, it was discovered that, albeit with periodic dental hygiene maintenance, crowded places in the dentition may increase the colonization of microflora because they provide a replicating as well as nourishing environment for them[4]. It is worthy to note that the present literature on the influence of dental crowding on oral hygiene is inadequate in comparison to the effect of dental crowding on the development of dental caries[3]. Numerous studies have been undertaken on the association between crowding and the likelihood of developing periodontal diseases and malocclusion, with or without it. When it comes to crowding, only excessive crowding in anterior teeth was linked to a moderate to significant correlation with Periodontal Disease, measuring the double risk of contracting the condition[5].

Additionally, children are the subjects of the majority of studies on dental crowding. In view of the aforementioned considerations, it was crucial to conduct a scientific investigation into how crowding affects adult population oral hygiene. This is also true of the existing scientific literature. Patients with crowding were more likely to practice generally good oral hygiene, according to a few studies that found conflicting outcomes. Within the confines of this study, the majority of the patients with crowding had good oral hygiene, and there was no difference in oral cleanliness between the genders of the patients with crowding[6]. The Simplified Oral Hygiene Index (OHI-S), which has two components—plaque (debris) and calculus—is used to measure the oral hygiene state of a population. This approach is known as the oral hygiene index. Six tooth surfaces, including the buccal surfaces of teeth 11, 16, 26, and 31, and the lingual surfaces of teeth 36 and 46, are used to determine the OHI-S[7]. This study aims to investigate the impact of dental crowding on oral hygiene in adult populations using OHI-S as a reference indicator. The introduction of the study highlights that malocclusion, including dental crowding, can increase the risk of caries and periodontal disease, particularly among communities with limited access to oral healthcare services. It has been argued that maintaining good oral hygiene and regular dental visits are important ways to reduce the risk of plaque buildup, but that dental crowding can present a barrier to achieving good oral hygiene.

The study also notes that previous literature on the influence of dental crowding on oral hygiene is limited and primarily focuses on children, rather than adults. Therefore, the study aims to use the Simplified Oral Hygiene Index (OHI-S) to measure the oral hygiene state of adult patients with crowding and determine if there is a difference in oral cleanliness between genders.This study has the potential to provide several benefits to society such as improved understanding of the impact of dental crowding on oral hygiene in adult populations.

The study aims to fill a gap in the existing literature by focusing on the oral hygiene of adult patients with crowding, rather than just children.

METHODOLOGY

This study was designed as analytical cross sectional study with inclusion of a comparison groupand was done in multiple dental settings in Lahore, including orthodontic department of a dental

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college. Permission was granted by the Institutional Ethical Committee to start this research. The sample included 456 adult patients with/without crowding of the premolars and/or front teeth in one or both jaws. Any adult of more than 18 years of age was included in the study. Dental casts of the participants were used to measure the amount of rotation or displacement. When one or more teeth were rotated or displaced by at least 15° from their usual position in the dental arch, or both, crowding was deemed to be present. The approximate surfaces of the rotated or displaced teeth that didn't seem to be easily accessible for mechanical cleaning i.e. tooth brushing, were also chosen using the castings. Four researchers who were Orthodontic specialists independently chose this option. Specific tooth surfaces alone were incorporated into the research, which were chosen by the examiners. Along with choosing the test surfaces, Control patients were chosen who didn't have teeth that were crowded. The contralateral approximate surface was often employed as a control. When this surface was misaligned as well, a roughly flat surface in the control was the other jaw or an undamaged approximate surface next to the crowded tooth. Assessment of Oral hygiene conditions was done using Oral Hygiene Index simplified (OHI-S) that has two components, Debris Index and Calculus Index. Both components of OHI-S were recorded with careful oral examination on index teeth and then were added to make a cumulative Index score. Single blinding technique was incorporated the study as subjects weren't made aware of the goal of the preliminary research examination. The Debris Index and Calculus Index were assessed twice, separated by a week, for each test. The statistical study made use of the two records' mean value. This was done to acquire an accurate assessment of the individuals' level of oral hygiene and gingival health. Four posterior and two anterior teeth were chosen to represent the six surfaces assessed for the OHI-S. The first completely erupted tooth distal to the second bicuspid (15), often the first molar (16), but occasionally the second (17) or third molar (18) were inspected in the posterior section of the dentition. The lingual surfaces of the chosen lower molars and buccal surfaces of the chosen upper molars were examined. The labial surfaces of the lower left (31) and upper right (11) central incisors were scored in the anterior part of the mouth. The central incisor on the opposing side of the midline (numbers 21 or 41, respectively) fills in for any of these anterior teeth if they are missing. Criteria for classifying Debris and Calculus were used in accordance with OHI-S.

RESULTS

The sample included 456 adult patients with/without crowding of the premolars and/or front teeth in one or both jaws. 55% of the patients were females and 45% of the patients were males. Oral Hygiene Index simplified scores in patients with crowding and without crowding were categorized into 3 groups as follows: 0–1.2 as Good, 1.3–3.0 as Moderate and 3.1–6.0 as Poor. Results of OHI-Simplified in patients with and without crowding are shown in table 1.

Table 1 shows overall proportions of patients in 2 categories i.e. Patients with crowding and patients without crowding. Both categories have been further stratified into 3 strata namely Good OHI-S, Moderate OHI-S and Poor OHI-S according to the their scores in Oral Hygiene Index-Simplified. Off 107 total patients having Good OHI-S, 82% belonged to the group having no dental crowding. 142 patients having Moderate OHI-S score showed 63% belonged to the group with Dental Crowding. Similarly, Poor OHI-S had a total of 207 patients, off which 73% of the patients were with Dental Crowding.

Relative Risk Ratio (RRR) of having Poor OHI-Simplified score in comparison with having Moderate and Good OHI-Simplified Score in both strata is given in table 2.

Table 2 shows relative risk ratio of highest category of having OHI-S in comparison with lower score categories which means higher the risk of having OHI-S, poorer the overall oral hygiene status among patients. Baseline group is Good OHI-S group given baseline 1 RRR for both patients with crowding and without crowding. The patients without crowding, there was 11% higher risk observed of getting Moderate OHI-S score as compared to Good OHI-S. Similarly, 13% higher risk was observed to have Poor OHI-S among patients without dental crowding. This risk was markedly increased among patients with dental crowding. Patients with dental crowding were at 57% (P-value <0.05) higher risk of getting Moderate OHI-S score and 89% (P-value <0.05) higher risk of getting Poor OHI-S. The results observed in groups with dental crowding and without dental crowding were statistically significant.

Table 1:

Status	Good OHI-S	Moderate OHI-S	Poor OHI-S	Total
Crowding Absent	88 (82.24%)	52 (36.61%)	57 (27.53%)	197
Crowding Present	19 (17.75%)	90 (63.38%)	150 (72.46%)	259
Total	107	142	207	456

Table 2:

Status	Good OHI-S RRR (95% CI)	Moderate OHI-S RRR (95% CI)	Poor OHI-S RRR (95% CI)	P-Value
Crowding Absent	1	1.11 (1.05-1.17)	1.13 (1.09-1.17)	0.01
Crowding Present	1	1.57 (1.55-1.59)	1.89 (1.84-1.93)	0.001

DISCUSSION

This study found a link between crowded teeth and poor oral hygiene among Lahore's urban population. Dental crowding is a misalignment of the tooth row caused by an imbalance between the size of the teeth and the size of the jaw. Rarely do teeth in the deciduous dentition become crowded. However, in the permanent dentition, crowded teeth are frequently present[8].

Conditions such as dental crowding pose issues for the patient. Food debris in the interdental region is challenging to brush away with a toothbrush because of the crowding of the teeth, which promotes the buildup of plaque and the development of calculus. This will worsen dental cavities, gingivitis, or even more periodontal tissue loss, which makes teeth more mobile[9]. The difficulty in maintaining oral hygiene led to patients with crowded teeth having a moderate oral hygiene level. The findings of this study were consistent with other studies that found that the traits of malocclusion, particularly crowded teeth, cause food debris to become trapped between the teeth, making it challenging to brush them. This condition was made worse when the food debris was accumulated by bacteria and turned into plaque, which was more challenging to remove[10,11,12].

A study conducted by showed that Crowding in both arches was shown to be significantly correlated with dental cleanliness. When compared to instances with mild or no crowding, even moderate crowding revealed greater OHI-S. Comparisons with prior research are made more difficult by the disparities in methodology and metrics used to measure oral and occlusal cleanliness[13]. The degree of the contact point deflection in both dental arches was strongly correlated with oral health. Food impaction is made easier and oral hygiene procedures are less effective in those with significant deflections, who also tend to have gingivitis and shallow periodontal pockets[14]. The primary drawback of the current study was that documenting OHI-S at a specific moment in time did not always reflect the real oral health history[15].

In our study, other orthodontic problems e.g. Overbite, Reverse Overjet were also observed among patients with crowding. These factors could be contributing factors that weaken this association and possibly explain why OHI-S does not rise with age as might otherwise be expected[16]. In this study, malocclusion characteristics had a high and statistically significant impact on OHI-S.

The study population was made up of a convenience sample of the patients who were visiting dental clinics; thus, there is a risk of biasness as this may not represent the true data of population who do not have any dental problem.

CONCLUSION

According to the results of our study, dental crowding is strongly linked to the buildup of calculus and debris in young adults' crowded regions in dental arches. It has been proven that crowding makes it more difficult to maintain good dental hygiene habits. This increases the likelihood that young adults may develop periodontal disease, which consequently causes early tooth loss.

Recommendation: It is recommended that Orthodontic treatment needs assessment must be implemented for every patient appearing in dental settings and they must be given awareness on practicing good oral hygiene habits.

Author's Contribution: HG: Concept & Design of Study, Principal Author, final approval of version, **URS:** Manuscript writing, **ARC:** Statistical analysis, **MF:** Revisiting Critically, **AA:** Quality insurer & Data Collection, **NAD:** Interpretation of results, **URS:** Referencing

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