



CODEN [USA]: IAJPBB

ISSN : 2349-7750

INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES

SJIF Impact Factor: 7.187

<http://doi.org/10.5281/zenodo.4311618>Available online at: <http://www.iajps.com>

Research Article

INFLUENCE OF ORTHODONTIC TREATMENT ON THE OCCURRENCE OF TOOTH DECAY

Dr Shazia Tanveer¹, Dr Meeral Ijaz², Dr Ayesha Talib³, Dr Mohsin Majeed⁴¹Dental Surgeon, THQ hospital Mankera Distt Bhakkar^{2,4}Nishtar Institute of Dentistry, Multan³Lahore Medical and Dental College, Lahore

Article Received: October 2020

Accepted: November 2020

Published: December 2020

Abstract:

Introduction: Obtaining better aesthetics and correct occlusion are the main reasons for undertaking orthodontic treatment in every patient. However, orthodontic treatment is predicted to increase the risk of carious lesions.

Aim: To analyze the prevalence of tooth decay depending on gender, age, duration of orthodontic treatment and the type of malocclusion; and to evaluate the practice of oral hygiene and eating habits in orthodontic patients.

Place and Duration: In the Orthodontic department of Nishtar Dental Hospital, Multan for six-months duration from March 2020 to August 2020.

Materials and Methods: A cross-sectional study of 212 orthodontic patients (11 to 30 years of age) with fixed appliances for at least six months was conducted. A questionnaire form based on the "dental condition and need for treatment, WHO" was used to present the DMFT index and the incidence of dental caries. A questionnaire was used to evaluate the oral hygiene practice and eating habits of orthodontic patients. The relationship between dental caries and gender, age group, duration of orthodontic treatment and the type of malocclusion was analyzed with the chi-square test ($p < 0.05$).

Result: The prevalence of dental caries (DMFT) was 79.2%, and the mean DMFT value was 2.87 among orthodontic patients. The incidence of dental caries in men and women was 69.44% and 60%, respectively. Caries was highest in the 16-20-year age group (72.22%), in the group lasting more than 18 months (63.92%) and in the class I malocclusion group (68.38%). Similarly, 30.2% eat sweets, 26.9% eat fast food, and 14.2% often snacks between meals.

Conclusion: A fairly large percentage of orthodontic patients use normal oral hygiene methods, but very few use special oral hygiene measures. The study did not show any association between the incidence of caries and gender groups, age groups, duration of orthodontic treatment, and types of malocclusion.

Key words: dental caries, DMFT, malocclusion, occurrence, orthodontic treatment, morbidity

Corresponding author:**Dr. Shazia Tanveer,**

Dental Surgeon, THQ hospital Mankera Distt Bhakkar

QR code



Please cite this article in press Shazia Tanveer et al, *Influence Of Orthodontic Treatment On The Occurrence Of Tooth Decay.*, Indo Am. J. P. Sci, 2020; 07(12).

INTRODUCTION:

Tooth decay is an infectious multifactorial microbial disease that causes local dissolution and destruction of calcified tooth tissues¹⁻². Orthodontic treatment may assign insufficient removal or elimination of plaque and food debris from restricted areas for removal due to braces. In fact, it takes more than the usual practice of brushing to maintain oral hygiene in orthodontic patients³⁻⁴. Most of the patients undergoing orthodontic treatment are teenagers and young adults, i.e. a generation with eating patterns / habits consisting mainly of fast food and consuming more sweets and chocolates. These types of eating habits are the main factor in the cause of multi-factor dental diseases, i.e. tooth decay. The concept of the caries trilogy (tooth, substrate, flora) is well understood in orthodontic patients prone to caries⁵⁻⁶. 'Tooth' with braces, especially in young people, has plaque retention areas, 'ground' means poor oral hygiene, less clearance, more frequent eating, high consumption of sticky and sweet foods, low saliva pH and 'flora'. by the build-up of plaque in the presence of large microbial populations. All this creates an ideal environment for the development of tooth decay over time⁷⁻⁸. This study aims to evaluate the oral hygiene habits, eating habits and prevalence of tooth decay among orthodontic patients. The study also analyzed the relationship between tooth decay and gender, age group, type of malocclusion and the duration of orthodontic treatment.

MATERIALS AND METHODS:

A cross-sectional study was conducted among 212 orthodontic patients at the Orthodontic department of Nishtar Dental Hospital, Multan for six-months duration from March 2020 to August 2020. The study included patients treated with fixed orthodontic appliances by one orthodontist. The age of the respondents ranged from 11-30 years, the distribution of men and women was 34% and 66%, respectively. The study required a minimum treatment duration of six months. Patients were classified according to the

duration of orthodontic treatment as; 6-12 months, 12-18 months and more than 18 months. Malocclusion was classified according to Angle's classification. A questionnaire form was developed along with a test card including the patient's general characteristics, duration of orthodontic treatment, and Angle's classification of malocclusion. A questionnaire on oral hygiene and eating habits was used. Dental health was examined using "Dental Status and Treatment Need", as assessed by the WHO in the 1997 Oral Health Study, which may represent the Caries, Missing, Filled Tooth Index (DMFT). The coronal part of the dentition was recorded and the root part was excluded from the study because the exposure of the root in the target group is negligible. The treatment needs part of the questionnaire was not included in this study. Cavities / buccal and lingual / palatal caries on girdled molars were excluded because vision was obscured by molar bands. No radiographic examination was performed to assess dental caries. After informed consent was obtained, the examination was performed using an oral mirror and a WHO probe under sterile conditions in a dental chair with sufficient lighting. The WHO criteria were used to assess DMFT. For the reliability of the data, all patients were examined by one qualified dentist. Statistical analysis was performed using SPSS version 16.0. To establish the relationship between dental caries and gender, age group, type of malocclusion, and duration of orthodontic treatment, statistical analysis including frequency distribution, cross-reference tables and chi-square test ($p < 0.05$) was used.

RESULTS:

212 orthodontic patients participated in this study, including 140 (66%) women and 72 (34%) men. The age of the respondents ranged from 11 to 30 years; the mean age was 19.69 years. The frequency distribution of the respondents by sex and age group is presented in Table 1, and the duration of orthodontic treatment in Figure 1.

Table 1: Distribution of subjects according to age and gender

Age group (in years)	Male	Female	Total	Mean	Standard deviation
11-15	21	28	49 (23.1%)	19.69	4.57
16-20	28	44	72 (34.0%)		
21-25	18	52	70 (33.0%)		
26-30	5	16	21 (9.9%)		
Total	72	140	212 (100%)		

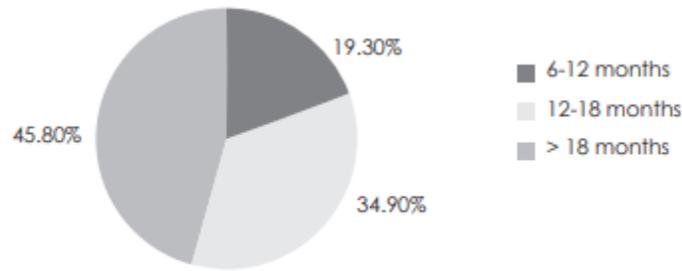


Figure 1: Duration of orthodontic treatment

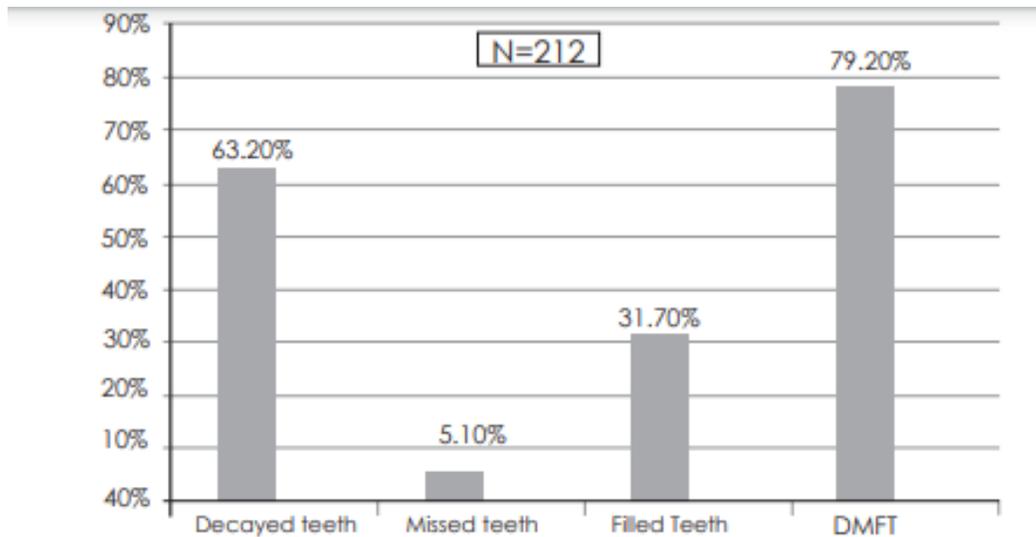


Figure 2: Prevalence of DMFT Index

Table 2: Cross tabulation between gender and dental caries

Gender	Carious teeth		Total	p-value
	Absent	Present		
Male	22 (30.56%)	50 (69.44%)	72	0.177
Female	56 (40.0%)	84 (60.0%)	140	
Total	78 (36.8%)	134 (63.2%)	212	

In this study, the incidence of dental caries (DMFT) was 79.2% (Figure 2) with an average DMFT value of 2, 87 and standard deviation 2.65. Of the 212 patients, 63.2% had one or more carious teeth in the oral cavity. The incidence of dental caries in men and women was 69.44% and 60%, respectively. However, no statistically significant relationship was found between the sex groups in the occurrence of caries (Table 2). In total, 46.2% of participants had their tooth extracted for other reasons; mainly for orthodontic therapeutic purposes. The study showed that the distribution of caries was the highest in the age group of 16-20 years, i.e. 72.22%. However, no relationship was found between the age group and the occurrence of dental caries (Table 3). Depending on the duration of orthodontic treatment; People treated for 6-12 months had 58.54%, 12-18 months 64.86%, and over 18 months 63.92% had tooth decay.

Table 3: Cross tabulation between age group and dental caries

Age group (in years)	Cariou teeth		Total	p-value
	Absent	Present		
11-15	16 (32.65%)	33 (67.35%)	49	0.92
16-20	20 (27.78%)	52 (72.22%)	72	
21-25	33 (47.14%)	37 (52.86%)	70	
26-30	9 (42.86%)	12 (57.14%)	21	
Total	78 (36.8%)	134 (63.2%)	212	

Table 4: Cross tabulation between duration of orthodontic treatment and dental caries

Duration	Cariou teeth		Total	p-value
	Absent	Present		
6-12 months	17 (41.46%)	24 (58.54%)	41	0.782
12-18 months	26 (35.14%)	48 (64.86%)	74	
>18 months	35 (36.08%)	62 (63.92%)	97	
Total	78(36.8%)	134(63.2%)	212	

However, no relationship was found between the duration of orthodontic treatment and the occurrence of caries (Table 4). Of the 212 orthodontic patients, 55.2% had Class I, 36.3% Class II, and 8.5% had a Class III molar ratio. The incidence of caries was 68.38% in class I, 57.14% in class II and 55.55% in class III. No significant relationship was found between the Angle classification of malocclusion and the occurrence of caries (Table 5).

Table 5: Angle's classification of malocclusion and dental caries

Angle's classification	Cariou teeth		Total	p-value
	No	Yes		
Class I	37 (31.62%)	80 (68.38%)	117	0.221
Class II	33 (42.86%)	44 (57.14%)	77	
Class III	8 (44.44%)	10 (55.55%)	18	
Total	78 (36.8%)	134(63.2%)	212	

Assessment of oral hygiene and eating habits

A review of oral hygiene habits among orthodontic patients showed that 72.6% had the habit of brushing two to three times a day, 82.5% a regular toothbrush, 17.5% an orthodontic toothbrush, and only 1.9% of patients. orthodontists used an interdental brush. brush. Of the subjects, 90.1% had the habit of rinsing the mouth after each meal, and 6.6% also used the mouthwash (Table 6).

Table 6: Distribution of subjects according to oral hygiene habits

Oral hygiene habits		Number	Percentage
Brushing habit	Once/day	53	25.0
	2-3 time/day	154	72.6
	Irregular	5	2.4
Type of tooth brush	Normal toothbrush	175	82.5
	Orthodontic toothbrush	37	17.5
Mouth rinsing habit	Rinse after every meal	191	90.1
	Rinse irregularly after meal	21	9.9
Additional oral hygiene aids	Interdental brush	4	1.9
	Regularly use mouthwash	14	6.6

The eating habits of orthodontic patients have shown that 30.2% frequently eat sweets and chocolates, and 26.9% frequently eat unhealthy food. Similarly, 14.2% of participants consumed snacks frequently between meals (Table 7).

Table 7: Distribution of subjects according to food habits

Food habits	Consume occasionally	Consume frequently
Sweets/ chocolates	148 (69.8%)	64 (30.2 %)
Junk food	155 (73.1%)	57 (26.9%)
Snack in between meals	182(85.8%)	30 (14.2%)

DISCUSSION:

In orthodontic patients, maintaining oral hygiene is difficult because defective teeth cause inconveniences in cleaning, which further complicates the fixture component and frequent ulcerations. Dental plaque is a precursor to tooth decay; and plaque retention sites are particularly prone to caries. Hriday reported high plaque build-up in orthodontic patients⁷⁻¹⁰. Various studies indicate a high prevalence of dental caries in orthodontic patients, which is also reflected in this study. Among the 212 examined patients, the frequency of DMFT was 79.2%, with an average DMFT value of 2.87. However, this result is not in line with the caries data in the ese population sample¹¹⁻¹². The incidence of tooth decay according to the Pakistan National Oral Health Pathfinder Survey (DMFT index) was 25.6% at the age of 12-13, 26.3% at the age of 15-16 and 57.5% in the 35-45-year cohorts. Stahl et al¹⁷ investigated DMFT values in primary and mixed dentition, the average values of which were 1.02 and 1.53, respectively. They found no positive correlation between the occurrence of caries and malocclusion, as in the current study of orthodontic patients. Mtaya et al showed that the mean decayed, missing, filled teeth and DMFT were 1.7, 2.1, 2.4 and 1.7, respectively¹³⁻¹⁴. In this study, the mean DMFT value was 0.63, 0.05,

0.30 and 2.87, respectively. Martignon et al. After 12-29 years of Colombian patients receiving permanent orthodontic treatment showed a mean DMF-S value of 6.7. Interestingly, Nolting et al; reported a reduction in DMFT after orthodontic treatment, possibly as a result of the convenience of maintaining oral health. These clear differences in caries index scores may be due to differences in the sample population, sample size, and study design. According to the assessment of the caries status, initial caries requiring cavity and fissure sealing and restorative treatment were included, and those requiring prophylactic treatment were considered non-caries, thus excluding white spots or surface lesions without cavitation. Richter et al. Described the occurrence of white spots during orthodontic treatment in 72.9% of patients, which later developed to cavitation in 2.3%. This report requires the determination of white spot lesions, also in orthodontic patients. Changing the oral environment to promote the build-up and retention of plaque increases the risk of caries development. Orthodontic treatment modifies the oral environment by providing plaque retention¹⁵. The present study showed a lower prevalence of caries in the early stages compared to the later stages of orthodontic treatment. Ahmed et al. Found an increased incidence of caries with the

duration of orthodontic treatment. According to their report, the caries incidence was 33% after 6 months and 61% after 12 months of treatment. Regarding the distribution of age groups, this study reveals that the younger age groups 11–20 years had a higher incidence of caries than the older age groups. Mtaya also showed that younger patients are more likely to develop caries than adults. According to data on oral hygiene by orthodontic patients, about two-thirds of patients brush their teeth two or more times a day, and more than ninety percent of patients rinse their mouths after each meal. However, with the braces in particular, only 17.5% use an orthodontic brush, 1.9% use an interdental brush, 6.6% use medicated mouthwashes; which are expected of all orthodontic patients. Unfavorable eating habits that contribute to tooth decay; 30.2% eat sweets and chocolates, 26.9% eat fast food, and 14.2% regularly snacks between meals.

CONCLUSION:

The incidence of dental caries (DMFT) was high, reaching 79.2%; however, the mean DMFT value was 2.87 in orthodontic patients. The incidence of untreated caries was 63.2%; which was highest in the younger age group and in the later stages of orthodontic treatment. A large proportion of orthodontic patients eat sweets, fast food and snacks in between meals, and very few patients use special oral hygiene measures. Well-positioned teeth are not only aesthetically pleasing, but also help to maintain proper oral hygiene and reduce the occurrence of caries. Motivating the patient to maintain oral hygiene with an orthodontic toothbrush, interdental cleaners and fluoride mouthwash / tooth foam helps to reduce cavities. Periodic evaluation of dental caries is necessary in orthodontic patients.

REFERENCES:

1. Tsai, Milton Hongli, and Nes Nawi. "INCIDENCE OF DENTAL CARIES DURING FIXED ORTHODONTIC TREATMENT IN PETRA JAYA DENTAL CLINIC: A RETROSPECTIVE STUDY." *Malaysian Journal of Medical Research (MJMR)* 3, no. 3 (2019): 7-13.
2. Tsai¹, Milton Hongli, and Nes Nawi. "INCIDENCE OF DENTAL CARIES DURING FIXED ORTHODONTIC TREATMENT IN PETRA JAYA DENTAL CLINIC: A RETROSPECTIVE STUDY."
3. Enerbäck, Hanna, Peter Lingström, Marie Möller, Cathrine Nylén, Cecilia Ödman Bresin, Ingrid Östman Ros, and Anna Westerlund. "Validation of caries risk assessment methods in orthodontic patients." *American Journal of Orthodontics and Dentofacial Orthopedics* (2020).
4. Jing, Dian, Jin Hao, Yu Shen, Ge Tang, Lei Lei, and Zhihe Zhao. "Effect of fixed orthodontic treatment on oral microbiota and salivary proteins." *Experimental and therapeutic medicine* 17, no. 5 (2019): 4237-4243.
5. Sonesson, Mikael, Anna Brechter, Salem Abdurraheem, Rolf Lindman, and Svante Twetman. "Fluoride varnish for the prevention of white spot lesions during orthodontic treatment with fixed appliances: a randomized controlled trial." *European Journal of Orthodontics* 42, no. 3 (2020): 326-330.
6. Dođramacı, Esma J., and David S. Brennan. "The influence of orthodontic treatment on dental caries: An Australian cohort study." *Community dentistry and oral epidemiology* 47, no. 3 (2019): 210-216.
7. Dimova, Elena, Liliya Doichinova, and Radosveta Andreeva-Borisova. "Dentists Awareness of white spot lesions during treatment with fixed orthodontic appliances."
8. Ko-Adams, Chelsea, Iacopo Cioffi, Delphine Dufour, SM Hashim Nainar, Céline M. Lévesque, and Siew-Ging Gong. "Short-term effects of fixed orthodontic appliance on concentrations of mutans streptococci and persister cells in adolescents." *American Journal of Orthodontics and Dentofacial Orthopedics* 157, no. 3 (2020): 385-391.
9. Choi, Yoon Young. "Relationship between orthodontic treatment and dental caries: results from a national survey." *International Dental Journal* 70, no. 1 (2020): 38-44.
10. Macey, Richard, Badri Thiruvengkatachari, Kevin O'Brien, and Klaus BSL Batista. "Do malocclusion and orthodontic treatment impact oral health? A systematic review and meta-analysis." *American Journal of Orthodontics and Dentofacial Orthopedics* 157, no. 6 (2020): 738-744.
11. Jablonski-Momeni, Anahita, R. Nothelfer, M. Morawietz, A. Kiesow, and H. Korbmacher-Steiner. "Impact of self-assembling peptides in remineralisation of artificial early enamel lesions adjacent to orthodontic brackets." *Scientific Reports* 10, no. 1 (2020): 1-10.
12. Knaup, Thomas, Heike Korbmacher-Steiner, and Anahita Jablonski-Momeni. "Effect of the caries-protective self-assembling peptide P11-4 on shear bond strength of metal brackets." *Journal of Orofacial Orthopedics/Fortschritte der Kieferorthopädie* (2020): 1-8.

13. Mahmoudzadeh, Majid, Sara Alijani, Loghman Rezaei Soufi, Maryam Farhadian, Fatemeh Namdar, and Somayeh Karami. "Effect of CO2 laser on the prevention of white spot lesions during fixed orthodontic treatment: a randomized clinical trial." *Turkish journal of orthodontics* 32, no. 3 (2019): 165.
14. Kumar, Mukesh, Sommya Kumari, Ambuj Chandna, Dharendra Pratap Singh, and Rameshwar Singh. "ASSESSMENT OF ENAMEL DECALCIFICATION IN ORTHODONTIC PATIENTS." *UNIVERSITY JOURNAL OF DENTAL SCIENCES* 6, no. 1 (2020): 28-30.
15. Фозилов, У. А., and С. М. Ризаева. "DEVELOPMENT AND IMPLEMENTATION OF A SET OF PREVENTIVE MEASURES AIMED AT PREVENTING THE DEVELOPMENT OF COMPLICATIONS IN THE ORTHODONTIC TREATMENT OF PATIENTS USING FIXED TECHNOLOGY." *Новый день в медицине* 2 (2020): 580-583.