Original Article

Oral Impacts Experienced by Patients Undergoing Fixed or Removable Orthodontic Appliances Therapy in Peshawar, Pakistan

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ABSTRACT

Objective: This study aims to identify potential orthodontics appliance related issues and provide ways to mitigate them by raising patient knowledge of the need of closely adhering to precautionary measures and practicing good oral hygiene.

Study Design: descriptive cross-sectional study.

Place and Duration of Study: This study was conducted at the orthodontic department of Sardar Begum Dental College Peshawar July 2023 to December 2023.

Methods: The data were analyzed using a statistic package in social sciences (SPSS) and frequency and percentage were obtained.

Results: The sample size for this research study is 271, in which 54.2% are females and 45.8% are males. orthodontic pain is present in 245(90.4%)patients and 26(9.6%) patients having no complain of pain .ln domain A (limitations in daily activities), the most common impacts are difficulty in daily activities and difficulty in cleaning teeth i.e. 88(32.1%), while sleep difficulty 10(3.7%) and difficulty in study and work 11(3.7%) are the least common impacts .Oral impacts related to domain B (limitations and disturbance in eating), in the oral impacts, the highest frequency is of the patients who could not eat the food 193(71.2%),while the lowest frequency is of the patients who could not enjoy the food 15(5.5%).Out of all the oral symptoms in domain C, the most prevalent impact is the presence of food debris under the appliances 240(88%), while the least prevalent is the presence of sores on tongue25(9.2%). The technical problems experienced by the orthodontic patients is the breakage of brackets 201(74.2%) and the breakage of band 30(11.1%).

Conclusion: The most common oral impact experienced by orthodontic patients is pain while the least common oral impact experienced by orthodontic patients are difficulty in study and work and difficulty in sleep.

Key Words: Orthodontic treatment, fixed appliances, removable appliances, oral impacts, discomfort, daily activities, oral hygiene, patient knowledge, precautionary measures

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INTRODUCTION

The term "orthodontic appliances" refers to any equipment used to apply stresses to a tooth, an entire set of teeth, or the craniofacial system in order to modify the bone, either with or without causing movement of the teeth.(1) Depending on the severity of the situation, orthodontic treatment may be carried out using a removable orthodontic or fixed orthodontic device.(2) Removable appliances are those that can be removed from the mouth by the patient themselves and are made of acrylic and wire components and are frequently used in orthodontics either to cure malocclusion issues or to maintain the effects of therapy while the fixed orthodontic devices are those that are attached to teeth by the operator and cannot be removed by the patients at will which contain wire, brackets, bands, tubes, hooks, and other supporting components, present inside the oral cavity.(1,2)

Malocclusion, a deviation from normal tooth alignment, results from genetic or environmental factors.(3) Untreated malocclusion has adverse psychological, social, and physical effects, reducing overall dental health-related quality of life.(4) Patients seek

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orthodontic treatment for improved appearance, dental function, psychological well-being, and quality of life.[5] Most people get orthodontic treatment to improve their esthetic in fact, their main concerns are typically cosmetic.[6] They also seek Orthodontic therapy to enhance psycho social wellness, and lessen the possibility of future malocclusion-related issues. The most common expectations from orthodontic treatment included enhanced self-assurance in eating (87%) and smiling in social settings (72%), improved aesthetic appearance of the teeth (85%), decrease in instances of teasing or bullying (63%) and 57% of participants believed that the treatment would facilitate easier tooth brushing.[5]

Orthodontic treatment has other impacts, related to treatment execution, just like many other disciplines in this field for which the patient or the practitioner may be responsible for these effects. Furthermore, Orthodontic treatment often induces pain (70-95%), affecting daily activities, with some patients discontinuing treatment due to discomfort, especially in the anterior.[7] Fear and anxiety are common before orthodontic treatment, often related to anticipated pain and discomfort, which can be a significant barrier to treatment.[8] Poor oral hygiene during orthodontic therapy, complicated by plaque accumulation and barriers to good practices, poses challenges to effective treatment; iatrogenic soft tissue injuries associated with fixed orthodontic devices may trigger reactions; and patients may develop gingivitis within 1-2 months, emphasizing the need for oral hygiene practices to prevent periodontitis.[9] Fixed orthodontic appliances can promote halitosis through plaque buildup, increasing the risk of white spot lesions after treatment.[1] Gingival recession is linked to mandibular incisor movement during orthodontic treatment.[10] Fixed appliances may cause traumatic ulcers due to mucosal irritation, requiring various treatments for relief.[11]

Eating habits may be disturbed by orthodontic appliances, impacting dietary recommendations and speaking may also get affected, particularly with fixed ones, which can disrupt tongue movement and distort certain sounds. Lingual appliances offer aesthetic advantages but may pose challenges such as speech discomfort and oral hygiene maintenance, limiting their use. Miscellaneous problems include temporomandibular dysfunction, decalcification, periodontal disease, discomfort, pulpal alterations, root resorption, and potential systemic side effects.[4] Orthodontic treatment can impact quality of life, with poor oral health affecting daily performance, but measures like Invisalign aim to mitigate these effects.[12,13] Technical problems during treatment, such as damage to molar bands or brackets, can significantly influence treatment outcomes, with self-ligating brackets potentially causing less pain.[14]

Examining the oral impacts of orthodontic treatment can give information for enhancing orthodontic care, addressing patient concerns, and customizing treatment plans to better meet the needs of Peshawar patients and the local environment. Since there haven't been any recent studies in this area. By attempting this study to clarify both patient- and dentist-based measures, this study hopes to close a significant knowledge gap in the field and offer a sophisticated grasp of the complexities of orthodontic treatment in this particular region. Our goal in conducting this research is to establish a foundation for customized treatments that directly address the specific needs of Peshawar community, thereby making a meaningful difference in their oral health outcomes and overall well-being.

METHODS

This study was conducted at orthodontic department of Sardar Begum Dental College Peshawar from July 2023 to December 2023, including patients using orthodontic appliances during their treatment and to investigate the oral impacts arise due to the specific appliances. The sample size of 271 participants was calculated through a statistical approach using the following formula: $n= p (1-p) (z/e)^2$ (17) with a 22.7%(18) prevalence, 5% margin of error and 95%(z=1.96) confidence interval. Using a non-probability convenience sample technique, the study included participants aged 10 to 30 who had been using orthodontic appliances for at least one month, including both genders while excluding mentally retarded patients.

A written application stating the purpose of the study with attached questionnaire was submitted to the head of orthodontic. Each part of the ethics related to the research study was extensively discussed with orthodontic department head of Sardar Begum degree college and each feature of research study was evaluated to ensure participants confidentiality and privacy. Oral consent was also taken from study participant and the contesting participants were asked to answer certain questions regarding oral impacts that they experienced while using orthodontic appliances. The data was collected through a readymade questionnaire that consists of demographic variables and the oral impacts that they experience. After collecting the required data, it was put into SPSS version 25 for the descriptive analysis to find out the frequency and percentage of every variable and then represented in the form of tables.

RESULTS

The demographic data from the study participants reveals a balanced distribution in terms of gender, with 54.2% being female and 45.8% being male. In terms of age, the age was categorized into two groups in which majority fall within the 10-20years group, constituting 58.3%, while 41.7% fall between the ages of 20-30

years. The socioeconomic status of the participants indicates diversity, with 3.7% classified as lower class, 41.7% as middle class, and a majority of 54.6% falling into the high-class category. The educational level of the majority of participants in the study was at the bachelor's level, comprising 84 individuals (31.0%). In contrast, a smaller number of participants, specifically 5 individuals (1.8%), were reported to be illiterate, as shown in table no1.

Table No 2 revealed the oral symptoms in the participants where the most commonly reported issue was the presence of food debris under the appliance, acknowledged by 88.6% of participants. Followed by gum bleeding at 49.1% while 40.2% reported experiencing bad smell and bad taste, with 38% participants complaining having sores on cheeks. Gum swelling, reported by 27.3% of participants, Sores on lips were reported by 12.2% of participants, followed by difficulty in mouth opening at 10.3% and sores on the tongue, experienced by 9.2%, were the least.

Table No. 1: Demographic Data

S.#	Variables		n	%
1	Gender	Male	124	45.8
		Female	147	54.2
2	Age	10-20 years	158	58.3
		20-30 years	113	41.7
3	Socio-economic status	Lower class	10	3.7
		Middle class	113	41.7
		High class	148	54.6
4	Education-al status	illiterate	5	1.8
		primary	16	5.9
		middle	72	26.6
		secondary	80	29.5
		Bachelor	84	31
		Higher education	13	4.8

Table No. 2: Oral symptoms

Sr.#	Variables	Frequency	Percentage
1	Difficulty in mouth opening	28	10.3
2	Sores on tongue	25	9.2
3	Sores on cheeks	103	38.0
4	Sores on lips	33	12.2
5	Bad smell and bad taste	109	40.2
6	Food debris under appliance	240	88.6
7	Gum bleeding	133	49.1
8	Gum swelling	74	27.3
	Total	271	100

DISCUSSION

Patients undergo orthodontic treatment in order to treat the malocclusion and for esthetic reason. Orthodontic appliances may be a fixed orthodontic device or a removable one, depending on severity of the case. Orthodontic appliances have several impacts that the patients experience during treatment. These can sometimes cause temporary discomfort, difficulty in eating, speaking and also irritation of oral mucosa which can lead to gum bleeding, gum swelling and soreness on different spots such as cheeks, tongue and lips, and also caused by poor oral hygiene.

In our study we assessed different oral impacts caused by wearing orthodontic appliances. Among these impacts pain, food debris under appliances and sores on cheeks were the most prevalent. Technical issues may arise like breakage of bands and brackets due to unbalance occlusal forces on the appliances.

We found a correlation—albeit a slight one—between sleep trouble and orthodontic patients' symptoms in our study and Aljami's 2019 UK study.[10] On the other hand, patients receiving fixed orthodontic therapy experienced significantly different sleep difficulties, according to Al Baseer's 2021 study conducted in Saudi Arabia.[5]

In line with Alajmi's 2019 study conducted in Kuwait, which likewise found no discernible difference between the fixed appliance and Invisalign groups, our research indicates no substantial variance in oral symptoms. In contrast to Alajmi's findings, we did discover a difference in the incidence of cheek sores ($p = 0.036$).[10]

The findings of our study reveal that orthodontic appliances have a major impact on everyday activities, in contrast to another study in UK study where patients reported little to no effect and did not emphasize it.[18]

According to another research, showing persistent eating issues throughout therapy, our study's subjects had difficulty chewing, eating, enjoying food, and tasting different foods. In accordance with Carter's research, several participants also considered cleaning the device to be a major concern.

In keeping with our study, where 90.4% of participants reported experiencing pain during treatment, A researcher reported that 94% of patients reported experiencing pain from orthodontic appliances. Philipp A also noted that patients' rates of pain were comparable.[19]

The current study suggests that having history of orthodontic treatment does not appear to result in greater difficulty of mouth opening.

Our analysis revealed a relationship between the difficulty of speaking during orthodontic treatment and the length of treatment, which is corroborated by another researcher, which demonstrated speech

difficulties following the implantation of fixed appliances that eventually cure.[20]

In our study, 74.2% of total participants reported fixed appliances breakage due to the unbalanced occlusal load on them. In contrast to the previous study conducted by Elizebath bradely in 2020, they reported 61 % breakage of fixed appliances.[4]

CONCLUSION

From this study, conducted in the orthodontic department of Sardar Begum Dental College Peshawar, it is concluded that, out of all the patients (271) most of them were females 147(54.2%). Age of the most of the participants were ranging between 10-20, 158 (58.3%). The study found that after getting orthodontic treatment patient with fixed orthodontic appliances experience greater discomfort including pain with mild intensity, sores on cheeks, gum bleeding, food debris under appliance compared to the other oral impacts.

The results of present study shows that most common oral impact of orthodontic appliances is pain 245(90.4%), while the least common oral impact of orthodontic appliance are difficulty in study and work 11(3.7%) and difficulty in sleep is 10(3.7%).

Recommendation: The complications arise from the orthodontic treatment can be minimized by the conjugated efforts of both Doctors and patients.

The dental professional should provide clear and reinforced instruction to their patients regarding oral hygiene i.e., brushing technique, what not to bite directly, taking cold intake of fluid which has soothing effect on pain due to inflammation and also how to keep the oral environment feasible for the recommended tooth movement.

On the other hand, patients should be able to listen carefully enough the instruction given by the dental professional and then make a checklist for the actions to be done accordingly, if patients feel any problem during their treatment, they should inform the dental professional regarding their issues immediately.

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