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A cross-sectional study on the impact of dental pain and its relation to quality of life among patients undergoing orthodontic treatment

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Abstract---Background: Patients experience pain during fixed orthodontic operations such as separator implantation, archwire placement and activations, orthopedic force delivery, and bracket debonding. The purpose of this study was to analyze pain and oral health-related quality of life among orthodontic patients. Materials and method: After gaining ethical approval from the Institutional Review Committee, this descriptive cross-sectional study was conducted among 157 orthodontic patients at a tertiary care institution from May 2021 to April 2022. The participants were chosen using the convenience sampling approach. The "Oral Health Impact Profile-14" was used to assess oral health-related quality of life and

pain experienced during the first month of fixed orthodontic treatment. The IBM SPSS version 22 was used to analyze the data and calculate the frequency and proportion. Results: The study participants' mean pain score was 4.95 ± 2.03 , and their mean oral health impact was 12.61 ± 7.37 . The majority of the participants in the study (86.6%) had experienced moderate pain as a result of orthodontic treatment. Among the reported effects, 139 (88.5%) reported unpleasant hurting in the mouth, and 130 (82.8%) had trouble eating. Changes in taste had the least impact and were only seen in 21%. Conclusion: The intensity of pain felt by patients varied. The majority of the individuals were in moderate discomfort, while only a few felt no pain at all. The fixed orthodontic treatment produced at least one or more oral health consequences for the individuals. Orthodontists should inform patients about any potential discomfort so that therapy is not interrupted owing to pain.

Keywords---orthodontic treatment, pain, quality of life, oral health impact profile-14, separator.

Introduction

Functional difficulties, discomfort, and suffering may result from fixed orthodontic appliance therapy.¹ Unpleasant tactile sensations, a sense of confinement in the oral cavity, stretching of the soft tissues, pressure on the mucosa, tongue displacement, and tooth soreness and pain are all examples of discomfort.^{2,3} Patients experience pain during all orthodontic operations, including separator implantation, archwire placement, and activations, orthopedic force application, and debonding. The pain caused by orthodontic therapy is usually minor and short-lived.⁴ However, some patients feel excruciating discomfort, to the point where mastication and teeth brushing are hampered. Pain is a subjective experience that varies greatly from person to person.^{5,6}

The appearance of the appliance and speech impediment may damage patients' self-confidence, especially during social encounters when attention is focused on the face, eyes, and lips. Poor dental health can have an impact on patients' physical, psychological, and social well-being, lowering their quality of life (QOL).⁷ Researchers in orthodontics have evaluated health-related quality of life (OHRQOL) concerning orthodontic treatment outcomes; however, there is little study on orthodontic patients' QOL during treatment. Orthodontic pain, the most commonly reported adverse consequence of orthodontic treatment, is a major source of concern for parents, patients, and practitioners. According to studies, this reaction is a major deterrent to orthodontic treatment and a primary reason for treatment termination.⁷ Understanding the effects and discomforts of fixed orthodontic appliance therapy allows patients to have more realistic expectations about orthodontic treatment and may help them stick to their treatments. Therefore, this study was carried out to assess pain and OHRQOL among orthodontic patients.

Materials and Method

After getting ethical approval from the Institutional Review Committee, a descriptive cross-sectional study was undertaken in the Department of Orthodontics and Dentofacial Orthopaedics from May 2021 to April 2022. All study participants gave their informed consent before being enrolled in the trial. The convenience sample method was used to select 157 individuals who were undergoing fixed orthodontic treatment. The study comprised patients between the ages of 18 and 35 who were undergoing fixed orthodontic treatment with stainless steel brackets. Patients who needed intraoral or extraoral appliances (e.g., bite plates, elastics), patients with severe Class II or Class III skeletal patterns who needed orthognathic surgery, syndromic patients, individuals with cleft lip or palate, and patients on systemic disease medication were also excluded.

A numeric pain rating scale (NPRS) was used to assess pain throughout the first month of fixed orthodontic treatment. The NPRS is a subjective scale that allows people to rate their pain on an eleven-point scale. The pain scale went from 0 to 10 (no discomfort at all) (worst imaginable pain). 0 = no pain; 1-3= mild pain (nagging, irritating, but not interfering much with daily activities); 4-6= moderate pain (interferes significantly with everyday activities); 7-10= severe pain (disabling; unable to perform activities of daily living).

Using the Oral Health Impact Profile, a face-to-face interview was conducted to document the oral health-related quality of life (OHIP-14).⁸ The OHIP-14 is a pretested standard questionnaire that has been translated and validated in several languages, including Hindi and English. Functional constraint, physical pain, psychological discomfort, physical impairment, psychological disability, and handicap are the seven characteristics of impact explored by OHIP-14. The responses were graded as 'very often' (4 points), 'pretty often' (3), 'sometimes' (2), 'hardly ever' (1), or 'never' (0). The OHIP-14 total score, which is computed by adding the ordinal values for 14 items, runs from 0 to 56. Higher ratings imply a greater influence on dental health. The 'severity' of adverse effects caused during the first month of fixed orthodontic treatment was measured using the total OHIP-14 score and subscale scores. For cross-tabulation, each item of OHIP-14 scores was further dichotomized as "OHIP= 0 (no impact)" and "OHIP > 0 (impact on daily performance)".

Before collecting data for the main study, a pre-test of 20 individuals with fixed orthodontic treatment was conducted. The OHIP-14 inter-rater agreement was 0.99, indicating high reliability. The data was entered into a Microsoft Excel Sheet version 2012 spreadsheet and analyzed with the Statistical Package for Social Sciences (SPSS version 22). In analyzing OHIP-14, the intra-class correlation coefficient (ICC) was employed to determine inter-examiner reliability. For OHIP-14 and NPRS, descriptive statistics such as the mean and standard deviations were calculated. The study population's pain level and OHIP-14 frequency distributions were determined.

Results

The study participants' average pain score throughout the first month of fixed orthodontic treatment was 4.95 ± 2.03 , and their mean oral health impact was 12.61 ± 7.37 . The average age of the participants in the study was 23.18 ± 3.06 years. There were 61 men (38.85%) and 96 women (61.15%). Among them, 39 (24.84%) of the 157 study participants reported significant discomfort, while 6 (3.82%) reported no pain at all as a result of any fixed orthodontic treatment treatments (Table 1). However, while undergoing fixed orthodontic treatment, the study participants had reported one or more detrimental oral health effects (Table 2).

Table 1
First month level of pain during the fixed orthodontic treatment

Pain level	Male n (%)	Female n (%)	Overall participants' response n (%)
0 (no pain at all)	4 (2.55)	2 (1.27)	6 (3.82)
1-3 (mild pain)	8 (5.09)	16 (10.19)	24 (15.29)
4-6 (moderate pain)	32 (20.38)	56 (35.67)	88 (56.05)
7-10 (severe Pain)	17 (10.83)	22 (14.01)	39 (24.84)

Table 2
The distribution of impacts reported in OHIP-14

Questions	Never n (%) Score 0	Hardly ever n (%) Score 1	Occasionally n (%) Score 2	Fairly Often n (%) Score 3	Very often n (%) Score 4	Overall impact (score 1-4)
Trouble pronouncing any words	81 (51.6)	27 (17.2)	41 (26.1)	6 (3.8)	2 (1.3)	76 (48.4)
Sense of taste has worsened	119 (75.8)	16 (10.2)	13 (8.3)	6 (3.8)	3 (1.9)	38 (24.2)
Painful aching in mouth	16 (10.2)	17 (10.8)	94 (59.9)	27 (17.2)	3 (1.9)	141 (89.8)
Uncomfortable to eat any food	26 (16.6)	21 (13.4)	69 (43.9)	34 (21.6)	7 (4.4)	131 (84.4)
Felt self-conscious	49 (31.2)	36 (22.9)	58 (36.9)	10 (6.4)	4 (2.5)	108 (68.8)
Felt tense	89 (56.7)	31 (19.7)	24 (15.3)	10 (6.4)	3 (1.9)	68 (43.3)
Diet been unsatisfactory	90 (57.3)	20 (12.7)	32 (20.4)	12 (7.6)	3 (1.9)	67 (42.7)
Had to interrupt meals	65 (41.4)	41 (26.1)	31 (19.7)	14 (8.9)	6 (3.8)	92 (58.6)
Difficult to relax	96 (61.1)	25 (15.9)	30 (19.1)	5 (3.2)	1 (0.6)	61 (38.8)
Been a bit embarrassed	97 (61.8)	26 (16.6)	25 (15.9)	6 (3.8)	3 (1.9)	60 (38.2)
Been a bit irritable with others	120 (76.4)	19 (12.1)	16 (10.2)	2 (1.3)	0 (0)	37 (23.6)
Had difficulty doing usual jobs	71 (45.2)	50 (31.8)	31 (19.7)	4 (2.5)	1 (0.6)	86 (54.8)
Life in general was less satisfying	102 (65)	28 (17.8)	22 (14)	3 (1.9)	2 (1.3)	55 (35)
Been totally unable to function	61 (38.8)	43 (27.4)	41 (26.1)	12 (7.6)	0 (0)	96 (61.1)

Discussion

The mean NPRS pain score in this study was 4.95 ± 2.03 , indicating that the study participants experienced moderate pain during the first month of their fixed orthodontic treatment. The participants' moderate pain showed that it was interfering significantly with their everyday activities. Orthodontic therapy might cause pain that exceeds our expectations. Treatment providers frequently underestimate their patients' pain and may not recognize when analgesics are required.² In an Indian survey, 62 percent of dental practitioners and students expected that patients will experience moderate pain and discomfort throughout orthodontic treatment. However, 94 percent of orthodontic patients reported moderate pain.⁹ There were 88 (56.05 percent) participants in the current study who had moderate pain. Many people (39, 24.84 percent) reported significant discomfort that prevented them from carrying out daily tasks.

The majority of research examining the influence of orthodontic therapy on oral health-related quality of life found that patients' total OHRQoL was significantly impacted until about one month after appliance implantation.¹⁰ During the first month of treatment, the overall impact of fixed orthodontic therapy was 12.71 ± 7.27 in this study. The start of fixed orthodontic treatment had varying effects on the participants' dental health-related quality of life. This outcome is comparable to one from a Brazilian study in which patients' quality of life deteriorated throughout orthodontic treatment due to functional constraints and physical pain.¹¹ In the current investigation, not a single subject was found to be impact-free. This finding matched that of a Swiss study, in which practically every patient reported some level of interruption in schooling or social activities.¹²

The majority of trial participants (141, 89.8%) reported intense hurting in the mouth and trouble eating (131, 84.4 percent). In a study conducted in India and Pakistan, the incidence of pain and discomfort caused by fixed orthodontic treatment was found to be similar.^{13,14} Individuals wearing braces complained of poor diet more than patients wearing detachable and functional appliances in Lithuanian research.¹⁵ However, according to Michigan research, only 21.9 percent of patients changed their diet as a result of brace pain.²

In a study conducted in Lithuania, it was discovered that 26.8% of patients had discomfort as a result of the reduced speech.¹⁵ However, 76 (48.4%) of the participants in this study had trouble pronouncing words. In this study, 86 (54.8%) patients had difficulties performing routine tasks, 60 (38.2%) felt ashamed, and 96 (61.1%) were completely unable to function due to pain and discomfort from fixed orthodontic treatment. This finding is in line with a study conducted in China, which found that physical functionality, body discomfort, and overall mental health domains were all altered following initial archwire implantation, demonstrating that orthodontic treatment had an impact on patients' lives.¹⁶ These findings aid orthodontists in informing patients about the expected impact of fixed orthodontic treatment so that they can accept the potential pain and discomfort once treatment begins.

There are some limitations to the research. This research was conducted on a small sample of patients at a single dental hospital and cannot be applied to all

fixed orthodontic treatments. To better understand the impact of orthodontic pain on quality of life, a wider population should be studied. The study solely tracks discomfort and quality of life during the first month of fixed orthodontic treatment with a single wire type. Longitudinal analytical studies assessing pain and quality of life in different orthodontic treatment phases, as well as different wire types, can help researchers better understand how pain perception and quality of life vary after orthodontic treatment.

Conclusion

Patients' discomfort levels varied greatly during the first month of fixed orthodontic therapy. More than half of the patients reported considerable discomfort, with only a few reporting no pain at all. The fixed orthodontic treatment produced at least one or more oral health consequences for the study subjects. As a result, orthodontists should devote more time to communicating with and counseling patients about potential discomfort so that treatment is not interrupted owing to pain.

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