

Pain Perception in Orthodontic Patients Treated by Fixed Orthodontic Appliances and Its' Effect on Their "Quality Of Life"

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ABSTRACT

Objectives: To investigate the effect of age and gender on pain perception of orthodontic patients treated by fixed appliances and its effect on their "Quality Of Life".

Methods: The sample of this study consisted of 276 patients, who were divided according to age into two main groups Adolescents (A) under the age of 18 years and Adults (B) above or equal 18 years. Group A was composed of 169 patients; 117 female patients (mean age =14.8±1.7 years), and 52 males (mean age =15.0±1.5 years), while, group B was composed of 107 patients; 72 female patients (mean age =22.7±5.6 years), and 35 males (mean age =23.4±5.3 years). The sample for this study was chosen from the orthodontic patients of the Orthodontic clinic at Princess Haya Al Hussein Hospital from March 2010 to October 2011. Fitting a fixed orthodontic appliance and an aligning wire was done for each patient. On the recall visit, patients were asked to fill a questionnaire, which requires a 5-10 minutes interview between the researcher and the patient to complete.

Results: It was revealed that, 90.2% of our orthodontic patients had pain from braces. No significant gender differences were found in means of pain intensity scores. Significant age differences were found from the second day of bonding extending to the recall visit, with P values $\leq .05$. For the adolescents group, the mean of the Quality Of Life scores was 3.29±4.3, while in adults, the mean was 5.46±5.5. This difference was significant between both groups. 49 adult patients (45.8%) and 66 of adolescent patients (39.1%) used pain killer medications.

Conclusions: From the results of this study it could be concluded that, the highest ratio of the patients reported pain was on same day of bonding, followed by gradual decrease in ratio over the successive days. A very low ratio of patients reported pain on the recall visit compared to that of bonding day. Pain intensity and ratio of patients experienced pain were higher in adult group than in adolescents. While, no significant gender differences could be found in both groups. Effects of orthodontic treatment on Quality Of Life of adult patients were higher than that observed in adolescent patients. Analgesic consumption was higher in adult patients than in adolescent patients, as well as, higher in female patients compared to males.

Key words: Fixed orthodontic appliances, Pain, Quality of Life.

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Introduction

Pain intensity and discomfort are side effects during orthodontic treatment by fixed orthodontic

appliances.⁽¹⁾ Pain and discomfort are common place after insertion of an initial aligning archwire. The prevalence, magnitude, and time course of pain, after insertion of the initial

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leveling archwire, had previously been reported by several groups of investigators.^(2,3) The level of pain reported after archwire placement is believed to be greater and more prolonged than that following extraction of teeth.⁽⁴⁾ Some researchers even mentioned that, 90 per cent of their orthodontic patients reported that, their treatment was painful and 30 per cent of them considered ceasing treatment prematurely because of the pain they experienced.⁽⁵⁾ Within first few hours of insertion of first archwires, the majority of patients report experiencing some pain, after 24 hours pain is reported by up to 95 per cent of patients undergoing therapy with fixed appliances.⁽²⁾ Erdiñç and Dinçer⁽⁶⁾ concluded that, initial pain is perceived at 2 hours and peaks at 24 hours during orthodontic treatment with fixed appliances. Patients' pain is one aspect of oral health-related quality of life (OHRQoL), a relatively new concept in the oral health sciences. Pain related to orthodontic treatment leads to poor oral health which can affect physical, psychological, and social conditions of the patient, which in turn affect patient's Quality Of Life (QOL).^(7,8) Pain from orthodontic treatment has been shown to have negative effects on oral hygiene efforts and to be a major reason for missing appointments; in addition, almost all orthodontic patients reported pain when chewing and biting foods of a firm or hard consistency, causing them to change their diet.^(2,9,10) The pain within the first 48 hours is so disturbing that approximately 20 per cent of patients reported awakened at night and it causes some patients to take analgesic medication.^(2,11) So, many researchers were interested in assessing the determinants and responsiveness of the OHRQoL.⁽¹²⁻¹⁵⁾ The variations in individual responses to the insertion of the archwire led several investigators to look for factors which could be helpful in predicting which patient will experience the most pain and how to manage this pain, so many researchers⁽¹⁶⁻²⁶⁾ studied how we could decrease the level of pain or even to prevent it by different means, by testing different types and gauges of wires, different bracket systems and techniques, and different mechanics, in order to produce a more biologic movement effect that avoids compromising the teeth and the periodontal support. As less pain intensity means less analgesic consumption and less effect on

QOL of the patient.⁽²⁷⁾ On the other hand, analgesics consumption by fixed orthodontic patients, and what types that could be used more safely to control orthodontic pain, were the target for many groups of researchers.^(18,19,28-30) Giving the orthodontic patients specific analgesics, prior to and after fitting the orthodontic appliance, will decrease or prevent the pain expected to be experienced by the patient. Xiaoting *et al*⁽³¹⁾ concluded that, analgesics are still the main treatment modality to reduce orthodontic pain. However, the pharmacologic actions as well as their side effects should be identified before prescribing these medications in routine clinical practice. Xiaoting *et al*⁽³¹⁾ also confirmed that, there was no difference in pain control between ibuprofen, acetaminophen, and aspirin. They declared that, some long-acting nonsteroidal anti-inflammatory drugs NSAIDs and cyclooxygenase enzyme COX-2 inhibitors are interestingly recommended for their comparatively fewer side effects, and their preventive use is promising. Other means for decreasing pain perceived by orthodontic patients were suggested by many researchers like: chewing gum,⁽³²⁾ vibratory stimulation,⁽³³⁾ and low-level laser therapy.⁽³⁴⁾ Some researchers concentrated on the relationship between personality traits, pain perception and attitude toward orthodontic treatment. They found that pain perception in treated subjects was lower in patients with previous knowledge of orthodontic treatment, and more positive attitude was found in patients who experienced less pain during orthodontic treatment.^(3, 35-37) Certainly, potential patients have heard about how painful orthodontics can be, but they all go through the treatment anyway. Therefore, pain perception is real, and must be accepted as part of routine orthodontic treatment.⁽¹⁵⁾ although orthodontics has developed significantly in several areas in the last decades, pain has been a constant worry for professionals and patients undergoing orthodontic treatment. However, few experimental studies have been conducted on this important symptomatology. This justifies going deeper into this area of research to provide new procedures to deal with the pain reported by the patients.^(9,38) This study was designed to investigate the pain perception in orthodontic patients treated by fixed appliances, explore age

and gender differences in pain perception, and determine the effect of this pain on their "Quality Of Life".

Methods

Ethical approval for this study was provided by the Human Research Ethics Committee- Royal Medical Services- Jordan. The sample of this study was composed primarily of 289 patients, who were chosen from the patients of the orthodontic clinic at Princess Haya Al-Hussein Hospital over the period from March 2010 to October 2011. All patients were taken according to their order on the waiting list randomly with the only condition that they fulfill the inclusion criteria requirements. The compliance of patients was more than 95%. Only 13 cases from the primary expected sample were excluded, five cases due to movement to another region and couldn't attend on the first recall visit, two cases due to very severe pain that they couldn't tolerate, so they asked for debonding within the first few days after bonding of the attachments, six patients didn't attend the clinic on the scheduled appointment and show no interest to complete the questionnaire. The final sample of this study was composed of 276 patients, who were divided according to age into two main groups Adolescents (A) with their ages less than 18 years and Adults (B) with their ages equal or above 18 years. The Adolescents group (A) was composed of 169 patients (117 female patients with the mean age was 14.8 ± 1.7 years, and 52 males with the mean age was 15.0 ± 1.5 years), while the Adult group (B) was composed of 107 patients (72 female patients with the mean age was 22.7 ± 5.6 years, and 35 males with the mean age was 23.4 ± 5.3 years), Table I.

The inclusion criteria for the sample selection were including the following:

1. Patients had no history of systemic or congenital diseases.
2. Patients had permanent dentition.
3. Patients had good healthy gingival tissues with fair to excellent oral hygiene habits.
4. No dental extraction was done since at least one month if there was any.
5. All patients need to be treated by fixed

orthodontic appliances.

6. Any carious teeth should be treated before attachments fitting.
7. No presence of local intra or extra oral diseases or lesions like ulcers or herpes labialis at time of bonding of the attachments, which would make it difficult to differentiate between the pain sources.
8. Patients were not using any medications that could affect pain perception.

Patient were already have undergone study impressions, treatment planning, separators, and molar bands fitting steps. The patients were asked to participate in the study on the day of placement of the fixed orthodontic appliance. Direct bonding of 0.018" Roth prescription brackets* were done for all participants. Brackets were placed by the same orthodontic practitioner from the second premolar to the contra lateral one for both upper and lower dental arches. The initial wire was 0.012* round martensitic active nickel-titanium (NiTi) alloy archwire** with full engagement by elastic O-ties*** for all cases. Similar oral hygiene and appliance maintenance instructions were given to both groups and all patients received a supply of relief wax. Instructions were given to all participants to record any pain killer medication consumption. On the recall visit, patients were asked to complete a questionnaire (Appendix 1) in a 5-10 minute interview with the practitioner and the assistant who explained the questionnaire before its completion by the participants. Reliability of a questionnaire in assessing experiences of adolescents in orthodontic treatment was tested by Feldman *et al.*,⁽¹³⁾ who found the test-retest reliability excellent. The questionnaire was composed of two parts: The first part was concerned with pain intensity felt during the placement visit (T1), immediately after (T2), one day (T3), two days (T4), and one week after placement of the appliance (T5), and on the recall visit day (T6). The recall visit was arranged after one month of the fixed appliance bonding visit for each patient, during this visit the wire was exchanged to 0.016" NiTi alloy archwire⁺⁺. The patient was asked to fill the questionnaire immediately after finishing the recall visit. The patient's pain experience was assessed by using a

*Manufactured by Global Orthodontics, USA

** Manufactured by G&H Wire Company, USA

*** Manufactured by American Orthodontics, USA

++ Manufactured by G&H Wire Company, USA

5-point Likert scale with five choices, starting on the left end by the descriptive terminology "No pain" =0 mark, "mild pain" =1 mark, "moderate pain" =2 marks, "severe pain" =3 marks, and ending on the right side by "very severe pain" =4 marks. Pain experiences of the patients were recorded according to their own experience and how they felt on the different time occasions from T1 to T6. Pain scores were collected and statistically analyzed. Mean of pain intensity scores were calculated for each event separately. Inter- and intra-group differences in means of pain scores were investigated. The second part of the questionnaire was concerned with the effect of pain related to the fixed orthodontic appliance on the quality of life (QOL) of the patients including any drug consumption related to orthodontic treatment. These questions were used by other studies,^(14,39) in which their test-retest reliability was considered excellent. These questions were found to be suitable and representative for the present study. This part was composed of six questions of Yes and No answers; each question was given 4 marks for "Yes" answer and 0 mark for "No" answer. These six questions were designed to find out if the pain from the fixed orthodontic appliance affected the patient daily life and activities, caused the patient to change the usual diet, made the patient's teeth hurt on biting or chewing, made it difficult for the patient to brush his/her teeth, disturbed the patient's normal sleep, and necessitated him/her to take analgesic medication to relief pain. Any pain relief medication taken by the patient should be written in type and dosage. The marks deserved for these six questions were summed together, to form the QOL score (from 0-24 out of 24). Higher QOL score meant that, there was more effect of the fixed appliance-induced pain on the QOL of the patient. Means of QOL scores were calculated for both groups, inter- and intra-group differences were tested statistically. Also, the correlation of the QOL scores with the age of the patients was tested for the whole sample. The ratio of patients who administered analgesic medication was calculated for both groups, and for those patients, the type and dosage of the medication was recorded to find the mean days of consumption of medication due to orthodontic pain. In addition, all types of analgesic medication taken by our patients were

investigated to find the most popular among them. For both groups, inter- and intra-group differences in means of days of medication consumption were tested statistically.

Statistics

Reliability of the questionnaires in assessing orthodontic responses and pain perception by the orthodontic patients was tested by many researchers and found to be good to excellent.^(10,13) Data of this study was gathered, tabulated, and statistically analyzed. Data analysis included descriptive and analytic statistics obtained with the Statistical Package for the Social Sciences (SPSS) software, version 16. The descriptive analysis was done for both groups and the subgroups including age, gender, pain intensity scores, QOL scores, and days of medication usage. Independent samples t-test was used in this study to find the significance of difference in inter- and intra-group pain score means on the different time intervals (T1-T6), QOL means, and mean days of medication usage. Bivariate Pearson correlation test was used to find the significance of correlation of the QOL scores and pain intensity scores with age of patients among the whole sample. The significance level for this study was considered as $P \text{ value} \leq 0.05$.

Results

Of the study sample, 276 subjects (95.5%) completed the study successfully. The other 13 subjects (4.5%) who failed to comply with the study were eliminated from the study and their results were excluded from data analysis. Gender distribution and mean age were cleared in Table I, for both groups.

Pain Course:

Frequency and ratio of patients who reported feeling pain and discomfort were calculated for each of the six time intervals from T1 to T6 (Table II). Means of pain intensity scores were calculated, for both groups, at each time event separately. Inter- and intra-group comparisons were done as expressed in Tables III and IV. Ratio of patients experienced pain increased sharply to reach up to 90.2% on same day of bonding. It continued to be high after one day (83.7%), and then, it started to decrease after two days of bonding (62.7%) down to 33.3% after

one week. On the recall visit, only 14.5% of the whole study sample reported that, they had pain of low intensity (mild to moderate). The results of this study revealed that, 3.7% of group B felt mild pain at the bonding visit (T1), while, in group A only 0.6% felt mild pain. Immediately after bonding and on same day (T2), pain intensity ranged from no pain to severe pain. 91.6% of group B patients felt pain from orthodontic appliance as compared to 89.3% of group A, most of them felt mild to moderate pain. On the second day (one day after bonding (T3)), 90.7% of the adults group felt pain with its severity started to decrease, while, in the adolescent group 79.3% felt pain. After two days of bonding (T4), less percentage of patients perceived pain (66.4% of group B and 60.4% of group A). Pain continued with 27.8% of group A and 42.1% of group B, after one week of bonding (T5). On the recall visit (T6), 21.5% of group B and 10.1% of group A had pain, but, their pain was of milder intensity. Regarding the means of pain intensity scores, no significant intra-group differences (gender differences) were found in both groups as illustrated in Table III. On the other hand, significant inter-group differences were found on T3, T4, T5, and T6 intervals, with P values equal .004, .050, .001, and .004 respectively (Table IV).

QOL: The effect of pain experienced during fixed orthodontic treatment on the oral related QOL was measured in both groups. Frequency and ratio of patients had an effect from pain of braces on their QOL were summarized in Table V. While, the means of QOL scores among both groups were summarized in Table VI. The results of this study revealed that, there were no significant gender differences among each of group A and group B, on the other hand, these results revealed a highly significant difference between both groups, with P value <.01 (Table VI).

Age: The patients were separated according to their ages into two groups A and B. the age for group A was < 18 years (n=169) and for group B it was ≥18 years (n=107), means of age for the participants and their standard deviations were summarized in Table I. Differences were found between both groups in means of pain intensity scores (on T3, T4, T5, and T6), means of QOL scores, and means of days of analgesic

consumption, as summarized in Tables IV and VI.

The correlation between age and QOL scores (Table VII) was found highly significant for the whole sample, as P value < .01. In addition to that, the correlation between age and pain intensity scores was found significant on T2, T5, and T6 time intervals, with P value < .05 as shown in Table VII.

Gender: Both groups A and B were divided into subgroups according to gender. Among group A, females had greater pain intensity scores mean than males on T1-T5 intervals, while on T6, males had greater mean of pain intensity scores than females. Also, females showed greater effect of pain from braces on their quality of life than males. In Addition to that, females had a little bit higher mean of days of analgesic consumption than males. In spite of these results, no significant gender differences were found in means of QOL scores, days of medication consumption, and pain intensity scores, except for the means of pain intensity scores on T6, with P value < .05 (Table III). On the other hand, among group B, females had higher pain score means than males on T4 and T6 intervals, while, males had higher pain score means on T1-T3, and T5 intervals. Also, males had more effect of pain from braces on their QOL than females. Means of days of analgesic consumption were found to be equal in both sub groups. All these differences among group B were found to be insignificant in this study.

Analgesic consumption: No specific prescription for pain medication was dispensed to the patients. Patients' instructions on bonding day tried not to mention the word "pain", in order not to affect the patient psychological response and his expectation or force him to take analgesic medication in advance. The orthodontist instructions point out that, if you feel any discomfort you may use what you usually use for mild headache. So, every patient was free to take any medication he/she felt necessary. Patients were asked to respond whether or not they had taken any analgesics. If the patient's answer was yes, then the type of analgesic, duration of taking it, and dosage should be reported. Ratio of patients reported taking different types of analgesics, and means of days of analgesic consumption were summarized, for both groups,

in Tables VIII and VI, respectively. Means of days of analgesic consumption were compared in this study for both groups; the results revealed that, there were no significant intra-group differences could be found among either of group A or B, although, males had higher means of days of medication consumption than females. While, the inter-group comparison showed that, a significant higher mean of days of analgesic consumption was found in group B more than in group A, (Table VI).

Discussion

In order to eliminate inter-examiner variability and subjective bias, all patients were treated and interviewed by the same clinician. Attempting to eliminate the effect of variables, other than age and gender, on results, same type of braces, archwires, technique of bonding, timing, and ligature elastics were used for the entire study population. Results of this study revealed that, the highest ratio of patients experienced pain was on same day of bonding. This ratio decreased slightly in the second day after bonding. On the third to the seventh day after bonding, patients' ratio that experienced pain dropped gradually and significantly. On the recall visit, only few patients of the whole study sample complained from pain of low intensity (mild to moderate).

These results were consistent with the results of other studies which showed that, pain started 2-4 hrs after insertion of the initial wire and peaked up after 24 hours. These studies also showed similar ratios of patients reported pain from braces at same time intervals.^(2-6,11,24) Among group B, male patients experienced pain more than females during the first two days after bonding, while after two days up to the recall visit, higher ratio of female patients experienced pain more than males. On the other hand, among adolescent group, females experienced pain more than males on T1-T3 and T5 intervals, while, males showed higher ratios on T4 and T6 intervals.

There were no significant gender differences ($P>0.05$) in pain intensity scores for both Adolescent and Adult groups. On the other hand, reported pain experiences over one week following bonding of the appliance were significantly higher ($P<0.05$) in group B than in Group A. However, there was no significant

difference ($P>0.05$) in means of pain scores during attachment placement or immediately after. The results of this study revealed a significant correlation between age and level of pain perceived among the entire sample population. These conclusions were in contrary with those obtained by Abu Alhaija *et al*,⁽³⁾ who documented the gender as the only variable affected subjects' average pain perception. Their conclusions were consistent with those obtained by Ren *et al*,⁽²⁴⁾ who found a significant difference in pain perception between males and females. They reported that, the highest frequency of pain was in the 13-16 year old age group, while no difference in pain intensity between age groups could be reported. In addition, Sheurer *et al*,⁽²⁾ found that, there was a significant gender difference in pain perception, but, no age difference in pain intensity. On the other hand, many studies demonstrated the patient age as a main determinant of the pain perception level. Jones *et al*,⁽⁴⁾ demonstrated that there are no significant gender differences in pain perception of orthodontic patients. A further support of our observations by Erdiñç *et al*,⁽⁶⁾ whose results were comparable to those obtained by this study. Other study conducted by Scott *et al*,⁽¹⁶⁾ found no gender, appliance type, or age effect on level of pain intensity; they documented post bonding time as the only determinant. In this study, the QOL of the patients was affected by pain resulted from the fixed orthodontic appliance and the aligning wire. The overall oral health-related QOL of the orthodontic adult patients was affected more than adolescents. For group A, the overall oral health-related QOL score was 3.29 ± 4.3 with a 13.7% decrease in QOL value. In group B, QOL score was 5.46 ± 5.5 with a 22.8% decrease in QOL value. There was a significant difference in QOL values between group A and group B. Main effects on QOL observed in this study, were analgesic consumption, changing diet consistency, teeth hurt on chewing and biting, difficulty in brushing teeth, and to a lesser degree, daily life activity and sleep. In the adolescence age group, females reported a higher change in their QOL compared to males. Apart from analgesics consumption which reported to be higher in females, the effect of the orthodontic treatment on males' QOL was higher than on the females' QOL of the adult

group. Although a difference in QOL scores between female and male patients was noted, this difference is not statistically significant. Our results were similar to those obtained in previous studies,^(1,2,10,39) in which, an obvious effect of pain due to braces on the QOL of patients including: changing consistency of foods in their diet, difficulties in chewing and biting, analgesic consumption, and daily life activity was reported. Erdinç and Dinçer,⁽⁶⁾ although reported that 50% of patients had some problems in their daily activities during the first three days of fitting the archwire, they considered their findings statistically insignificant. In order to decrease the effect of pain on the QOL of the patients, Shalish *et al*⁽²⁰⁾ recommended that the most appropriate treatment modality in relation to Health-Related Quality of Life parameters should be performed. In contrast to our results, other studies showed a relatively low ratios of patients used analgesics to relief pain caused by braces. Krukemeyer *et al*,⁽³⁹⁾ reported that 26.5% of their sample used analgesics to relief pain. Sheurer *et al*,⁽²⁾ and Tecco *et al*⁽¹⁹⁾ reported ratios of 16.2%, and 16.5% respectively. In this study, relatively high ratios of patients used analgesics were observed. 49 patients (45.8%) of adult patients and 66 of the adolescent patients (39.1%) used pain killer medications. For most of the patients, the onset of taking analgesics was one day after the appliance bonding. Females were the dominant in analgesic consumption in both adolescent and adult groups. The results of this study revealed that, there was no significant gender difference could be found in both groups in mean days of analgesic consumption. While, a highly significant age difference was found in mean days of analgesic consumption. The relatively high ratio of analgesic consumption observed in this study, could be related to cultural differences or lack of adequate information given to patients by their orthodontist. Bergius *et al*,⁽¹⁾ recommended that the patient should be carefully and adequately informed about each step in the treatment, expected complication and discomfort in order to enhance their compliance with the treatment. They emphasized on the importance of managing patients whom proved to be anxious and have low pain tolerance with further reassurance, discussion, and relaxation exercises. There recommendations were in agreement with

Sheurer *et al*,⁽²⁾ who claimed that perceived pain and analgesic consumption would decrease if the patient was efficiently informed about the discomfort that would be experienced. The decision of taking analgesics should not be left in hands of adolescent patients, the orthodontist should identify the more anxious and afraid patients and should prescribe certain type of analgesic with the least undesirable effects on patient QOL. The importance of prescribing analgesic with least side effects, the least possible effective dose, and appropriate intervals was suggested by Patel *et al*.⁽³⁰⁾ Recent researchers,⁽²⁸⁻³⁰⁾ after examination of different types of analgesics, found that the use of non steroidal anti inflammatory drugs (NSAIDS) is the preferred method to control pain related to fixed orthodontic appliances. Naproxen sodium, Aspirin, Ibuprofen, and Acetaminophen found to be equally effective in pain control and relatively safe. In this study, different types of analgesics were used by the patients including, Acetaminophen, Ibuprofen, and Diclofenac Sodium. Further research in this important issue should be done, to find the most appropriate way for decreasing or even preventing the pain that our fixed orthodontic patients could feel during their treatment period.

Conclusions

From the results of the present study it could be concluded that:

1. The highest ratio of patients complained from pain was on the same day of bonding, this patient's ratio decreased gradually over the following successive days of the study.
2. Pain intensity reported to be the highest in the second and third days after bonding. This intensity gradually decreased to a mild-moderate intensity after one week.
3. There was a significant difference in number of patients who experienced pain and pain intensity between the adult and adolescent age groups; being higher in the adult group.
4. There was no significant difference between males and females in pain intensity and number of patients who reported pain in both groups.

5. The effect of pain resulting from fixed orthodontic appliances on QOL was higher in the adult patients compared to the adolescent patients.
6. The main items of the QOL affected by fixed orthodontic treatment were analgesic consumption, changing of diet, and dental pain on chewing or biting.
7. Analgesic consumption was higher in adult patients than in adolescent patients, as well as, higher in female patients compared to males.

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Table I: Gender distribution and mean age of the patients in both groups A and B

S.e.m.	S.D.	Mean Age (Yr)	% from sample	% from group	n	Gender	Group
.155	1.673	14.77	42.4%	69.2%	117	F	A
.122	1.527	15.02	18.8%	30.8%	52	M	
.125	1.629	14.85	61.2%	100%	169	Total	
.654	5.551	22.74	26.1%	67.3%	72	F	B
.890	5.265	23.40	12.7	32.7%	35	M	
.526	5.443	22.95	38.8	100%	107	Total	

Table II: Frequency and ratio of patients had pain and their pain scores at the different time intervals in both groups

	Group B						Group A						score	
	Total		M		F		Total		M		F			
%	n	%	n	%	n	%	n	%	n	%	n	%	n	
96.3	103	91.4	32	98.6	71	99.4	168	100	52	99.1	116	0	0	T1
3.7	4	8.6	3	1.4	1	.6	1	0	0	.9	1	1	1	
8.4	9	5.7	2	9.7	7	10.7	18	13.5	7	9.4	11	0	0	T2
36.4	39	34.3	12	37.5	27	39.6	67	36.5	19	41	48	1	1	
33.6	36	37.1	13	31.9	23	30.2	51	28.8	15	30.8	36	2	2	
21.5	23	22.9	8	20.8	15	19.5	33	21.2	11	18.8	22	3	3	
9.3	10	5.7	2	11.1	8	20.7	35	21.2	11	20.5	24	0	0	T3
27.1	29	25.7	9	27.8	20	31.4	53	32.7	17	30.8	36	1	1	
37.4	40	37.1	13	37.5	27	30.2	51	28.8	15	30.8	36	2	2	
26.2	28	31.4	11	23.6	17	17.7	30	17.3	9	17.9	21	3	3	
33.6	36	42.9	15	29.2	21	39.6	67	46.2	24	36.8	43	0	0	T4
17.8	19	8.6	3	22.2	16	26.6	45	19.2	10	29.9	35	1	1	
29.9	32	28.6	10	30.6	22	20.7	35	21.2	11	20.5	24	2	2	
18.7	20	20.0	7	18.1	13	13.0	22	13.4	7	12.8	15	3	3	
57.9	62	60.0	21	56.9	41	72.2	122	78.8	41	69.2	81	0	0	T5
18.7	20	5.7	2	25.0	18	17.8	30	7.7	4	22.2	26	1	1	
14.0	15	20.0	7	11.1	8	7.7	13	9.6	5	6.8	8	2	2	
9.3	10	14.3	5	6.9	5	2.4	4	3.8	2	1.7	2	3	3	
78.5	84	80.0	28	77.8	56	89.9	152	82.7	43	93.2	109	0	0	T6
19.6	21	17.1	6	20.8	15	10.1	17	17.3	9	6.8	8	1	1	
1.9	2	2.9	1	1.4	1	-	-	-	-	-	-	2	2	

Table III: Means of pain intensity scores among sub-groups, and intra-group differences (using independent samples t-test).

P Value	t-Value	s.e.d.	Mean diff.	s.e.m	S.D.	mean	n	Group	Variable
.507	-.666	.013	-.009	.009	.092	.01	117	F	T1
				M	52	.00	.000	.000	
.067	1.850	.039	.072	.014	.118	.01	72	F	T2
				.048	.284	.09	35	M	
.934	-.083	.154	-.013	.083	.902	1.59	117	F	T3
				.071	.923	1.58	52	M	
.481	.708	.187	.133	.109	.924	1.64	72	F	T4
				.148	.877	1.77	35	M	
.820	-.228	.169	-.038	.094	1.013	1.46	117	F	T5
				.141	1.016	1.42	52	M	
.286	1.073	.193	.207	.112	.949	1.74	72	F	T6
				.153	.906	1.94	35	M	
.674	-.422	.177	-.075	.096	1.042	1.09	117	F	T7
				.154	1.111	1.02	52	M	
.616	-.503	.234	-.118	.129	1.093	1.38	72	F	T8
				.206	1.221	1.26	35	M	
.682	-.412	.162	-.026	.064	.697	.41	117	F	T9
				.114	.820	.38	52	M	
.331	.976	.210	.205	.110	.932	.68	72	F	T10
				.200	1.183	.89	35	M	
.037	2.103	.050	-.026	.023	.253	.07	117	F	T11
				.053	.382	.17	52	M	
.938	-.078	.097	-.008	.054	.459	.24	72	F	T12
				.083	.490	.23	35	M	

Table IV: Means of pain intensity scores among main-groups, and inter-group differences (using independent samples t-test).

P Value	t-Value	s.e.d.	Mean diff.	s.e.m	S.D.	mean	n	Group	Variable
.056	1.915	.016	.031	.006	.077	.01	169	A	T1
				.018	.191	.04	107	B	
.395	.852	.113	.096	.071	.923	1.59	169	A	T2
				.088	.0907	1.68	107	B	
.004	2.916	.121	.354	.078	1.011	1.45	169	A	T3
				.090	.936	1.80	107	B	
.050	1.973	.135	.285	.082	1.061	1.07	169	A	T4
				.109	1.132	1.34	107	B	
.001	3.265	.106	.345	.057	.735	.40	169	A	T5
				.099	1.020	.75	107	B	
.004	2.875	.046	.133	.023	.302	.10	169	A	T6
				.054	.467	.23	107	B	

Table V: Frequency and ratio of patients had an effect from pain of braces on their QOL in main- and sub-groups

BM		BF		Group B		Group A		AM		AF		Groups	Question
%	n	%	n	%	n	%	n	%	n	%	n	Frequency	
2.9	1	1.4	1	1.9	2	0	0	0	0	0	0	1	1. Did pain affect your daily life and activities?
54.3	19	40.3	29	44.9	48	21.9	37	17.3	9	23.9	28	2	2. Did pain from braces cause you change diet?
34.3	12	29.2	21	30.8	33	14.8	25	9.6	5	17.1	20	3	3. Did your teeth hurt when you bite or chew?
14.3	5	11.1	8	12.1	13	6.5	11	5.8	3	6.8	8	4	4. Did pain make it difficult for you to brush your teeth?
2.9	1	0	0	.9	1	0	0	0	0	0	0	5	5. Did pain from braces disturb your sleep?
37.1	13	50	36	45.8	49	39.1	66	30.8	16	42.7	50	6	6. Did you take analgesic medication to relief pain?

Table VI: Means of QOL scores and Days of medication consumption among both groups, and inter- and intra-group differences (using independent samples t-test).

P Value	t-Value	s.e.d.	Mean diff.	s.e.m	S.D.	mean	n	Group Subgroup	Variable				
.133	-1.511	.719	-1.085	.406	4.394	3.62	117	A F	QOL				
				.571	4.118	2.54	52	A M					
				.333	4.328	3.29	169	Group A					
				.535	5.533	5.46	107	Group B					
				.617	5.236	5.28	72	B F					
.631	.481	1.144	.561	1.042	6.162	5.83	35	B M					
				.835	-2.209	.266	-0.056	.137	1.480	1.02	117	A F	Days
				.255	1.836	.96	52	A M					
				.122	1.592	1.00	169	Group A					
				.229	2.365	1.69	107	Group B					
.986	-.018	.490	-0.009	.262	2.224	1.69	72	B F					
				.451	2.665	1.69	35	B M					

Table VII: Correlation relation between age and each of pain intensity scores and QOL scores among the whole sample (using Bivariate Pearson Correlation Test).

P Value	R Value	Variables	P A I N I N T E N S I T Y
.237	.071	Age-T1	
.678	.025	Age-T2	
.008	.159	Age-T3	
.062	.113	Age-T4	
.004	.174	Age-T5	
.000	.219	Age-T6	
.000	.273	Age-QOL	

Table VIII: Types of analgesic medication consummated by the orthodontic patients in both groups

Medication Taken		Ratio of Patients Took Analgesics (%)					Whole Sample	
		AF	AM	A	BF	BM		B
No Medication		57.3	69.2	60.9	50	62.9	54.2	58.3
Ibuprofen	Brufen	0	1.9	.6	4.2	0	2.8	1.4
	Doloraz	3.4	1.9	3.0	2.8	5.7	3.7	3.3
	Dolostop	.9	0	.6	2.8	0	1.9	1.1
Acetaminophen	Panadol	3.4	5.8	4.1	8.3	0	5.6	4.7
	Dolomol	.9	0	.6	0	0	0	.4
	Revanin	32.5	21.2	29.0	27.8	14.3	23.4	26.8
Diclofenac Sodium	Voltarin	.9	0	.6	4.2	17.1	8.4	3.6
Two-type Combination		.9	0	.6	0	0	0	.4
Ratio of patients took analgesics		42.7	30.8	39.1	50	37.1	45.8	41.7

Appendix 1

The questionnaire form which was designed for this study.

QUESTIONNAIRE

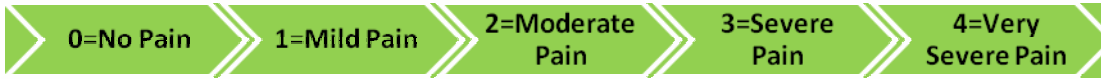
Name:

No:

Gender:

D.O.B.:

I. Pain Perception in the Following Events:



1. During the braces bonding appointment:
2. Immediately following the braces bonding appointment:
3. One day after the braces bonding appointment:
4. Two days after the braces bonding appointment:
5. One week after the braces bonding appointment:
6. During today's appointment:

II. The Effect of Pain Perceived on the "Quality Of Life" of the orthodontic patients:

1. Pain from braces affects your daily life and activities. Yes/No
2. Pain from braces causes you to change diet. Yes/No
3. Your teeth hurt when you bite or chew. Yes/No
4. Pain makes it difficult for you to brush your teeth. Yes/No
5. Pain from braces disturbed your sleep. Yes/No
6. You take analgesic medication to relief pain. Yes/No

If yes what type?

Dosage?

The researcher informed me about this study and invited me to participate in this questionnaire. I accept to be included in this study and to participate in filling this questionnaire.

Patient Signature

Patient's Parent Signature