

Relationship Between Pain Perception and Anxiety Level During the Placement of Straight Wire Bracket Appliances

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Abstract

We aimed to understand patients' pain perception based on the gender, age, and anxiety levels, with the time interval of 24 and 168 h after placement of straight wire bracket appliances. The anxiety levels and pain perception were measured in orthodontics patients at RSKGM FKG UI (20 female patients; age, 12–40 years and 20 male patients; age 12–40 years). The anxiety levels were measured once, i.e. before the placement of the straight wire bracket appliances using the Hamilton Anxiety Rating Scale (HARS) questionnaires. The pain perception was measured twice, i.e., at the time interval of 24 h and 168 h after the placement of straight wire bracket appliances using the visual analogue scale (VAS). No differences were found in the patient's anxiety level who would undergo the orthodontic treatment, or in the pain perception between the two genders. However, differences in anxiety levels were observed at pretreatment and also the pain perception during the treatment using straight wire bracket appliances between the age groups. Orthodontic treatment was more sensitive at the age group of 20–40 years (young adults); however, no significant differences were observed between the male and female gender.

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Introduction

The demands for a good teeth alignment and appearance have become one of the main motives for seeking orthodontic treatment, which primarily aimed to improve the oral and dental health, especially the function and stability of the occlusion, thus improving the facial aesthetics.¹ Majority of patients who seek the orthodontic treatment are adults and young adult. Patients usually avoid dental care, especially adults, because they are afraid of pain that may arise during the process.² Hakeberg reported that adult patients avoid dental care because of fear and anxiety about the accompanying pain.³

According to the International Association for the Study of Pain, pain is defined as an unpleasant sensory and emotional experience

associated with tissue damage, whether direct or indirect.⁴ In other words, pain is a warning signal to the tissues to avoid any danger and possible risk of tissue damage.⁵ The pain felt by patients during an orthodontic treatment is caused by the feeling of pressure, tension, and pain in the teeth. Pressure in orthodontic treatment occurs through the braces and wires that move the teeth in the alveolar bone. Clinical studies show that patients feel pain and discomfort at 1 or 2 days after starting the orthodontic treatment, and the pain intensity will decrease after 7 days.⁶

In their study, Riley et al. reported that women experienced a higher-intensity level of pain with longer duration when compared to men. Most men will hide the pain they experienced, although it turns out that they feel the same pain intensity as women.² Bergius et al. reported that the difference in pain intensity was no significant between women and men. Most orthodontic literatures reported no differences in the pain intensity between women and men.⁷ Ngan et al. reported that patients experienced pain and discomfort mainly after setting up the separator and braces.⁸

Perception is a process of compilation, identification, and interpretation of sensory

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information to provide an illustration and comprehension of an event or environment. Everyone has different perceptions about aesthetics. This is influenced by their own experience and social environment. Likewise in pain, one will have a different pain perception with everyone else.

Pain is an important indication that is often overlooked in dental care, especially during the orthodontic treatment. Several studies have shown how patients will refuse the treatment after experiencing pain or even refused any treatment due to anxiety about the pain that may arise during treatment. This may happen due to the patient's different pain thresholds during an orthodontic treatment.⁹ This behavior can cause patients who actually need orthodontic treatment discontinue the treatment or will refrain themselves from seeking orthodontic treatment.

Pain threshold may vary between individuals and is influenced by psychological conditions related to an individual's personality. One of which is the level of anxiety during the process of overcoming pain.¹⁰ Anxiety is a tense or worried feeling experienced by an individual. According to Kaplan and Sadock, anxiety disorders may occur at any age, but usually reported by adults and more frequently by women. Most anxiety occurs at the age of 21–45 years because this age range is a productive period, where someone must fulfill the work demand and have to think about the future.¹¹

Pain is generally assessed using the Visual Analogue Scale (VAS), an instrument that identifies a number of lines informing the pain intensity felt by the patient. This scale consists of a horizontal line visualization from 0 to 10 mm.¹² Both ends have a description of the pain felt by the subjects. The operator will first explain the meaning of numbers 0–10 to the subject. The closer the number to 0, the lesser intense is the pain intensity experienced. The closer the number to 10, the more intense the pain intensity is felt by the subjects. The subjects are then asked to make a visual line mark (0–10 mm) to express the pain experienced.¹³

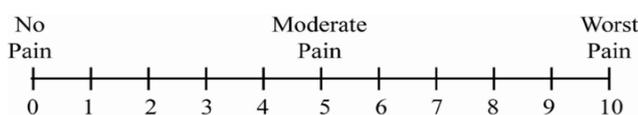


Figure 1. Visual analogue scale line.

Anxiety can be measured using an anxiety level measurement device known as the Hamilton Anxiety Rating Scale (HARS).¹⁴ The HARS scale measures anxiety based on the emergence of symptoms in individuals who experience anxiety. It was first used in 1959, introduced by Max Hamilton, and now has become the standard measurement of anxiety, especially in clinical trials.¹⁴ The HARS scale has been proven to have a high validity and reliability.^{14,15} HARS consists of 14 symptom items. Each item was assessed by giving a score (Likert scale) between 0 and 4, based on the severity of symptoms. Each score has a different category.^{14,15,16}

Materials and methods

Samples were obtained from 40 male and female patients who will undergo orthodontic treatment at RSKGM FKG UI dental clinic. The samples were then further divided according to age: 12–19 years (adolescents) and 20–40 years (young adults). The sample size used in this study was determined based on the correlation study by Tecco et al. (2009),¹⁷ which is calculated the G-Power application, with a power of 89%. The subjects' pain and anxiety levels were obtained by conducting interviews.

The inclusion criteria consist of patients with a case of mild crowding (irregularity index scores of 1–3 mm): a slight crowding found in the anterior maxillary and mandibular teeth; a case of moderate crowding (irregularity index scores of 4–6 mm): crowding found in the anterior teeth of the maxilla and mandible and are indicative of orthodontic treatment; patients who will undergo orthodontic treatment using slot 0.022 SWA brackets (MBT Ormco) with Niti 0.014 or Niti 0.016 (GAC) wires and willing to participate in the study and fill out a questionnaire measuring the anxiety level at pretreatment (HARS) and a questionnaire measuring the pain intensity perception (VAS) at post-treatment with a time interval of 24 h and 168 h, respectively. Age range groups were determined based on the classification of eight human development periods¹⁸ : 12–19 (adolescents) and 20–40 (young adults). The exclusion criteria consist of patients with severe crowding (irregularity index score of 7–9 mm) (the teeth are heavily crowded and may result in a poor oral hygiene; thus, orthodontic treatment is extremely required);

patients with very severe crowding (irregularity index score of 10 mm) (the crowding found on the teeth are more severe, and thus in dire need of orthodontic treatment); and patients who previously underwent any orthodontic treatment and used the appliances.

Data obtained were then processed using the SPSS version 23.0 program. Because the total number of study samples was <50, the normality test was carried out using the Shapiro–Wilk test. The normality test results on VAS data at 24 h and 168 h showed a p-value of <0.05, indicating that the data distribution is not normal. Due to the abnormal data distribution, the difference in pain perception between the 24-h and 168-h periods after the bracket placement in the 12–19 (adolescents) and 20–40 (young adults) age groups were statistically tested by Mann–Whitney non-parametric tests.

The questionnaire validity was measured using the Item-Total Correlation Test, while the reliability was tested using the Cronbach’s Alpha Test. To examine the conformity and accuracy of inter- and intraobserver measurements, this study used the Bland–Altman test. The results in the HARS questionnaire were tested using the Kruskal–Wallis test to determine whether any anxiety differences were found between male and female patients who underwent the orthodontic treatment using a Straight Wire Appliances bracket type. Analysis of variance test was used to determine differences in VAS scores among patients of different sexes and ages using the Straight Wire Appliances bracket type after 24 h and 168 h. The Spearman’s correlation test was used to determine the relationship between VAS and HARS scores in different sexes and ages.

Results

Differences in pain perceptions between male and female patients who were treated with Straight Wire Appliances bracket after 24 h will be compared to the perceived pain perception after 168 h using the VAS questionnaire. This comparison showed that the pain in the first 24 h reached its highest peak and gradually decreased after 168 h of the Straight Wire Appliances bracket placement.

Female patients perceived more pain at 24 h and 168 h after the placement of Straight Wire Appliances bracket than male patients,

although P-value of pain perception at 24 h and 168 h after placement was not statistically significantly different between the two gender groups.

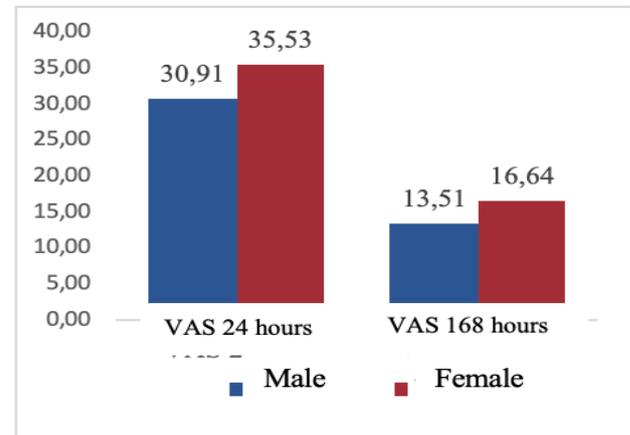


Figure 2. The mean value of pain perception with VAS questionnaire at 24 h and 168 h after the placement of Straight Wire Appliances bracket between male and female patients.

	Gender	N	Mean	P value
VAS 24 Hours	Male	20	30,91	0,257
	Female	20	35,52	
VAS 168 Hours	Male	20	13,51	0,461
	Female	20	16,64	

Figure 3. P-values of pain perception with VAS questionnaire at 24 h and 168 h after the placement of Straight Wire Appliances bracket between male and female patients.

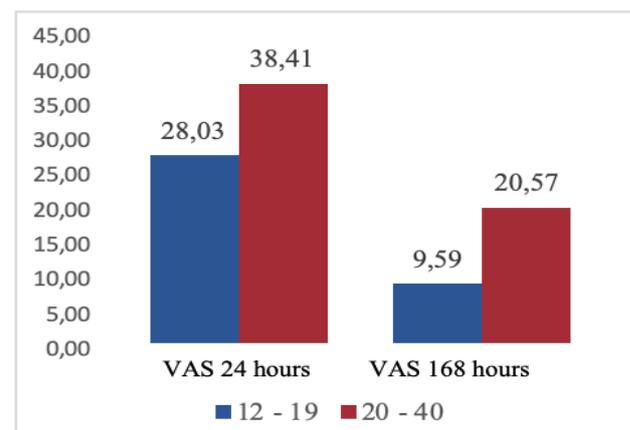


Figure 4. The mean value of pain perception with VAS questionnaire at 24 h and 168 h after the placement of Straight Wire Appliances bracket on female patients between the two age groups.

Female patients perceived more pain at 24 h and 168 h after the placement of Straight Wire Appliances bracket than male patients, although *P*-value of pain perception at 24 h and 168 h after placement was not statistically significantly different between the two gender groups.

	Age	N	Mean	<i>P</i> value
VAS 24 Hours	12-19	20	28,03	0,008
	20-40	20	34,04	
VAS 168 Hours	12-19	20	9,58	0,007
	20-40	20	20,56	

Figure 5. *P*-values of pain perception with VAS questionnaire at 24 h and 168 h after the placement of Straight Wire Appliances bracket on female patients between the two age groups.

Differences in pain perceptions between 12–19 (adolescents) and 20–40 years (young adults) in patients who had Straight Wire Appliances bracket placed after 24 h were compared with pain perceptions after 168 h using the VAS questionnaire. The results showed that the pain perceived in patients in the 20–40-year (young adults) age group was significantly higher than those in the 12–19-year age group (adolescents) in the first 24 h after the placement of the Straight Wire Appliance bracket. Although the perceived pain declined after 168 h, the pain perception in patients in the 20–40-year age group (young adults) remained higher than those in the 12–19-year age group (adolescents). Several orthodontic studies t on the influence of age on pain perception showed that adult patients perceived more pain than adolescent patients.^{19,20,21}

Results of the anxiety level examination showed that the 20–40-year age group (young adults) had a higher anxiety level compared to 12–19-year age group (adolescents). Therefore, VAS is found to be sensitive to age differences but not to sex differences.

To determine whether pain perception was related with anxiety level between different age groups and genders, results of the VAS and HARS questionnaires were tested using the Spearman’s correlation test because HARS is an ordinal data while VAS is a numerical data.²² The correlation test showed that the anxiety level is not correlated with pain perception in patients among different age groups and genders after

the placement of Straight Wire Appliance bracket.

	Age	N	Correlation value (<i>r</i>)	<i>P</i> value
VAS-HARS	12-19	20	0,216	0,360
	20-40	20	0,372	0,106
	Total	40		

Figure 6. The *r* values of the VAS and HARS questionnaires were tested using the Spearman’s correlation after the placement of Straight Wire Appliances bracket among patients in the two age groups.

	Gender	N	Correlation value (<i>r</i>)	<i>P</i> -value
VAS-HARS	Male	20	0,233	0,324
	Female	20	0,226	0,337
	Total	40		

Figure 7. The *r* values of VAS and HARS questionnaires were tested using the Spearman’s correlation after the placement of Straight Wire Appliances bracket among patients in the two gender groups.

Discussion

This study aimed to determine differences between patients’ pain perceptions after 24 h and 168 h of placement of Straight Wire Appliances bracket, where the subjects were further divided based on age groups and sexes. The age group category used in this study was 12–19 years (adolescents) and 20–40 years (young adults).²³ Genders are divided into male and female groups. The age grouping was performed according to the majority of orthodontic patients’ age who visited the RSKGM FKG-UI.

Pain perceptions obtained from VAS questionnaires between the male and female patients showed that the pain reached its highest peak after 24 h of bracket placement and then declined as shown on the VAS questionnaire filled after 168 h. These results are in line with that of a previous study that reported pain at its highest in the first 24 h after an orthodontic bracket placement.²⁴ Female patients perceived greater pain than male patients when the Straight Wire Appliances bracket was placed, albeit statistically the differences of the pain perception between them were not significantly different. Similar results were also reported by Bergius et al., i.e., no significant difference in the pain

intensity level between women and men. Most orthodontic literature reported that no differences in the pain intensity level between women and men.

Pain perceptions were also compared between patients in the 12–19-year (adolescents) and 20–40-year (young adults) age groups, and VAS questionnaires were also given to patients twice, i.e., 24 h and 168 h after the placement of brackets. This is in line with a study conducted by Jones and Richmond, who reported that adult patients perceived greater pain when compared to young adult patients undergoing orthodontic treatment. Likewise, a study conducted by Scheureur et al. also reported that orthodontic patients aged <13 years perceived less pain when compared to patients with aged 13–16 years. Several orthodontic literatures that investigated the influence of age on pain perception concluded that adult patients perceived more pain when compared to adolescent patients.

The anxiety level was found to be higher in the 20–40-year age group (young adults) than that in the 12–19-year age group (adolescents); this is in line with the study conducted by Kaplan and Sadock (2010), demonstrating that even though anxiety disorders may occur at all ages, they were more common in adult subjects. Results also showed that anxiety level was not correlated with pain perception among patients in different age groups and genders after the placement of Straight Wire Appliance bracket. This was in contrast to the study conducted by Hakeberg et al (1993), which showed that adult patients avoid any dental care due to the fear and anxiety about pain that may occur during the treatment.

Conclusions

In this study, results showed that no differences were observed in the anxiety level between male and female patients who underwent orthodontic treatment and no differences in pain perception between the two sexes after 24 h and 168 h of Straight Wire Appliances bracket placement. However, different age groups were found to have significant differences in the anxiety level before the initiation of orthodontic treatment started and significant differences in pain perception were

also found when the placement of Straight Wire Appliances bracket was evaluated after 24 h and 168 h. Thus, orthodontic treatment is concluded to be more sensitive in the age group of 20–40 years (young adults), but is not influenced by genders.

The anxiety level and pain perception were not correlated based on different genders and age groups after the placement of Straight Wire Appliances bracket. Thus, the anxiety level of each individual does not affect the pain perception that might occur during the orthodontic treatment.

Declaration of Interest

The authors report no conflict of interest.

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