

Effect of physical activity level on orthodontic pain perception after separator placement in adult patients managed at a tertiary care teaching public sector hospital in Lahore

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ABSTRACT

Background: Different behavioral therapies are used to reduce pain severity in patients undergoing separator placement apart from pharmacological treatments. However, there is limited local data. This study aimed to determine the frequency of high and low levels of activity in adult patients who needed separator placement and compared the mean pain scores with respect to baseline physical activity level following the intervention.

Subjects and methods: It was a descriptive case series carried out at the Orthodontics Department, De'Montmorency College of Dentistry, Lahore, for a period of 3 months from 15.7. 2022 to 15.9.2022. Total 120 patients aged 18 to 40 years of both genders, who needed separator placement were included in the study. Patients were excluded if they had medical conditions or systemic diseases that was a contraindication for usage of fixed orthodontic appliances, had chronic pain or pain in the orofacial or dental region, had maxillary or mandibular fracture and who had previous history of mandibular or maxillary surgery. Baseline physical activity level was noted down as per clinical history. Patients then underwent separator placement. Patients were followed up after 7 days and were asked for pain by using Face, Legs, Activity, Cry, Consolability scale and pain scores at baseline and after 7 days were compared.

Results: Mean age of the patients was 28.67±6.312 years. There were 62 (51.7%) males and 58 (48.3%) females. Baseline low physical activity was found in 77 (64.2%) patients while high activity was found in 43 (35.8%) patients. Mean pain scores in the low physical activity group were 3.9±2.056 and in the high physical activity group were 2.26±2.094 and the difference was statistically significant i.e. p=0.001 as assessed by independent t-test.

Conclusion: Frequency of low physical activity level was higher in patients and it was found to be associated with higher mean pain scores compared to patients who had high baseline level of physical activity.

Keywords: Orthodontic, pain, separator placement, physical activity

INTRODUCTION

Orthodontic pain is an inflammatory pain that is initiated by orthodontic force induced vascular occlusion followed by a cascade of inflammatory responses, including vascular changes, the recruitment of inflammatory and immune cells, and the release of neurogenic and pro-inflammatory mediators.^{1,2} Currently, several treatment modalities have been applied for the relief of orthodontic pain, including pharmacological, mechanical and behavioral approaches and low-level laser therapy.^{3,4}

Many studies were conducted to find out the effect of physical activity on pain.^{5,6} In one of the studies it was found that physical activity, in addition to many other health benefits, also help reduce orthodontic pain

perception.^{7,8} The patients who were more physically active reported less pain and took less pain medication during the week after their separators were placed.^{9,10}

There is no local data available which could help us in determining the beneficial role of physical activity level on perception of pain to improve the outcome. So, we want to conduct this study to get the local evidence and implement the application of physical activity level to reduce pain perception in local settings which will reduce the number of complaints of pain in cases of separator placement.

SUBJECTS AND METHODS

It was a descriptive case series that was carried out at the Department of Orthodontics, De'Montmorency College of Dentistry/ Punjab Dental Hospital, Lahore, for a period of 3 months from 15th July 2020 to 15th October 2021. Sample size of 120 cases was calculated with 95% confidence, 9% margin of error, and taking expected percentage of high level of activity was 38.7%. Non-probability consecutive sampling was used.

Conflict of interest: The authors declared no conflict of interest exists.

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History was elicited and clinical examination was carried out. Baseline physical activity level was assessed on history and was noted down as low or high. Physical activity was defined as movement of the body leading to energy consumption. Baseline physical activity was labeled as low if the participant did walking for at least 20 minutes per day for 3 days a week and was labeled as high if the participant did walk for at least 20 minutes per day for 7 days a week⁸.

Pain perception was assessed by pain rating scale i.e. FLACC pain scale⁸. Pain was assessed after 7 days as acute pain lasts for one week. Pain was assessed clinically. The scores used to label the severity of pain out of a total score of 10; where 0 is categorized as 'relaxed and comfortable', score 1 to 3 as 'mild discomfort', score 4 to 6 as 'moderate pain' and score of 7 and more as 'severe pain'. Patients then underwent separator placement at the mesial and distal contact points of the maxillary and mandibular first molars. Following separator placement, patients were followed up in OPD after 7 days. For pain relief, participants were allowed to take any over-the-counter analgesic of their choice. They were asked to report whether they consumed analgesics each day and record this as a binary response (yes or no) along with the pain assessment. Patients again were asked for pain by using FLACC and findings were noted down as per operational definitions.

SPSS version 25 was used to analyze the data. Age, the FLACC pain rating scale, and other quantitative information were displayed as mean and standard deviation. Qualitative information, including gender and baseline physical activity levels (low vs. high) was expressed as frequency and percentages. Age, gender, and education-related data were stratified. Effect modifiers such as age, gender and education were dealt with using the post-stratification chi square test. To compare the pain scores between the two groups, an independent T-test was used, and a result of 0.05 or lower was considered significant.

RESULTS

Mean age of the patients was 28.67 ± 6.312 years. There were 62 (51.7%) males and 58 (48.3%) females. The mean pain scores were 3.31 ± 2.207 . Low Baseline Physical Activity was found in 77 (64.2%) patients while high activity was found in 43 (35.8%) patients. Stratification of physical activity with respect to gender, age and educational status was done (Table 1) which demonstrated low physical activity present in 38 (31.7%) males and 39 (32.5%) females and high physical activity present in 24 (20%) males and 19 (15.8%) females, low physical activity present in 42 (35%) patients of age <30 years and in 35 (29.2%) patients of age ≥ 30 years. and low physical activity in 18 (15%) of uneducated patients, 16 (13.3%) patients who were educated till primary, in 11 (9.1%) patients who were educated till middle, 7 (5.8%) patients who were educated till matric, 14 (11.7%) patients who did graduation and 11 (9.1%) patients who did masters, whereas, high physical activity was present in 6 (5%) of uneducated patients, 14 (11.7%) patients who studied till primary, 8 (6.7%) patients who studied till middle, 2 (1.7%) patients who did matric, 7 (5.8%) who did

Table 1: Stratification of Physical Activity with Respect to Effect Modifiers

Variable	Physical Activity		p-value
	Low	High	
Gender:			
Male	38 (31.7%)	24 (20%)	0.497
Female	39 (32.5%)	19 (15.8%)	
Age:			
<30 years	42 (35%)	24 (20%)	0.893
≥ 30 years	35 (29.2%)	19 (15.8%)	
Educational Status:			
Uneducated	18 (15%)	6 (5%)	0.569
Primary	16 (13.3%)	14 (11.7%)	
Middle	11 (9.1%)	8 (6.7%)	
Matric	7 (5.8%)	2 (1.7%)	
Graduate	14 (11.7%)	7 (5.8%)	
Masters	11 (9.1%)	6 (5%)	
Mean Pain Scores:	3.90 ± 2.056	2.26 ± 2.094	

graduation and 6 (5%) patients who did Masters. However, no significant association between these effect modifiers and physical activity as was indicated by a p value of >0.05 (Table 1).

Mean pain scores were compared between the low and high physical activity patients and it was found that the mean pain scores in the low physical activity group was 3.9 ± 2.056 and in the high physical activity group it was 2.26 ± 2.094 . It was found that the mean pain scores were significantly lesser in patients of high activity as compared to the mean pain score in patients of low activity and the difference was statistically significant i.e. $p=0.001$ (Table 1).

DISCUSSION

The current study findings revealed that in the majority (64.2%) of the patients who had separator placement, the baseline physical activity level was low and the mean pain score (2.26) after separator placement was significantly less in the high physical activity patients compared to the mean pain score (3.9) in patients with low physical activity. Patients' levels of pain and suffering during orthodontic tooth separation can vary greatly, and these are the main patient worries that prevent some patients from obtaining treatment and others from finishing it.¹⁹ Cognitive behavioral therapy, physical activity, music therapy, and other behavioral interventions are used to treat orthodontic pain.²⁰ Reassurance and attention diverting strategies are a common element of these behavioral modalities.²⁰ Reassuring orthodontic patients may be a practical strategy for decreasing orthodontic pain because it has been well established that patients experience anxiety and stress after experiencing orthodontic pain, and that an early follow-up might dramatically reduce their orthodontic pain levels.²⁰ Multiple therapy sessions are used in CBT, a type of psychotherapy, to rectify patients' negative attitudes and lessen their anxiety. As previously noted, patients experience more pain as a result of heightened anxiety due to neuronal pathways mediated by the limbic system. Clinical studies have shown that CBT can effectively relieve orthodontic pain by lowering patients' anxiety. In addition, clinical studies have shown that physical activity and music therapy can reduce orthodontic pain by diverting patients' attention through insular cortex-mediated neural pathways.²¹ The effectiveness of behavioral therapy in reducing orthodontic pain, however, needs to be further established due to the paucity of available data.^{22,23} One previous study on patients who underwent

separator placement demonstrated that majority of the patients had low physical activity level at baseline i.e. 61.3% and high physical activity level was seen in 38.7% patients.²⁴ This is similar to finding of the current study. Another study found that the pain scores were higher in patients with low baseline levels of physical activity.²⁵ One more study also described that patients who were engaged in some sort of physical activity had reduced pain scores compared to those who were only encouraged and supported.²⁶

Exercise is a rather unusual habit in that it can both prevent and treat pain while also having a wide range of other health advantages.²⁷ For physical activity to have positive benefits on pain reduction, a variety of physiological and psychological systems must work together.²⁸ Preliminary results of current study demonstrated a significant relationship between baseline physical activity level and orthodontic mean pain scores among patients after separator implantation. It was found that the mean pain scores were significantly lesser in patients of high activity as compared to the mean pain score in patients of low activity.

The study had some limitations. Firstly, the results cannot be generalized because the study was single-centered and had a limited sample size. Second, characteristics like socioeconomic status, family influence, and psychological/mental health state that might have affected the trial's outcome were not evaluated.

CONCLUSION

Exercise is a relatively unique behavior in that it has the capacity to relieve pain in addition to providing numerous other health benefits. Many physiologic and psychological mechanisms interact to produce the beneficial effects of physical activity in terms of reducing pain. Our preliminary findings show that physical activity has a significant influence on orthodontic mean pain score between patients with baseline physical activity level (low vs high) after separator placement.

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