

## MEAN PAIN PERCEPTION AFTER MINI SCREW PLACEMENT AMONG ORTHODONTIC PATIENTS: A CROSS SECTIONAL STUDY AT KHYBER COLLEGE OF DENTISTRY, PESHAWAR

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### ABSTRACT

*Orthodontist and patient prefer to use miniscrew anchorage because of ease of placement and removal which requires minimal patient compliance and are economically viable. The objective of the study was to determine the mean pain perception in orthodontic patients after mini screw placement using visual analogue scale. A cross sectional study was conducted using convenient sampling by taking seventy four participants at Orthodontics department at Khyber College of Dentistry, Peshawar from May 2018 to Nov 2018. Mini screws were inserted under local anesthesia and patients received a proforma with a 10 mm visual analogue scale score (VAS). Patients were asked to report their pain after mini screw placement at day 1, day 3 and day 7. Data were analyzed using SPSS version 20.0. Results of this study showed that most common site for the placement of mini screw was posterior maxilla (48.6%) The participants mostly experienced pain on the first day of placement (VAS P1) mean  $3.59 \pm 1.57$  while least pain experienced on day 7 (VAS P7)  $2.1 \pm 1.19$ . There was a significant difference ( $p \leq 0.01$ ) regarding VAS score among gender with females reporting of high VAS ( $39 \pm 52.7$ ) score as compared to males ( $35 \pm 47.3$ ). It was concluded that most of the patients experienced little pain after mini screw placement.*

**Key Words:** Mini screws, pain, mean perception, visual analogue scale

### INTRODUCTION

Anchorage control can be regarded as one of the most important factors for achievement of success in clinical orthodontics.<sup>1</sup> The term 'orthodontic anchorage' denotes the nature and degree of resistance offered by an anatomic unit to the displacement of teeth. Therefore, to achieve the intended treatment goals, anchorage control is important so that the desired tooth movements be maximized, and undesirable effects could be minimized.<sup>2</sup> Traditionally, orthodontic therapy used extra oral appliance like head gear for anchorage but their effectiveness depends on patient compliance. Since a

patient's cooperation is not always optimal, temporary anchorage devices (TAD) have been introduced.<sup>3</sup>

Miniscrew anchorage has greatly expanded the limit of clinical orthodontics. They have been widely accepted by the orthodontists and the patients because of their ease of placement and removal, provides absolute anchorage, requires minimal patient compliance and are economically viable.<sup>4,5</sup> A study by Pithon et al in Brazil showed greater acceptance of mini screws by patients. They reported pain during mini screw placement  $3.03 \pm 2.30$  while pain was  $1.56 \pm 2.16$  at end of treatment when miniscrew was recorded.<sup>6</sup>

Even without the need for patient compliance, miniscrews can provide stationary anchorages for various tooth movements and even make it possible to move the tooth in directions which could have been not possible with traditional orthodontic mechanics.<sup>5</sup> On the other hand, the clinical use of mini screw anchorage includes some risks and complications like screw fracture, damage to tooth root, peri-implantitis and ulceration in oral mucosa are some of the common side effects associated with the clinical use of mini screws. Damages of soft tissues are temporary and healed in most cases, but damages to hard tissues are irreversible and should be avoided.<sup>3</sup>

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**Received for Publication:** May 17, 2019

**Revised:** June 14, 2019

**Approved:** June 20, 2019

Even though patients do not find the extra cost a problem, the additional discomfort along with the fear could alter their decision when opting for mini screws. This fear of possible pain and discomfort resulting from even a minimal surgical procedure could be an issue, as it can contribute to the patient trying to avoid the orthodontic treatment.<sup>7</sup> It has been documented that patients do, in fact, complain about the discomfort and pain they experience during orthodontic treatment. However, little is known about the discomfort and anxiety they experience associated with miniscrews placement and how it compares with pain associated with other orthodontic procedures.<sup>8</sup>

For most patients pain might be one of the common side effect and a primary factor for non-compliance. The knowledge of treatment perception can also help provide patients with realistic expectations of the likely pain and discomfort that may be encountered during orthodontic treatment, and accordingly, can help educate the patients for informed consent.<sup>9</sup>

Given the indepth information on patients' perspectives of pain related to the placement of mini-implants, this study was aimed to determine the mean pain patients perception associated with the placement of mini-screws.

## MATERIALS AND METHODS

A cross sectional study was conducted at the Department of Orthodontics of Khyber College of Dentistry, Peshawar from May 2018 to November 2018 using convenient sampling technique. Seventy-four Subjects were part of the study. By using openepi, the total calculated sample was 74 by taking  $3.03 \pm 2.30$  as the pain perception during mini screw placement while  $1.56 \pm 2.16$  after the pain perception from the previous study<sup>6</sup> while keeping 95% confidence interval and 80% power of the test. An ethical approval was taken from the KCD ethical committee. The purpose, procedures, risk and benefits of the study were explained to them. An informed consent was taken from the patients. They were assured of maintaining confidentiality of their personal and other data collected from their records.

Patients younger than 14 years of age and patients with systemic bone disease and patients with cleft lip and palate, allergic to titanium or local anaesthesia were excluded from the study. After radiographic evaluation of interdental space mini-screw with a diameter of 1.3 mm and a length of 7 mm or 10 mm were placed in subjects under 0.5 ml of local anaesthesia (2% lidocaine) with a one-step self-drilling procedure. All patients were informed of the necessary treatment stages for their orthodontic care in a standardized way at their orthodontic treatment planning consultation visit and received a written proforma with a 10mm

Visual analogue scale. They were asked to rate their expected pain experience on a 10 mm visual analog scale (VAS) score where '0' represented 'no pain' and '10' represented 'the worst pain imaginable'. Patients were then provided with the proforma of VAS to rate the pain they experienced on day 1, 3 and day7 (P1, P3, P7) following the treatment they had received by using a structured questionnaire concerning pain experienced. Data were analyzed using SPSS version 20.0. Mean and standard deviation was calculated for pain grade. Paired sample T-test was used to compare mean differences between two different VAS scores. Independent sample T-test was used to compare VAS score (P1, P3, P7) among gender while one way ANOVA was used to compare the mean difference of VAS score among different sites.

## RESULTS

Out of total 74, the mean age of the participants was  $22.2 \pm 3.0$ . Majority of the participants were females (52.7%) while the most common site for the placement of mini screw was posterior maxilla (48.6%) followed by posterior mandible (28.4%).

Most of the participants experienced pain on the first day of placement VAS P1 mean  $3.59 \pm 1.57$  and least pain experienced on day7 (P&), The VAS was  $2.1 \pm 1.19$ . The mean age of the participants was  $22.2 \pm 3.0$  (Table 1). Paired sample T-test was used to compare the mean difference between different visual analogue scales. By comparing P1 with P3, the mean difference was  $0.66 \pm 1.5$ . Similarly, by comparing P1 and P7, the mean difference was  $1.4 \pm 1.3$  and for P3 and P7 it was  $0.79 \pm 0.92$  having P value  $< .05$  for all the three comparison. (Table 2).

We run the independent sample T-test to know mean changes of VAS with gender. There was a significant difference of P3 with gender having  $2.3 \pm 1.3$  for male while  $3.4 \pm 0.96$  for female. Very similar result for P7 while VAS-P1 was not different (P value 0.3) as shown in Table 3. Similarly, one way ANOVA was used to analyse the mean difference VAS among three different days (P1, P2 and P7). Results showed that there was a significant difference among all the three days ( $P < .05$ ). See also table 4 for further details.

## DISCUSSION

Current study was aimed to determine patients mean pain perception associated with the placement of mini-screws. One of the key element in the success of orthodontic treatment is patient's compliance which is influenced by many factors particularly the pain experienced during different stages of treatment. Patients often complain of pain and discomfort which varies from individual to individual.

TABLE 1: DESCRIPTIVE STATISTIC(TOTAL N=74)

Univariate/Analysis	Categories	Mean	Standard deviation
<b>Variable</b>			
VAS score	VAS P1	3.59	1.57
	VAS P3	2.9	1.25
	VAS P7	2.1	1.19
Gender	Male	35	47.3
	Female	39	52.7
Site of placement	Anterior maxilla	6	8.1
	Posterior maxilla	36	48.6
	Anterior mandible	11	14.9
	Posterior mandible	21	28.4
Age	-----	22.2	3.0

TABLE 2: MEAN DIFFERENCES BETWEEN EACH VAS

Bivariate Analysis	Mean	Std. Deviation	95% Confidence Interval		P value
			Lower	Upper	
Comparison between VAS_P1 - VAS_P3	0.66216	1.51048	0.31221	1.01211	0.001
Comparison between VAS_P1 -VAS_P7	1.45946	1.34663	1.14747	1.77145	0.002
Comparison between VAS_P3 - VAS_P7	0.79730	0.92128	0.58385	1.01074	0.001

\*using Paired Samples Test.

\*\*P value ≤0.05 as significant.

TABLE 3: MEAN DIFFERENCES OF THREE VAS GROUPS AMONG GENDER

	Gender Categories	N	Mean	Std. Deviation	Mean Difference	95% Confidence Interval		P value
						Lower	Upper	
VAS_P1 with Gender	Male	35	3.4000	1.83431	-0.36923	-1.10173	.318	0.318
	Female	39	3.7692	1.30710				
VAS_P3 with Gender	Male	35	2.3714	1.30802	-1.06447	-1.59414	.000	0.002
	Female	39	3.4359	.96777				
VAS_P7 with Gender	Male	35	1.8286	1.15008	-.58168	-1.12432	.036	0.036
	Female	39	2.4103	1.18584				

\*P value ≤0.01 as significant.

\*\*Independent Sample T test.

TABLE 4:MEAN DIFFERENCES OF VISUAL ANALOGUE SCALE AMONG DIFFERENT GROUPS

	Mean Square	F	P value
VAS_P1	8.277	3.690	0.016
VAS_P3	4.580	3.177	0.029
VAS_P7	4.841	3.760	0.015

\*P value ≤0.01 as significant.

\*\*ANOVA.

Few studies have been done on patient's perception of pain after mini screw placement. In this study most of the patients experienced pain on day 1 VAS P1 and fewer subjects complained of pain on day 7. This is consistent with study conducted by Hossein. A, M. Hashem et al who conducted a study in Iran about the patient's experience of pain after mini screw placement, concluded that high level of pain was experienced during the first one hour of mini screw insertion and pain significantly decreased after one day and the following one week.<sup>8</sup> One of the reasons for the similar results might be that both studies were cross-sectional and hospitalised studies. Same results were reported by Genzer N *et al*<sup>9</sup> who compared the pain and discomfort following mini screw insertion with pain after extraction of a premolar and showed that patient reported significantly lower levels of pain, with less impact on daily life activities as compared to premolar extraction.

In present study females reported of high VAS score as compared to males. The possible reason for this might be that females experience more stress regarding the procedure related to placement of mini screw. Some other studies reported that females have thinner cortical bone as compared to males in the region of attached gingiva in the maxilla mesial to the first molar, which might contribute to more pain and less stability of mini screw placed in this area.<sup>10,11</sup>

Patients were easily managed on the dental chair, and no complications were recorded. Panagiota Ntolou *et al*<sup>12</sup> in their study had reported that complications like mini screw bending or fracture, trauma to PDL and tooth root and inflammation of soft tissues can occur.

## CONCLUSION

Mini screws are a good alternative to traditional anchorage appliances, use in conventional orthodontics, and can achieve difficult tooth movements with more accuracy. The pain experienced during insertion of mini screws is minimal with less complications, that are easily manageable. Therefore it is important to properly educate the patients about the installation, uses and complications of mini screws so as to increase their acceptability and compliance.

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## CONTRIBUTIONS BY AUTHORS

**Prof Ghulam Rasool** is the main author. Co-authors have contributed substantially particularly in data collection.