Does Preoperative Dental Anxiety Play a Role in Postoperative Pain Perception After Third Molar Surgery?

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Abstract

**Background:** Surgical removal of the impacted third molar is associated with inflammatory morbidities which include swelling, trismus, and pain. Pain is the most common postsurgical morbidity associated with third molar surgery. It remains an important factor in patients’ perception of recovery after third molar surgery with dental anxiety reported to exert influence on its threshold. **Objective:** The aim of the study was to determine if preoperative dental anxiety has any significant role on postoperative pain perception after third molar surgery. **Materials and Methods:** This was a cohort study involving sixty consecutive adult patients requiring extraction of impacted mandibular third molars under local anesthesia. Modified Dental Anxiety Scale Questionnaire was administered to each participant in the waiting area before the surgery. The visual analog scale was also given to each participant to be completed once daily at approximately the same time as the surgery time until day 7 after the surgery. Data collected were analyzed using SPSS version 23. **Results:** Sixty participants who consented to third molar surgery took part in this study. Five participants were lost to follow-up. There were slightly more males (50.9%) than females (49.1%). Nineteen participants in this study had moderate dental anxiety (34.5%) and 6 participants (11%) had severe dental anxiety with more females having moderate-to-severe dental anxiety. The correlation between pain perception at different days and dental anxiety was not significant ($P > 0.05$). **Conclusion:** Preoperative dental anxiety may not significantly influence pain perception after third molar surgery.

**Keywords:** Dental anxiety, pain perception, third molar surgery

Résumé

**Contexte:** L’extraction chirurgicale de la troisième molaire incluse est souvent accompagnée d’un gonflement, d’une difficulté à ouvrir la bouche et de douleurs. La douleur est la morbidité post-chirurgicale la plus courante associée à la chirurgie de la troisième molaire. C’est un facteur important qui détermine la façon dont les patients perçoivent la guérison après une chirurgie de la troisième molaire. Il est rapporté que l’anxiété dentaire a une influence sur le seuil de douleur des patients. **Objectif:** Pour déterminer si l’anxiété dentaire préopératoire a un rôle significatif sur la perception de la douleur postopératoire après une chirurgie de la troisième molaire. **Méthodes:** Soixante patients adultes nécessitant l’extraction des troisièmes molaires incluses sous anesthésie locale ont été inclus dans cette étude de recherche. Un Modified Dental Anxiety Scale Questionnaire a été administré à chaque participant dans la salle d’attente avant la chirurgie. Le Visual Analogue Scale (VAS) a également été donné à chaque patient à compléter une fois par jour à peu près au même moment que l’heure de la chirurgie jusqu’au jour 7 après la chirurgie. Les données obtenues ont été analysées à l’aide de la version 23 de SPSS. **Résultats:** Soixante participants ayant consenti à une chirurgie de la troisième molaire ont participé à cette étude. Cinq patients ont été perdus de vue. Il y avait un peu plus d’hommes (50,9%) que de femmes (49,1%). Dix-neuf participants avaient une anxiété dentaire modérée (34,5%) et 6 (11%) une anxiété dentaire sévère, un plus grand nombre de femmes ayant une anxiété dentaire modérée à sévère. La corrélation entre la perception de la douleur à différents jours et l’anxiété dentaire n’était pas significative ($P > 0.05$). **Conclusion:** L’anxiété dentaire préopératoire peut ne pas avoir d’effet significatif sur la perception de la douleur après une chirurgie de la troisième molaire.

**Mots clés:** Anxiété dentaire, Perception de la douleur, Chirurgie de la troisième molaire incluse

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**Introduction**

Anxiety is defined as “Experience of fear or apprehension in response to anticipated internal or external danger accompanied by restlessness, tension, tachycardia, and dyspnea”.³ It is a multisystem reaction to a perceived threat or danger.² It is also a multidimensional complex phenomenon with no single variable exclusively accounting for its development.³,⁴ Factors such as age, sex, culture, and past experiences modify the experience of anxiety.⁵,⁶

Dental anxiety is a prevalent problem that can have far-reaching effects.⁷ It has a significant effect on the outcome of surgery and anesthesia.⁸ Impacted third molar surgery is the most common procedure done in oral and maxillofacial surgery.⁹,¹⁰ The surgery is usually associated with trauma to the bone and soft tissues leading to varying degrees of morbidities.¹¹,¹² Pain is the most common post surgical morbidity associated with third molar surgery and usually starts almost immediately after the anesthesia wears off.¹³ Psychological variables such as anxiety play a role in patients’ perception of pain.¹⁴ Anxiety before lower third molar surgery is usually common.¹⁵,¹⁶ There are worldwide variations in the prevalence of dental anxiety, with estimates ranging from 3% to 43%.¹⁷ The prevalence of dental anxiety in the general population was reported to range from 4% to 20% independent of ethnic, social, and cultural background and is noted not to be reduced by improving dental treatment.¹⁴ Recovery from pain after third molar surgery has been shown to be affected by the level of patients’ anxiety.¹⁷ Preoperative anxiety is reported to be associated with increased postoperative pain and longer surgical duration.¹⁸ Studies have correlated the level of preoperative anxiety to recovery from pain after surgery, especially after third molar surgery.¹⁷-¹⁹ Some of the impacts of dental anxiety on the outcome of surgery include increased postoperative pain, increased risk of infection, and longer healing time.¹⁷,¹⁹-²¹ This study was therefore designed to look into the role of preoperative dental anxiety on postoperative pain perception after third molar surgery in a Saudi population bearing in mind the role of culture and its effect on surgical outcome.

**Materials and Methods**

This was a cohort study that looked at preoperative dental anxiety and its effects among third molar surgery patients at the Oral and Maxillofacial Surgery clinics of King Khalid University College of Dentistry. Sixty consecutive patients between the ages of 18 and 40 years who reported to the dental clinics for third molar extraction that fulfilled the inclusion criteria and gave consent were recruited for the study. Those excluded from the study were patients who had previously undergone third molar surgery; those in which nonsteroidal anti-inflammatory drugs and amoxicillin are contraindicated; patients on corticosteroids; women in their first or third trimester of pregnancy; and patients with local or systemic diseases in which surgical extraction under local anesthesia is contraindicated. Prior to surgery, consent was obtained from all participants. On enrollment, participants completed the biodata form, which included social demography, past medical, and dental history. They also filled the Modified Dental Anxiety Scale Questionnaire while in the waiting area. Assistance was provided by the researchers to those who found it difficult to read/understand the questionnaires. The duration of surgery was recorded in minutes. The duration of surgery was timed from the beginning of the first incision to the insertion of the last suture. The timing was conducted by the researchers’ assistant using a stopwatch. Surgery was performed for all participants by the researchers under local anesthesia. Anesthesia of the inferior dental nerve, lingual nerve, and long buccal nerve was achieved using 2% mepivacaine containing 1:100,000 adrenaline. Postoperative instructions were given orally as well as a written detail for reference. Participants were placed on oral prophylactic amoxicillin 500 mg 8 hourly for 5 days and ibuprofen 400 mg 8 hourly for 3 days. A 10-point visual analog scale (VAS) for pain assessment was given to each participant to be completed once each day at approximately the same time as the surgery time until day 7 after the surgery when the sutures were removed. The researchers reminded all the study participants to complete their daily pain assessment through the use of text messages/daily calls at approximately the time the assessment should be conducted.

**Data analysis**

The data collected were recorded and analyzed using the Statistical Package for the Social Sciences IBM SPSS version 23. IBM Corp., Armonk, N.Y., USA.

Exploratory analysis was conducted to ensure data consistency. The results were expressed using frequency tables and percentages. Descriptive analysis was conducted using a wide variety of measures of central tendency (mean, median, and mode) and dispersion (variance, deviation, and quartile range). These are presented in tables. Bivariate analysis was conducted to test the association between preoperative dental anxiety, duration of third molar surgery, and postoperative recovery from pain after third molar surgery. Chi-square test or one-way ANOVA was used to assess the association between variables where applicable. The effect of preoperative dental anxiety on duration and postoperative pain perception after third molar surgery was inferred at $P < 0.05$.

**Results**

Sixty patients who presented for third molar surgery participated in this study. Five participants were lost to follow-up. There were slightly more males (50.9%) than females (49.1%). Majority of the participants (76.4%) were within the age group of 21–30 years, while 3.6% of the participants were within the age group of 11–20 years. Twenty-five participants (45.5%) had tertiary education, while 43.6% of the participants had secondary school education [Table 1]. Most participants in this study had low dental anxiety (54.5%), while 6 participants (11%) had severe dental anxiety, with more females having moderate-to-severe dental anxiety than males [Table 1]. Age and level of education had no significant relationship with modified dental anxiety scores of the participants. However, sex is significantly associated with dental
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anxiety ($\chi^2 = 13.449, P = 0.001$). The females were associated with severe dental anxiety more than the males [Table 2]. There was no significant difference in the mean anxiety scores across various demographic variables ($P > 0.05$) [Table 3]. Majority of participants (70.9%) had their third molar surgery done in $<30$ min, while 16 participants had their surgery spanning $>30$ min [Table 1]. There was also no significant correlation between the duration of surgery and dental anxiety ($P = 0.778$). The correlation between pain at different days and dental anxiety was not significant ($P > 0.05$) [Table 4]. A comparison of the mean pain scores across dental anxiety levels shows that pain was significantly higher among subjects with moderate anxiety, followed by those with high anxiety in the 4th day postoperatively ($F = 3.622, P = 0.034$) [Table 5]. Horizontal impaction was the most common type of impaction, accounting for 38.2%, followed by mesioangular impaction (27.2%) [Table 1]. Side of impaction was almost equally distributed in a ratio of 1:1.04, with left-sided impaction accounting for 50.9%.

### DISCUSSION

Postoperative pain challenges after third molar surgery have necessitated studies on various factors to pain recovery among third molar surgery patients, with many being on pharmacological methods of ameliorating pain.[11,12] Psychological aspect of pain recovery has also been explored with preoperative dental anxiety reported in literature to have an effect on pain recovery[15-17] despite the fact that anxiety expression is dependent on culture and other factors.[5,6] Postoperative pain recovery was found to be the same across the different anxiety levels in our study. This is contrary to some literature reports that assert levels of pain to be consistent with the severity of preoperative dental anxiety and others that reported postoperative anxiety to be responsible for increase pain after surgery.[22-25] Absence of trait anxiety measurement in our study could account for the differences in our outcome as compared to studies that reported a positive correlation between preoperative anxiety and increased postoperative pain. Previous dental experience which was not put into consideration in this study may also have affected our outcome, considering Mugali and Komerik[26] report that attributed pain felt postoperatively to a previous negative experience in their study of factors related to patients’ anxiety before and after oral surgery. The mean pain scores across dental anxiety levels were significantly higher among participants with moderate anxiety, followed by those with severe anxiety on the 4th day postoperatively. This finding might be explained.

### Table 1: Sociodemographic characteristics and other variables

| Frequency (%) |
|---------------|
| Sex | Male | 28 (50.9) | Female | 27 (49.1) |
| Age group | 11-20 | 2 (3.6) | 21-30 | 42 (76.4) | 31-40 | 11 (20.0) |
| Level of education | Primary | 6 (10.9) | Secondary | 24 (43.6) | Tertiary | 25 (45.5) |
| Level of dental anxiety | Low | 30 (54.5) | Moderate | 19 (34.5) | Severe | 6 (11) |
| Type of impaction | Distoangular | 5 (9.1) | Horizontal | 21 (38.2) | Mesioangular | 15 (27.2) | Vertical | 14 (25.5) |
| Side of impaction | Left | 28 (50.9) | Right | 27 (49.1) |
| Duration of surgery (min) | $\leq$30 | 39 (70.9) | $>$30 | 16 (29.1) |

### Table 2: Association between social demographic characteristics and modified dental anxiety

| MDAS score | Low, n (%) | Moderate, n (%) | Severe, n (%) | $\chi^2$ | P |
|------------|------------|----------------|---------------|----------|---|
| Age group | 11-20 | 1 (50.0) | 1 (50.0) | 0 (0.0) | 2.267 | 0.687 |
| | 21-30 | 21 (50.0) | 16 (38.1) | 5 (11.9) | 13.449 | 0.001 |
| | 31-40 | 8 (72.7) | 2 (18.2) | 1 (9.1) | 4.262 | 0.372 |
| Sex | Male | 22 (78.6) | 5 (17.8) | 1 (3.6) | 11.721 | 0.001 |
| | Female | 8 (29.6) | 14 (51.9) | 5 (18.5) | 20.721 | 0.001 |
| Level of education | Primary | 1 (16.7) | 4 (66.6) | 1 (16.7) | 4.262 | 0.372 |
| | Secondary | 15 (62.5) | 7 (29.2) | 2 (8.3) | 3.171 | 0.206 |
| | Tertiary | 14 (56.0) | 8 (32.0) | 3 (12.0) | 1.571 | 0.210 |

n=Number of participants, MDAS=Modified Dental Anxiety Scale
Eleven percent prevalence of severe dental anxiety among our study population was slightly lower as compared to findings in Caucasians. The study design with racial and/or cultural differences may have accounted for the differences.

There was no significant relationship between the age and dental anxiety in our study, as was also seen in previous studies. The age bracket of 18–40 years used in this study, with majority of the participants being 21 years and above, may have accounted for no significant findings between the age and preoperative dental anxiety.

Preoperative dental anxiety had no significant influence on the duration of surgery in our study which is in contrast to Lago-Mendez et al.'s findings of extended surgery time among highly dental anxious patients. Age, sex, and difficulty index of the impacted third molar are factors known to influence the duration of surgery and this appears to be applicable in our study. Benediktsdottir et al.'s study found age as a factor in the duration of surgery reporting that surgery could last significantly longer in older patients, while Sursarla and Dodson reported sex as a significant factor in the duration of surgery but disagree on age effect. Gbotolorun et al.'s reported body mass index and age as having a significant correlation with the duration of surgery. Furthermore, surgeons’ experience plays a role in the duration of surgery. Our findings of an insignificant relationship between the preoperative dental anxiety and surgery duration could be explained by the fact that our participants cooperated well after we implemented the existing clinic anxiety reduction protocol for anxious patients and achieved good anesthesia.

Further findings in our study show that horizontal impaction was the most common type of impaction, followed by mesioangular impaction. The side of impaction was seen almost equally between right and left.

**Conclusion**

Our findings suggest that preoperative dental anxiety may not significantly have a role in postoperative pain recovery after third molar surgery as well as an influence on the duration of surgery among Saudis. However, good anesthesia, anxiety reduction protocol, and immediate (2–5 minutes) postoperative medications should be considered a standard protocol in third molar surgeries. Postoperative anxiety influence on postoperative pain recovery after third molar surgery may also have to be explored in future researches.

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### Table 3: Comparison of the mean anxiety score across various demographic variables

| Age group   | Mean±SD       | F/t | P   |
|-------------|---------------|-----|-----|
| 11-20       | 12.50±3.54    | 0.249 | 0.781 |
| 21-30       | 12.95±10.66   | 0.558 | 0.249 |
| 31-40       | 10.64±4.61    | 0.994 | 0.325 |

**Sex**

|       | Mean±SD       | F/t | P   |
|-------|---------------|-----|-----|
| Male  | 11.21±12.42   | 0.948 | 0.667 |
| Female| 13.78±5.12    | 0.628 | 0.994 |

**Level of education**

|       | Mean±SD       | F/t | P   |
|-------|---------------|-----|-----|
| Primary| 15.33±5.05   | 0.408 | 0.011 |
| Secondary| 12.79±13.28 | 0.751 | 0.483 |
| Tertiary| 11.48±5.31   | 0.038 | 0.844 |

*F*=Fisher’s test. SD=Standard deviation

### Table 4: Correlation between pain at different days, duration of surgery, and dental anxiety

| Day  | VAS          | MDAS          | r   | P   | n   |
|------|--------------|---------------|-----|-----|-----|
| 1st  | Pearson correlation coefficient (r) | −0.055 | 0.692 | 55  |
| 2nd  | Pearson correlation coefficient (r) | −0.081 | 0.558 | 55  |
| 3rd  | Pearson correlation coefficient (r) | −0.067 | 0.628 | 55  |
| 4th  | Pearson correlation coefficient (r) | −0.044 | 0.751 | 55  |
| 5th  | Pearson correlation coefficient (r) | −0.065 | 0.635 | 55  |
| 6th  | Pearson correlation coefficient (r) | −0.052 | 0.706 | 55  |
| 7th  | Pearson correlation coefficient (r) | 0.011  | 0.938 | 55  |
| Duration surgery | Pearson correlation coefficient (r) | −0.039 | 0.778 | 55  |

*F*=Number of participants, VAS=Visual analog scale, MADS=Modified Dental Anxiety Scale

by individual idiosyncrasies and subjective nature of the assessing instrument, which was VAS. We noted almost equal number of male and female in our study in contrast to female preponderance reported in previous studies with one such report attributing it to the fact that females seek treatment of their oral diseases more than males. However, our finding is similar to Bamgbose et al.'s report of an equal number of male and female among Nigerians. Moderate and severe preoperative dental anxieties were seen more in females in our study buttressing previous findings in the literature that reported females to be more dentally anxious than males. However, in the mean anxiety score, gender had no significant relationship with dental anxiety and this agrees with Okawa et al.'s and Kanegane et al.'s findings. The study design with racial and/or cultural differences may have accounted for the differences.

Furthermore, surgeons’ experience plays a role in the duration of surgery. Our findings of an insignificant relationship between the preoperative dental anxiety and surgery duration could be explained by the fact that our participants cooperated well after we implemented the existing clinic anxiety reduction protocol for anxious patients and achieved good anesthesia.

Further findings in our study show that horizontal impaction was the most common type of impaction, followed by mesioangular impaction. The side of impaction was seen almost equally between right and left.
Table 5: Comparison of mean pain scores across dental anxiety levels

| Day | Mild | Moderate | High | F   | P    |
|-----|------|----------|------|-----|------|
| 1st | 7.23±2.69 | 8.63±1.64 | 8.33±2.34 | 2.210 | 0.120 |
| 2nd | 5.63±2.57 | 6.68±1.95 | 6.83±3.31 | 1.334 | 0.272 |
| 3rd | 4.33±2.45 | 5.58±2.19 | 5.67±3.14 | 1.834 | 0.170 |
| 4th | 3.27±2.43 | 5.05±2.15 | 4.83±2.86 | 3.622 | 0.034 |
| 5th | 2.30±1.10 | 3.53±1.67 | 3.50±1.35 | 2.555 | 0.087 |
| 6th | 1.63±0.71 | 2.21±1.12 | 2.33±1.63 | 0.737 | 0.483 |
| 7th | 0.67±0.12 | 1.26±0.41 | 1.50±0.05 | 2.029 | 0.142 |

SD=Standard deviation, F=Fisher’s statistics

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Conflicts of interest
There are no conflicts of interest.

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