

**ASSESSMENT OF PREOPERATIVE AND  
POSTOPERATIVE ANXIETY AND  
HAEMODYNAMIC CHANGES IN SURGICAL  
REMOVAL OF IMPACTED LOWER  
THIRD MOLAR**

*Dissertation Submitted to*  
**THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY**

*In partial fulfillment for the Degree of*

**MASTER OF DENTAL SURGERY**



**BRANCH III**  
**ORAL AND MAXILLOFACIAL SURGERY**  
**APRIL 2016**

**THE TAMIL NADU Dr. MGR MEDICAL UNIVERSITY  
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**DECLARATION BY THE CANDIDATE**

I hereby declare that this dissertation title “ASSESSMENT OF PREOPERATIVE AND POSTOPERATIVE ANXIETY AND HAEMODYNAMIC CHANGES IN SURGICAL REMOVAL OF IMPACTED LOWER THIRD MOLAR” is a bonafide and genuine research work carried out by me under the guidance of **Dr. MALINI JAYARAJ, M.D.S.**, Professor, Department of Oral & Maxillofacial Surgery, Ragas Dental College and Hospital, Chennai.

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## CERTIFICATE

This is to certify that this dissertation titled **“ASSESSMENT OF PREOPERATIVE AND POSTOPERATIVE ANXIETY AND HAEMODYNAMIC CHANGES IN SURGICAL REMOVAL OF IMPACTED LOWER THIRD MOLAR”** is a bonafide record of work done by **Dr. Ravi Sankar Nutalapati** under our guidance and to our satisfaction during his postgraduate study period **2013-2016**.

This Dissertation is submitted to **THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY**, in partial fulfillment for the award of the Degree of **MASTER OF DENTAL SURGERY – ORAL AND MAXILLOFACIAL SURGERY, BRANCH III**. It has not been submitted (partial or full) for the award of any other degree or diploma.

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## **ACKNOWLEDGEMENT**

*First of all I thank **GOD** for his love, grace, mercy and wisdom which formed the foundation of my life and all my work.*

*I wish to thank my father **Mr Venkateswara Rao Nutalapati** and my mother **Mrs Venkata Ramana Nutalapti** for the sacrifices they made and for giving me a great foundation in my life and for being the most wonderful parents. I thank my sister **Bhargavi Yalamanchili** and brother in law **Sai Krishna Yalamanchili** and my brother **Srikanth Mandadapu** for being the pillars of my life and showering me their love, encouragement. I sincerely thank my grandmother **Late Smt. Namburu Pushpavathi** and my grandfather **Shri Namburu Sambasiva Rao** for believing in me & supporting me unconditionally.*

*With deep satisfaction and immense pleasure, I present this work undertaken as a Post Graduate student specializing in Oral and Maxillofacial Surgery at Ragas Dental College and Hospital. I would like to acknowledge my working on this dissertation which has been wonderful and enriching learning experience.*

*I convey my heartfelt gratitude and my sincere thanks to my Head of the department and my guide **Professor Dr M Veerabahu**, Department of Oral and Maxillofacial Surgery, Ragas Dental College and Hospital, Chennai for his exceptional guidance, tremendous encouragement, well timed suggestions,*

*concern and motivation providing me with his immense patience in brightening years of my postgraduate program. I have been fortunate to study under his guidance and support. I thank you very much sir for guiding me in my thesis work and I am indebted towards you forever for all consideration you have shown towards me. I would definitely cherish these memories throughout my life.*

*I would like to extend my heartfelt gratitude to **Professor Dr S Ramachandran**, Principal, Ragas Dental College and Hospital for allowing us to use the scientific literature and research facilities of the college and for providing the platform to meet such wonderful academicians and people.*

*I owe enormous gratitude to my guide **Professor Dr Malini Jayaraj** for her invaluable guidance and support throughout my course. She has always been a source of provoking new thoughts in me. Her loving and caring nature lightened the burden of many hardships. I shall forever remain thankful to her for her valuable guidance and input throughout the making of this dissertation. It was an enriching experience to have spent three years of my life under her guidance.*

*I wish to convey my heartfelt thanks to **Professor Dr B Vikraman**, a great teacher who has always been a source of inspiration. His way of looking at things three dimensionally has always given a touch of perfection. His*

*subtle humor and comments have been thoroughly enjoyed throughout my post graduate life*

*I would also thank my **Professor Dr J A Nathan** for everlasting inspiration, constant encouragement, constructive criticism and valuable suggestion conferred upon me throughout my postgraduate period.*

*I am greatly indebted to **Dr Radhika Krishnan** Anesthesiologist, for imparting and sharing her vast experience in the field of medicine. I thank her for her valuable suggestion and constant encouragement through my postgraduate course.*

*I am grateful and sincerely thankful to **Dr D Sankar, Dr Sathya Bama, Dr Saneem and Dr Satish** Readers, for their vehement personal interest, wish and never ending willingness to render generous help to me throughout my dissertation and post graduate with valuable advice.*

*I thank **Dr Seema Alice Mathew, Dr James Bhagat, Dr Naren Kumar** Senior lecturers for their guidance, scholarly suggestion and whole hearted support throughout my postgraduate course.*

*I thank **Dr Venkatesh, Dr Rinku George** Department of surgical oncology Cancer Institute Adayar, Chennai, and **Dr Ashwin, Dr Baliram,** Department of Plastic Surgery Gandhi Medical College, Secunderabad, for their vehement, for their valuable guidance and encouragement during my peripheral postings.*

*I would like to thank my dear friends **Dr Rajya lakshmi, Dr Divya, Dr Sharmishta, Dr Pavan, Dr Mithileswer** for inspiring and encouraging me during my postgraduate period. My heartfelt thanks to my dear friends, without whom my time at Ragas wouldn't have been enjoyable.*

*I sincerely thank my batch mates, **Dr Balaji Arivarasu, Dr Giri Chellappa, Dr Hariharan and Dr Sriram** for their support, constructive criticism at every step and selfless co - operation during my dissertation. I wish them a successful career ahead.*

*I offer my sincere thanks to my seniors **Dr Krishna Kumar, Dr Sindhu, Dr Jay, Dr Anandhi, and Dr Umapathy.** My Juniors **Dr Narayana Moorthy, Dr Vivek, Dr Sivaiah** for their encouragement and support during the course.*

*I sincerely thank Mr Thavamani, Ms Sudha for helping in editing and printing of my thesis. I would also thank Theatre assistants Mr Venugopal, Sis.Lakshmi, OT staffs, Sis.Deepa, Sis.Laila, for helping me throughout my post graduate period.*

*I would like to dedicate this dissertation to my family who always wish for me to reach great heights and achieve greater goals in my life.*

## LIST OF ABBREVIATIONS

<b>ABBREVIATION</b>	<b>EXPANSION</b>
<b>MDAS</b>	Modified Dental Anxiety Scale
<b>STAI</b>	State Trait Anxiety Inventory
<b>DFS</b>	Dental Fear Survey
<b>VAS</b>	Visual Analog Scale
<b>ASA</b>	American Society Of Anesthesiologists
<b>IRB</b>	Institutional Review Board
<b>IOPA</b>	Intra Oral Periapical Radiograph
<b>HPA SYSTEM</b>	Hypothalamic-Pituitary Adrenal axis System
<b>DHEA</b>	Dehydroepiandrosterone
<b>ANOVA</b>	Analysis of Variance
<b>SD</b>	Standard Deviation
<b>SPSS</b>	Statistical Package for the Social Sciences
<b>NSAIDS</b>	Non Steroidal Anti Inflammatory Drugs



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6.	STETHOSCOPE

# *Introduction*

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## **INTRODUCTION**

Minor oral surgical procedures and surgical removal of third molars evoke fear, anxiety and distress to patients. In spite of being rarely life threatening, having short duration of surgical procedure and recovery, a total of 65% of patients experienced various levels of heightened anxiety and fear. Dental phobia in many patients is also considered a major cause of avoidance, postponement and cancellation of dental surgical appointments of procedures.

These patients can be handled with minimum stress and according to Wright<sup>54</sup> 1983 any stressful surgical procedures require proper counseling encouragement and positive attitude in both surgeon and patient for rendering dental treatment efficiently and effectively.

Anxiety is defined as

*“A nonspecific feeling of apprehension towards a concrete situation that does not necessarily require previous experience, and is not proportional to the response that is triggered in the individual”.*<sup>13</sup>

Dental anxiety has multi system response and varies from individual to individual.<sup>43,48</sup> Dental anxiety may be due to the internal (cognitive and somatic) or external (environmental) stimuli or due to previous dental trauma experience or inputs of information regarding the surgical experiences of aggravating stress, fear, phobia, and tension to various levels in patients. Weiner and Sheehan<sup>53</sup> mentioned that dentally anxious patients could be

divided into exogenous and endogenous groups. In exogenous group anxiety is due to previous traumatic dental experiences, where as in endogenous group, its origin is due to constitutional vulnerability of patients to anxiety disorders.<sup>12,50,53</sup> Patient's anxiety is affected by various factors such as age, gender, educational status etc.<sup>29</sup> The patients with dental anxiety shows following altered symptoms of physiological changes in cardiovascular, respiratory, gastro-intestinal modifications, changes in sympathetic nervous system, cognitive and behavioral dimension.<sup>20</sup>

Anxiety may also arise due to previous negative experiences to pain and discomfort occurred during the procedure or during postoperative phase. Patients having poor oral health with painful decayed teeth experience more anxiety, pain and discomfort during procedures and during immediate post op recovery periods.<sup>50</sup> This results in, increase in operating time and incidence of unnecessary complications in carrying out the procedure.<sup>37</sup> Few studies showed that dental anxiety is more associated with females, more in younger individuals than elderly people.<sup>34,37</sup> The anxiety may be due to pain during the procedure due to factors like fear to injection, noise and vibration of drill.<sup>30,37</sup> Patients with high economic status and education have less anxiety than counterpart.<sup>12</sup> In 2014 L.Aznar-Arasa<sup>28</sup> et al mentioned that anxiety is significantly related to the difficulty of impacted tooth to be extracted. Few studies revealed that uninvolved and non-interactive behavior of dentist also causes dental anxiety and fear.

The objective measures to evaluate the psycho-physiological response are associated in general, with increase in the activity of sympathetic nervous system of autonomic nervous system. The changes are associated with cardiovascular system are increased blood pressure and pulse rate, excessive sweating from sweat glands, increased muscle tone, spasmodic activity in musculoskeletal system, changes in respiratory system and gastrointestinal disturbances needs to be evaluated. In anxious patients changes in pulse (>10 beats/Min) and changes in Blood pressure are detectable.<sup>8</sup> Various studies mentioned that these physiological changes are very useful in assessing level of anxiety and stress suffered by patients during dental procedures. F. Gulnot Jimeno<sup>13</sup> et al suggested that Heart rate and Blood pressure were reliable objective indicators in assessing dental anxiety. Anxiety and stress results in increased production of endogenous cortisol by altering and disturbances in the hypothalamic-pituitary- adrenal axis.<sup>8</sup>

Quantification of Dental anxiety can be assessed using self-reporting scales. These scales are used in determining prevalence in population, to measure the risk factors and symptoms, and also to determine the changes brought by previous experiences. These scales are also recommended for the use of clinicians in their daily routine practice to aid in screening the anxiety and fear and providing better tailored treatment options. There are various measures for determining dental anxiety. The three subjective measures used in this study were Modified Dental Anxiety Scale (MDAS), a modified form



of Norman Corah's Dental Anxiety Scale, State –Trait Anxiety Inventory (STAI), and Dental Fear Survey (DFS). All the scales were widely accepted and reliable indicators in assessing dental anxiety. They have been reliable and valid in different languages and cross cultures.

As the State anxiety fluctuates time to time depending on situation, thus studies have set to assess anxiety qualitatively. There are very few studies reporting subjective and objective differences in assessing anxiety in surgical removal of third molar. The purpose of this study is to assess the levels of anxiety using self-reported questionnaires and Haemodynamic changes (Blood Pressure, Pulse, Oxygen saturation) in surgical removal of Impacted third molar preoperatively, immediate postoperatively and 7 days later to the procedure.

*Aim & Objective*

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## **AIM AND OBJECTIVE**

The aim and objective of this study was to assess the amount of anxiety and fear in patients undergoing surgical removal of impacted lower third molar using subjective and objective scales.

# *Anxiety and Stress*

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## **ANXIETY AND STRESS**

Anxiety, phobias and depression can lead to misperceptions of diseases or its severity. Stress plays a great role in health and disease than formerly supposed. Clinical research on dental anxiety has begun in the early 1970's by Gothenburg<sup>6</sup> Sweden. The term anxiety entered in the field of psychology from the word "Angst" German word by Ferud<sup>13</sup> in 1936. Humans are stressors and even visits for health care can activate the HPA system. Anxiety generated by such ordeals as dental or medical appointments, or by public speaking, solo musical performances, examinations, or interviews is normal. Stress is also fairly common in dental students and staff. Stress can lead to reactions, affecting a wide range of functions.

### **SOME POSSIBLE EFFECT'S OF ACUTE AND CHRONIC STRESS<sup>8</sup>:**

	<b>Mild stress</b>	<b>Acute stress</b>	<b>Chronic stress</b>
<b>Central nervous system</b>	Mood change	Improved concentration and clarity of thought	Anxiety, loss of sense of humor, depression, fatigue, headaches, migraines, tremors
<b>Cardiovascular</b>	Rise in pulse rate and blood pressure	Tachycardia, arrhythmias	Hypertension, chest pain , ischemic heart disease
<b>Respiratory</b>	Raised respiratory rate	Hyperventilation	Cough and asthma
<b>Mouth</b>	Slight dryness	Dry mouth	Dry mouth, ulcers

<b>Gastrointestinal</b>	Raised bowel activity	Impaired digestion	Peptic ulceration, irritable bowel syndrome
<b>Sexual</b>	Male impotence and female irregular menstruation	Male impotence and female irregular menstruation	Male impotence and female amenorrhea

Fear, an emotion that deals with danger, causes an automatic, rapid protective response in many body systems, coordinated by the amygdala. Emotional memories stored in the central amygdala may play a role in disorders involving very distinct fears such as phobias, while different parts may be involved in other forms of anxiety.

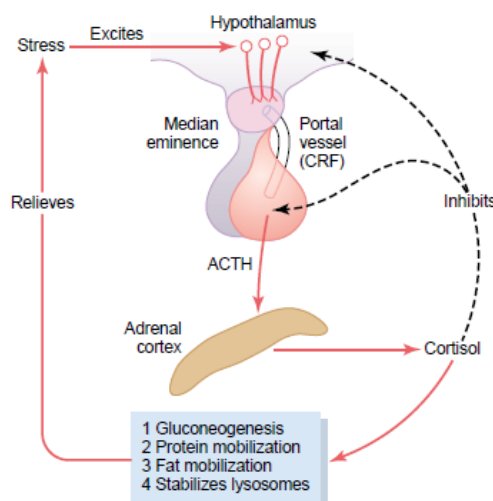
The hippocampus- an area of the brain critical to memory and emotion is involved in intrusive memories and flashbacks typical of post-traumatic stress disorder, and results in raised levels of stress hormones-cortisol, epinephrine, and nor epinephrine.

Danger induces high levels of enkephalins and endorphins, natural opioids, which can temporarily mask pain and in some anxiety states higher levels persist even after the danger has passed.

Cortisol is the major steroid hormone produced in the adrenal gland and is essential for the body to cope with stress. Cortisol levels exhibit a natural rise in the morning and fall at night. If this rhythm is disturbed, mineral balance, blood sugar control and stress responses are affected. Lack of cortisol can lead to fatigue, allergies, and arthritis, while excess cortisol can have

greater negative effect on body. While short term elevations of cortisol are important for dealing with stress of life threatening issues, illness and wound healing, chronically elevated levels of cortisol can result in tiredness, depression, and accelerated ageing with hypertension, muscle loss, bone destruction, obesity and diabetes. Prolonged stress or prolonged exposure to glucocorticosteroids can also have adverse effects on the hippocampus to cause atrophy, and memory deficits such as have been demonstrated in Cushing syndrome, depression and post- traumatic stress disorder.

Dehydroepiandrosterone (DHEA), the most abundant steroid hormone in the body, appears to counter the effects of high level of cortisol and improves ability to cope with stress. Low levels of DHEA have been associated with impaired immunity, cardiovascular disease, Alzheimer's disease, hypothyroidism, and diabetes.

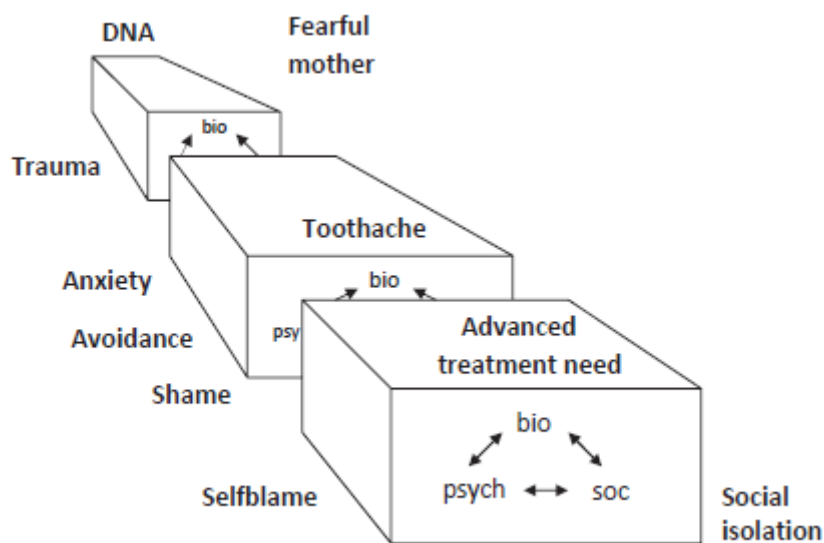


**HP Axis**

**ETIOLOGY<sup>6</sup>:**

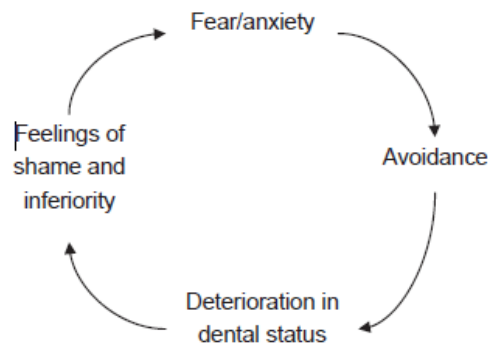
There are still numerous problems deserving intensified attention in the dental anxiety area. One largely unresolved issue concerns the etiology of the condition. There seems to be a small genetic component and as usual remaining environmental factors. Dental anxiety and fear is a complex phenomenon. However dental anxiety mostly depends upon single cause-genetic or experiential. The development of this composed syndrome may run through several stages, each bringing a new complication to the condition, each forming a changing basis for the maintenance and continued development of the fearfulness syndrome.

Below image illustrates an intuitive conception of how a perpetual interaction among biological, psychological, and social factors may bring about a successively more complex and more firmly maintained state of illness.





BERGGREN<sup>4</sup>, in his PhD thesis, presented a model describing the possible circular relationship among fear/anxiety, avoidance, deterioration of dental state, and feelings of shame and inferiority ('Berggren's model).



**Berggren Model**

**CLINICAL FEATURES<sup>8</sup>:**

Anxiety can cause several physical effects as a result of overwhelming autonomic activity. Sympathetic activity via the release of catecholamines causes apprehension, tachycardia, hyperventilation, sweating, tremor and dilating pupils. Parasympathetic activity may lead to involuntary defecation and urinary incontinence.

	FEATURES	FEATURES	FEATURES
	<b>Physiological</b>	<b>Behavioral</b>	<b>Cognitive</b>
CHILD	Pallor, increased pulse rate, tension, hyperventilation	Crying, uncooperative, restless, disruptive, silent or sullen.	Scared anxious, negative thoughts

ADULT	Dry mouth	Verbal abuse, excessive talking, cancelling appointments, arriving late or not at all	Negative thoughts.
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**DIAGNOSIS:**

Pathological anxiety may be difficult to diagnose and requires careful consideration of individual's personal history and presenting clinical features. A thorough psychiatric assessment may be appropriate, but underlying organic causes such as hyperthyroidism and mitral valve prolapse should be excluded first. Anxiety can be classified into following diagnostic categories.

- Panic disorder- discrete attacks with no external stimulus
- Phobias – discrete attacks with stimuli
- Generalized anxiety disorder- a generalized persistent state of anxiety
- Anxiety as a manifestation of other psychiatric disease's such as depression.

**MANAGEMENT<sup>25</sup>:**

Treatment of anxiety and stress may require:

- Appropriate cause of underlying organic disease
- Lifestyle changes to reduce stressors and avoid precipitating factors
- Behavioral techniques
- Pharmacotherapy (anxiolytics and beta blockers)

- Psychotherapy – this may be used to aid adjustment of life style (supportive) or to explore patient conflicts and secondary gain (psychodynamic).

**STRESS REDUCTION PROTOCOL<sup>31</sup>:**

**NORMAL, HEALTHY, ANXIOUS PATIENTS (ASA I)**

- Recognize the patient's level of anxiety
- Pre-medicate the evening before the dental appointment, as needed
- Pre-medicate immediately before the dental appointment as needed
- Schedule the appointment in the morning
- Minimize the patient's waiting time
- Consider psycho sedation during therapy
- Administer adequate pain control during therapy
- Length of appointment variable
- Follow up with postoperative pain and anxiety control
- Telephone the highly anxious or fearful patients later the same day that treatment was delivered.

**MEDICAL RISK PATIENTS (ASA II, III, IV)**

- Recognize the patient's degree of medical risk
- Complete medical consultation before dental therapy, as needed
- Schedule the patients appointment in the morning
- Monitor and record preoperative and postoperative vital signs
- Consider psycho-sedation during therapy

- Administer adequate pain control during therapy
- Length of appointment variable do not exceed the patients limits of tolerance
- Follow up with postoperative pain and anxiety
- Telephone the higher medical risk patient later on the same day that treatment was delivered
- Arrange the appointment for the highly anxious or fearful, moderate to high risk patient during the first few days of the week when the office is open for emergency care and the treating doctor.

### **DENTAL MANAGEMENT OF ANXIOUS PATIENT<sup>21</sup>**

#### **➤ Behavioral management:**

#### **Preoperative:**

- Establish effective communication
- Be open and honest; let patients see who you are.
- Provide consistent verbal and nonverbal communication.
- Explain procedures and answer questions.
- Explain what you will do to make procedure “pain free”.
- If discomfort is anticipated, explain this to the patient.
- Consider confronting the patient who appears anxious
  - “You seem tense today.”
  - “Would you like to talk about it?”

**Operative:**

- Allow patients to ask questions about what is happening
- Let patient know if any discomfort is about to be felt
- Reassure patient that the procedure is going well

**Postoperative:**

- Explain what usually occurs after the procedure
- Explain what patient needs to do
- Explain what patient needs to avoid
- Describe what complications can occur such as pain, bleeding, infection, allergic reaction to medication prescribed.
- Tell patient to contact if any complications develop.
- In case of severe bleeding or allergic reaction, the patient should go to emergency room.

➤ **Pharmacologic**

**Preoperative:**

- Oral sedation
- Benzodiazepines were commonly used; the selected drug should act fast and should be effective at low doses.
- The drug should be administered at the night before appointment and day of appointment.

**Operative:**

- Effective local anesthesia
- Oral sedation ( benzodiazepine)
- Inhalation sedation (nitrous oxide)
- Intramuscular sedation ( Midazolam, Promethazine, Meperidine)
- Intravenous sedation (Diazepam, Midazolam, Fentanyl)

**Postoperative:**

- Effective postoperative pain control is essential.
- Select the most appropriate drug for pain control.

**Drug dosages commonly used:**

- Alprazolam – Xanax 0.5 mg tab 1 tab in the evening before bed, 1 tab 1 hour before appointment preoperatively.
- Diazepam – Vallium 2, 5, 10 mg tab, preoperatively in the evening before bed, 1 tab 1 hour before appointment.
- Triazolam – Halcion 0.125 or 0.25 mg tab, preoperatively in the evening before bed, 1 tab 1 hour before appointment.
- Midazolam – Versed IV, 2.5mg, or less over 2 minutes just before procedure.
- Fentanyl – Sublimaze IV, 0.07 to 2µg/kg, given minutes before procedure.
- Mephridine – Demerol IM, 1mg/kg minutes before procedure.

# *Review of Literature*

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## **REVIEW OF LITERATURE**

**Norman L. Corah, Elliot N. Gale, Stephen J. Illig (1969)**<sup>38</sup> given a scale for assessment of dental anxiety consists of four multiple choice items dealing with patient's subjective reactions about going to dentist, waiting in the dentist's office for the procedures, and anticipation of drilling and scaling.

**C. H. Spielberger (1968, 1977)**<sup>7</sup> developed the STAI in the context of his work on the links between anxiety and learning ability and reflected limitations in existing measures of anxiety. He proposed a scale with state and trait sub-classes. State anxiety refers to transitory unpleasant feelings of apprehension, tension, nervousness or worry often accompanied by activation of the autonomic nervous system; it reflects how threatening a person perceives his environment to be. Trait anxiety is a personality disposition that describes a person's tendency to perceive situations as threatening, and hence to experience state anxiety in stressful situations. Trait anxiety is not observed directly, but is expressed as a state anxiety when stress is experienced. The STAI State form consists of 20 statements, and the answers are used to judge patient's anxiety at specific time. The STAI Trait form consists of 20 statements and the answers to these are used to calculate patient's underlying degree of anxiety. Each statement in the STAI-State Trait is rated on 4 point scale according to the patient's agreement. The overall score ranges from 20-80 for each scale and classified as little or no anxiety (20-37), moderate anxiety (38-44), and extreme anxiety (45-80).



**Ronald A. Kleinknecht, Klepac, Alexander (1978)**<sup>45</sup> given Dental Fear Survey (DFS) consists of 20 items grouped into 3 dimensions avoidance, physiological reactions, and specific dental stimuli according to which patients dental anxiety is measured on a Likert Scale ranging from 1 (no fear) to 5 (extreme fear) and lower limit for fear is considered to be 63.

**Ronald A. Kleinknecht, F. Dudley McGlynn, Robert M. Thornidike et al (1984)**<sup>44</sup> done factor analysis of the Dental Fear survey and cross validated. Cross validation showed avoidance, physiological reactions, and specific dental stimuli factors to be consistent across four demographically and geographically diverse groups.

**Pederson (1994)**<sup>41</sup> given difficulty index for removal of impacted third molars based on angulation of tooth, depth and ramus relationship / space available.

**P. Earl (1994)**<sup>40</sup> has done a study of Patients anxiety about third molar surgery in 105 patients. They were asked to complete questionnaires preoperatively, postoperatively to assess accuracy of preoperative explanation, difference in expectations and which aspect would worry those most. Results showed patients generally found their worries as expected or even better. Some found events worse with only paraesthesia (13%) and pain (12%). Reassurance and adequate pain control are the most important factors to patients in third molar surgery; reassurance should be started at operation booking rather than on admission.

**Warren P. Vallerand, April Hazard Vallerand, Marc Heft (1994)<sup>52</sup>**

done a study on 40 patients scheduled to undergo surgical extraction under local anaesthesia and intravenous conscious sedation were randomly assigned to two groups. Treatment group members were given postoperative instructions that include descriptive information regarding potential sequelae as well as detailed information regarding analgesic use. Control group members were given basic open-ended postoperative wound care instructions. These results indicated that increasing the quantity of postoperative preparatory information significantly increases pain relief and resultant satisfaction with pain control without increasing analgesic consumption.

**Humphris GM et al (1995)<sup>18</sup>** given Modified Dental Anxiety Scale (MDAS), a questionnaire specifically designed to measure anticipatory fear and anxiety. This self-rating instrument is a 5 item scale and each question has five scores ranging from relaxed to very anxious. The total score ranging from 5-25, 5-10 was considered as low anxiety, 11-18 moderate anxiety and 19-25 as high anxiety.

**David Locker, Andree Liddell, David Shapiro (1999)<sup>9</sup>** studied to use a population-based sample to assess the psychological validity for diagnosing dentally anxious individuals in 1480 randomly selected adults. Results showed all subjects indicated extreme dental fear and were broadly similar in terms of their cognitive and behavioural response to dental care. Overall results indicated that dental anxiety is a complex fear with a number of components.

**G.W. Bell, P.J. Kelly (2000)**<sup>14</sup> done a study to find out whether dose of midazolam necessary for sedation, and whether dose of midazolam, operating time or technique have any influence on levels of amnesia and anxiety in 60 patients. They found that the dose required for sedation was not linked with pulse rate, amnesia, blood pressure, or preoperative anxiety. Sedation reduced postoperative anxiety scores significantly.

**Ebtissam. M. Al-Madi, Hoda Abdel Latif (2002)**<sup>11</sup> this study assessed the current prevalence of dental anxiety and fear in a population of 1424 Saudi female adolescents. To assess they used DFS and DAS questionnaires. They showed that highest anxiety and fear levels were found in adolescents who had an extraction at their last visit. Higher fear and anxiety levels were found in adolescents who had recently been to dentist, while lower fear and anxiety levels were associated with adolescents who had never been to dentist. The lowest fear and anxiety levels were related to oral prophylaxis. One may conclude that anxiety and fear are high among the subjects with previous traumatic dental exposure.

**James. D. Bader, Arthur. J. Bonito, Daniel. A. Shugara et al (2002)**<sup>22</sup> done a systematic review to identify any additional risks of adverse cardiovascular outcomes to hypertensive patients represented by use of epinephrine containing anaesthetic solutions and epinephrine impregnated retraction cords. Results showed use of epinephrine in uncontrolled hypertensive patients was associated with small, non-significant increase in

systolic and diastolic blood pressure. They concluded that increased risk for adverse effects was found to be low and reported occurrence of adverse effects were minimal.

**Mats Mehrstedt, Sven Tonnies, Idis Eisentraut (2004)**<sup>36</sup> study showed women were more fearful than men, younger persons were more fearful than older ones. Patients of lower socio economic status had slightly more dental problems compared with more economic status persons. They also concluded that dental fears are negatively related to quality of life.

**Yusa H, Onizawa K ,Hori M, Takesa S, et al (2004)**<sup>56</sup> investigated to quantitate the anxiety associated with third molar extraction in university students, and to compare the measured anxiety before and after extraction and between men and women, first and second extraction, impaction versus non impacted tooth extraction. The Japanese version of the State-Trait Anxiety Inventory was used for 108 students. The anxiety status of students undergoing third molar extraction could be quantitatively evaluated using STAI.

**Hasan Garip, Osman Abali, Kamil Goker, Ulku Gokturk, Yildiz Garip (2004)**<sup>15</sup> assessed the anxiety of 120 Turkish patients who has undergone third molar extraction. They Amsterdam Preoperative Anxiety and Information Scale (APAIS) and Spielberger's State Trait Anxiety Inventory (STAI) were used to evaluate anxiety. They showed that women were significantly more anxious than men, women who had not had a previous

operation were more anxious than other women, there was no difference in the anxiety scores of patients who had previously had a local anaesthetic and those who had not, there were no differences in anxiety as measured by trait scores, patients who wanted lots of information were more anxious. An anxious patient can affect other patients in the waiting room, and this directly affects cooperation between surgeons and patients.

**Lucia Lago Mendez, Marcio Diniz Freitas, Carmen Senra-Rivera et al (2006)**<sup>30</sup> evaluated dental anxiety in patients who consulted for third molar removal and also assessed possible relationship with general trait anxiety. Dental anxiety was evaluated using Corah's Anxiety Scale (DAS), the Dental Fear Survey (DFS), and state anxiety scale of State Trait Anxiety Inventory (STAI). The results showed significant positive correlation with both DAS score and DFS score for anxiety. The three scales of dental anxiety all showed positive correlation with each other significantly. They also showed difference between men and women was only statistically significant in the case of trait anxiety. They concluded that trait anxiety may be a useful predictor of a patient's predisposition to dental anxiety.

**Malamed (2007)**<sup>31</sup> described that heightened anxiety and fear of dentistry can lead to exacerbation of medical problems such as angina, and asthma, as well as other stress related problems like hyperventilation and vasodepressor syncope. He also told that one of the goals in patient evaluation is to determine whether a patient is psychologically capable of tolerating stress

associated with the planned treatment. Three methods are available to enable the doctor to recognize the presence of anxiety. First is medical history questionnaire, second is anxiety questionnaire, and third is the art of observation.

**Mehtap Muglali, and Nurgul Komerik (2008)<sup>37</sup>** has done a study to identify the factors that may contribute to anxiety in 120 patients who underwent minor oral surgery before and after procedure. They concluded that to reduce patient's anxiety underestimated factors such as jaw fatigue and fluid collection in the mouth should be taken into account during minor oral surgery under local anaesthesia. Postoperatively swelling and difficulty in eating and pain should also be considered to relieve patient's anxiety.

**S. Jaakkola, P. Rautava, P. Alanen, M. Aromaa et al (2009)<sup>48</sup>** developed a new dental fear measurement, the Short Dental Fear Survey Question and tested for clinical practice.

**Hae-Ra Han (2009)<sup>16</sup>** this paper provided comprehensive methodological review of literature concerning anxiety measurement in children. While multiple measures of anxiety are available to evaluate level of anxiety, selection of measurement approach should be an iterative process based on rigorous evaluation of evidence of reliability and cross validation of the tool across different age groups of children.

**Manju A Nair, Rajesh Shankarapillai, Vijayalaxmi Chouhan (2009)<sup>35</sup>** determined the prevalence of dental fear among 164 oral surgery patients. The results indicated that level of dental anxiety is comparable to literature.

**Lucia Lago- Mendez, Marcio Diniz-Freitas, Carmen Senra – Rivera, Gloria Seoane–Pesqueira, Jose Manuel Gandara-Rey (2009)<sup>29</sup>** done a prospective on 145 patients who underwent lower third molar extractions. Dental anxiety was evaluated using Corah Dental Anxiety Scale (DAS), Kleinkencht Dental Fear Survey (DFS) and State-Trait Anxiety Inventory (STAI). They concluded that patients with high trait or dental anxiety may tend to require longer surgery times and has poorer post-operative recovery.

**Jason Armfield (2010)<sup>23</sup>** given about most widely used self-report measures in assessing dental anxiety. This of concern given that these scale, by their very nature, serves to define the concept they aim to measure.

**F. Gulnot Jimeno, S. Yuste Blesla, C. Curadros Fernandez et al (2011)<sup>13</sup>** given objective and subjective measures for assessing anxiety in paediatric patients. He also concluded that the level of cooperation will also improve when anxiety levels are low.

**Ioana Marginean, Letitia Filimon (2011)<sup>20</sup>** validated study of Dental Fear Survey (DFS) on 198 participants on Romanian population. DFS is a

psychometrical instrument frequently used for measurement of fear associated with situations and stimuli of dental treatment. Because dental fear and anxiety are present with all social categories and with all ages, measurement with validated instruments is essential for establishing of the treatment programme adapted to the patient's need and problems.

**Ad de Jongh, Arjen J. Van Wilk, and Jerome A. Lindeboom (2011)<sup>2</sup>** examined the psychological impact of surgical removal of third molar, and to identify possible psychological risk factors for the development of dental anxiety and symptoms of psychological trauma in 71 patients. Results suggested that surgical removal of third molar by use of local anaesthesia has minimal impact on the development of dental anxiety or symptoms of psychological trauma.

**Ekta A Malvania, Ajithkrishnan CG (2011)<sup>12</sup>** assessed the prevalence and socio-demographic correlates of dental anxiety in a group of 150 adults. Results showed that 46% were dentally anxious. Females were significantly more anxious than males, subjects residing in villages are more anxious than in city. Subjects with past negative dental experience were significantly associated with more anxiety. They recommended that this issue should be given importance and addressed in practical and meaningful manner.

**Hina Hakim, Ishak Bin Abdul Razak, (2012)<sup>17</sup>** assessed prevalence and level of dental fear among health related undergraduates and to identify



factors causing dental fear using Klienknechts DFS questionnaire in medical and dental undergraduates. Results revealed that dental students reported higher prevalence of dental fear (96%). Drill and anaesthetic needle were the most fear provoking factors. Heart beats faster and muscle being tensed were top two physiological symptoms experienced. They concluded that Dental fear and anxiety is a common problem in both medical and dental undergraduates. Also high level of anxiety leads to avoidance of dental treatment.

**Porritt J, Buchanan H, Hall M, Ghilchrist F, Marashman Z (2012)**<sup>43</sup> assessed dental anxiety children's using self-report measures. They concluded dental anxiety and fear related behaviours in children provide challenges to clinician and dental public health practitioners.

**A. Al-Namankany, M.de Souza, and P. Ashley (2012)**<sup>1</sup> reviewed paediatric dental anxiety measures, assessed statistical methods used for validation and their clinical implications. They concluded that to date there is no scale of gold standard, and there is need to further develop a scale with cognitive component for children and adolescents.

**Jean Carlos Fernandes Goulart, Matheus Dias Pinheiro, Rodrigo Ventura Rodrigues et al (2012)**<sup>24</sup> assessed the influence of dental anxiety on heart rate and blood pressure during dental care in a sample of 60 volunteers. They concluded that there was no difference in heart rate during dental treatment in potential anxiety level and there was no difference in behaviour of systolic and diastolic blood pressure in relation to the anxiety level and pain.

**Paul Brady, Chris Dickinson, Helen Whelton (2012)<sup>39</sup>** aimed to identify and quantify anxious dental patients and dental office environment factors that may influence anxiety. Anxiety was significant in those respondents those delay their appointments would make them more anxious. Many have preferences about dentists and the surgery environment which may be modulators of their anxiety.

**JM Armfield, LJ Heaton (2013)<sup>25</sup>** reviewed a number of non-pharmacological techniques that can be used in management of fear and dental anxiety. Management ranges from good communication and establishing rapport to use of systematic desensitization and hypnosis.

**Maria Carrillo-Diaz, Antonio Crego and Martin Romero-Moroto (2013)<sup>34</sup>** studied on influence of gender on the relationship between dental anxiety and oral health-related emotional well-being. They concluded that girls have high level of Dental Fear and Anxiety was associated with low levels of oral health –related emotional well-being.

**Bernson JM, Elfstrom ML, Hakeberg .M (2013)<sup>5</sup>** investigated dental coping strategies, general anxiety, and depression in relation to regularity of dental treatment among persons with either regular dental care or phobic avoidance, whilst controlling for socio-demographic factors in 263 patients. Results showed 141 were anxious who were receiving dental treatment. Levels of dental, general anxiety and depression were significantly higher. This study

also indicates a high level of general anxiety indicates a higher risk for irregular dental care.

**Sungtae Kim, Yoon-jin Lee, Sojin Lee, Hong-Seok Moon, Moon-Kyu Chung (2013)**<sup>49</sup> investigated 89 patients assessed subjective factors influencing pain perception included anxiety from overall dental treatment and anxiety relative to the time from implant surgery. The objective factors were sex, age, and implant number and location. They concluded that a patient's anxiety represented by Dental Anxiety Score and state of anxiety scores affected pain intensity. Anxiety regarding dental treatment is attributed to complicated factors such as behavioural, psychological, and environmental factors. The anxiety is most often related to possibility of pain during the procedure.

**Carlson SG, Wide Boman U, Lundgren J, Hakeberg M (2013)**<sup>6</sup> given an introductory article aims to describe the development of research and clinical work on dental anxiety. They told about approach, treatment evolution, etiological issues and current and future challenges. They also concluded that much remains to explore in dental anxiety research.

**Crispian Scully, Roderick A. Cawson (2013)**<sup>8</sup> described anxiety generated by dental appointments, and also anxious patients require drugs to control anxiety. They also told about effects of acute and chronic stress. They described clinical features, diagnosis and management of anxiety and stress, in general and dental aspect.

**Sandhya YK, Sandhya S, Jalihal S et al (2013)<sup>46</sup>** assessed haemodynamic, ventilator, and electrocardiograph changes during extraction procedure among 12-15 year old children and compared changes with anxiety fear and pain in 60 patients. They concluded that fear; anxiety and pain have an effect on haemodynamic, electrocardiograph and ventilator parameters during procedure.

**Jigar M Dhuvad, Rajesh A Kshisagar, Mukesh M Dhuvud (2014)<sup>26</sup>** compared vital parameters, operators comfort and patient satisfaction during third molar removal under local anaesthesia, with or without sedative agents. Results showed a decrease in the intra-operative plasma oxygen saturation during the surgical removal of impacted third molar. The Heart rate and Blood pressure increased after ten minutes of giving Local anaesthesia.

**Mauricio Antonio Oliveria, Miriam Pimenta Vale, Cristiane Baccin Bendo (2014)<sup>33</sup>** validated Dental Fear Survey (DFS) in Brazilian Portuguese language and is reliable.

**L. Aznar-Arasa, R. Figueiredo, E. Valmaseda-Castellon, C. Gay-Escoda (2014)<sup>28</sup>** has done a prospective cohort study to assess whether patient anxiety influences the difficulty of impacted lower third molar and to identify other predictive factors of surgical difficulty in 102 patients under local anaesthesia. They found statistically significant association between the operating time and following variables: depth of impaction, third molar angulation, radiological signs of proximity between third molar roots and

mandibular canal, hard and soft tissue coverage, need to perform ostectomy and tooth sectioning. Patients with a previous history of infections, those with deeply impacted third molars, and those that required tooth sectioning were more anxious. No relevant differences between male and female were detected. Increased levels of anxiety were significantly correlated with longer operation times, and concluded that impacted lower third molar extractions are significantly more difficult in anxious patients.

**Pia Lopez-Jornet, Fabio Camacho-Alonso, Mariano Sanchez – Siles (2014)**<sup>42</sup> analysed the amount of anxiety and fear felt before, immediately after and one week after dental extraction in 70 patients under local anaesthesia. Each patient's anxiety was measured using Spielberger's State-Trait Anxiety Inventory (STAI), the Modified Corah Dental Anxiety Scale (MDAS), and the Dental fear survey (DFS). There were significant differences in the STAI Trait scale between before and 7 days after extraction and in the MADS between before and immediately after extraction and immediately after and 7 days after extraction. The DFS also differed between before and immediately after extraction and between immediately and 7 days after extraction. They also concluded that dental anxiety immediately after tooth extraction may be influenced by operative techniques, but anxiety after 7 days after extraction is not.

**Juan Nuinelo-Lorenzo, Jose Otero Sanfeliu, Santiago Vivas Alegre et al (2014)**<sup>27</sup> studied the hemodynamic changes during dental check-ups and

preventive treatments and establish the relation between psychometric tests and haemodynamic parameters in 71 paediatric patients. They concluded that significant changes in Heart rate and Blood pressure in patients who visited for dental check-ups and preventive treatments.

**Urszula Kanaffa Kilijanska, Urszula Kaczmarek, Barbara Kilijanska, Dorota Frydecka (2014)<sup>50</sup>** studied 117 patients to assess the oral health status and hygiene habits among subjects with respect to level of dental anxiety. They concluded that dental anxiety has negative influence on oral health status.

**Vedati Prathima, M. Shakeel Anjum, P. Parthasarathi Reddy et al (2014)<sup>51</sup>** assessed the levels of dental anxiety among the patients who required dental treatments in dental clinics or hospitals. They found that anxiety levels are higher in patients in who have to undergo extraction than those who must be fitted with dentures. The dentists should pay more attention to patients with more dental anxiety.

**Shalender Sharma, Kaberi Majumder, J.K. Dayashankara Rao et al (2015)<sup>47</sup>** aimed to evaluate the various factors which can increase the anxiety and its association with pain perception of patients following dental extraction in 100 patients. Pain anxiety were analysed using Visual Analog Scale (VAS). Results showed there was significant gender difference in pain and anxiety level. Women being more anxious than men because as they were expecting pain.

**Devapriya Appakuttam, Sangeetha Subramanian, Anupama Tadepalli, Lokeshkumar (2015)<sup>10</sup>** evaluated dental anxiety, factors influencing dental anxiety, and anxiety towards tooth extraction procedure in 1148 consecutive patients aged 18-70. Results showed that 45.2% participants were less anxious, 51.8% were moderately or extremely anxious and 3% were suffering from dental phobia. Female subject's younger individuals were more anxious, participants who had negative dental experience are more anxious. Notably, 82.6% were anxious towards extraction procedure. They concluded that significant percentage of population is suffering from dental anxiety. Factors like age, gender, education level, occupation, financial stability, and previous bad dental experiences influences dental anxiety. Extraction followed by drilling of tooth and receiving local anaesthetic injection provoked more anxiety.

## *Materials and Methods*

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## **MATERIALS AND METHODS**

This study was done in Ragas Dental College and Hospital in Department of Oral and Maxillofacial Surgery during the period May 2014 to August 2015. The study and protocol was accepted by Institutional Review Board (IRB) in 2014 May. We designed a prospective study to assess the anxiety and haemodynamic changes with 3 time intervals, assessment were made preoperatively, immediate postoperatively and 7 days later for surgical removal of impacted third molar under local anesthesia. The study included 50 patients who fulfilled inclusion criteria. Informed consent was obtained from all the patients who participated in the study. Clinical and general examination of the patients was done thoroughly and all patients were medically fit to undergo procedure.

### **INCLUSION CRITERIA:**

- 1) All patients undergoing removal of impacted lower third molar under local anesthesia with Pederson's difficulty score less than 7
- 2) All patients who were healthy with no serious medical condition or blood dyscrasias.
- 3) All patient's above 18 years of both sexes.
- 4) All patients should come under ASA 1

**EXCLUSION CRITERIA:**

- 1) Patients who presented with acute infections
- 2) Patients having past history of minor oral surgery
- 3) Patients with psychiatric, or behavioral disorders
- 4) Patients having language and cognitive problems
- 5) Those who are unwilling to participate in the study

**PROCEDURE:**

Patients were assessed medically and personal data were recorded (age, sex, occupation, past medical history, past dental history). The patients were explained by the operating surgeon about the procedure and given verbal counseling to their queries. Informed consent was obtained from each subject participating in the study. The angulation of the impacted tooth, position, relationship to the ramus and Pederson's score is determined using IOPA (Intra Oral Periapical Radiograph). The levels of anxiety were assessed preoperatively. The patients were requested to fill the questionnaires in a comfortable waiting area. The blood pressure, heart rate and oxygen saturation were measured using Sphygmomanometer (Diamond®) Stethoscope (Life Line™®) and pulse oximeter (Easy Care®) at regular time intervals. The teeth were extracted under local anesthesia using 2% lignocaine with adrenaline (1:80000). The procedure was performed by a single operator trainee in oral & maxillofacial surgery in the department. The procedure was performed by a standard surgical technique. Duration of the procedure,

number of blocks / injections given was recorded. The duration of the procedure is from the time of administration local anesthetic to placement of last suture is recorded. Bleeding was controlled. Post-operative instructions and medication was advised. Patients were advised postoperative instructions. The questionnaires and blood pressure, heart rate, and oxygen saturation were recorded immediately after procedure. Complications were recorded intra-operatively and postoperatively and addressed. Patient asked to review after 7 days for suture removal. After 7 days suture removal done, any complaints were noted and patient asked to complete the questionnaires and the blood pressure, oxygen saturation and heart rate were noted.

#### **NUMERICAL RATING SCALES**

The three anxiety scales used in the study were Spielberg's State-Trait Anxiety Inventory (STAI), Modified Dental Anxiety Scale (MDAS), and Dental Fear Survey (DFS).

Modified Dental Anxiety Scale (MDAS) is a self-rating instrument designed specifically to measure anxiety and fear given by Humpris<sup>18</sup> et al. It is a 5 item scale and each question has five scores ranging from no anxious to very anxious. The total score is a sum of all five questions and can range from 5-25. The scoring criteria is 5-10 was considered as low anxiety, 11-18 as moderate anxiety, and 19-25 as high anxiety, the lower limit for marking patients with extreme anxiety is 19.

The Dental Fear Survey (DFS) is second most commonly used measure of dental anxiety and fear. DFS was originally developed as 27 item scale (Kleinknecht<sup>44</sup> 1973) and subsequently reduced to 20 items as a result of later factor analytic study (KleinKnecht<sup>44</sup> 1984). The 20 item scale consists of two items focused on avoidance, five items on physiological reactions, and remaining on specific dental stimuli. Patients anxiety is measured on a Likert scale of intensity ranging from 1 (no fear) to 5 (extreme fear). Scores ranging from 20 -100 i.e. no fear to extreme fear and the lower limit for and appreciable degree of fear is to be 63.

The State Trait Anxiety Inventory (STAI) is given by C.H.Speilberger<sup>7</sup> 1977. He proposed a scale with state and trait sub-classes. State anxiety refers to a provisional state or condition characterized by subjective feelings of tension and apprehension, coupled with activation of the autonomous nervous system; it reflects how threatening a person perceives his environment to be. Trait anxiety is a personality disposition that describes a person's tendency to perceive situations as threatening, and hence to experience state anxiety in stressful situations. Trait anxiety is not observed directly, but is expressed as a state anxiety when stress is experienced. The STAI State form consists of 20 statements, and the answers are used to judge patient's anxiety at specific time. The STAI Trait form consists of 20 statements and the answers to these are used to calculate patient's underlying degree of anxiety. Each statement in the STAI-State and Trait is rated on 4 point scale according to the patient's

agreement. The overall score ranges from 20-80 for each scale and classified as little or no anxiety (20-37), moderate anxiety (38-44), and extreme anxiety (45-80).

**TIME INTERVALS:**

The three questionnaires and the blood pressure, heart rate, oxygen saturation were measured at three intervals of time during the procedure.

Time 0 (T0) - pre-operatively

Time 1(T1) - immediate postoperatively

Time 2 (T2) - 7 days after the procedure

The collected data stored in an Excel® (Microsoft Office 2010) and then held for descriptive statistical analysis.

## **CONSENT FOR PARTICIPATING IN THE STUDY**

Date:

I, \_\_\_\_\_ am giving my willing consent for participating in the study and willing consent for surgical procedure under local anesthesia.

I am informed about the questionnaires to be filled at three different times. I am aware of blood pressure, heart rate, oxygen saturation are to be recorded at three time intervals.

I am informed about the surgical procedure & type of anesthesia being given to me. I am informed that adequate safety precautions are taken to avoid or manage any possible complications arising.

This undertaking is given upon my own accord, I have been explained by the operating surgeon in English and in my own regional language.

NAME OF PATIENT:

SIGNATURE OF PATIENT

**PATIENT DATA RECORD**

Date:

Name:

Age:

Sex:

Occupation:

Past Medical History:

Past Dental History:

Diagnosis:

Surgical Treatment Plan:

Pederson's Score:

Angulation of Teeth:

Position:

Class:

No of Injections:

Duration of Procedure:

HAEMODYNAMIC RECORD:

TIME	BLOOD PRESSURE	HEART RATE	OXYGEN SATURATION
T0			
T1			
T2			

SCORES OF ANXIETY SCALES:

TIME	MDAS	DFS	STAI-STATE	STAI-TRAIT
T0				
T1				
T2				

T0- Before procedure

T1- Immediately after procedure

T2- One week after procedure



**MODIFIED DENTAL ANXIETY SCALE (MDAS)**

CAN YOU TELL US HOW ANXIOUS YOU GET, IF AT ALL, WITH  
YOUR DENTAL VISIT?

PLEASE INDICATE BY INSERTING 'X' IN THE APPROPRIATE BOX

**1. If you went to your Dentist for TREATMENT TOMORROW, how  
would you feel?**

*Not Anxious*  *Slightly Anxious*  *Fairly Anxious*  *Very Anxious*   
*Extremely Anxious*

**2. If you were sitting in the WAITING ROOM (waiting for treatment),  
how would you feel?**

*Not Anxious*  *Slightly Anxious*  *Fairly Anxious*  *Very Anxious*   
*Extremely Anxious*

**3. If you were about to have a TOOTH DRILLED, how would you feel?**

*Not Anxious*  *Slightly Anxious*  *Fairly Anxious*  *Very Anxious*  
 *Extremely Anxious*

**4. If you were about to have your TEETH SCALED AND POLISHED,  
how would you feel?**

*Not Anxious*  *Slightly Anxious*  *Fairly Anxious*  *Very Anxious*  
 *Extremely Anxious*

**5. If you were about to have a LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel?**

*Not Anxious*  *Slightly Anxious*  *Fairly Anxious*  *Very Anxious*   
*Extremely Anxious*

**Instructions for scoring** (remove this section below before copying for use with patients)

*The Modified Dental Anxiety Scale.* Each item scored as follows:

Not anxious = 1

Slightly anxious = 2

Fairly anxious = 3

Very anxious = 4

Extremely anxious = 5

Total score is a sum of all five items, range 5 to 25: Cut off is 19 or above which indicates a highly dentally anxious patient, possibly dentally phobic.

**State-Trait Anxiety Inventory Scale**

SELF- EVALUATION QUESTIONNAIRE STAI FORM Y1

NAME: AGE: \_\_\_\_\_ SEX: M/F T: \_\_\_\_\_.

**DIRECTIONS:** A number of statements which people have used to describe themselves are given below. Read each statement and circle the appropriate number to the right of the statement to indicate how you feel right now. There is no right or wrong answer. Do not spend too much time on any one statement but give the answer which seems to describe your present feeling best.

	<b>NOT AT ALL</b>	<b>SOME WHAT</b>	<b>MODERATELY SO</b>	<b>VERY MUCH SO</b>
1) I feel calm	1	2	3	4
2) I feel secure	1	2	3	4
3) I am tensed	1	2	3	4
4) I feel strained	1	2	3	4
5) I feel at ease	1	2	3	4
6) I feel upset	1	2	3	4
7) I am presently worrying over possible misfortunes	1	2	3	4
8) I feel satisfied	1	2	3	4
9) I feel frightened	1	2	3	4

10) I feel comfortable	1	2	3	4
11) I feel self-confident	1	2	3	4
12) I feel nervous	1	2	3	4
13) I feel jittery	1	2	3	4
14) I feel indecisive	1	2	3	4
15) I feel relaxed	1	2	3	4
16) I feel content	1	2	3	4
17) I am worried	1	2	3	4
18) I am confused	1	2	3	4
19) I feel steady	1	2	3	4
20) I feel pleasant	1	2	3	4

**SELF- EVALUATION QUESTIONNAIRE STAI FORM Y2**

NAME: AGE: \_\_\_\_\_ SEX: M/F T: \_\_\_\_\_.

**DIRECTIONS:** A number of statements which people have used to describe themselves are given below. Read each statement and circle the appropriate number to the right of the statement to indicate how you feel right now. There is no right or wrong answer. Do not spend too much time on any one statement but give the answer which seems to describe your present feeling best.

	<b>ALL MOST NEVER</b>	<b>SOME TIMES</b>	<b>OFTEN</b>	<b>ALMOST ALWAYS</b>
21) I feel pleasant	1	2	3	4
22) I feel nervous and restless	1	2	3	4
23) I feel satisfied with myself	1	2	3	4
24) I wish I could be happy as others seems to be	1	2	3	4
25) I feel like a failure	1	2	3	4
26) I feel rested	1	2	3	4
27) I am calm cool and collected	1	2	3	4
28) I feel that difficulties	1	2	3	4

are piling up so that I cannot over come				
29) I worry too much over something that really doesn't matter	1	2	3	4
30) I am happy	1	2	3	4
31) I have disturbing thoughts	1	2	3	4
32) I lack self confidence	1	2	3	4
33) I feel secure	1	2	3	4
34) I make decisions easily	1	2	3	4
35) I feel in adequate	1	2	3	4
36) I feel content	1	2	3	4
37) some un important thoughts runs through my mind and bothers me	1	2	3	4
38) I take disappoinments so keenly that I can't put them out my mind	1	2	3	4
39) I am a steady person	1	2	3	4
40) I get in a state of	1	2	3	4

tension or turmoil as I  think over my recent  concerns and interests				
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**State-Trait Anxiety Inventory for Adults Scoring Key (Form Y1 Y2)**

To use this stencil, fold the sheet in half and line with the appropriate test side either form Y1 or Y2. Simply total the scoring weights shown on the stencil for each response category. For example for question number 1, if the respondent marked 3 then the weight would be 2. Refer to the manual for appropriate normative data.

<b>Form Y1</b>	<b>Not at all</b>	<b>Some what</b>	<b>Moderately so</b>	<b>Very much so</b>	<b>Form Y2</b>	<b>Almost never</b>	<b>Some times</b>	<b>Often</b>	<b>Almost always</b>
<b>1.</b>	4	3	2	1	<b>21.</b>	4	3	2	1
<b>2.</b>	4	3	2	1	<b>22.</b>	1	2	3	4
<b>3.</b>	1	2	3	4	<b>23.</b>	4	3	2	1
<b>4.</b>	1	2	3	4	<b>24.</b>	1	2	3	4
<b>5.</b>	4	3	2	1	<b>25.</b>	1	2	3	4
<b>6.</b>	1	2	3	4	<b>26.</b>	4	3	2	1
<b>7.</b>	1	2	3	4	<b>27.</b>	4	3	2	1
<b>8.</b>	4	3	2	1	<b>28.</b>	1	2	3	4
<b>9.</b>	1	2	3	4	<b>29.</b>	1	2	3	4
<b>10.</b>	4	3	2	1	<b>30.</b>	4	3	2	1
<b>11.</b>	4	3	2	1	<b>31.</b>	1	2	3	4

<b>12.</b>	1	2	3	4	<b>32.</b>	1	2	3	4
<b>13.</b>	1	2	3	4	<b>33.</b>	4	3	2	1
<b>14.</b>	1	2	3	4	<b>34.</b>	4	3	2	1
<b>15.</b>	4	3	2	1	<b>35.</b>	1	2	3	4
<b>16.</b>	4	3	2	1	<b>36.</b>	4	3	2	1
<b>17.</b>	1	2	3	4	<b>37.</b>	1	2	3	4
<b>18.</b>	1	2	3	4	<b>38.</b>	1	2	3	4
<b>19.</b>	4	3	2	1	<b>39.</b>	4	3	2	1
<b>20.</b>	4	3	2	1	<b>40.</b>	1	2	3	4



**The Dental Fear Survey**

- 1) Has fear of dental work ever caused you to put off making an appointment?

1	2	3	4	5
Never	Once or Twice	A few times	Often	Nearly every time

- 2) Has fear of dental work ever caused you to cancel or not appear for an appointment?

1	2	3	4	5
Never	Once or Twice	A few times	Often	Nearly every time

When having dental work done:

- 3) My muscles become tense...

1	2	3	4	5
Never	Once or Twice	A few times	Often	Nearly every time

- 4) My breathing rate increases...

1	2	3	4	5
Never	Once or Twice	A few times	Often	Nearly every time

- 5) I perspire...

1	2	3	4	5
Never	Once or Twice	A few times	Often	Nearly every time

6) I feel nauseated and sick to my stomach..

1	2	3	4	5
Never	Once or Twice	A few times	Often	Nearly every time

7) My heart beats faster...

1	2	3	4	5
Never	Once or Twice	A few times	Often	Nearly every time

	1 None at all	2 A little	3 Some- what	4 Much	5 Very much
8) Making an appointment for dentistry..					
9) Approaching the dentist's office...					
10) Sitting in waiting room ..					
11) Being seated in dental chair..					
12) The smell of dentist's office..					
13) Seeing the dentist walk in..					
14) Seeing the anesthetic needle..					

15) Feeling the needle injected..					
16) Seeing the drill..					
17) Hearing the drill..					
18) Feeling the vibrations of the drill..					
19) Having your teeth cleaned..					
20) All the things considered, how fearful are you of having dental work done?					

**PEDERSON'S DIFFICULTY INDEX FOR IMPACTED  
LOWER THIRD MOLAR<sup>41</sup>**

CLASSIFICATION	DIFFICULTY INDEX VALUE
ANGULATION	
Mesioangular	1 easiest to remove
Horizontal /Transverse	2
Vertical	3
Distoangular	4
DEPTH	
Level A	1
Level B	2
Level C	3
RAMUS RELATIONSHIP/ SPACE AVAILABLE	
Class I	1
Class II	2
Class III	3

Very difficult: 7-10

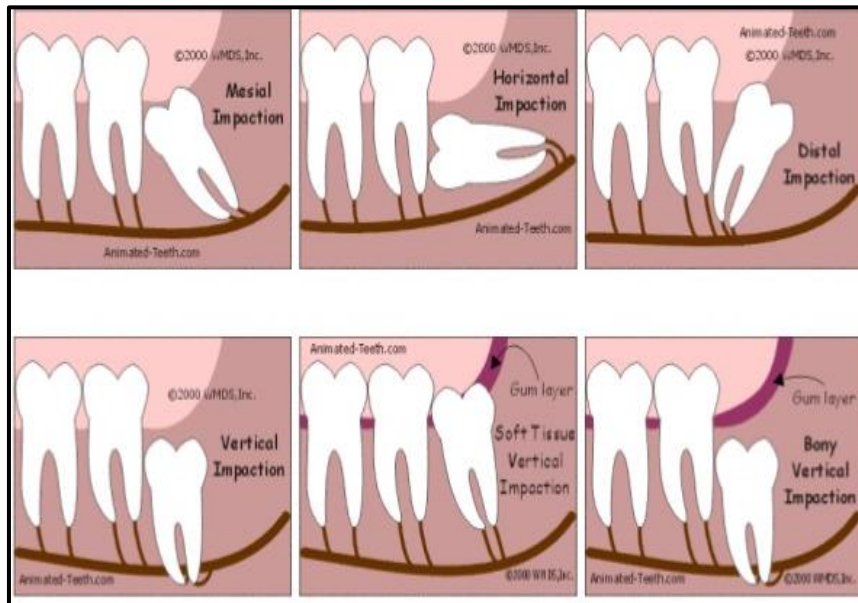
Moderately difficult: 5-7

Minimally difficult: 3-4

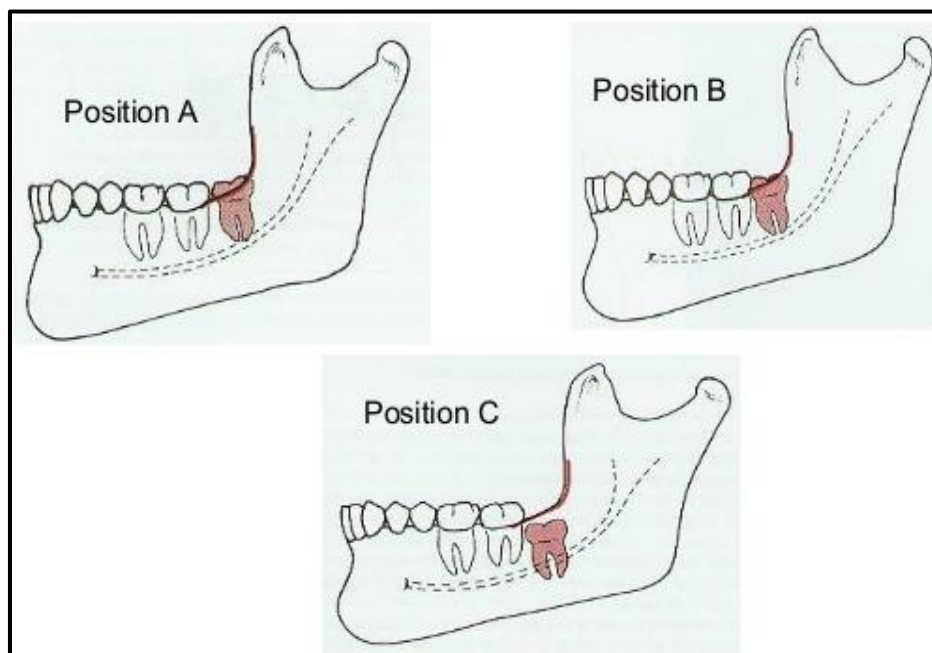
## *Figures*

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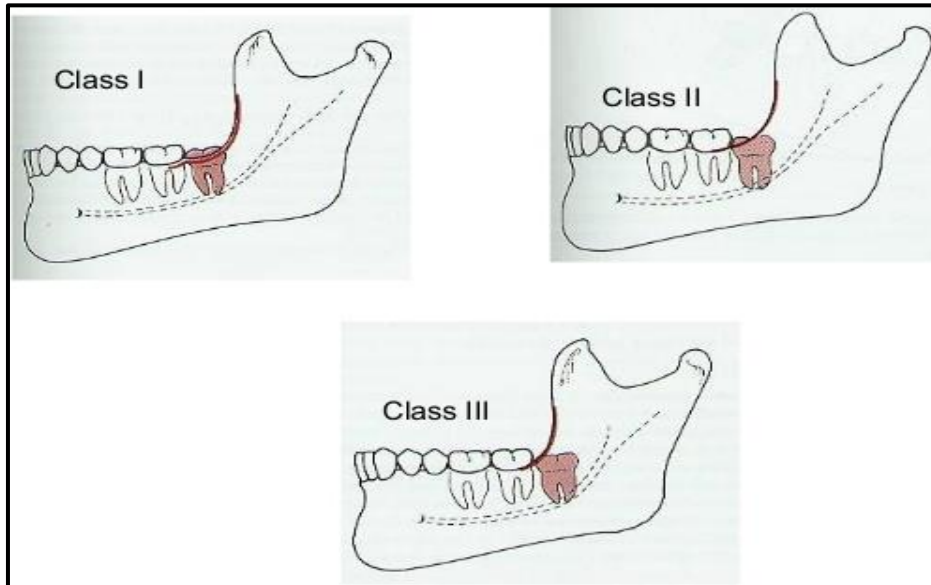
**Fig. 1: ANGLATION OF TEETH**



**Fig. 2: POSITION OF TEETH**



**Fig. 3: RAMUS RELATIONSHIP /SPACE AVAILABLE**



**Fig. 4: PULSE OXIMETER**



**Fig. 5: SPHYGMOMANOMETER**



**Fig. 6: STETHOSCOPE**





## *Results*

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## **RESULTS**

In present study total 50 patients were assessed, of which 27 were male and 23 were female who are willing to participate in the study and satisfied inclusion criteria. All patients were with a mean age of 28.3 (SD 5.925) years ranging from 18-40 years. Out of 50 patients 23 were operated on third quadrant (38) and 27 were operated on fourth quadrant (48).

As per Pederson's difficulty index for removal of third molar, all cases come under mild to moderately difficult i.e. score ranging from 3-6. They are categorized as 3-4 minimally difficult and 5-6 as moderately difficult. Out of 50 patient's 21 were mild difficult and 29 were moderately difficult. No patients in the study came under Pederson's severe difficulty index.

The mean duration of the procedure is 41.380 minutes (SD: 3.768) ranging from 32 minutes to 48 minutes.

In 16 patients only one nerve block / injection of local anesthesia is required and in 34 patients two or more blocks / injections of local anesthesia are required.

Postoperative complications such as injury to inferior alveolar nerve, lingual nerve, alveolitis, hypoesthesia, sensitivity loss, infection were not encountered in present study. Six patients reported with limited mouth opening which is managed by mouth opening exercises.

Parameters evaluated were:

**Subjective parameters:**

- 1) Modified Dental Anxiety Scale (MDAS)
- 2) State Trait Anxiety Inventory (STAI)
- 3) Dental Fear Survey (DFS)

**Objective parameters:**

- 1) Blood pressure
- 2) Oxygen saturation
- 3) Heart rate

All parameters were evaluated at three time intervals i.e.

T0 – Before starting the procedure

T1 – Immediately after the procedure

T2 – one week after the procedure

Statistical analysis for the significances was assessed using Statistical Package for the Social Sciences (S.P.S.S version 16) software. A descriptive study was made for each variable. The basic inferential analysis was done using repeated measures ANOVA analysis, and the correlation between different qualitative variables was assessed using Chi square test and independent sample test. Probabilities of  $< 0.05$  were accepted as significant.

**Modified Dental Anxiety Scale (MDAS):**

On comparing at three different intervals, there is significant difference between T0 and T1, T1 and T2. The mean score at T0 is 13.080 (SD: 4.711), T1 is 16.220 (SD: 5.155) and T2 is 10.180 (SD: 3.153) respectively. Using Repeated measures ANOVA analysis the changes obtained were statistically significant (p=0.0001).

Preoperatively at T0 7 patients had severe anxiety, at T1 29 patients had severe anxiety and at T2 there were no patients who were severe anxious. According to Pia Lopez-Jornetet<sup>42</sup> a score of  $\geq 19$  is considered as severe anxious in present study.

Using Chi-square test, At T1 the level of anxiety increased, due to increase in:

**Number of blocks/ injections of local anesthesia:** 34 patients were recorded more than one block /injection of local anesthesia. Out of 34 patients 28 patients were severely anxious (p=0.0001), which is statistically significant.

**Duration of the procedure:** 31 patients had taken more than 40 minutes was recorded. Out of 31 patients 21 patients were severely anxious (p=0.0001).

**Pederson's difficulty index:** Indicated higher the difficulty severe the anxiety levels. 29 patients who were moderately difficult of score more than 5 had operated. Out 29 patients 21 patients were severely anxious (p=0.0001).

There is no influence of sex on anxiety ( $p=0.235$ ). The change in anxiety levels is not dependent on the side of the tooth which is operated ( $p=0.558$ ).

The scores at T2 decreased compared to T1. Increase in number of blocks/injections of local anesthesia ( $p=0.003$ ) and duration ( $p=0.017$ ) of procedure influenced the anxiety levels at T2. There was no influence of sex, tooth removed, and the difficulty of the impaction.

**State Trait Anxiety Inventory (STAI):**

In STAI- State the mean increased gradually from T0 to T1 and decreased at T2. Using repeated measures ANOVA analysis there is significant difference ( $P=0.0001$ ) between T0 mean 43.36 (SD: 13.097), T1 mean 52.060 (SD: 14.577) and T2 mean 35.150 (SD: 11.170).

Independent sample tests indicated that the increase of anxiety at T1 is caused due to increase in;

**Number of blocks/injections of local anesthesia:** 30 patients out of 34 patients taken two or more blocks / injections were anxious which is significant ( $p=0.0001$ ).

**Pederson's difficulty score:** 21 patients were anxious in 29 patients whose difficulty score is  $>5$  which is significant.

Other variables have no significant influence on anxiety at T1.

At T2 the patients suffering from anxiety were patients who received more number of blocks/injections during the procedure, 14 out of 34 patients of more than one block / injection were anxious ( $p=0.0001$ ) and Pederson's difficulty score of more than  $\geq 5$ , 13 out of 29 patients were anxious. Increase in duration of procedure also influenced anxiety at T2, of which 13 were anxious out of 31 patients whose duration more than 40 minutes.

In STAI –Trait scale, mean scores obtained at three intervals were T0 40.140 (SD: 10.950), T1 49.680 (SD: 13.406) and T2 33.960 (SD: 9.321) respectively. These results were statistically significant ( $p=0.0001$ ) which are measured using repeated measures ANOVA.

Independent sample test indicated that, there was increase in anxiety due to number of blocks / injections, Pederson's difficulty score. The changes in mean scores were statistically significant ( $p=0.0001$ ) at T1 and T2. Other variables did not influence the levels of anxiety significantly.

#### **Dental Fear Survey (DFS):**

Dental Fear Survey also showed difference between T0 and T1, T1 and T2 which is statistically significant ( $P=0.0001$ ) by using repeated measures ANOVA. The mean values of DFS were T0 47.860 (SD. 16.290), T1 53.400 (SD: 16.926) and T2 43.500 (SD: 14.52 1) respectively.

Postoperatively at T0 12 patients were having dental anxiety, at T1 14 patients were having anxiety, and at T2 1 patient having anxiety.

Chi- square test showed that at T1, there is significant difference between variables as follows:

**Duration of the procedure:** 13 patients were experienced fear / anxiety out of 31 patients, who have taken more than 40 minutes (p= 0.01).

**Number of blocks/injections of local anesthesia:** 14 patients having anxiety out of 34 patients, who has received more than one block / Injection of local anesthesia (p= 0.0001).

**Pederson's difficulty index:** 13 patients had experienced anxiety out of 29 patients with difficulty index more than 5 (p= 0.006).

A week after i.e. T2, significant difference in anxiety levels were showed only in number of blocks/ injections (p= 0.0001).

**Blood Pressure:**

On assessing systolic pressures and diastolic pressures at three intervals, the mean scores obtained were as follows. The mean Systolic pressures at T0, T1, T2 were 123.48 (SD: 9.534), 130.48 (SD: 9.918), 121.60 (SD: 8.251) respectively. Similarly the mean diastolic pressures at T0, T1, T2, were 81.40 (SD: 6.391), 85.56 (SD: 6.392), 79.68 (SD: 5.486) respectively. Repeated measures ANOVA revealed that differences were statistically significant (p=0.0001). Blood pressure is increased from T0 to T1 within the normal range.

**Heart rate:**

The mean scores obtained at three intervals were T0 78.66 (SD: 8.74.), T1 84.40 (SD: 9.80), T2 76.72 (SD: 6.94). The heart rate increased during and immediately after the procedure (T1). The mean heart rate came down at T2. The differences in heart rate were also statistically significant ( $p=0.0001$ ) using repeated measures ANOVA. The increase of heart rate at T1 was within the normal range.

**Oxygen saturation:**

The amount of oxygen saturation was measured at three intervals i.e. T0 98.80 (SD: 0.782), T1 97.52 (SD: 1.581), T2 98.74. (SD: 0.723). There was decrease in mean saturation levels at T1 when compared to T0 and which increased at T2. By using ANOVA multivariate tests, the differences at three were statistically significant ( $p=0.0001$ ).

Overall, all the objective parameters were within the normal limits at all the three time intervals.



## *Tables and Graphs*

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**Table 1**

Study of Dental Anxiety using the STAI, Immediately after impaction and after 7 days (n=50).

		STAI State immediate post-operative		STAI Trait immediate postoperative		STAI State 7 days later		STAI Trait 7 days later	
		Mean (SD)	p value	Mean (SD)	p value	Mean (SD)	p value	Mean (SD)	p value
Pederson's Score	< 5 (n=21)	47.52 (13.41)	0.060	46.09 (12.38)	0.108	29.28 (6.32)	0.108	30.23 (6)	0.015
	≥ 5 (n=29)	55.34 (14.72)		52.27 (13.37)		39.31 (12.08)		36.65 (10.41)	
Sex	Male (n=27)	53.66 (12.55)	0.404	51.25 (11.99)	0.372	33.70 (9.82)	0.343	33.14 (8.48)	0.510
	Female (n=23)	50.17 (16.73)		47.82 (14.95)		36.73 (12.59)		34.91 (10.32)	
No. of blocks / injections	One (n=16)	36.56 (8.16)	0.001	35.37 (7.57)	0.001	26.56 (3.70)	0.001	26.75 (3.10)	0.001
	Two or more (n=34)	59.35 (10.67)		56.41 (9.73)		39.11 (11.27)		37.35 (9.73)	
Duration of procedure	≤ 40 minutes (n=19)	48.52 (13.53)	0.182	47.21 (12.33)	0.313	30.00 (6.99)	0.010	30.73 (5.79)	0.055
	> 40 minutes (n=31)	54.22 (14.97)		51.19 (14.00)		38.22 (12.16)		35.93 (10.54)	
Tooth No.	38 (n=23)	53.65 (13.97)	0.482	50.65 (12.63)	0.641	36.56 (11.57)	0.398	35.00 (9.18)	0.472
	48 (n=27)	50.70 (15.20)		48.85 (14.21)		33.85 (10.87)		33.07 (9.52)	

**Inference:** Pederson's difficulty index and number of blocks / injections influenced the level of anxiety at immediate postoperatively and seven days later. Other factors like tooth number, duration of procedure, sex have no influence on anxiety.

**Table 2**

Study of Dental anxiety using the MDAS, Immediate postoperatively and 7 days later. Data are number (%) and n=50

		MDAS immediately after impaction					MDAS 7 days later impaction				
		No (0-5)	Mild (6-11)	Moderate (12-18)	Severe (19-25)	p value	No (0-5)	Mild (6-11)	Moderate (12-18)	Severe (19-25)	p value
<b>Pederson's Score</b>	< 5	0	4 (19)	9 (42.9)	8 (38.1)	0.0001	1 (4.8)	15 (71.4)	5 (23.8)	0	0.105
	≥ 5	0	8 (27.6)	0	21 (72.4)		2 (6.9)	12 (41.4)	15 (51.7)	0	
<b>Sex</b>	Male	0	4 (14.8)	6 (22.2)	17 (63)	0.235	1 (3.7)	14 (51.9)	12 (44.4)	0	0.652
	Female	0	8 (34.8)	3 (13)	12 (52.2)		2 (6)	13 (56.5)	8 (34.8)	0	
<b>No. of blocks/injections</b>	One	0	9 (56.2)	6 (37.5)	1 (6.2)	0.0001	2 (12.5)	13 (81.2)	1 (6.2)	0	0.003
	Two or more	0	3 (8.8)	3 (8.8)	28 (82.4)		1 (2.9)	14 (41.2)	19 (55.9)	0	
<b>Duration of procedure</b>	≤ 40 minutes	0	4 (21.1)	7 (36.8)	8 (42.1)	0.024	0 (0)	15 (78.9)	4 (21.1)	0	0.017
	> 40 minutes	0	8 (25.8)	2 (6.5)	21 (67.7)		3 (9.7)	12 (44.4)	16 (51.6)	0	
<b>Tooth No.</b>	38	0	4 (17.4)	4 (17.4)	15 (65.2)	0.558	1 (4.3)	11 (47.8)	11 (47.8)	0	0.564
	48	0	8 (29.6)	5 (18.5)	14 (51.9)		2 (7.4)	16 (59.3)	9 (45)	0	

**Inference:** Patient's with more difficulty index score, who received more than on block / injection and more duration of procedure suffered from higher anxiety levels at immediate postoperatively. After 7 days patients who received more than one block / injection showed significant anxiety levels.

**Table 3**

Study of dental fear using DFS, Immediate postoperatively and 7 days after impaction. Data are number (%) and n=50.

		DFS immediately after impaction				DFS 7 days later impaction			
		Mild (0-33.3)	Moderate (33.34-66.66)	Severe (66.67-100)	p value	Mild (0-33.33)	Moderate (33.34-66.66)	Severe (66.66-100)	p value
Pederson's Score	< 5	4 (19)	16 (76.2)	1 (4.8)	0.006	11 (52.4)	10 (47.6)	0	0.164
	≥ 5	5 (17.2)	11 (37.9)	13 (44.8)		8 (27.6)	20 (69)	1 (3.4)	
Sex	Male	3 (11.1)	19 (70.4)	5 (18.5)	0.042	8 (29.6)	19 (70.4)	0	0.191
	Female	6 (26.1)	8 (34.8)	9 (39.1)		11 (47.8)	11 (47.8)	1 (4.3)	
No. of blocks/injections	One	7 (43.8)	9 (33.3)	0	0.0001	15 (93.8)	1 (6.2)	0	0.0001
	Two or more	2 (5.9)	18 (66.7)	14 (41.2)		4 (11.8)	29 (85.3)	1 (2.9)	
Duration of procedure	≤ 40 minutes	3 (15.8)	15 (55.6)	1 (5.3)	0.010	9 (47.4)	10 (52.6)	0	0.450
	> 40 minutes	6 (19.4)	12 (38.7)	13 (41.9)		10 (32.3)	20 (64.5)	1 (3.2)	
Tooth No.	38	4 (17.4)	11 (40.7)	8 (34.8)	0.604	8 (34.8)	15 (65.2)	0	0.560
	48	5 (18.5)	16 (59.3)	6 (22.2)		11 (40.7)	15 (55.6)	1 (3.7)	

**Inference:** Patients who received more than one block /injection, increased difficulty score, and increased duration showed higher fear levels immediate postoperatively. After 7 days only patients who received more blocks / injections are anxious.

**Table 4**

Study of dental anxiety and fear at different time points T0 immediately before impaction, T1 immediate postoperatively, T2 7 days later. Data are Mean (SD) and n=50.

Time points	STAI State	STAI Trait	MDAS	DFS
T0	43.36 ( 13.09) <sup>a</sup>	40.14 ( 10.95) <sup>a</sup>	13.08 ( 4.71) <sup>a</sup>	47.86 (16.29) <sup>a</sup>
T1	52.06 ( 14.57) <sup>b</sup>	49.68 ( 13.40) <sup>b</sup>	16.22 ( 5.15) <sup>b</sup>	53.40 ( 16.92) <sup>b</sup>
T2	35.10 ( 11.17) <sup>a</sup>	33.96 ( 9.32) <sup>a</sup>	10.18 ( 3.15) <sup>a</sup>	43.50 (14.52) <sup>a</sup>

Groups indicated by different superscripted letters differ significantly.

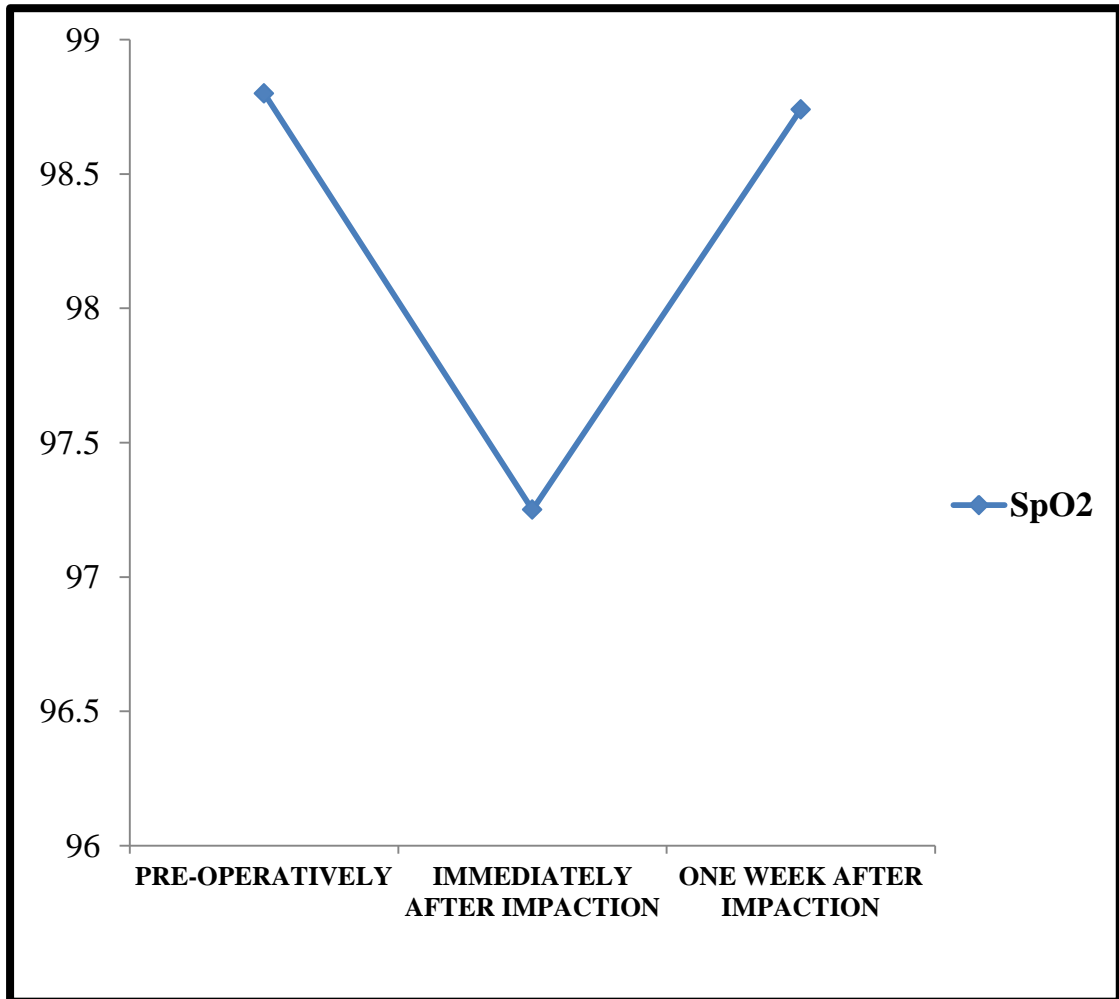
**STAI-** State Trait Anxiety Inventory

**MDAS** – Modified Dental Anxiety Scale

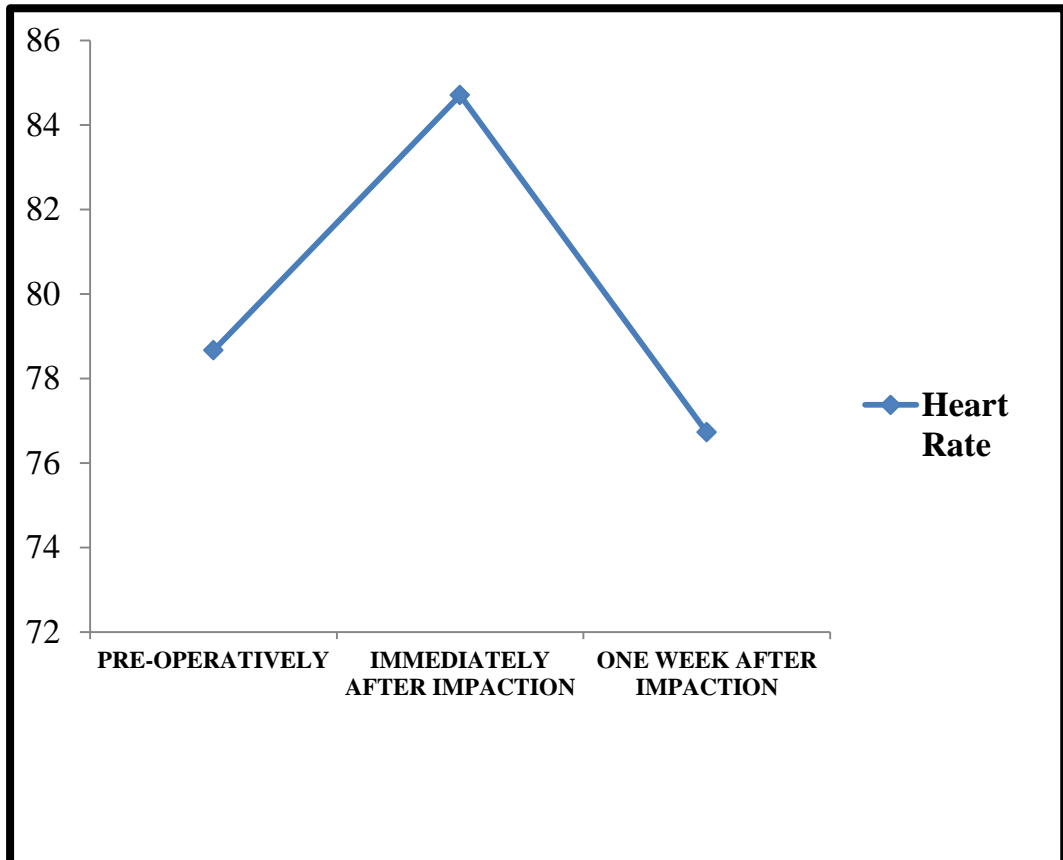
**DFS-** Dental Fear Survey

**Inference:** There were significant differences in all scales at each time interval.

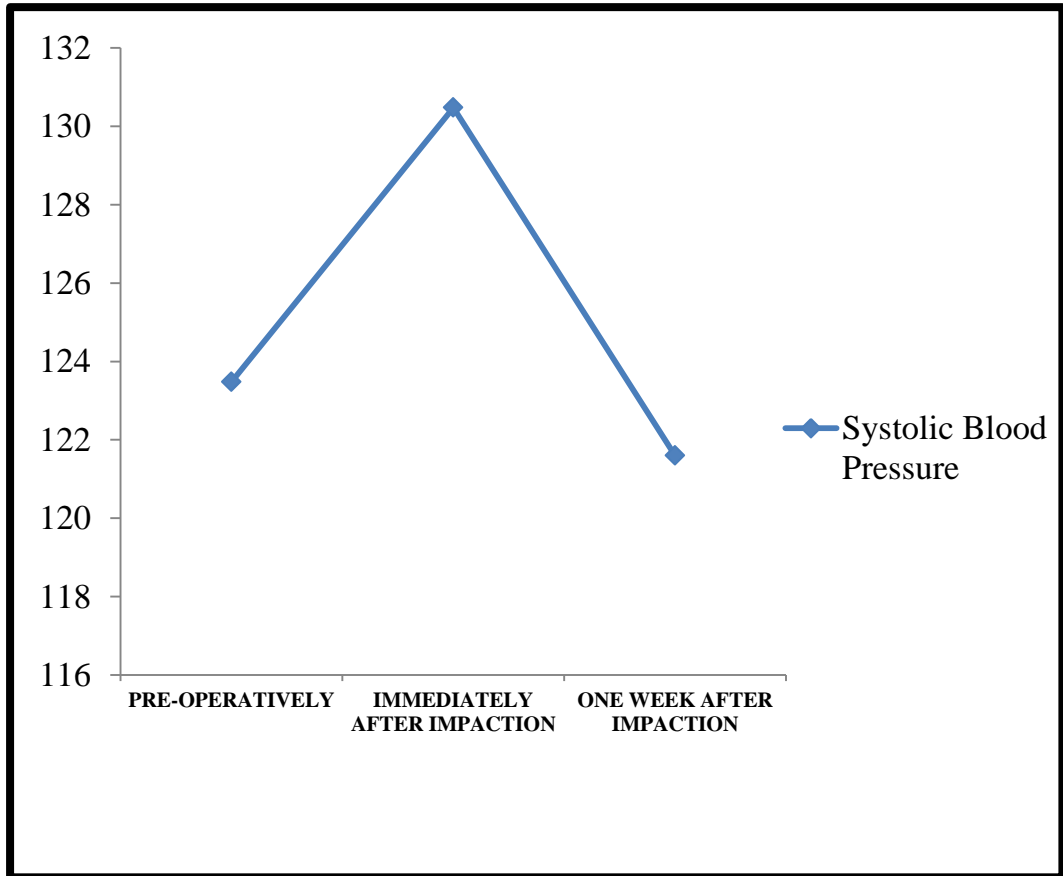
**Graph 1: OXYGEN SATURATION**



**Graph 2: HEART RATE**

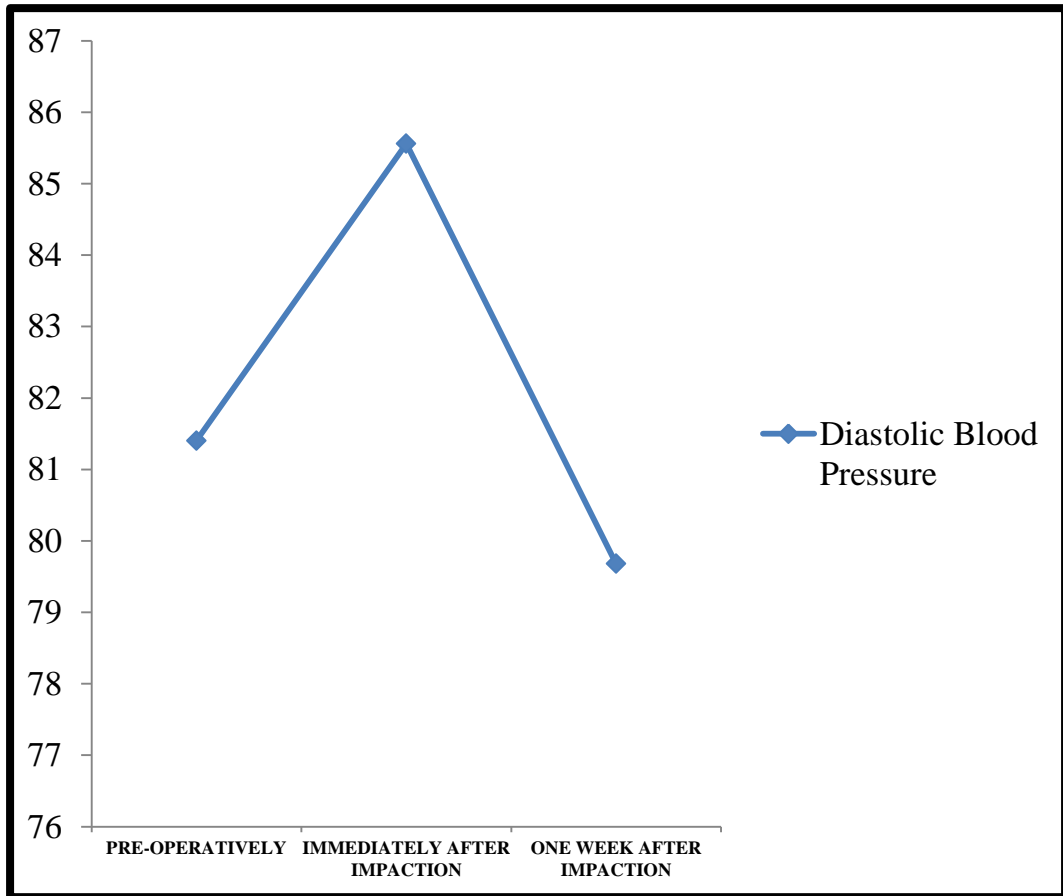


**Graph 3: SYSTOLIC BLOOD PRESSURE**





**Graph 4: DIASTOLIC BLOOD PRESSURE**



*Discussion*

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## **DISCUSSION**

Anxiety is a phenomenon which is most common in dental practice and dental anxiety is influenced by various factors and has complex etiology. There have been few studies in assessing anxiety and fear in patients undergoing oral surgery. David Locker and Shapiro<sup>9</sup> et al indicated that dental anxiety is a complex fear with number of components. Anxiety not only causes emotional unease, but may also provoke the behavior of the patient that hinders surgery, prolonging the procedure and also results in complications in postoperative phase.<sup>9</sup> In present study, the assessment of anxiety was done using subjective scales i.e. Modified Dental Anxiety Scale (MDAS), State Trait Anxiety Inventory (STAI), and Dental Fear Survey (DFS) and we also assessed changes in the objective parameters like Blood pressure, Heart rate and oxygen saturation. The uses of self reporting questionnaires are found to be more advantageous, more reliable and are fast and inexpensive to assess anxiety.

The anticipation upcoming dental treatment or surgical procedure induces a physiologic stress response on human body that causes release of corticosteroids, blood pressure changes and haemodynamic and cardiovascular changes.

The present study, aimed to assess the anxiety and changes in blood pressure, heart rate, oxygen saturation in patients undergoing surgical removal of impacted lower third molar from 2014 to 2015.

In present study all patients were medically fit for the procedure. We explained about the difficulty of the impaction, preoperative instructions, counseling and possible complications of the surgical procedure. Patients were explained and given assurance and counseling about the procedure. In Dental phobia patients the use of topical anesthesia spray was advocated for painless injection before local anesthetic administration. We also observed that patients with higher difficulty index required longer duration of surgery. Perioperatively we prevented injury to lingual nerve by protecting lingual flap. Postoperative complication of pain and swelling were reduced by administering Diclofenasodium, and Dexamethosone 8 mg intra-muscularly. Control of bleeding for surgical wound was mandatory. The surgical wound was closed appropriately to prevent dry socket and distal pocket for second molar. To prevent infection we have advised oral antibiotics and NSAIDS for five days. Postoperative follow up was done third day after procedure for preventing the possible complications and after seven days suture removal was done.

In the year 2014 Pia- Lopez – Jornet et al<sup>42</sup> conducted a study on assessment of preoperative and postoperative anxiety in patients undergoing tooth extraction. They used self-reporting questionnaires for assessing anxiety.

We planned to do similar kind of study by assessing preoperative and postoperative anxiety in patients undergoing surgical removal of impacted mandibular third molar. We also used self-reporting questionnaires which are used by them which are universally accepted and cross validated.

Yusa et al<sup>56</sup> used STAI to quantitate anxiety in students undergoing third molar extraction, similarly we also used STAI along with other scales to assess anxiety.

Sandhya YK et al<sup>46</sup> in 2013 done a study in assessing haemodynamic, ventilator, and ECG changes in pediatric patients undergoing extraction. Similarly to this we included this in our study to assess changes in blood pressure, heart rate, and oxygen saturation during the three time intervals along with subjective scales. Present study assessed changes in both the subjective and objective parameters.

Pia Lpoez- Jornetet<sup>42</sup> in 2014 found that there were significant differences in anxiety score at three intervals in MDAS, STAI- Trait Scale, and DFS at three time intervals i.e. T0 and T1 and T1 and T2. But in STAI- State scale there was only significant difference at T1 and T2. In present study results showed that there was significant difference in anxiety levels of the patients at T0 and T1 and T1 and T2 intervals in MDAS, STAI and DFS. These results showed that our patients were more anxious.

Hasan Garip et al<sup>15</sup> told that anxiety can be influenced by the patient's time in waiting room, in present study we made our patient's to sit comfortably in a separate room and self-reporting questionnaires were filled by the patient.

Vallerand et al<sup>52</sup> stated that STAI Trait scale is an accurate predictor of postoperative recovery and pain and also reduces the amount of analgesics. In present study we managed postoperative pain and swelling by NSAIDS, so our patients did not complained of pain postoperatively.

In present study, there was significant relation between anxiety and difficulty of impaction at T1 and T2 intervals as told by L. Aznar-Arasa<sup>28</sup> et al in 2014. In present study results showed that patients having higher Pederson's score are more anxious. So patients should be managed by premedication to reduce anxiety.

Lucia Lago Mendez<sup>30</sup> et al showed that there was a significant positive correlation between all the three scales. In the present study there was significant correlation between all the scales. They also showed that patients with dental anxiety required longer operating time which is similar to present study.<sup>29</sup>

Ad de Jongh et al<sup>2</sup> concluded that surgical removal of impacted third molar under local anesthesia had minimal chances of developing anxiety, which is contrary to the present study results. As removal of impacted third

molar is traumatic procedure and causes psychological trauma to patients which definitely results in dental anxiety.

Various studies showed that females were having more amount of dental anxiety during dental procedures. (Maria Carrillo-Diaz, et al<sup>34</sup> 2013 Shalender Sharma, et al<sup>47</sup> 2015) But in present study we found contrast results to the above studies, we did not find significant differences in anxiety based on gender at all the three time intervals in all subjective scales.

Yusa et al<sup>56</sup> showed that anxiety can be quantitatively can be assessed using STAI in patients undergoing third molar extraction. Similarly in present study results showed that immediately after procedure STAI showed significant differences in number of blocks/injections, duration of procedure. Patients with high dental anxiety showed increased in duration of the procedure which is also proved by Lucia Lago Mendez et al<sup>30</sup> in 2009.

Mugalali and Komerik<sup>37</sup> has identified the factors that might have contributed to anxiety on patients undergoing minor oral surgery has found that difficulty of procedure does not influence the anxiety in immediate postoperative phase but has influence on follow up phase. In present study we found that high Pederson's difficulty index resulted in significant values in immediate postoperatively and follow up phase.

Humphris et al<sup>19</sup> referred anxiety as an "aversive psychological construct" unpleasant to experience and always associated to specific event, which takes time to dissipate. This is supported in present study as the scores

and values decreased significantly at 7 days follow up. This may also be due to fact that our patients did not develop any complications as we have taken necessary steps to prevent complications.

Jean Carlos Fernandes et al<sup>24</sup> found that there was no difference in heart rate and systolic and diastolic blood pressure during dental treatment, but present study showed that there was significant difference in heart rate and blood pressure. In present study there was increase of blood pressure and heart rate between T0 and T1 within the normal range. F. Gulnot Jimeno et al<sup>13</sup> Juan Muienelo Lorenzo et al,<sup>27</sup> Sandhya S et al<sup>46</sup> concluded that there was a significant change in heart rate, systolic blood pressure, diastolic blood pressure and oxygen saturation in anxious patients, whose results were similar to present study results.

While performing minor oral surgical procedures, majority of patients undergoes stress and anxiety, and become uncooperative, due to which the surgical duration gets prolonged, with requirement for more local anesthesia. There is a necessity to adopt proper stress reduction protocols in every institutions / clinics to avoid complications. Pre medication can be advised, the night prior to the procedure and one hour before procedure for patients with dental phobia whenever required. Conscious sedation with proper monitoring of vitals and haemodynamic parameters in day care is gaining popularity for safe minor oral surgical procedures. It is also necessary to keep in check the haemodynamic parameters during the procedure in order to monitor the patient's physical status.



## *Summary and Conclusion*

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## **SUMMARY AND CONCLUSION**

This study of 50 patients who underwent surgical removal of impacted lower third molars under local anesthesia showed:

There was difference in levels of anxiety at three time intervals which is assessed using Modified Dental Anxiety Scale (MDAS), State- Trait Anxiety Inventory (STAI), and Dental Fear Survey (DFS). The study concluded that majority of patients of sample were anxious at immediately after the procedure.

Present study showed that there was no difference in levels of anxiety based on gender of the population in surgical removal of impacted lower third molar.

There was significant difference in variables, i.e number of blocks/injections, Pederson's difficulty score, and duration of procedure at immediate postoperatively and after 7days.

The Haemodynamic changes recorded were increased in immediately after impaction and decreased 7 days later. The changes obtained were within the normal limits.

Good communication between the operator and the patient is essential and beneficial, allowing to patients to express their anxieties enables the

operator to prevent and reduce many of the factors responsible for dental anxiety.

Anxiety and fear play an important role in haemodynamic changes as in present study. Hence assessing anxiety and control of anxiety should be encouraged in minor oral surgical procedures.

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*Annexure*

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## OBJECTIVE PARAMETERS

SNO	Systolic blood pressure (mm of Hg)			Diastolic blood pressure (mm of Hg)			Heart rate (beats/ min)			Oxygen saturation (%)		
	T0	T1	T2	T0	T1	T2	T0	T1	T2	T0	T1	T2
Patient 1	138	148	136	90	96	88	88	97	86	98%	96%	97%
Patient 2	110	116	108	80	82	78	70	76	68	99%	98%	100%
Patient 3	136	144	136	88	92	80	83	92	78	98%	95%	98%
Patient 4	124	130	120	78	80	76	78	84	78	99%	96%	99%
Patient 5	128	130	126	82	84	80	73	74	70	99%	96%	99%
Patient 6	130	136	130	86	88	80	78	82	80	98%	97%	97%
Patient 7	132	138	130	86	90	84	88	94	84	99%	96%	98%
Patient 8	110	124	120	80	86	80	80	88	78	100%	98%	99%
Patient 9	112	120	110	78	80	76	74	78	72	100%	99%	99%
Patient 10	122	130	124	80	88	82	76	84	78	99%	96%	98%
Patient 11	130	138	128	80	88	78	78	89	76	99%	95%	98%
Patient 12	132	140	130	88	90	80	88	94	86	97%	95%	97%
Patient 13	108	116	110	70	72	70	67	77	72	99%	99%	99%
Patient 14	138	142	128	88	90	86	81	92	78	99%	99%	99%
Patient 15	118	130	120	78	88	80	74	79	71	99%	96%	99%
Patient 16	136	148	136	90	92	88	88	94	72	98%	94%	98%
Patient 17	110	106	106	70	66	60	66	63	68	100%	100%	100%
Patient 18	138	138	130	98	100	90	75	78	70	98%	97%	98%
Patient 19	134	128	120	86	80	80	67	72	66	99%	99%	99%
Patient 20	118	128	118	84	86	90	83	92	90	99%	99%	99%
Patient 21	114	124	110	76	80	76	68	72	66	99%	99%	99%

Patient 22	120	128	126	90	96	88	78	85	80	99%	95%	100%
Patient 23	134	146	130	86	90	80	79	87	94	99%	98%	99%
Patient 24	122	134	110	72	78	80	69	73	80	98%	98%	99%
Patient 25	120	124	120	80	82	80	72	76	70	99%	99%	99%
Patient 26	112	116	120	78	80	80	68	73	66	98%	99%	99%
Patient 27	132	142	130	88	90	80	78	88	74	99%	96%	99%
Patient 28	134	142	128	80	88	80	75	83	73	99%	96%	98%
Patient 29	110	118	110	78	80	70	68	70	68	100%	99%	100%
Patient 30	136	132	126	80	86	80	88	92	88	99%	98%	99%
Patient 31	120	128	124	80	90	82	72	80	70	100%	99%	99%
Patient 32	112	118	108	62	80	70	64	72	72	99%	99%	99%
Patient 33	128	138	120	76	88	80	76	86	74	99%	99%	99%
Patient 34	130	136	120	80	80	70	80	85	75	99%	99%	99%
Patient 35	130	140	132	88	90	80	78	90	79	99%	95%	99%
Patient 36	122	124	120	86	86	80	98	102	90	98%	96%	98%
Patient 37	124	130	120	84	90	80	72	76	70	100%	98%	99%
Patient 38	128	136	126	86	88	80	100	102	90	98%	98%	98%
Patient 39	114	120	110	78	80	80	74	76	74	99%	98%	99%
Patient 40	106	108	106	80	80	80	82	80	76	99%	96%	99%
Patient 41	120	120	120	80	80	80	75	76	76	98%	98%	99%
Patient 42	110	130	120	70	80	80	86	90	75	99%	99%	99%
Patient 43	126	136	120	80	90	80	80	99	78	99%	99%	100%
Patient 44	124	136	126	82	90	84	78	92	88	100%	98%	99%
Patient 45	120	136	120	82	90	84	98	104	88	99%	99%	99%
Patient 46	130	130	128	80	82	80	77	78	76	98%	98%	98%
Patient 47	128	132	126	90	96	86	97	102	89	98%	98%	98%

Patient 48	136	148	128	80	90	80	78	88	76	99%	99%	99%
Patient 49	116	122	120	84	78	70	93	99	84	96%	95%	98%
Patient 50	112	124	110	74	82	78	77	80	76	99%	99%	99%



## SUBJECTIVE PARAMETERS

SNO	MDAS			STAI-STATE			STAI-TRAIT			DFS		
	T0	T1	T2	T0	T1	T2	T0	T1	T2	T0	T1	T2
Patient 1	6	8	5	23	26	22	23	27	20	27	30	26
Patient 2	16	20	11	45	60	30	41	57	32	55	61	43
Patient 3	8	10	7	31	35	30	29	36	28	28	35	28
Patient 4	17	21	13	48	63	35	46	59	32	56	62	45
Patient 5	7	7	7	25	29	24	24	28	20	25	25	25
Patient 6	12	15	10	42	56	26	42	59	28	48	52	45
Patient 7	7	8	6	24	28	22	25	27	24	27	30	24
Patient 8	13	19	10	46	61	32	39	55	28	49	58	45
Patient 9	7	9	7	31	35	29	30	37	30	30	37	29
Patient 10	19	22	14	61	68	54	56	62	48	70	77	63
Patient 11	6	6	6	22	28	23	25	26	24	26	26	26
Patient 12	17	21	11	47	62	31	43	60	35	58	63	45
Patient 13	6	7	5	24	27	23	24	25	23	26	29	25
Patient 14	18	21	13	59	66	51	57	63	47	68	75	60
Patient 15	8	10	7	31	35	30	30	25	29	29	36	30
Patient 16	16	19	10	45	60	32	43	55	30	55	59	48
Patient 17	9	12	8	33	38	33	32	39	30	34	39	30
Patient 18	16	19	14	45	59	35	38	56	30	55	65	48
Patient 19	8	10	7	32	37	30	30	35	29	27	33	28

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Patient 20	16	19	12	47	62	33	43	55	31	55	64	48
Patient 21	9	12	7	31	38	27	32	39	29	28	36	25
Patient 22	16	19	10	57	63	49	55	60	45	60	69	59
Patient 23	7	10	7	28	33	26	25	30	24	30	35	28
Patient 24	17	20	13	46	61	30	45	56	34	58	60	50
Patient 25	6	8	5	25	31	22	23	29	20	38	31	26
Patient 26	14	19	12	47	62	33	40	56	30	50	59	47
Patient 27	8	10	7	30	36	26	28	33	25	26	30	25
Patient 28	20	22	15	60	67	55	53	64	50	71	74	65
Patient 29	8	13	6	28	35	22	30	35	27	28	33	26
Patient 30	21	23	16	61	68	54	55	65	51	72	75	66
Patient 31	9	12	7	32	39	26	33	40	26	31	34	29
Patient 32	16	20	12	50	65	36	47	60	33	57	63	47
Patient 33	8	13	6	34	40	25	32	39	28	28	36	25
Patient 34	12	20	10	44	60	30	37	52	30	50	57	48
Patient 35	9	14	8	31	41	26	32	39	29	32	41	30
Patient 36	13	16	10	40	56	27	43	60	40	47	54	47
Patient 37	10	15	9	35	43	28	33	41	30	35	42	33
Patient 38	19	21	14	61	68	53	55	62	48	69	73	60
Patient 39	16	19	10	48	61	30	42	61	33	52	62	43
Patient 40	19	22	15	64	70	55	58	64	50	70	78	69
Patient 41	18	20	13	59	60	50	52	65	45	70	74	63
Patient 42	19	21	14	62	65	53	54	63	49	69	71	66

Patient 43	19	21	14	63	70	55	54	63	49	70	74	62
Patient 44	15	20	11	56	62	46	53	59	42	59	67	57
Patient 45	18	20	13	61	63	50	50	65	48	66	72	64
Patient 46	15	20	12	48	61	32	39	57	29	51	58	46
Patient 47	13	19	11	43	59	31	38	50	29	49	59	45
Patient 48	16	19	12	54	61	47	52	61	43	60	69	55
Patient 49	14	19	13	47	62	33	41	59	27	47	59	48
Patient 50	18	21	14	62	68	53	56	61	47	68	69	60

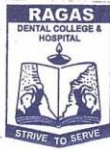
**DEMOGRAPHIC DATA**

SNO	AGE	SEX	PEDERSONS SCORE	NO. OF BLOCKS /INJECTIONS	DURATION OF PROCEDURE IN MINUTES	TOOTH NUMBER
Patient 1	33	F	6	2	43	48
Patient 2	32	M	5	2	37	48
Patient 3	33	M	5	2	45	48
Patient 4	23	M	5	2	41	48
Patient 5	35	F	4	2	43	48
Patient 6	40	M	3	2	35	48
Patient 7	38	M	4	1	39	38
Patient 8	30	M	4	2	39	48
Patient 9	31	F	4	1	36	48
Patient 10	21	F	5	2	40	38
Patient 11	32	F	6	1	40	48
Patient 12	32	F	4	2	43	38
Patient 13	36	F	4	1	45	48
Patient 14	22	F	4	2	41	38
Patient 15	26	F	5	1	39	38
Patient 16	22	M	4	2	40	48
Patient 17	33	M	3	1	33	38
Patient 18	32	M	4	2	38	38
Patient 19	35	F	5	1	42	48
Patient 20	25	M	6	2	45	38
Patient 21	31	F	4	1	35	48
Patient 22	27	F	5	2	45	38
Patient 23	29	M	6	1	46	48
Patient 24	26	M	4	2	43	38

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Patient 25	30	M	5	1	43	38
Patient 26	28	M	4	1	39	48
Patient 27	32	M	5	1	41	38
Patient 28	18	M	6	2	47	38
Patient 29	38	M	4	1	32	38
Patient 30	19	M	5	2	45	48
Patient 31	34	F	4	1	36	48
Patient 32	23	F	5	2	48	38
Patient 33	30	F	4	1	43	38
Patient 34	29	M	5	2	42	38
Patient 35	34	M	4	2	38	38
Patient 36	39	M	4	2	38	48
Patient 37	28	M	4	1	42	48
Patient 38	24	F	6	2	43	48
Patient 39	31	F	5	2	39	48
Patient 40	19	F	5	2	42	48
Patient 41	20	M	5	2	41	48
Patient 42	19	M	5	2	40	38
Patient 43	20	F	6	2	43	48
Patient 44	26	F	6	2	46	38
Patient 45	19	M	5	2	47	48
Patient 46	28	M	6	2	43	38
Patient 47	29	M	5	2	43	48
Patient 48	26	F	5	2	41	38
Patient 49	28	M	4	2	40	48
Patient 50	20	F	6	2	46	38



# RAGAS DENTAL COLLEGE & HOSPITAL

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## REVIEW BOARD APPROVAL LETTER

Date: 28-12-2015,

CHENNAI.

FROM

THE INSTITUTIONAL REVIEW BOARD,  
RAGAS DENTAL COLLEGE AND HOSPITAL,  
UTHANDI,  
CHENNAI.

### TO WHOM SO EVER IT MAY CONCERN

THE THESIS TOPIC "ASSESSMENT OF PREOPERATIVE AND  
POSTOPERATIVE ANXIETY AND HAEMODYNAMIC CHANGES IN  
SURGICAL REMOVAL OF IMPACTED LOWER THIRD MOLAR"  
SUBMITTED BY Dr. RAVI SANKAR NUTALAPATI HAS BEEN APPROVED BY  
THE INSTITUTIONAL REVIEW BOARD OF RAGAS DENTAL COLLEGE AND  
HOSPITAL ON 5<sup>TH</sup> MAY 2014.

  
(Dr. S. RAMACHANDRAN, M.D.S)

IRB, SECRETARY,  
HEAD OF THE INSTITUTE,  
RAGAS DENTAL COLLEGE AND HOSPITAL,  
CHENNAI.



PRINCIPAL  
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