



FACTORS AFFECTING PAIN EXPERIENCE AFTER SIMPLE TOOTH EXTRACTION

Aathira. C.M¹, Dr. M. P. Santhosh Kumar^{2*}

Article History: Received: 12.12.2022

Revised: 29.01.2023

Accepted: 15.03.2023

Abstract

Objectives: The most often done procedures in dental clinics and at oral and maxillofacial surgery clinics is the extraction of wisdom teeth. This procedure is frequently followed by complications in the mandible. There are frequent and debilitating complications as well, including postoperative pain. Pain is one of the most usually reported postoperative complications of extraction and may be caused due to the release of pain mediators from the injured tissues. The aim of the study is to assess the factors affecting pain experience in patients with simple tooth extraction.

Materials and Methods: Patients reported to Saveetha Dental College OPD who were subjected to undergo simple extraction due to various reasons were involved in the study. A total of 100 patients were included and were assessed through a universal pain scale questionnaire post operatively for 2 weeks.

Results: Majority of the patients reported that postoperative pain was severe for the 1st week and were under painkillers for pain as prescribed by their doctor.

Conclusion: Therefore, it is evident that patients experience severe pain postoperatively even after simple tooth extractions and use analgesics for a long period of time.

Keywords: Extraction, pain, post-operative sequela, complications, painkillers

¹Graduate student, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 77, Tamil Nadu, India

^{2*}Professor, Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 77, Tamil Nadu, India

DOI: 10.31838/ecb/2023.12.s2.160

1. Introduction

Pain is an important factor in clinical practice which might provoke the patient to stay home rather than seeking professional treatment for pain management¹⁻³⁴. It starts once the anesthesia has worn off completely which might be the next day after extraction where the pain will reach its peak level^{5,6}. Presence of dry socket or infection triggers the onset of inflammation and will escalate postoperative pain⁷. Postoperative pain is linked directly to the amount of surgical trauma⁸. Majority of the patients' concern during their dental visit will be the pain experienced during and after the treatment. Patients undergoing dental procedures might experience more concerns and higher levels of anxiety and stress which tends to affect their psychology and decision-making ability.

This dental fear and anxiety had been ranked as the 4th most feared among the general public⁹. Myths, false information and unpleasant past dental experience from friends and family regarding dental treatment precipitates pain. This attitude among the patients will make the job of dentists difficult as they perceive more pain than the actual pain of the procedure due to anticipation of fear¹⁰. Patients tend to exaggerate pain due to dental treatment which they haven't experienced, compared to those they have experienced in the past¹¹. A study was conducted to identify techniques that reduce dental anxiety among patients in which preparedness, teamwork, reinforced trust, and tentative treatment plan were considered as important factors. Moreover, patients wanted to know about the anticipated discomfort preoperatively and postoperatively, the cost, expected treatment time¹².

Dental anxiety was found to have a direct influence on pain perception in dental treatment in in-vivo and clinical studies. It is closely associated with painful stimuli and increased pain perception. Henceforth anxious patients tend to experience more pain that lasts longer with exaggerated memory of pain¹³. There is a direct association between the patient's fear and anxiety level and pain perception after dental procedures¹⁴. Previous study conducted by Tabrizi et al compared the pain experience in patients who went through both extraction and dental implant surgery. Their results revealed that the pain of dental implant surgery

decreased faster than tooth extraction with time, and that the postsurgical pain with implant surgery is mild with moderate inflammation¹⁵.

There is very little literature regarding pain experience of patients preoperatively and postoperatively after simple tooth extractions and the factors affecting it. Therefore, future studies are required to understand the factors affecting pain in patients after dental extractions. Our team has extensive knowledge and research experience that has translate into high quality publications¹⁶⁻²⁵. The aim of the study is to assess the factors affecting pain experience in patients with simple tooth extraction.

2. Materialsa Methods

100 patients (50 males and 50 females) were randomly selected after simple tooth extraction reported to Saveetha dental college OPD.

Inclusion criteria:

1. Patients above 18 years of age
2. Patients who underwent simple tooth extraction without guttering
3. Medically fit patients
4. History of recent simple extractions
5. Reason for extraction was mobility, root caries or chronically inflamed teeth

Exclusion criteria:

1. Patients with comorbidities
2. Third molar extraction / trans-alveolar extraction

Procedure: Extraction was done and analgesics were prescribed to patients. Post operative follow up was done for 1 and 2 weeks. Patients were asked to assess their pain using universal visual analog scale and the nature of pain using the Mc Gill pain questionnaire. The assessment was carried out over phone calls during the 2nd week after extraction was done.

Statistical analysis:

The data obtained from patients were imported to Microsoft Excel and tabulated. It was then exported to SPSS Software version 23.0. Chi square test was done to find the association between variables and descriptive statistics were also used.

3. Results

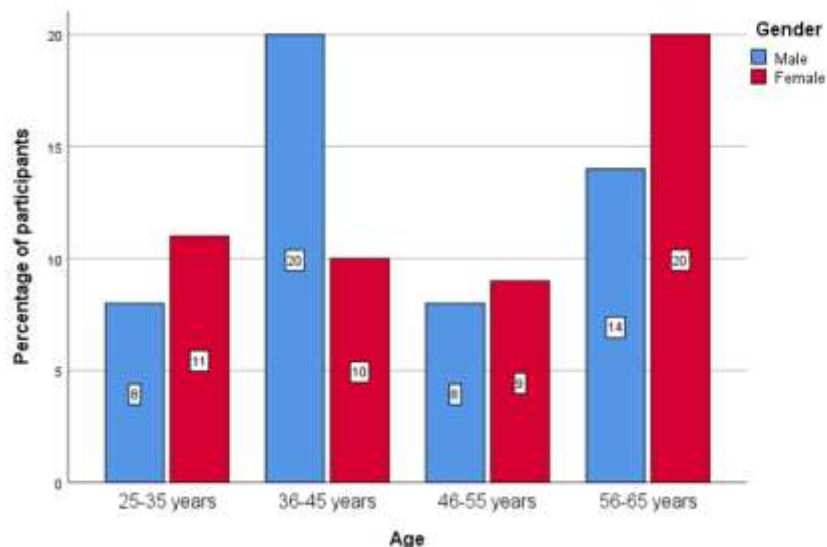


Figure 1 represents association between the age of the participants and gender of the participants involved in the study.

The age of the patients is plotted on the X axis and the gender of the participants on the Y axis. Blue represents male and Red represents female. It was noticed that the majority (20%) females and (14%) males were between 56 and 65 years of age. Chi square test was used to find the association between age and gender of the participants and was

found to be statistically significant. Pearson chi square value is 8.064, p value is 0.005.

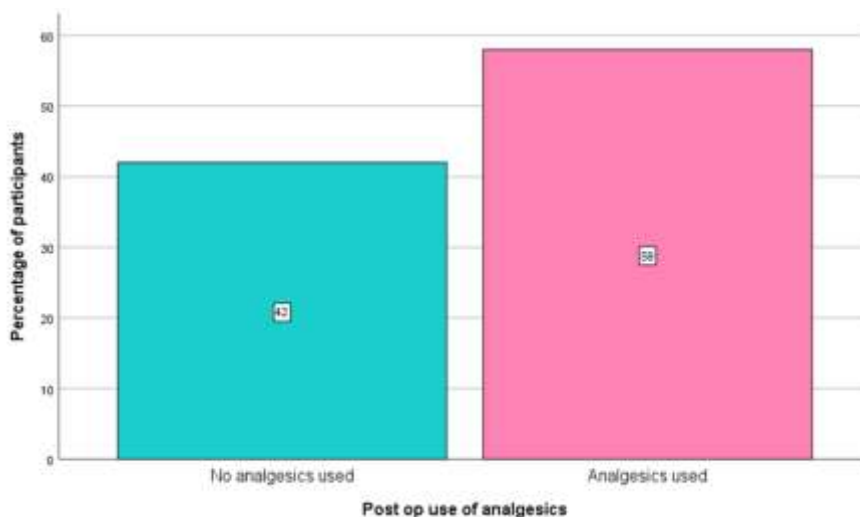


Figure 2 representing the post-operative use of analgesics by patients in percentage.

The postoperative use of the analgesics is plotted on the X axis and the percentage of participants on the Y axis. Green represents no analgesics used and Pink represents analgesics were used in the postoperative period. It was noticed that the majority (58%) used analgesics postoperatively.

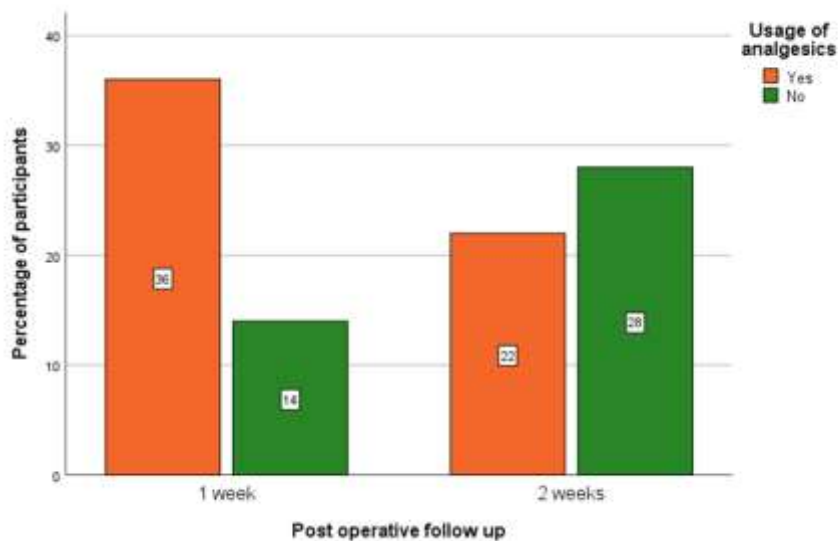


Figure 3 representing the association between usage of analgesics and post-operative follow up.

The postoperative follow up is plotted on the X axis and the usage of analgesics on the Y axis. Orange represents yes and Green represents no. It was noticed that the majority (28%) did not use analgesics by the 2nd week and was more

commonly used in the 1st week. Chi square test was used to find the association between usage of analgesics and post op follow up and was found to be statistically significant. Pearson chi square value is 20.016 and p value is 0.002.

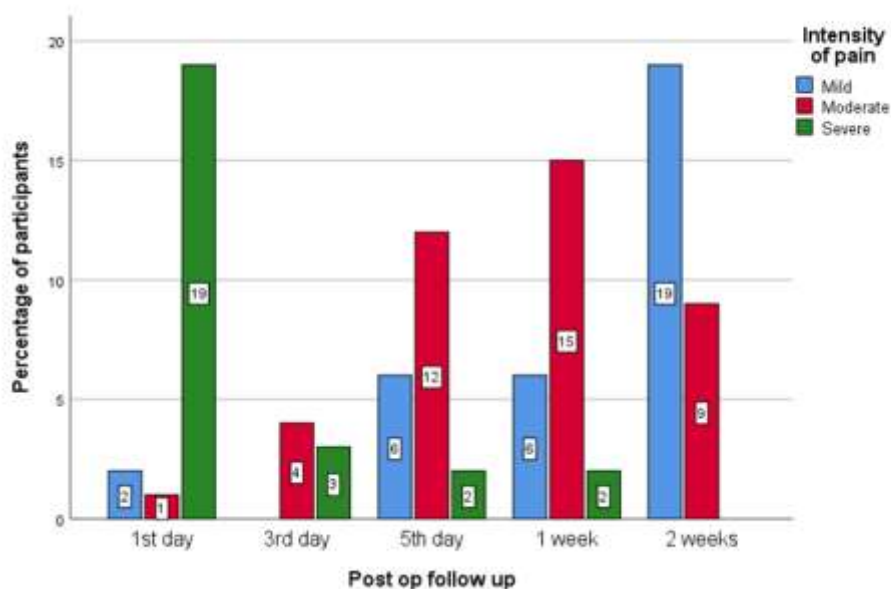


Figure 4 representing the association between post-operative pain and intensity of pain.

The post op follow-up is plotted on the X axis and the intensity of pain on the Y axis. Light blue represents mild, Red represents moderate and Green represents severe. It was noticed that the majority (19%) patients had severe pain at the end of 1st week and mild pain by the 2nd week post

operatively. Chi square test was used to find the association between post op follow up and intensity of pain and was found to be statistically significant. Pearson chi square value is 73.475 and p value is 0.00.

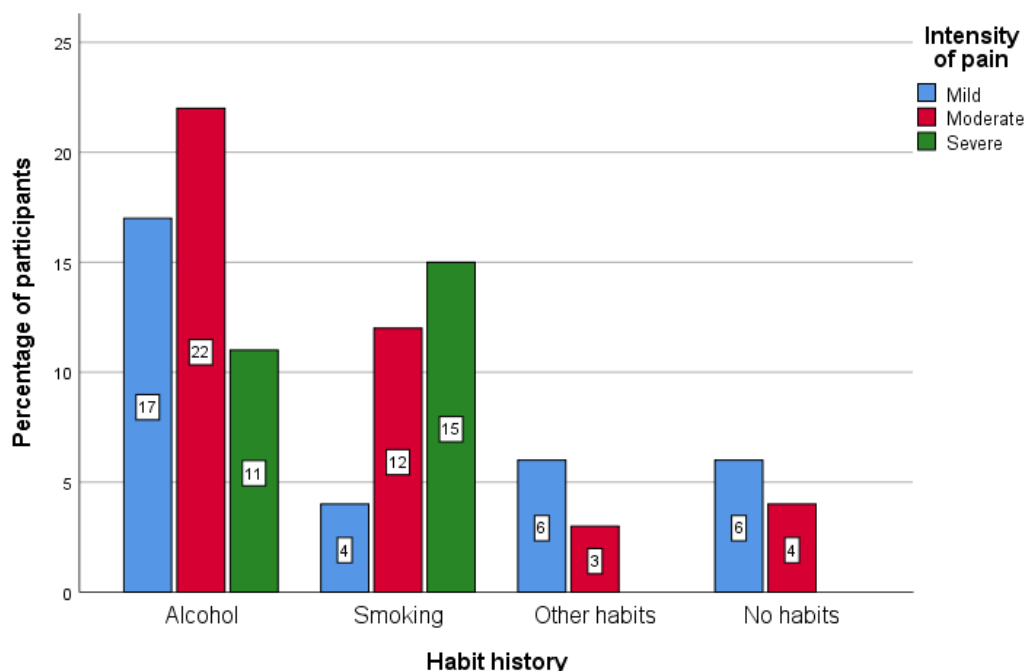


Figure 5 representing the association between habit history and intensity of pain.

The habit history is plotted on the X axis and the intensity of pain on the Y axis. Light blue represents mild, Red represents moderate and Green represents severe. It was noticed that the majority (22%) patients with a history of alcohol

consumption had moderate pain. Chi square test was used to find the association between habit history and intensity of pain and was found to be statistically significant. Pearson chi square value is 20.614 and p value is 0.02.

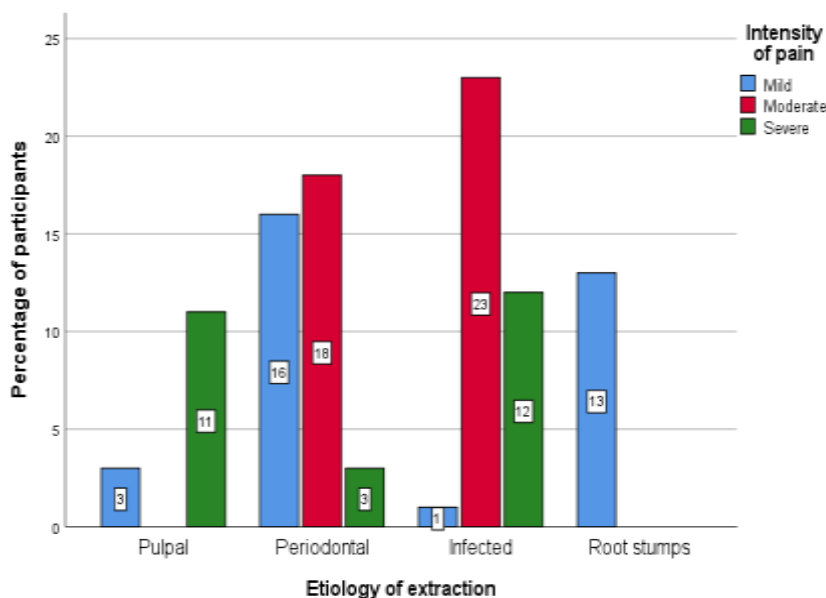


Figure 6 representing the association between etiology of extraction and intensity of pain.

The etiology of extraction is plotted on the X axis and the intensity of pain on the Y axis. Light blue represents mild, Red represents moderate and Green represents severe. It was noticed that the majority (23%) patients had moderate pain after

extraction of tooth due to periodontal etiology. Chi square test was used to find the association between etiology of extraction and intensity of pain and was found to be statistically significant.

Pearson's chi square value is 69.173 and p value is 0.00.

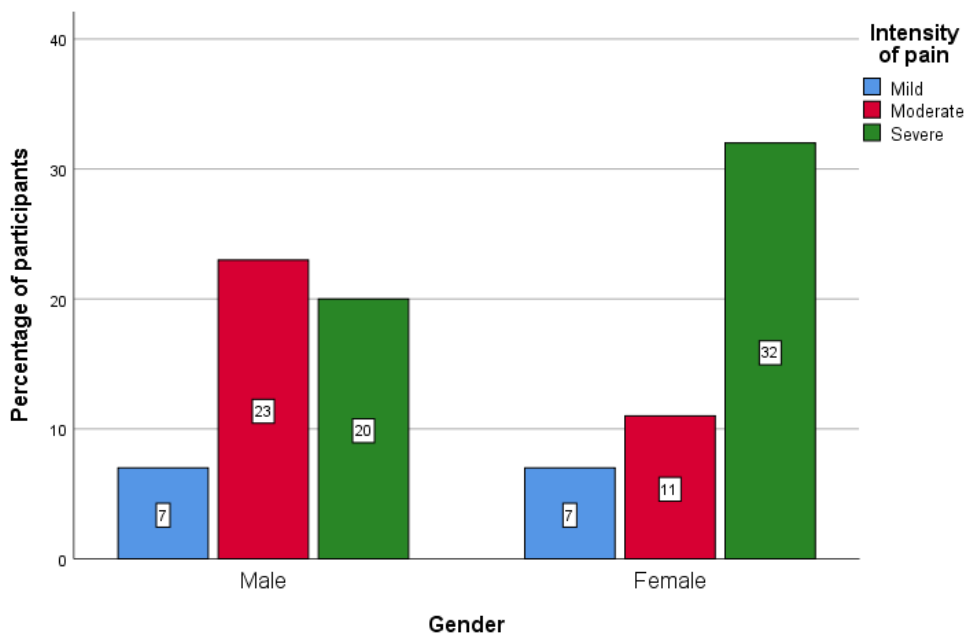


Figure 7 represents the association between gender and intensity of pain.

Gender is plotted on the X axis and the intensity of pain on the Y axis. Light blue represents mild, Red represents moderate and Green represents severe. It was noticed that the majority (32%) females had severe pain after simple tooth extraction whereas only 20% males had severe pain after simple tooth

extraction. Chi square test was used to find the association between gender and intensity of pain and was found to be statistically significant. Pearson chi square value is 7.005 and p value is 0.03.

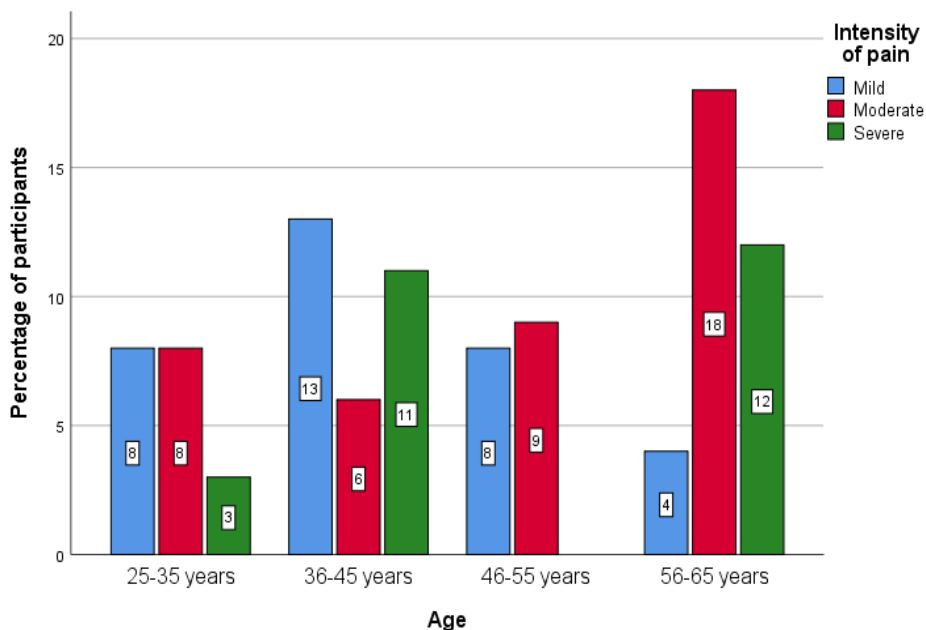


Figure 8 representing the association between age and intensity of pain.

The age is plotted on the X axis and the intensity of pain on the Y axis. Light blue represents mild, Red

represents moderate and Green represents severe. It was noticed that the majority (18%) patients aged

between 56 and 65 years had moderate pain after simple tooth extraction. Chi square test was used to find the association between age and intensity of pain and was found to be statistically significant. Pearson chi square value is 19.013 and p value is 0.03.

4. Discussion

From the results obtained, it was observed that the majority (20%) of females and (14%) males of age 56 - 65 years were involved in experiencing more pain after simple tooth extraction than males (14%). Aging can influence the production and sensory stimulation²⁶⁻²⁸. A similar study conducted by Blondeau and Daniel showed contrary results which stated that increased neurosensory problems in patients were seen above 24 years²⁹. The elderly could be usually prone to higher risk of complications, which includes severe pain and sensory disturbances which might be due to poorer healing potential, denser bones and completed dental roots^{30,31}.

Post-operative analgesic usage was to be reported in the majority of the population which accounts for 58% of the total population. Similar results were obtained in previous studies conducted by Urquhart et al which implies patients required and used analgesics immediately for 24-48 hours after extraction³². Also, other studies suggest that gender increases anxiety in patients and urges to use analgesics post operatively^{33,34}. Other studies reported the usage of analgesics were more commonly seen in patients even after simple tooth extraction and in specific, it was observed that the drug usage was more on the day and next day after extraction. There might be a gradual decline in the usage of drugs after a few days.

The association between usage of analgesics and post-operative follow up revealed that 28% of the patients did not use analgesics by the 2nd week after extraction. Other studies showed that there was a decline in the usage of drugs after 1 day of extraction and was more commonly used immediately after extraction, mostly within 24 hours. The most commonly used drug was NSAIDS due to the feasibility and easy availability of the drug³⁵. Our study is in accordance with other studies^{36,37,38}.

19% of the patients showed severe pain on the 1st post op day and 19% patients showed mild pain during the 2nd week of post op. A similar result was obtained in a previous study which showed that pain was experienced by patients only at 4-12 hours after extraction and the intensity of pain was gradually decreasing after days of extraction³⁸. During the postoperative period it is more often to experience complications in patients even after simple tooth extractions. One among which is pain

and it may also show varied responses from different patients. Our study is in accordance with other studies as it demonstrated that pain decreases gradually after 1 -3 days after extraction. The main attribute for pain after simple extraction is due to the minimal tissue damage during removal of the tooth³⁹. Similar study conducted by Troullos explained that tissue damage has an effect on the post-operative pain⁴⁰.

Patients with a habit history of alcohol consumption (22%) showed moderate pain experienced after simple tooth extraction and those with a history of smoking (18%) showed the most severe pain experience. It is believed that smoking tends to reduce the blood supply and thereby increase pain in the bony socket^{41,42}. A study conducted by Meechan et al demonstrated that chronic smokers have a high chance of poor filling of their extraction sockets with blood. A positive correlation was also found which showed painful sockets were reported immediately after extraction⁴². Contrasting results were obtained by a study conducted by Haraji and Rakshan et al, which stated that smoking had no significant effects on postoperative pain on the first or third postoperative days. They also assessed the interaction of gender and smoking, and no positive correlation existed¹. Smoking was considered a major predisposing factor in occurrence of painful sockets after tooth extraction by Maechan et al. It was also associated with poorer healing followed by mucogingival surgery and with higher rates of refractory periodontitis⁴³.

12% of the patients experienced severe pain after extraction due to an underlying infection whereas 18% of the patients experienced moderate pain due to periodontal etiology. Previous literature showed that chronic inflamed teeth showed severe postoperative pain. Our study is in accordance with other studies^{4,44}. The expression of substance P and vasoactive intestinal peptides increased in caries induced pulpal inflamed teeth⁴⁵⁻⁴⁸. The reason for severe pain in inflamed teeth is due to the nociceptors which are already sensitized in the previous inflammation and carious teeth with excited nerve endings will produce more pain when extracted as compared with non-inflamed ones where nociceptors are not sensitized.

32% females and 20% males experienced severe pain after simple tooth extraction. Previous literature shows that association between pain and gender is a complicated one but still studies showed that females reported more pain when compared to males which may be attributed to the anatomy, facial pain, tooth pain, musculoskeletal pain etc.

Our study is in accordance with previous studies conducted^{49,36,50}. But also, in this study majority of males aged between 45-55 experience more pain which is in contrast to the study conducted by

Capuzzi et al.⁵¹. The pain experienced after simple extraction was due to the difference in the metabolism, biologic mechanism, psychological and cultural factors influence on the individual. Apart from these studies, there was no evidence found which reported the influence or impact of gender on the pain experienced after simple tooth extraction. 18% patients aged 56-65 years reported moderate pain and 12% reported severe pain after simple tooth extraction. Previous literature shows contrary results with no significant association between age and complications⁵²⁻⁵⁴.

5. Conclusion

Within the limitations of the study, it can be concluded that age and gender have a positive association with the pain experienced post operatively after simple tooth extraction. As the age advances, pain also is found to be more prevalent among elderly patients after simple tooth extraction. The use of analgesics has improved the postoperative period by experiencing less pain and therefore has also been found that patients rely on drug administration even after 7 days of simple extraction as it relieves pain. Patients with a known history of smoking and alcohol reported to experience moderate and severe pain postoperatively when compared to patients with no habits. Although dental extractions are done due to various reasons, it was found that extraction of teeth due to infection and pulpal etiology produced severe pain after extraction. Future studies have to be done to approach and eliminate the use of drugs post operatively even after 7 days for a simple tooth extraction.

ACKNOWLEDGEMENT

The authors would like to acknowledge the help support rendered by Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai.

FUNDING SUPPORT

The present project is funded by

- Saveetha Institute of Medical and Technical sciences ,
- Saveetha Dental college and Hospitals ,
- Saveetha University,
- Royal Medicals

CONFLICTS OF INTEREST

The authors declare no potential conflict of interest.

6. References

Haraji A, Rakhshan V. Chlorhexidine gel and less difficult surgeries might reduce post-operative pain, controlling for dry socket, infection and analgesic consumption: a split-

mouth controlled randomised clinical trial. *J Oral Rehabil* 2015; 42: 209–219.

Bienstock DA, Dodson TB, Perrott DH, et al. Prognostic factors affecting the duration of disability after third molar removal. *J Oral Maxillofac Surg* 2011; 69: 1272–1277.

Wardle J. Dental pessimism: negative cognitions in fearful dental patients. *Behav Res Ther* 1984; 22: 553–556.

Slade GD, Foy SP, Shugars DA, et al. The impact of third molar symptoms, pain, and swelling on oral health-related quality of life. *Journal of Oral and Maxillofacial Surgery* 2004; 62: 1118–1124.

Susarla SM, Blaeser BF, Magalnick D. Third molar surgery and associated complications. *Oral Maxillofac Surg Clin North Am* 2003; 15: 177–186.

Haraji A, Rakhshan V, Khamverdi N, et al. Effects of Intra-alveolar Placement of 0.2% Chlorhexidine Bioadhesive Gel on Dry Socket Incidence and Postsurgical Pain: A Double-Blind Split-Mouth Randomized Controlled Clinical Trial. *Journal of Orofacial Pain* 2013; 27: 256–262.

Kolokythas A, Olech E, Miloro M. Alveolar osteitis: a comprehensive review of concepts and controversies. *Int J Dent* 2010; 2010: 249073.

de Boer MP, Raghoobar GM, Stegenga B, et al. Complications after mandibular third molar extraction. *Quintessence Int* 1995; 26: 779–784.

Tanidir AN, Atac MS, Karacelebi E. Information given by multimedia: influence on anxiety about extraction of impacted wisdom teeth. *British Journal of Oral and Maxillofacial Surgery* 2016; 54: 652–657.

Klages U, Ulusoy O, Kianifard S, et al. Dental trait anxiety and pain sensitivity as predictors of expected and experienced pain in stressful dental procedures. *European Journal of Oral Sciences* 2004; 112: 477–483.

van Wijk AJ, Hoogstraten J. Experience with Dental Pain and Fear of Dental Pain. *Journal of Dental Research* 2005; 84: 947–950.

Wang M-C, Vinall-Collier K, Csikar J, et al. A qualitative study of patients' views of techniques to reduce dental anxiety. *Journal of Dentistry* 2017; 66: 45–51.

Wong M, Kaloupek DG. Coping with dental treatment: The potential impact of situational demands. *Journal of Behavioral Medicine* 1986; 9: 579–597.

Croog SH, Baume RM, Nalbandian J. Pre-surgery psychological characteristics, pain response, and activities impairment in female patients with repeated periodontal surgery. *Journal of Psychosomatic Research* 1995; 39: 39–51.

Shafiei S, Tabrizi R, Mohajerani H, et al. Do

- Patients have the same experience of pain following tooth extraction and dental implants? *Annals of Maxillofacial Surgery* 2020; 10: 88.
- Ramesh A, Varghese S, Jayakumar ND, et al. Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study. *J Periodontol* 2018; 89: 1241–1248.
- Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol* 2019; 90: 1441–1448.
- Priyadharsini JV, Vijayashree Priyadharsini J, Smiline Girija AS, et al. In silico analysis of virulence genes in an emerging dental pathogen *A. baumannii* and related species. *Archives of Oral Biology* 2018; 94: 93–98.
- Teja KV, Ramesh S, Priya V. Regulation of matrix metalloproteinase-3 gene expression in inflammation: A molecular study. *J Conserv Dent* 2018; 21: 592–596.
- Manohar MP, Sharma S. A survey of the knowledge, attitude, and awareness about the principal choice of intracanal medicaments among the general dental practitioners and nonendodontic specialists. *Indian J Dent Res* 2018; 29: 716–720.
- Nandakumar M, Nasim I. Comparative evaluation of grape seed and cranberry extracts in preventing enamel erosion: An optical emission spectrometric analysis. *J Conserv Dent* 2018; 21: 516–520.
- Varghese SS, Ramesh A, Veeraiyan DN. Blended Module-Based Teaching in Biostatistics and Research Methodology: A Retrospective Study with Postgraduate Dental Students. *J Dent Educ* 2019; 83: 445–450.
- Panchal V, Jeevanandan G, Subramanian E. Comparison of instrumentation time and obturation quality between hand K-file, H-files, and rotary Kedo-S in root canal treatment of primary teeth: A randomized controlled trial. *J Indian Soc Pedod Prev Dent* 2019; 37: 75–79.
- Nair M, Jeevanandan G, Vignesh R. Comparative evaluation of post-operative pain after pulpectomy with k-files, kedo-s files and mtwo files in deciduous molars-a randomized clinical trial. *Braz Dent J*, <https://bds.ict.unesp.br/index.php/cob/article/view/1617> (2018).
- Felicita AS. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor - The sling shot method. *Saudi Dent J* 2018; 30: 265–269.
- Enkling N, Nicolay C, Bayer S, et al. Investigating interocclusal perception in tactile teeth sensibility using symmetric and asymmetric analysis. *Clin Oral Investig* 2010; 14: 683–690.
- Jacobs R, Van Steenberghe D. From osseoperception to implant-mediated sensory-motor interactions and related clinical implications. *J Oral Rehabil* 2006; 33: 282–292.
- Kazemi M, Geramipناه F, Negahdari R, et al. Active tactile sensibility of single-tooth implants versus natural dentition: a split-mouth double-blind randomized clinical trial. *Clin Implant Dent Relat Res* 2014; 16: 947–955.
- Blondeau F, Daniel NG. Extraction of impacted mandibular third molars: postoperative complications and their risk factors. *J Can Dent Assoc* 2007; 73: 325.
- Phillips C, White RP Jr, Shugars DA, et al. Risk factors associated with prolonged recovery and delayed healing after third molar surgery. *J Oral Maxillofac Surg* 2003; 61: 1436–1448.
- H AYM, Abu YMH. Dry Socket: Frequency, Clinical Picture, and Risk Factors in a Palestinian Dental Teaching Center. *The Open Dentistry Journal* 2011; 5: 7–12.
- Breivik H, Nicholas M, Campbell W, et al. *Clinical Pain Management : Practice and Procedures*. CRC Press, 2008.
- Olmedo-Gaya MV, Vallecillo-Capilla M, Galvez-Mateos R. Relation of patient and surgical variables to postoperative pain and inflammation in the extraction of third molars. *Med Oral* 2002; 7: 360–369.
- Liddell A, Locker D. Gender and age differences in attitudes to dental pain and dental control. *Community Dent Oral Epidemiol* 1997; 25: 314–318.
- Kitagawa J, Tsuboi Y, Ogawa A, et al. Involvement of dorsal column nucleus neurons in nociceptive transmission in aged rats. *J Neurophysiol* 2005; 94: 4178–4187.
- Logan DE, Rose JB. Gender differences in post-operative pain and patient controlled analgesia use among adolescent surgical patients. *Pain* 2004; 109: 481–487.
- Urquhart E. Analgesic agents and strategies in the dental pain model. *Journal of Dentistry* 1994; 22: 336–341.
- de Santana Santos T, Calazans ACM, Martins-Filho PRS, et al. Evaluation of the muscle relaxant cyclobenzaprine after third-molar extraction. *J Am Dent Assoc* 2011; 142: 1154–1162.
- Garcia Garcia A, Gude Sampedro F, Gandara Rey J, et al. Trismus and pain after removal of impacted lower third molars. *J Oral Maxillofac Surg* 1997; 55: 1223–1226.
- Troullos ES, Hargreaves KM, Butler DP, et al. Comparison of nonsteroidal anti-

- inflammatory drugs, ibuprofen and flurbiprofen, with methylprednisolone and placebo for acute pain, swelling, and trismus. *J Oral Maxillofac Surg* 1990; 48: 945–952.
- Larrazábal C, García B, Peñarrocha M, et al. Influence of oral hygiene and smoking on pain and swelling after surgical extraction of impacted mandibular third molars. *J Oral Maxillofac Surg* 2010; 68: 43–46.
- Meehan JG, Macgregor ID, Rogers SN, et al. The effect of smoking on immediate post-extraction socket filling with blood and on the incidence of painful socket. *Br J Oral Maxillofac Surg* 1988; 26: 402–409.
- MacFarlane GD, Herzberg MC, Wolff LF, et al. Refractory periodontitis associated with abnormal polymorphonuclear leukocyte phagocytosis and cigarette smoking. *J Periodontol* 1992; 63: 908–913.
- Ruta DA, Bissias E, Ogston S, et al. Assessing health outcomes after extraction of third molars: the postoperative symptom severity (PoSSe) scale. *Br J Oral Maxillofac Surg* 2000; 38: 480–487.
- Rodd HD, Boissonade FM. Comparative immunohistochemical analysis of the peptidergic innervation of human primary and permanent tooth pulp. *Arch Oral Biol* 2002; 47: 375–385.
- Awawdeh L, Lundy FT, Shaw C, et al. Quantitative analysis of substance P, neurokinin A and calcitonin gene-related peptide in pulp tissue from painful and healthy human teeth. *Int Endod J* 2002; 35: 30–36.
- Caviedes-Bucheli J, Lombana N, Azuero-Holguín MM, et al. Quantification of neuropeptides (calcitonin gene-related peptide, substance P, neurokinin A, neuropeptide Y and vasoactive intestinal polypeptide) expressed in healthy and inflamed human dental pulp. *Int Endod J* 2006; 39: 394–400.
- Bowles WR, Withrow JC, Lepinski AM, et al. Tissue levels of immunoreactive substance P are increased in patients with irreversible pulpitis. *J Endod* 2003; 29: 265–267.
- Morin C, Lund JP, Villarroel T, et al. Differences between the sexes in post-surgical pain. *Pain* 2000; 85: 79–85.
- Wiesenfeld-Hallin Z. Sex differences in pain perception. *Gen Med* 2005; 2: 137–145.
- Capuzzi P, Montebugnoli L, Vaccaro MA. Extraction of impacted third molars. A longitudinal prospective study on factors that affect postoperative recovery. *Oral Surg Oral Med Oral Pathol* 1994; 77: 341–343.
- Bui CH, Seldin EB, Dodson TB. Types, frequencies, and risk factors for complications after third molar extraction. *J Oral Maxillofac Surg* 2003; 61: 1379–1389.
- Adeyemo WL, Ogunlewe MO, Ladeinde AL, et al. A Comparative Study of Surgical Morbidity Associated with Mandibular Third-Molar Surgery in Young and Aging Populations. *The Journal of Contemporary Dental Practice* 2010; 11: 1–8.
- Benediktsdóttir IS, Wenzel A, Petersen JK, et al. Mandibular third molar removal: risk indicators for extended operation time, postoperative pain, and complications. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004; 97: 438–446.
- Gayathri MM. Knowledge and awareness among patients about dental implants. *Journal of Pharmaceutical Sciences and Research*. 2016 May 1;8(5):351.
- SK M. Knowledge, attitude, and practices regarding infection control among undergraduate dental students. *Asian J Pharm Clin Res*. 2016;9(1):220–4.
- Balaji R, Duraisamy R, Kumar MP. Complications of diabetes mellitus: A review. *Drug Invention Today*. 2019 Jan 15;12(1).
- Santhosh K. Knowledge, attitude and practices regarding needlestick injuries among dental students. *Asian J Pharm Clin Res*. 2016;9(4):312–5.
- H AYM, Abu YMH. Dry Socket: Frequency, Clinical Picture, and Risk Factors in a Palestinian Dental Teaching Center [Internet]. Vol. 5, *The Open Dentistry Journal*. 2011. p. 7–12. Available from: <http://dx.doi.org/10.2174/1874210601105010007>
- Urquhart E. Analgesic agents and strategies in the dental pain model [Internet]. Vol. 22, *Journal of Dentistry*. 1994. p. 336–41. Available from: [http://dx.doi.org/10.1016/0300-5712\(94\)90084-1](http://dx.doi.org/10.1016/0300-5712(94)90084-1)
- Palanivelu, J., Thanigaivel, S., Vickram, S., Dey, N., Mihaylova, D., & Desseva, I. (2022). Probiotics in functional foods: survival assessment and approaches for improved viability. *Applied Sciences*, 12(1), 455.
- Adeyemo WL, Ogunlewe MO, Ladeinde AL, Hassan OO, Taiwo OA. A Comparative Study of Surgical Morbidity Associated with Mandibular Third-Molar Surgery in Young and Aging Populations [Internet]. Vol. 11, *The Journal of Contemporary Dental Practice*. 2010. p. 1–8. Available from: <http://dx.doi.org/10.5005/jcdp-11-4-1>