Nat. Volatiles & Essent. Oils, 2021; 8(5): 5819 - 5832

Relationship Between Impacted Mandibular Third Molars And Inferior Alveolar Nerve

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ABSTRACT

Inferior alveolar nerve injury can be one of the most serious complications that can result from performing extraction of impacted mandibular third molar teeth during oral and maxillofacial surgical procedures. Because of the anatomical location of this nerve, it can be iatrogenically traumatized during various surgical procedures such as management trauma, cancer, pre-prosthetic problems, orthognathic surgery, and more often due to the extraction of the third molar.

AIM

To study the relationship between the impacted mandibular third molars and inferior alveolar nerve.

MATERIALS AND METHODS

This study was performed in the Department of oral surgery of the Saveetha Dental College and Hospitals in Chennai. The data of patients who had their impacted mandibular third molar extracted of age group 10-90 yrs were included in the study. The bar graphs were plotted and the results were statistically analysed using an SPSS Software system. Pearson's chi-square group test was used to find the association between categorical variables. For the test, $P < 0.05$ is to be considered statistically significant.

RESULTS

Males had more impacted teeth than females. Analysing the impacted mandibular molar teeth and nerve canal patterns, most of the nerve canals were normal. Dark and bifid root, darkening of a root, deflection of a root, diversion of the canal, interruption of white line canal, narrowing of root and narrowing of the canal are the anatomical variations of inferior alveolar nerve canal observed in this study. In the left impacted mandibular third molar 39.50% had normal nerve canals,0.83% had dark and bifid roots, 3.85% had darkening of roots, 1.35% had deflection off roots, 0.52% had roots with diversion of canals, 4.26% had nerve canals with interruption of white line canal, 2.18% had narrowing of canal and 0.94% had narrowing of roots. In the right impacted mandibular third molar 35.45% had normal nerve canals, 0.62% had dark and bifid roots, 3.53% had darkening of roots, 1.04% had deflection off roots, 0.52% had roots with diversion of canals, 3.01% had nerve canals with interruption of white line canal, 1.04% had narrowing of canal and 1.35% had narrowing of roots.

CONCLUSION

Within the limitations of the study, we found that there was a high incidence of mandibular third molar impaction in 10–30 years of age group, with the left impacted third molars more commonly involved, and a male predominance was observed. Most of the nerve canals were normal and some patients had a predilection to develop nerve injury-related complications due to the differences in the positioning of the nerve and the tooth root. Darkening of the roots and Interruption of the white line canal was the most commonly seen patterns associated with both impacted 38 and 48.

KEYWORDS
Impaction, impacted mandibular third molars, inferior alveolar nerve damage, innovative technique.

INTRODUCTION

Mandibular third molars (M3) extraction for impacted or erupted is one of the dentoalveolar operations most commonly performed. Extraction of impacted third molars may not be necessary if the teeth are healthy, grown completely (fully erupted), positioned correctly, biting properly with their opposing teeth and able to be clean teeth as part of daily hygiene practices. However, sometimes wisdom teeth can't properly mature and can create difficulties. Wisdom teeth can erupt at various angles in the jaw, sometimes even horizontally (1,2). In most of the conditions, they remain completely hidden under the gingiva. If they do not erupt normally, the teeth are trapped within the mandible (impacted), leading to infection, inflammation, or a cyst that can affect other roots of teeth or underlying bony structures (3,4). Since it is hard to see and clean the region, wisdom teeth that partially emerge through the gums create a passageway that can attract bacteria and cause gingival disease and oral infection. In some conditions where there is crowding of the nearby teeth and when the wisdom teeth do not have enough room to erupt properly, they may crowd and may damage nearby teeth.

Most dentists prescribe that wisdom teeth be removed if they do not fully emerge. Many dentists agree that wisdom teeth should be extracted at a younger age before the roots and bones are fully developed. So that the recovery time is relatively shorter after the extraction of an impacted tooth. Healing from impacted tooth extractions generally takes 3 to 5 days for teens and 5 to 7 days for adults(5). That's why a few young individuals get their teeth removed in an asymptomatic state. There are several controversies about prophylactic removal of asymptomatic impacted mandibular third molars based on evaluating the costs and risks of removal against the consequences of non-removal. Prophylactic surgical removal is justified for reducing the cancer risk (cysts and tumours), reducing the risk of a mandibular angle fracture, increasing surgical challenge due to age, non-restorable caries or periodontal disease, and impacted lower third molars may be less significant in mastication(6,7).

Some well-established indications for removing impacted teeth are Jaw swelling, Jaw pain, Tender or bleeding gums, inflamed or swollen gums, difficulty opening the mouth, Unpleasant taste in the mouth, and persistent pain and bad breath(8). Surgical removal of impacted teeth is not risk-free. Complications and risks of the procedure are as follows: Trismus, Exposure of the Maxillary Sinus, Recovery Time, Opioid Abuse, Post Operative Pain, Post Operative Infections, Accidental Damage to Adjacent Teeth, Swelling (Edema), Dry Socket (Alveolar Osteitis), Facial Bruising, Residual Periodontal Infections, Nerve Damage (inferior alveolar nerve, lingual nerve), Incomplete Tooth Removal, Osteonecrosis of the Jaw, Dislocation of 3rd Molar into the Maxillary Sinus, Bone Sequestrum, Jaw Dislocation, Temporo-Mandibular Joint (TMJ) Damage, Post Op Tooth Alignment Problems, Fractured Tuberosity, Aspiration of the tooth, Bleeding, Jaw

Fracture, Adverse Reactions to Anesthesia, Ludwig's Angina, Sharp Bone Irregularities, Surgically-induced Subcutaneous Emphysema, Post Extraction Granuloma and Hyper-eruption of Opposing Teeth(9).

Although nerve damage is more common with lower wisdom tooth extractions, it can happen with any tooth extraction if the nerve is close to the extraction site. Permanent nerve injuries are uncommon and usually occur only after the nerve has been cut or torn. They are usually caused by trauma from the surgical drill. Numbness of the lip, tongue, and cheek can occur and is recorded in 5% to 8% of mandibular extractions, with over 95% of initial complaints of numbness disappearing entirely within 4-8 weeks(10). Our team has extensive knowledge and research experience that has translated into high-quality publications(11),(12),(13),(14),(15–24)(25),(26–28)(29,30). This study aims to evaluate the relationship between the impacted mandibular third molars and the inferior alveolar nerve.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of oral surgery of the Saveetha Dental College and Hospitals in Chennai. The research was held in the department from May 2020 to January 2021. Data of patients of different age groups between 10-90 years old who underwent extraction of impacted teeth were collected. Data for the study was taken from the online database of Saveetha dental college (Dental Information Archiving Software DIAS). Ethical approval was obtained by the Institutional ethical board at Saveetha University. The study was based on the random sampling method. To minimize the sampling bias, all the cases were priorly reviewed before being included. The total sample size was 962 out of which 663 belonged to the 10-30 years age group, 226 belonged to the 31-60 years age group and 73 belonged to the 61-90 years age group who underwent extraction of the impacted mandibular molars. The collected data were tabulated under the underlying parameters Patient demographic details, Tooth number (tooth number were included which showed maximum maturation) and The gender of the patient was noted. Collected data were entered into a Microsoft Excel spreadsheet and analyzed using SPSS software (version 20). Descriptive statistics were used. Pearson's chi-square group test was used to find the association between categorical variables. For the test, $P < 0.05$ is to be considered statistically significant.

RESULTS

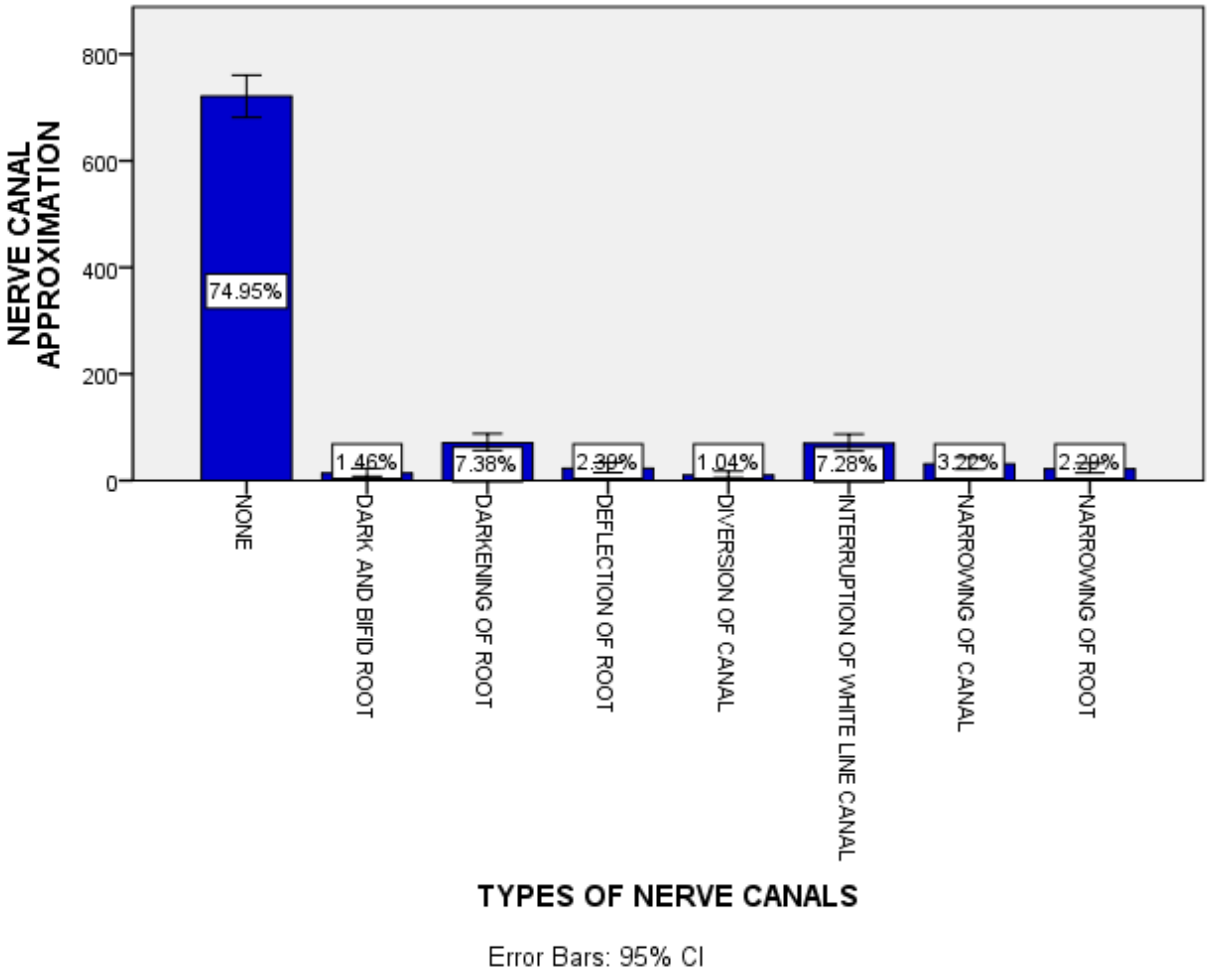

Figure 1 represents the distribution of different types of nerve canals among the studied subjects. The x-axis denotes the types of nerve canals and the y-axis denotes the number of participants. It was found that 74.95% of the individuals had normal nerve canals. 7.38% had darkening of roots, 7.28% had nerve

canals with interruption of white canals, 3.22% had narrowing of canals, 2.29% had narrowing of roots, 1.46% had a dark and bifid root, 2.29% had nerve canals with deflection of roots and 1.04% had a diversion of nerve canals.

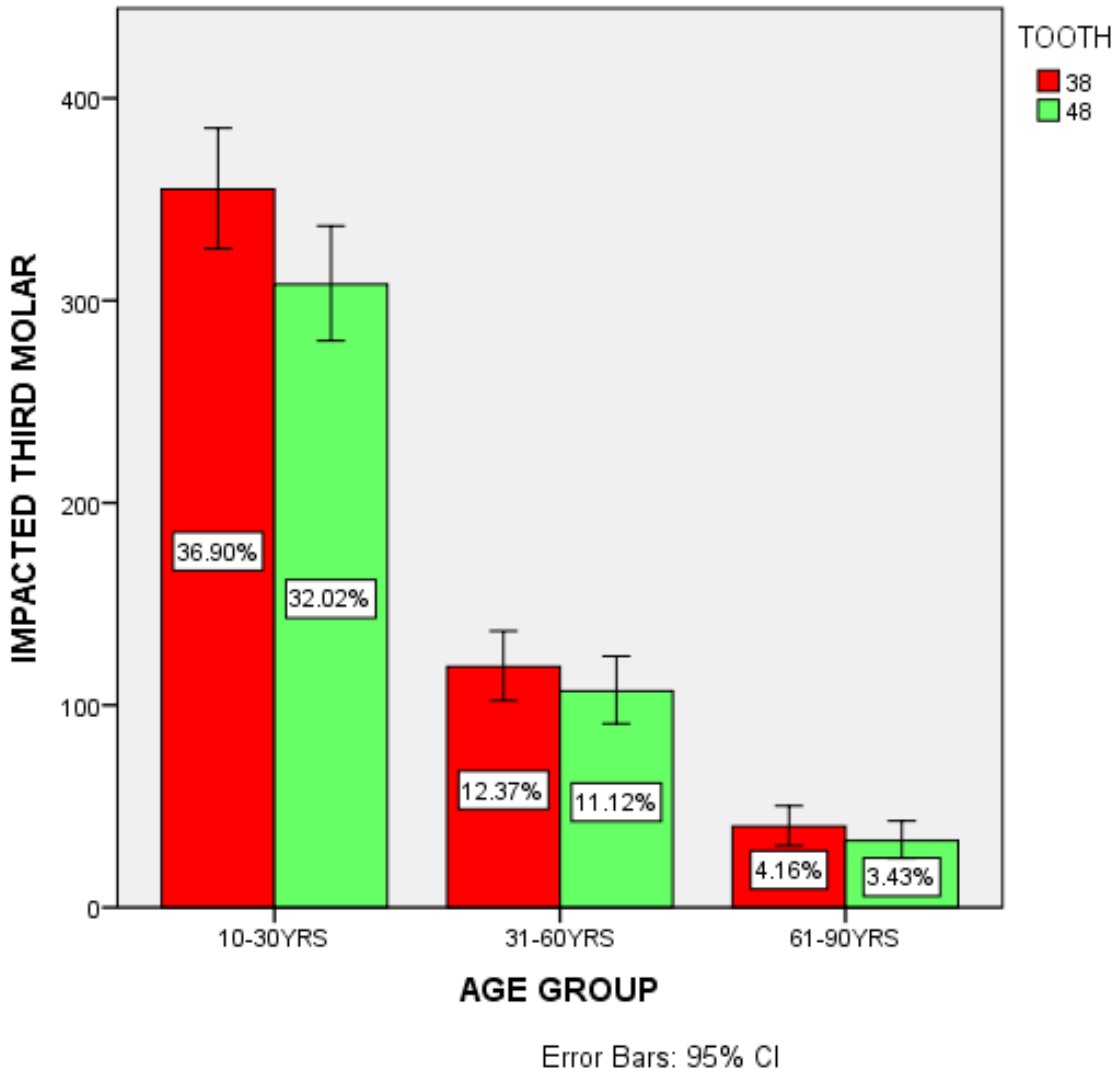

Figure 2 depicts the association between impacted mandibular third molars and age group distribution. The X-axis represents the age distribution into 3 groups, 10-30 years, 31-60 years and 61-90 years. The y-axis denotes the percentage of impacted mandibular third molars indicated for extraction. The purple colour denotes tooth number 38 and the yellow colour represents tooth number 48. From this study, it can be understood that extraction of impacted third molars was more common in young. As the age progresses the extraction rate decreases. In 10-30 years of patients, it was identified that 36.90% of the teeth extracted were 38 and 32.02% of the teeth were 48. Among 31-60 years patients 12.37% were 38 and 11.12% were 48 respectively. 4.16% of the teeth indicated for extraction was 38 and 3.43% of the teeth were 48 in 61-90 years patients.The Darkening of the roots and Interruption of the white line canal was the most commonly seen patterns associated with both impacted 38 and 48. The p-value obtained

with chi-square analysis for association between the age of the patients treated and the tooth number was statistically not significant (p = 0.945)

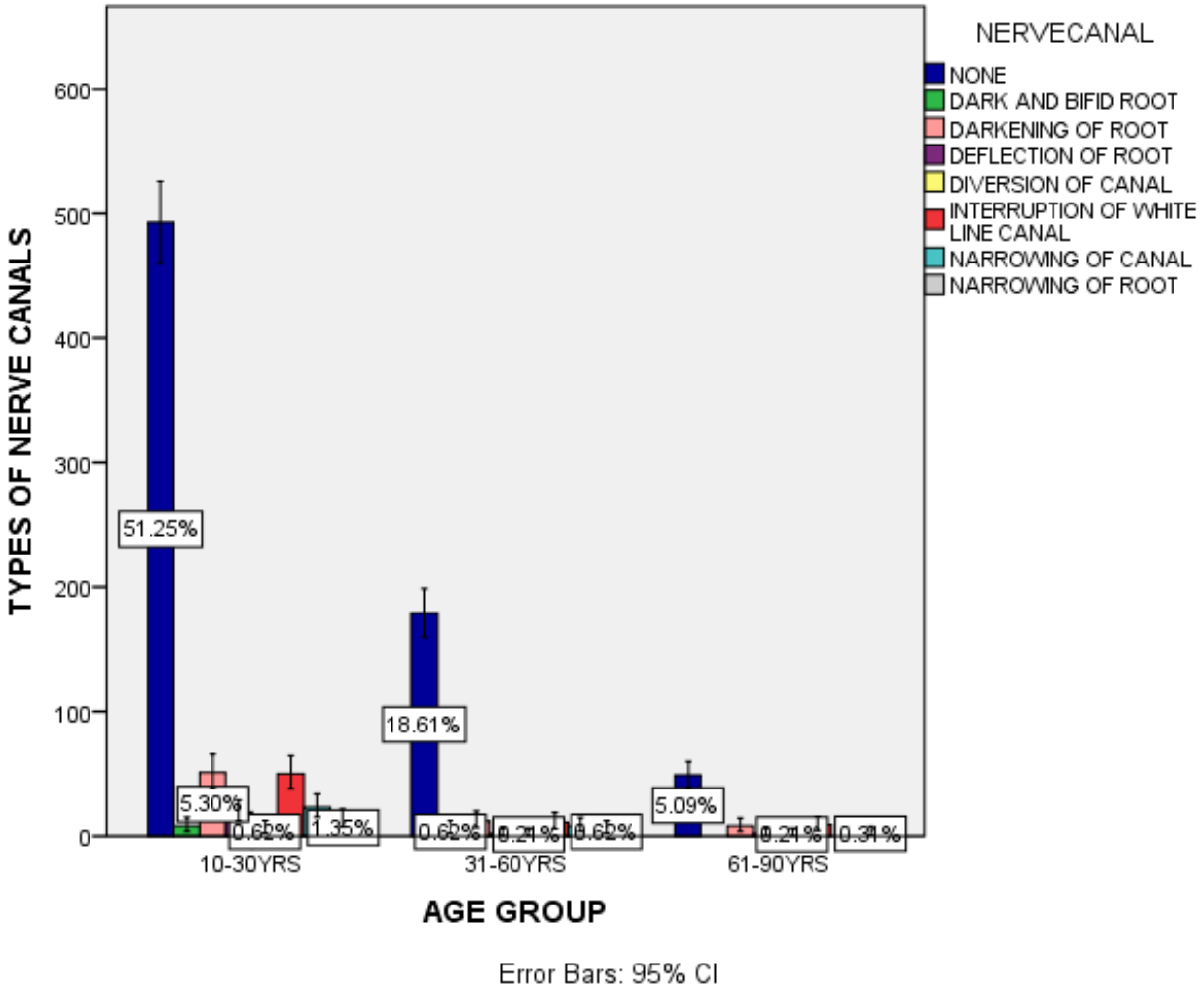

Figure 3 is the association between nerve canal approximation with the impacted mandibular third molars and the age group. The X-axis denotes the age group classification and the y-axis denotes the nerve canal approximation in different teeth. Among 10-30 years where most of the extraction of impacted man teeth were done, 51.25% of the patients had a normal Nerve canal. 0.83% had Dark and bifid root, 5.30% had darkened root, 0.62% had a diversion of the canal, 5.20% had an interruption of white line canal, 1.35% had narrowed root. Normal nerve canal was found in 18.61% of the individuals, 0.62% had Dark and bifid teeth, 0.21% had a deflection of the canal, 1.14% had an interruption of white line canal and 0.62% had narrowed root canal in patients belonging to 31-60 years age group. In the age group between 61-90 years age group, it was found that 5.09% had normal nerve canal, 0.21% had darkening of the root, 0.94% had a diversion of the canal and 0.31% had narrowed root. The p-value obtained with chi-square analysis for the association between the age of the patients treated and the nerve canal configuration was statistically not significant (p = 0.104).

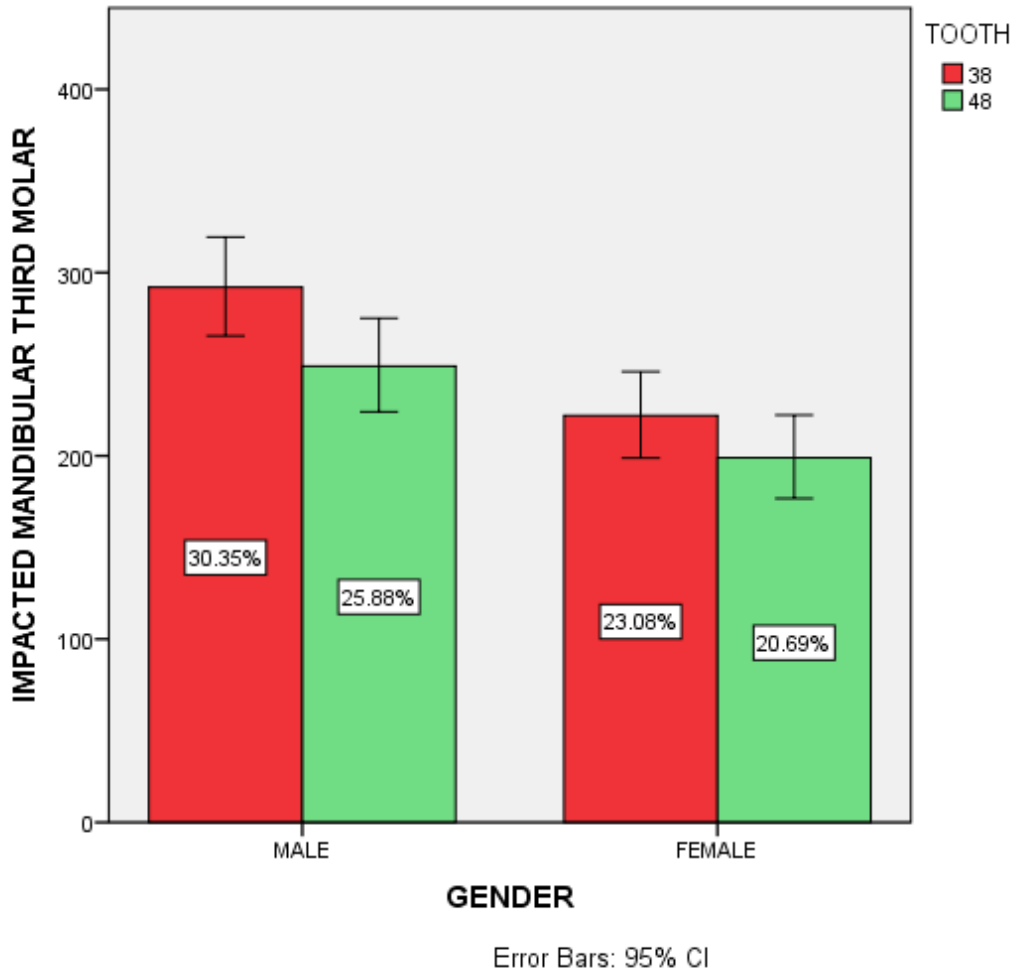

Figure 4 represents the association between the impacted mandibular third molars number and gender. The X-axis depicts the age group distribution and the y-axis representing the tooth number of either 38 or 48. The purple colour denotes tooth number 38 and the yellow colour represents tooth number 48. We could observe the male predilection in the extraction of impacted mandibular third molars. Among male patients 30.35% had their impacted 38 extracted and 25.88% had their impacted 48 extracted. In female patients, 23.08% of the tooth indicated was 38 and 20.69% of patients the indicated tooth was 48. The p-value obtained with chi-square analysis for the association between the gender of the patients treated and the tooth number was statistically not significant (p = 0.702)**.**

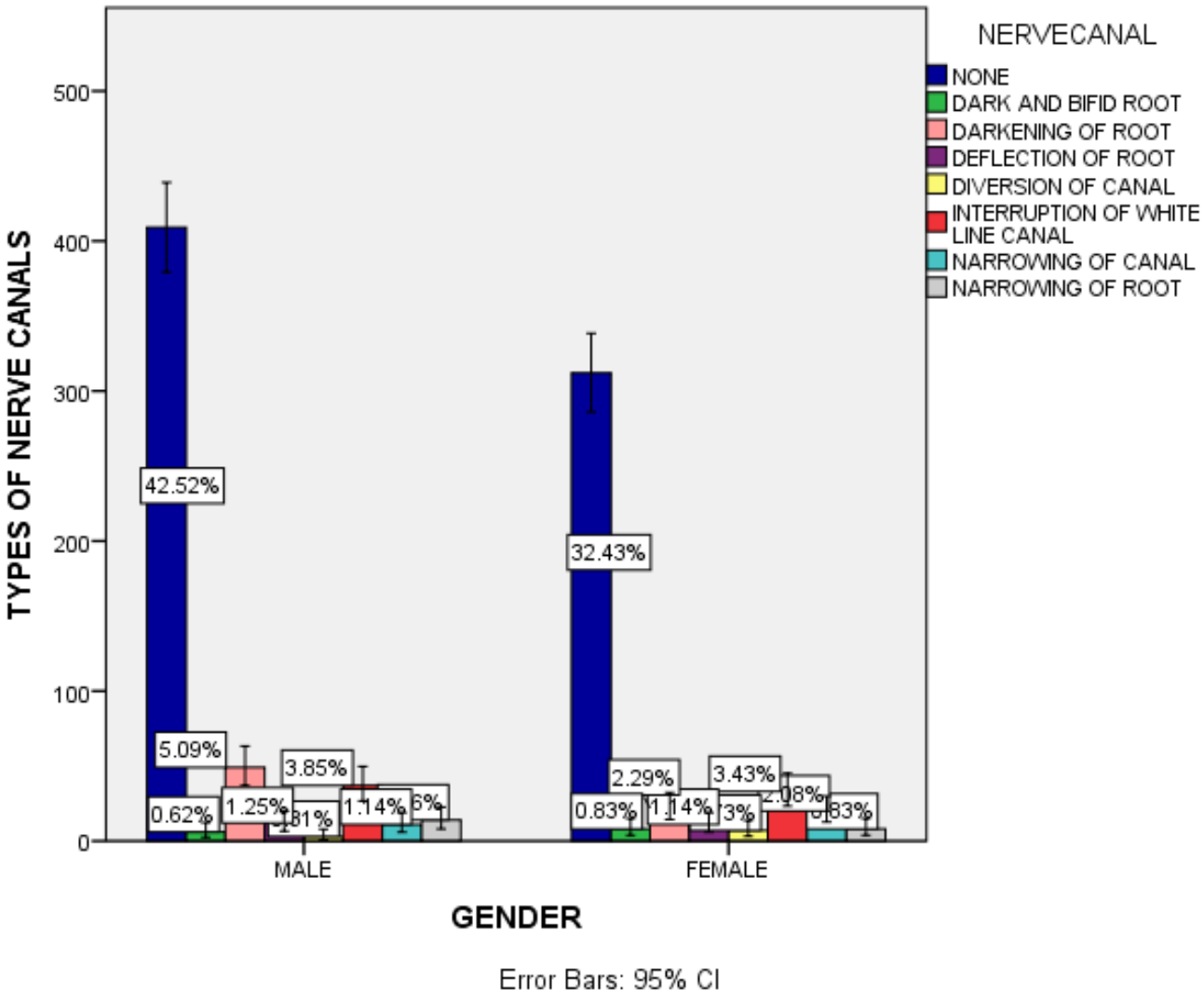

Figure 5 represents the association between the nerve canal approximation and the gender of the patients. The x-axis represents the gender of the patients and the y-axis denotes the different types of nerve canals. Among Male, 42.52% of the patients had a normal Nerve canal. 0.62% had Dark and bifid root, 5.09% had darkened root, 0.31% had a diversion of the canal, 3.85% had an interruption of white line canal, 1.46% had narrowed root and 1.14% had narrowed canals. Normal nerve canal was found in 32.43% of the individuals, 0.83% had Dark and bifid teeth, 1.14% had a deflection of the canal, 3.43% had an interruption of white line canal and 0.83% had narrowed root canal in female patients. The p-value obtained with chi-square analysis for association between the gender of the patients treated and the nerve canal configuration was statistically significant (p=0.036).

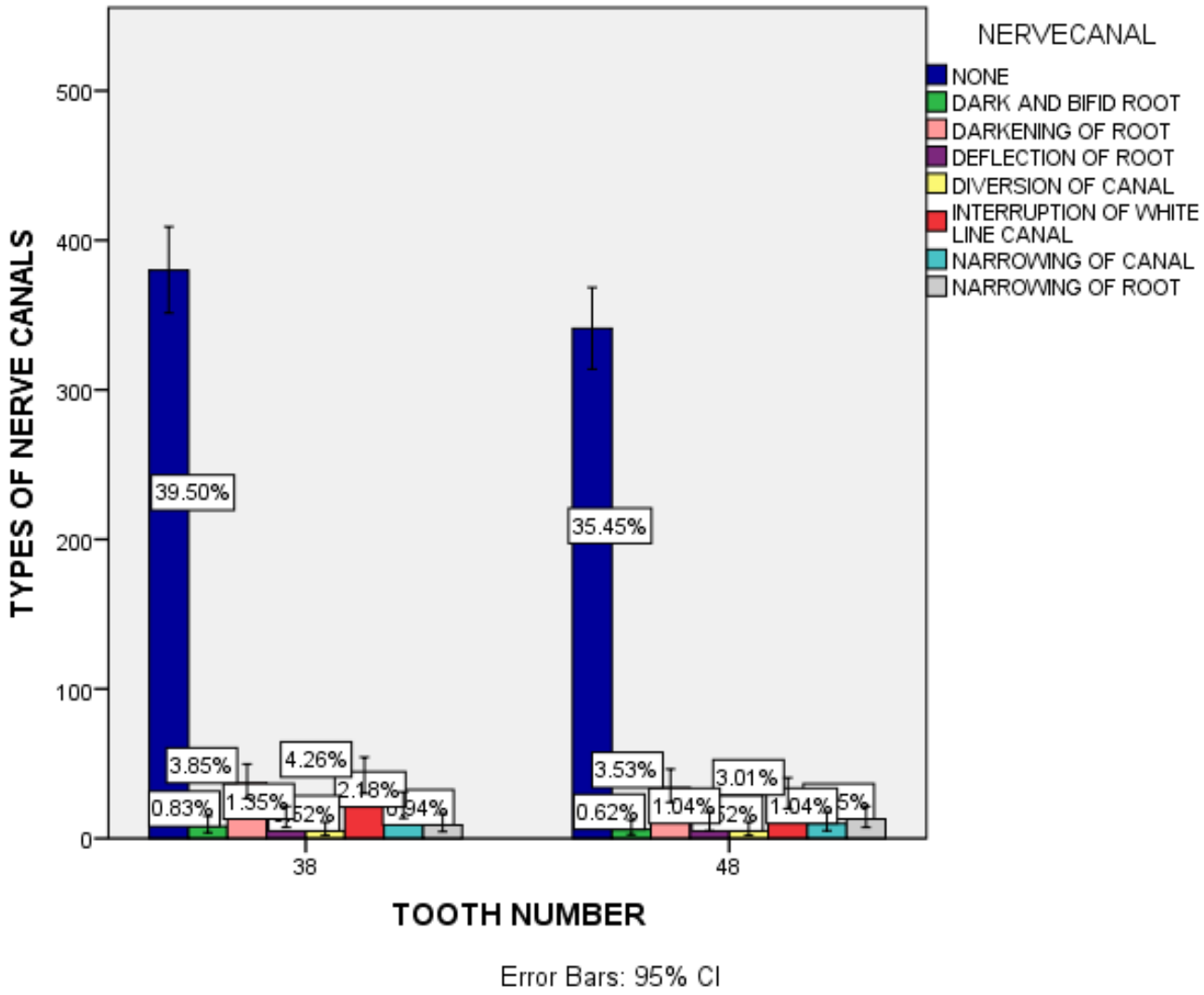

Figure 6 represents the association between the nerve canal approximation and the impacted teeth in the studied subjects. The x-axis represents the tooth number and the y-axis represents the types of nerve canals. In the left impacted mandibular third molar 39.50% had normal nerve canals,0.83% had dark and bifid roots, 3.85% had darkening of roots, 1.35% had deflection off roots, 0.52% had roots with diversion of canals, 4.26% had nerve canals with interruption of white line canal, 2.18% had narrowing of canal and 0.94% had narrowing of roots. In the right impacted mandibular third molar 35.45% had normal nerve canals, 0.62% had dark and bifid roots, 3.53% had darkening of roots, 1.04% had deflection off roots, 0.52% had roots with diversion of canals, 3.01% had nerve canals with interruption of white line canal, 1.04% had narrowing of canal and 1.35% had narrowing of roots. The p-value obtained with chi-square analysis for the association between the nerve canal configuration and impacted teeth was statistically not significant (p=0.648).

DISCUSSION

Several pieces of evidence from many clinical studies show that an asymptomatic impacted third molar doesn't need to indicate the absence of further infection. Patients with Impacted teeth may exhibit

symptoms such as severe pain, oedema or trismus. A physical and radiographic examination can recognise acute pericoronitis, dental caries or localized or spreading fascial space infection or a combination of the preceding. It is important to understand the relation between the mandibular impacted third molar and inferior alveolar nerve (31,32).

Rood et.al found that 66% of the mandibular third molars were judged to make contact with the mandibular canal on dental 3D-CT images. Previous research says that The prevalence of inferior alveolar nerve paresthesia ranges from 0.35 per cent to 8.4 per cent. Although the percentage of paraesthesia and nerve damage is very low it plays a greater significance in both patients and dentists(33,34). It is well known that unintentional injury to the inferior alveolar nerve can always happen due to the proximity of the cortex region of the molar to the nerve, being separated from it by the periosteum alone. Therefore the dentist needs to warn the patients of the risks of mandibular third molar surgery including the possibility of inferior alveolar nerve damage.

Nerve injuries are temporary and get back to normal within 8 weeks. Studies state that in most cases the injuries result in temporary sensory disturbances but in some cases permanent paresthesia (abnormal feeling), hypesthesia (decreased feeling), or worse, some form of dysesthesia (uncomfortable abnormal feeling). Patients belonging to the age group 10-30 years are usually more prone to lateral impactions, close radiographic proximity to the mandibular canal and treatment given by inexperienced surgeons are all associated with a slightly higher rate of paresthesia in the inferior alveolar nerve.

Nerve canal approximation with proper Radiographs helps in preventing any nerve damage(35–37). From the radiographs, the nerve canal and the surrounding structures can be classified into Dark and bifid root, darkening of the root, deflection of the root, diversion of the canal, interruption of white line canal, narrowing of root and narrowing of canal(38,39).
Researchers state that there was a high incidence of mesioangular lower third molar impaction (33.97 %), the highest number of patients were found in 15–30 years of age group (48.33 %), a left side (56.93 %) was more commonly involved, female predominance (63.44 %) was observed and recurrent pericoronitis (33.81 %) was the most common indication. This can ensure the surgeons perform the procedure and with much care(40). Knowing the indications for surgical removal of the affected third molar of the lower jaw in patients will help avoid the future risk of complications and morbidity, which not only saves time and money but also prevents psychological trauma that occurs with delayed treatment.

LIMITATIONS

The limitations of the study may be less level of evidence compared with prospective studies**.** Convenience sampling is not representative of the general population and is prone to selection bias and retrospective studies are more prone to recall bias or misclassification bias.

CONCLUSION

Within the limitations of the study, we found that there was a high incidence of mandibular third molar impaction in 10–30 years of age group, with the left impacted third molars more commonly involved, and a male predominance was observed. Most of the nerve canals were normal and some patients had a

predilection to develop nerve injury-related complications due to the differences in the positioning of the nerve and the tooth root. Darkening of the roots and Interruption of the white line canal was the most commonly seen patterns associated with both impacted 38 and 48. More clinical and laboratory studies are needed to determine the exact relationship between the impacted mandibular third molars and inferior alveolar nerve with age and gender.

ACKNOWLEDGEMENT

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

FUNDING SUPPORT

The present study is supported by

- Saveetha Institute of Medical and Technical Sciences,
- Saveetha Dental College and Hospitals,
- Saveetha University,
- Raja Super Market, Chennai.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in the present study.

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