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INDICATIONS FOR REMOVAL OF MANDIBULAR THIRD MOLARS - A RETROSPECTIVE INSTITUTIONAL STUDY

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ABSTRACT

The extraction of a third molar is one of the most commonly performed procedures in oral surgery. The indications include caries, pericoronitis, for orthodontic treatment & prophylactic removal. The aim of this study was to determine the different indications for extraction of third molars of mandible in dental patients. This retrospective study involved analysis of case records of all patients who underwent extraction of mandibular third molars from June 2019 to April 2020 in our institution. Our study sample consisted of 1462 patients, and data tabulation was done based on the following parameters: age, gender, tooth Number and indications for extraction. Statistical analysis was done using SPSS Version 20.0, and results obtained. Categorical variables were expressed in terms of frequency and percentage. Chi-square test was used for testing associations between categorical variables and p-value <0.05 was considered statistically significant. The extraction of mandibular third molar showed slightly higher prevalence in females (51.2%) with a female - to - male ratio of 1.05 : 1. Highest prevalence of extractions was observed in the age group of 21-30 years [25.0%] followed by 31-40 years [24.6%]. Caries was the most predominant indication for extraction of mandibular 3rd molars [66.0%] in our study population. There was a statistically significant association present between age and indications for extractions of mandibular third molar [p<0.001]; and gender and indications for extractions of mandibular third molar.

[p < 0.001]. Within the limits of the study, it was concluded that, extraction of mandibular third molars was more prevalent among females than males. Higher prevalence of mandibular third molar extractions was observed in patients in their third decades of life. Caries was the most common indication for extraction of mandibular third molars in our study population. Pericoronitis is the common indication for mandibular third molar extraction in the younger age group and dental caries is the common reason for removal in the middle age group, while periodontitis is the common cause for removal of mandibular third molars in the elderly people.

INTRODUCTION

Extraction can be defined as the painless removal of the whole tooth or root with minimal trauma to the investing tissues, so that the wound heals uneventfully. Third molars are often termed as the `Stepchild' of permanent dentition. Third molars are also the last teeth to erupt into the oral cavity, erupting at the age of 17 - 21 Years. These may erupt completely into the oral cavity, or may be partially erupted, or can undergo a bony / soft tissue impaction. The reason can be attributed to its distal most position in the arch, the decrease in the jaw size during the course of evolution and genetic variations. Nevertheless, even in people with erupted mandibular third molars, third molars are the teeth most frequently affected by caries owing to accessibility in brushing the tooth and also in performing restorative or endodontic procedures, making them highly prone for extraction. Thus, the mandibular third molars are extracted due to a wide range of indications:

1. Recurrent pericoronitis leading to pain, trismus, halitosis & inability to consume food
2. Recurrent infections which may lead to abscess, cellulitis etc
3. Impacted teeth leading to pericoronitis & bone resorption
4. Prior to orthodontic treatment to relieve or prevent crowding in the mandible
5. During orthognathic surgery of mandible such as BSSO, to prevent inadvertent fractures
6. Management of pre-prosthetic concerns
7. Buccoverted third molar leading to frictional keratosis, ulceration or irritation fibroma
8. Prophylactic removal to prevent untowardly pathologies such as cysts, tumors of odontogenic origin, prevention of root resorption and caries of adjacent teeth, pathological fractures of jaw angle, pain of unexplained origin & prophylactic removal in medically compromised patients & those undergoing chromotherapy, radiotherapy[1].

The pathologies associated with mandibular 3rd molar and the indications for removal of mandibular 3rd molar have been reported by different authors in different populations. Braimah et al[1,2] have reported that dental caries (38.53%) and pericoronitis (29.36%) were the most common pathologies associated with mandibular third molars and the incidence of cysts and tumors with impacted mandibular third molars was very low. In the population of Barcelona, pericoronitis (43.1%) and prophylactic removal (33.5%) were the most common indications reported[3], while in the Malaysian population, prophylactic removal was the most common indication for removal of

mandibular third molar[4]. According to Bataineh et al[5], among the Jordanians, pericoronitis was the common indication (46.8%) followed by caries (23.0%) and the prevalence of prophylactic removal was significantly lower than found in other populations[6,7].

The existing studies in literature do not contain sufficient information on the indications for mandibular third molar extraction in the Indian population, in particular the South Indian population. The aim of the study was to determine the different indications for the removal of mandibular third molar; to evaluate the presence of gender based and age based differences in the indications of mandibular third molar removal.

MATERIALS AND METHODS

2.1. Study Design and Study Setting

This retrospective cross-sectional study was conducted in the department of oral and maxillofacial surgery, Saveetha dental college and hospital, Saveetha university, Chennai, to analyse the various indications for the extraction of mandibular third molars among dental patients visiting our institution from June 2019 to April 2020. The study was initiated after approval from the institutional review board [SDC/SIHEC/2020/DIASDATA/0619-0320].

2.2 Study population and sampling

After assessment in the patient database, all case records of patients who underwent extraction of mandibular third molars were included in the study with a total of 1462 patients. All missing or incomplete data of patients were excluded from the study. Cross verification of data for errors was done with the help of an external examiner.

2.3 Data collection and Tabulation

Data collection was done using the patient database with the timeframe work of 1st June 2019 to 30th April 2020 by a single calibrated examiner. Case records of around 41,438 patients were reviewed and relevant data were included in the study. The collected data was tabulated based on the following parameters: name, age, gender, mandibular third molar extracted [left lower third molar (38) or right lower third molar (48)], indications for extraction.

2.4 Statistical analysis

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 20.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Categorical variables were expressed in frequency and percentage; and continuous variables in mean and standard deviation. Chi-square test was used to test associations between categorical variables. P value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

In our study, 1462 patients underwent mandibular third molar extractions in the stipulated time. The prevalence of mandibular third molar extraction in the population was 3.53% [Out of the 41,438 dental patients].

Figure 1 depicts the gender wise distribution of mandibular 3rd molar extractions with higher prevalence in females [51.2% (n=749)] than in males [48.7% (n=712)]. The prevalence in transgender was 0.1% (n=1). Female - to - male ratio is 1.05 : 1. The age group wise distribution of extraction of mandibular 3rd molar is depicted in Figure 2. Highest prevalence was noted in the age group of 21-30 years [25.0% (n=365)] followed by 31-40 years [24.6% (n=360)] and 41-50 years [21.2% (n=310)]. Least prevalence was observed in the 81-90 years age group [0.3% (n=5)].

Figure 3 shows the tooth wise distribution of mandibular 3rd molar extractions with higher proportion of extraction of mandibular left third molar (38) [53.1% (n=776)] than mandibular right third molar (48) [46.9% (n=686)]. The distribution of different indications for extraction of mandibular 3rd molar is depicted in Figure 4. Caries was the most predominant indication for extraction of mandibular 3rd molars [66.0% (n=965)]. The prevalence proportions of pericoronitis and periodontics as indications for tooth removal were 18.5% (n=270) and 14.1% (n=206) respectively. Least prevalence was for orthodontic treatment as an indication for extraction of mandibular third molars [1.4% (n=21)].

The association between gender and indication for mandibular third molar extraction is revealed in Figure 5. In males the order of prevalence of different indications was : Caries 30.78% (n=450), followed by periodontitis 9.17% (n=134) and pericoronitis 8.20% (n=120). In females the order of indications was caries 35.16% (n=514) followed by pericoronitis 10.26% (n=150) and periodontitis 4.92% (n=72). Orthodontic extractions was the least prevalent indication in both males [0.55% (n=8)] and females [0.89 (n=13)]. This association yielded a p-value <0.001 after chi-square test indicating high statistical significance. Thus, Caries was the most common indication for mandibular third molar extraction in both Males (30.78%) and females (35.16%)

Figure 6 shows the association between tooth number and indications for mandibular third molar extraction with caries being the most common indication in both 38 [35.64%, n=521] and 48 [30.37%, n=444] and orthodontics being the least prevalent indication in both 38 [0.62%, n=9] and 48 [0.82%, n=12]. However, the association was statistically not significant with a p-value > 0.05 .

The association between age groups and indication for mandibular third molar extractions is depicted in Figure 7. In the age group 11-20 years and 21-30 years pericoronitis was the most common indication with prevalence proportions of 1.23% (n=18) and 15.80% (n=231) respectively. Caries was the most prevalent indication in the age groups 21-40 years [23.12% (n=338)], 41-50 years [20.86% (n=305)] and 51-60 years [10.40% (n=152)]. Periodontitis was the most reported indication in the age groups 61-70 years [6.91%

(n=101)], 71-80 years [3.01% (n=44)] and 81-90 years [0.34% (n=5)]. Orthodontic treatment as an indication for extraction was observed only in the age groups 11-20 years [0.55% (n=8)] and 21-30 years [0.90% (n=13)]. This association yielded a p-value <0.001 after a chi-square test, and the results were highly statistically significant. Thus, pericoronitis is the common indication for mandibular third molar extraction in the age group of 21-30 years; periodontitis is the common cause for removal of mandibular third molars in 61-70 years; caries is the common reason for removal of mandibular third molars in 31-40 years and 41-50 years.

Third molar extractions are one of the most commonly performed dental procedures and also the commonest among oral surgical procedures[8,9,10]. These may be simple extractions or transalveolar (open) extractions depending on the position of tooth and influence of other complicating factors [11,12]. It is also one of the most careful procedures to be performed due to the vicinity of the tooth to vital structures like the inferior alveolar nerve, lingual nerve and the potential complications associated with the extraction of mandibular third molar such as swelling, pain, hemorrhage, fracture of lingual plate and accidental slippage of tooth into the lingual pouch [13,14,15]. Considering all these factors, the decision made by the dentist regarding the extraction of mandibular third molars based on the indication is highly important [16,17]. All these findings point out to the important and pivotal role of assessing the indications for the removal of mandibular third molars [18,19,20].

According to Lysell et al.,[5,21], pericoronitis and development of a cyst or caries in the second molars were the most influential factors considered by the Oral Surgeons of Sweden in extraction of mandibular third molars. This emphasis on cysts is because of the fact that about 37% of apparently normal impactions were associated with cystic transformation (dentigerous cyst), as reported by Glosser et al.,[22]. Further S. Kandasamy et al.[23], reveal that individuals who undergo extraction of mandibular third molars with no pathology associated (healthy periodontal status) were at higher risk for developing periodontal pockets (48%). In the population of Ghana, 94.8% of third molar extractions involved the mandible with a male to female ratio of 1.1:1 and recurrent pericoronitis (49.25%) being the most common indication followed by dental caries (26.1%) and prophylactic removal[24]. In the current study, the gender ratio was reversed to a female predilection (51.2%) and a female to male ratio of 1.05:1.

In the population of Nigeria, recurrent pericoronitis was the most reported indication in about 46.7% of third molar surgeries performed[25]. Similar accounts of pericoronitis being a major indication for third molar extractions have been reported by different studies. In a study of Libians by Krishnan et al.[26], about 54% of mandibular third molar extractions were due to recurrent pericoronitis, 31% due to caries and 2% for orthodontic reasons. According to Patel et al.[27], in the population of Ahmedabad, a female predominance was reported for impacted mandibular third molars and recurrent pericoronitis (33.81%) was the most common indication. Meanwhile, a study in the Nigerian population by Olasoji et al.[28] report that in about 69.6% of third

molar extractions of mandible, infection was the most common indication followed by periodontal pocket formation distal to second molar (12.5%).

Contradictory to these are the findings of Adeyemo et al.[29] in the Nigerian population, where caries and its sequelae were the major indications for extraction of mandibular third molar, (63.2%) followed by pericoronitis (26.3%) and periodontitis (9.2%). The same study also reveals that the age of patients with caries as an indication was greater than those with periodontitis as an indication but lower than those with pericoronitis as an indication. These findings are very similar to that of current study where pericoronitis was the most common indication in the age group of 11-30 years, caries in 31-60 years and periodontitis in 61-90 years. McArdle et al.[29,30] also points out that caries involving distal aspect of mandibular second molars as an important indication for third molar removal in the United Kingdom.

A totally different strategy has been adopted by the general dentists of the United States. According to Joana et al.[29,30,31], in 79% of patients, general dentists recommend removal of mandibular third molars for prophylaxis or to prevent future problems. In such cases of prophylaxis, or incases of mandibular third molars without any symptoms, the patient's age plays a pivotal role in determining the need for extraction, as reported by Liedholm et al.[32], and Liedholm. R[33]. Such asymptomatic third molars don't confirm the absence of any disease. But, there is no evidence to support the extraction or retention of such asymptomatic third molars[34,35].

All the above studies and current study point out to population based differences in the indications for extraction of mandibular third molars. While caries and pericoronitis are major indications for extraction of mandibular third molars in the population of Nigeria, Libya, North India and the United Kingdom, prophylaxis plays an important role in the United States of America. In the current study, 66% of mandibular third molar extractions were carried out for the reason of caries. Age and gender based prevalence are similar to other populations with a female predilection in the South Indian population and the indications differ based on the age groups, as quoted previously.

However, there is lack of evidence regarding the association between age, gender and indications for extraction in the Indian population. The current study compensates for this void in literature, by revealing two highly statistically significant associations - one between age group and indication for extraction of mandibular third molars and the other between gender and indication for extraction of mandibular third molars.

This study possesses few limitations as the sample size being very small and hence not possible to generalize the results to a larger population. However, the results revealed, will serve as a base for future research of Indian population.

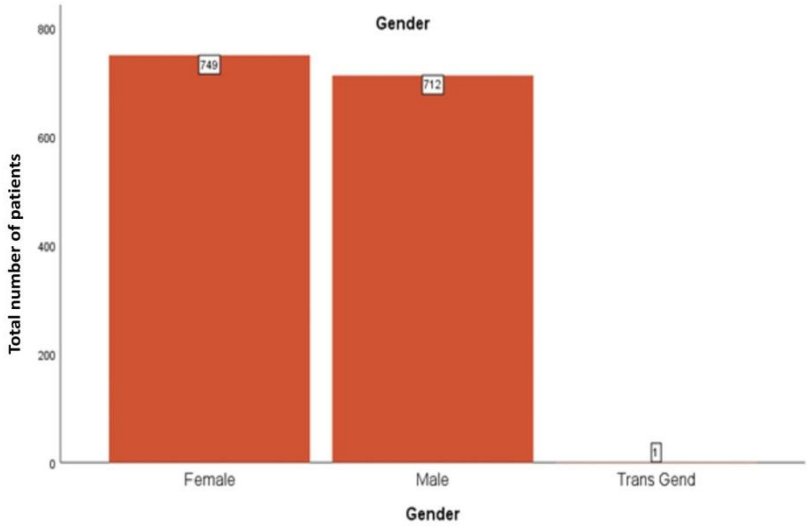

Figure 1: Bar chart depicting the gender wise distribution of mandibular third molar extractions. X-axis - gender and Y-axis - total number of mandibular third molar extractions. Mandibular third molar extractions were more in females than males.

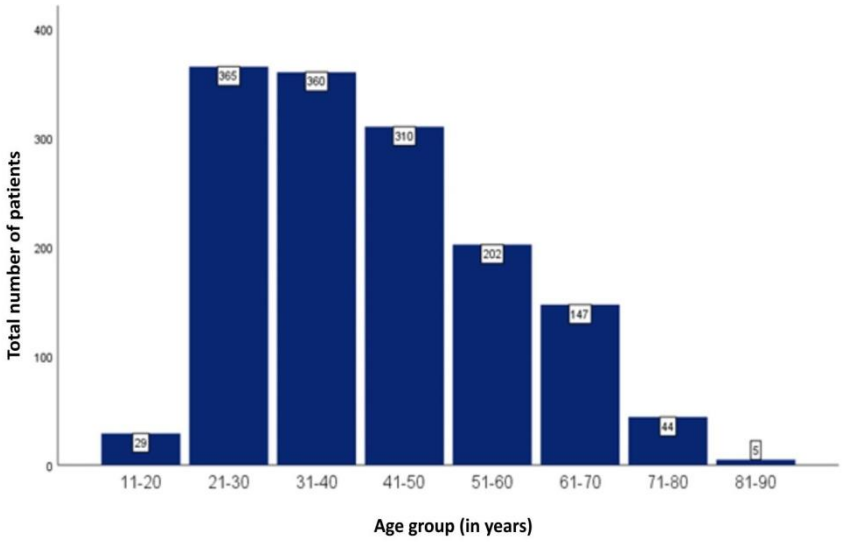

Figure 2: Bar chart depicting the age wise distribution of mandibular third molar extractions. X-axis - age groups (in years); Y-axis - total number of mandibular third molar extractions in each age group. Mandibular third molar extractions were most prevalent in the age group of 21-30 years.

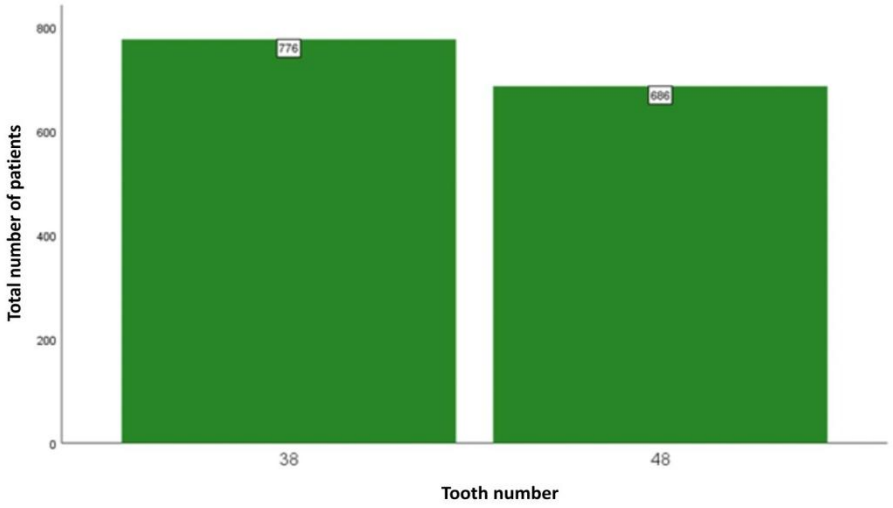

Figure 3: Bar chart depicting the tooth wise distribution of mandibular third molar extractions. X-axis - tooth number involved; Y-axis - total number of mandibular third molar extractions. Higher proportion of mandibular left third molar (38) extractions were observed.

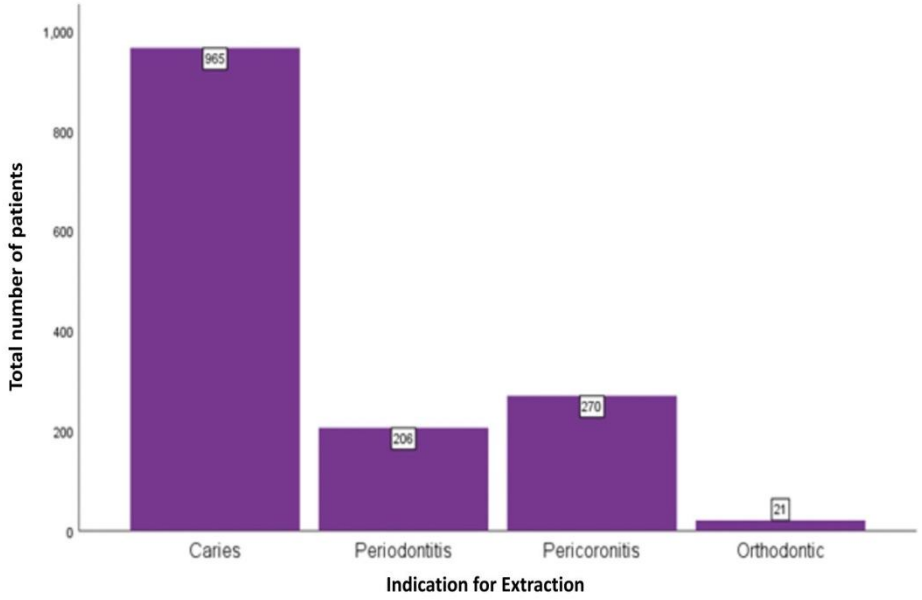

Figure 4: Bar chart depicting the distribution of indications for extraction of mandibular third molars. X-axis - different indications for extraction; Y-axis - total number of mandibular third molar extractions. Caries is the most common indication for extraction of mandibular third molars

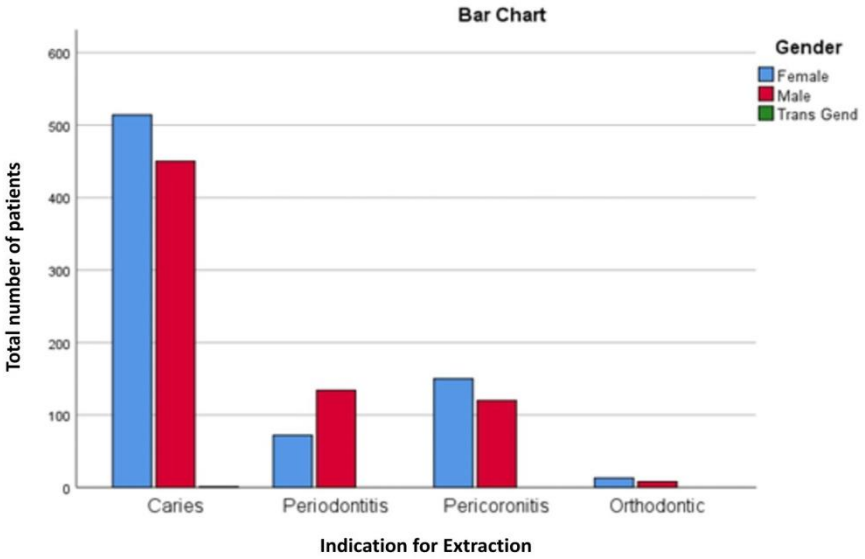

Figure 5: Bar chart depicting the association between gender and indications for extraction of mandibular third molars. X-axis - different indications ; Y-axis - total number of third molar extraction patients. Caries was the most prevalent indication for mandibular third molar extraction in both males (red) and females (blue). Chi-square test, $p < 0.001 (<0.05)$. The results were of high statistical significance.

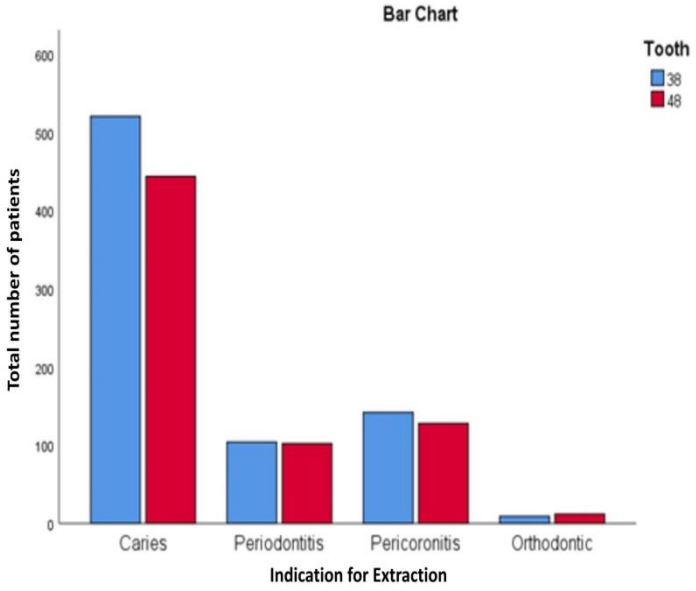

Figure 6: Bar chart depicting the association between tooth number [38 or 48] and indications for extraction of mandibular third molars. X-axis - different indications; Y-axis - total number of third molar extraction patients. Caries was the predominant indication for removal of both 38 and 48. Periodontitis as an indication for extraction was seen equally in relation to 38 and 48. Orthodontic treatment was the least prevalent indication for third molar extraction in both 38 and 48. Chi-square test, p- value 0.618 (>0.05) . The results were statistically not significant

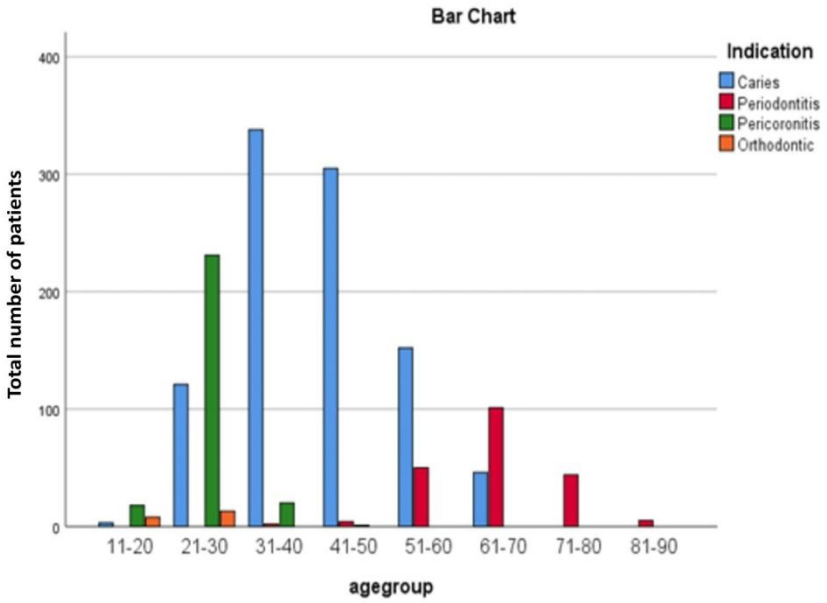

Figure 7: Bar chart depicting the association between age group and indications for extraction of mandibular third molars. X-axis - age groups (in years); Y-axis - frequency of different indications for mandibular third molar removal. In the age groups of 31-40 years, 41-50 years and 51-60 years caries was the most prevalent indication for extraction of mandibular third molars. Pericoronitis is the common indication for mandibular third molar extraction in the age group of 21-30 years and periodontitis in the age group of 61-70 years. Chi-square test, $p < 0.001(<0.05)$. The results were of high statistical significance.

CONCLUSION

Within the limits of the study, it can be concluded that extraction of mandibular third molars was more prevalent among females than males. Higher prevalence of mandibular third molar extractions was observed in patients in their third decade of life. Caries was the most common indication for extraction of mandibular third molars in our study population. Pericoronitis is the common indication for mandibular third molar extraction in the younger age group and caries is the common reason for removal in the middle age group, while periodontitis is the common cause for removal of mandibular third molars in the elderly people.

AUTHORS CONTRIBUTIONS

First author (Kalyani. P) performed the analysis, and interpretation and wrote the manuscript. Second author (Dr. M. P. Santhosh Kumar) contributed to conception, data design, analysis, interpretation and critically revised the manuscript. Both the authors have discussed the results and contributed to the final manuscript.

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CONFLICTS OF INTEREST

None declared

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