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THIRD MOLAR IMPACTION AS A PREDISPOSING FACTOR IN ANGLE OF MANDIBULAR FRACTURE - A RETROSPECTIVE ANALYSIS

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Abstract

Aim: *The mandibular angle and condylar region are most prone to fracture and this has been attributed to the presence and absence of the third molar. There was a definitive positive relation to impacted third molar and increased incidence of angle fractures. Third molar impaction acts as a predisposing factor to angle fracture. The aim of the study is to investigate the effect of third molar impaction in the mandible angle fracture.*

Materials and methods; *The study retrospectively analyzed the clinical and radiographic finding of the patients with the angle of mandibular fracture during the time period of June 2019 to March 2020 by reviewing 86,000 patients records who visited Saveetha Dental College in Chennai. The total sample of mandibular angle fracture obtained was 19. The data was tabulated and entered in excel. Chi-square analysis was done using SPSS package software. The variables impaction of third molar and side of mandibular angle fracture were compared. In the study, $p<0.05$ was considered to be the level of statistical significance.*

Results: *Among the 77 maxillofacial fracture data collected only 62.3% fracture were found to be mandibular fractures. The fracture that occured in the angle region of the mandible was 44.1%. 31.6% of the third molar were impacted whereas 68.4% were non-impacted teeth.There is higher incidence of mandibular fractures in males compared to that of females.Most common age group was 31-40 years. Chi-square test was done and p value obtained was 0.252 which >0.05. There was no significant difference between the presence of impacted third molar and angular fracture of mandible.*

Conclusion : *In this study it is observed that the mandibular fracture is more prevalent in male with right mandibular angle fracture in both impacted lower third molars.Presence of third molar attributes to the increased mandibular fragility which leads to mandibular fracture.*

Keywords: *Impaction - third molar- mandibular fracture.*

Introduction

Mandible is a tubular V shaped, immaculate in design and articulates with the skull pairing with temporomandibular joints. Mandible bone has varying regions of strength associated with stress distribution on function [1]. Mandible is often termed as a “mobile bone” and consists of some weak areas [2]. Mandible is regarded as the strongest bone in the maxillofacial region. Ironically mandible is the most commonly fractured bone of the maxillofacial injuries [3]. This occurs due to its prominence in face, the presence of the teeth and functional roles such as phonetics, mastication and deglutition weakens the corticocancellous framework of the mandible [4,5].

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People with mandibular fractures are presented with malocclusion, edema, pain, changes in facial contour, loss of dental elements, trismus, bone mobility and crepitation, ecchymosis or hematoma, paresthesia of lower lip [6,7].

When stress is subjected to mandible generally aims at the weakest point of the arch which results in extreme bending and tensile failure at the weakest point. Fractures in the mandible occur most often in the angle region, condylar region and parasymphysis area which are considered to be a weak area of the mandible. When force is applied at the chin region, the force is distributed along the body towards the condyle causing stress to occur in the lateral aspect of the angle [8]. Factors such as musculature of the face,presence or absence of impacted third molar and architecture of mandible contributes to the risk of angle fracture [9].

Angle region of the mandible is quite vulnerable for fracture as it forms the junction between ramus and the body and is influenced to a great extent by masticatory sling of muscles present in the medial and lateral aspects [10,11]. Angle of the mandible is found to be a transition zone between the dentulous and edentulous part of the mandible where retained teeth are frequently found [12]. Another reason for the increase in fracture at the angle of the mandible is because it acts as a transition zone from the dentate body of the mandible to the lateral flare of the ramus. Greatest amount of shear force was observed in the mandible angle region. Less amount of force and muscle tension is required to cause fracture in the angle of mandible [13].

A tooth is said to be retained after a normal eruption is still covered by bone or soft tissue [14]. Lower third molars are the teeth that are the most common tooth to remain impacted. Followed by upper third molars. Upper canine, supernumerary teeth. Most oftenly third molars are congenitally missing. As a result of spacial insufficiency that occurs in the area of eruption, third molars follow an abortive path of eruption and become impacted.[15] Impacted lower third molars are the most common tooth and are frequently related to infection , caries, dental resorption,cyst,tumour and predisposition to mandibular fracture. The presence of third molars tends to weaken the area which predisposes to fractures difference in stress distribution is observed [16]. Hence it was commonly postulated that an impacted third molar increases the risk for an angle of mandible fracture. The literature in this regard is highly divided with no consensus. Hence the present study aimed to investigate the effect of third molar impaction in the mandible angle fracture.

Materials and methods

Study setting

The study was conducted as a retrospective cross sectional study under a university setting. The ethical approval for the current study was obtained from the Institutional Review Board (SDC/SIHEC/2020/DIASDATA/0619-0320). Patients who visited Saveetha Dental College during the time period of June 2019 to March 2020 were considered. The patients were predominantly South Indian of varied populations due to geographic limitations.

Sampling

The list of patients who underwent treatment for mandibular fractures were collected by reviewing 86,000 patients records who visited Saveetha Dental College during the time period of June 2019 and March 2020. A total of 77 maxillofacial fracture data was obtained. Out of which 47 mandibular fractures data was collected. Inclusion criteria for the study was patients with angle fractures of mandibles with completely filled case sheets. Exclusion criteria for the study was fractures that occurred in the condylar and parasymphysis region and partially filled case sheets.The age group of the data was categorised as 1-10years, 11-20 years,21-30 years, 31-40 years, 41-50 years, 51-60 years. The final study sample size was 19 who had undergone treatment for mandibular fractures at angle regions. Any gross incomplete data which had the possibility of bias and could affect the studies was not included. All the data collected was cross verified by another examiner.

Statistical Analysis

The data collected was entered and tabulated in excel under the headings Age, Gender, Presence of impacted tooth, Side of Mandibular Fracture. The data was then transferred to Statistical Package for Social Sciences (SPSS) Version 1.0.0.1347 64 bit (IBM corp., NY, USA)

The data obtained was in the descriptive form and subjected to analysis with the help of frequencies, percentages,means and crosstabs.the results were obtained in form of graphs. The type of analysis done was correlation and association. Univariate analysis was done between individual factors. A non-parametric Chi-

square test was performed using the same SPSS software to find the statistical significance of the study. A p value of < 0.05 was considered to be statistically significant.

Results

Among the 77 maxillofracture data collected, 62.3% were found to be mandibular fracture. 44.1% of the mandibular fractures occur at the angle region. The total number of patients in the present study was 19 patients. All the patients had visited Saveetha Dental College and Hospital during the time period of June 2019 to March 2020. The patients had undergone treatment for mandible angle fracture. Among this study sample 14 were male patients (70%) and 5 were female patients (30%) (figure 1). The age distribution of the patients was 1-10 years (10.5%), 11-20 years (10.5%), 21-30 years (26.3%), 31-40 years (31.5%), 41-50 years (10.5%), 51-60 years (10.5%) (figure 2). The presence of impacted teeth was found to be 38 impacted (5.2%), 48 impacted (5.2%), both 38 and 48 impacted (21%), no impacted tooth (68.4%) (figure 3). The side of mandible angle fracture was found to be right sided fracture (52.6%), left sided fracture (47.3%) (figure 4). Association between gender and mandibular angle fracture shows increase in left mandibular angle fracture in males was observed (42.11%) (figure 5). Association between age groups and mandibular angle fracture shows i Increase of angular fractures in the age group of 31-40 years was observed (31.58%) (figure 6). Association between impaction of third molar and mandibular angle fracture shows increase of right mandibular angle fractures in patients with non- impacted third molar was observed (42.11%) (figure 7).

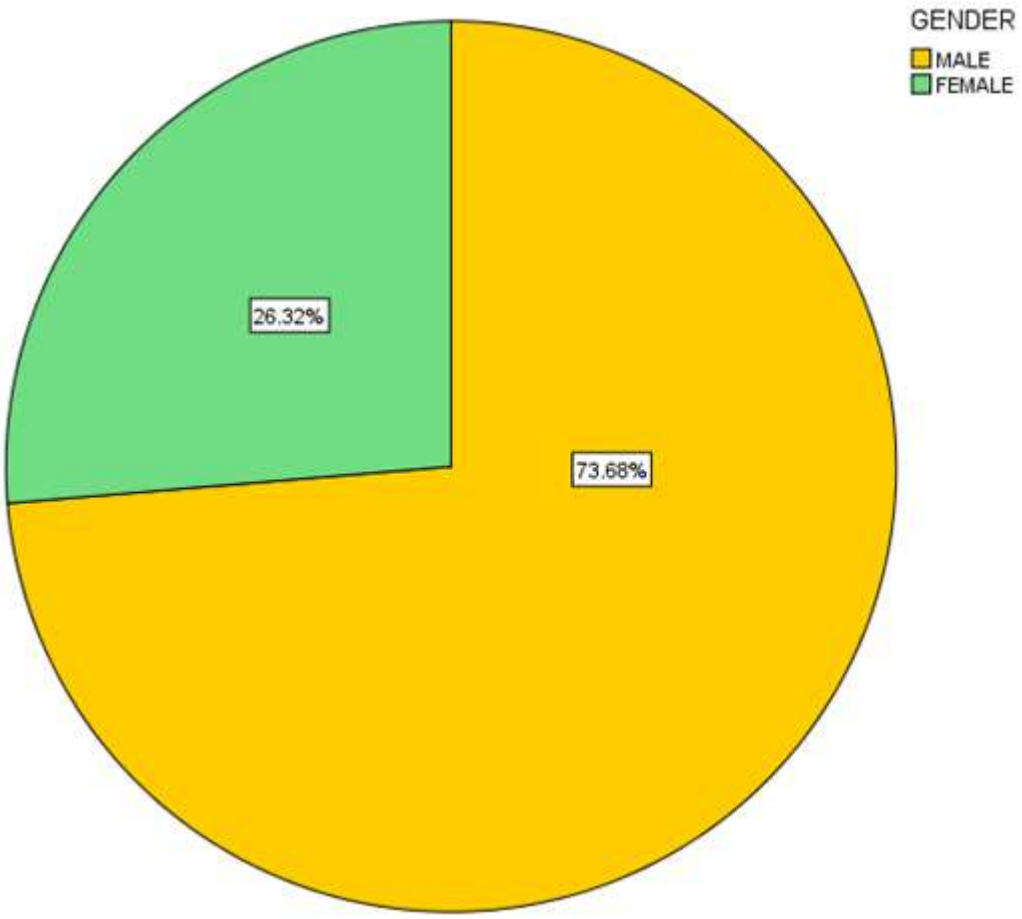

Figure 1:The pie chart depicts the percentage of gender of the patients who had undergone treatment for mandibular fracture.Male predominance was observed in mandibular angle fracture (73.68%) (yellow) compared to females (26.32%) (green).

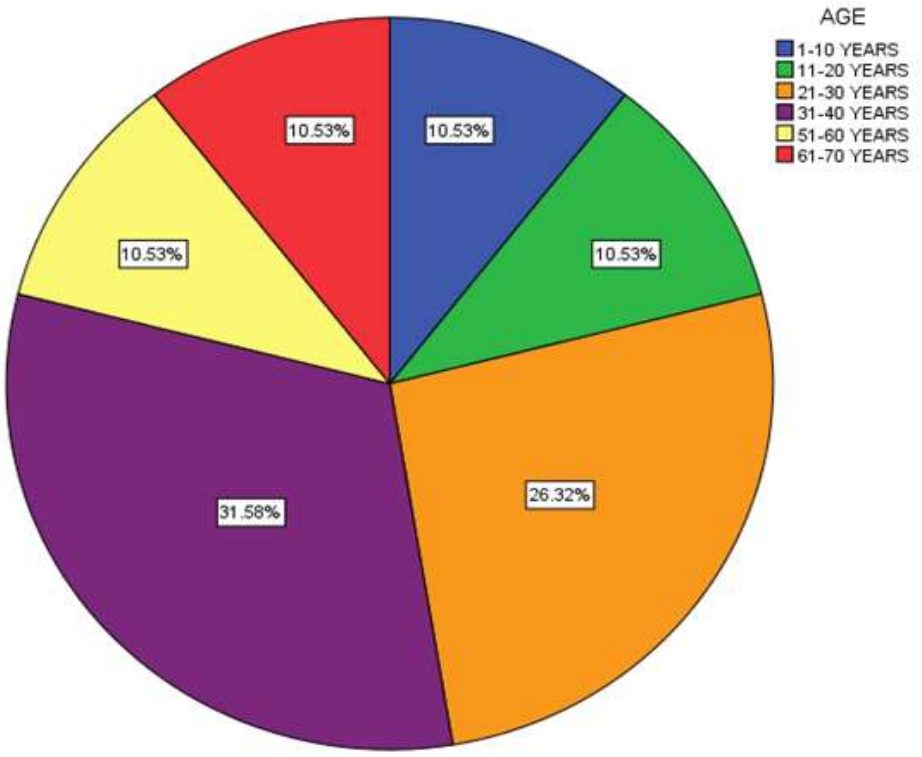

Figure 2 : The pie chart depicts the percentage of age group of the patients who had undergone treatment for mandibular fracture. 10.53% patients belonged to 1-10 years (blue), 11-20 years (green), 51-60 years (yellow), 61-70 years (red), 26.32% were 21-30 years(orange), 31.58% were 31-40 years(violet). Majority of the mandibular angle fracture was observed in the age group of 31-40 years (31.58%).

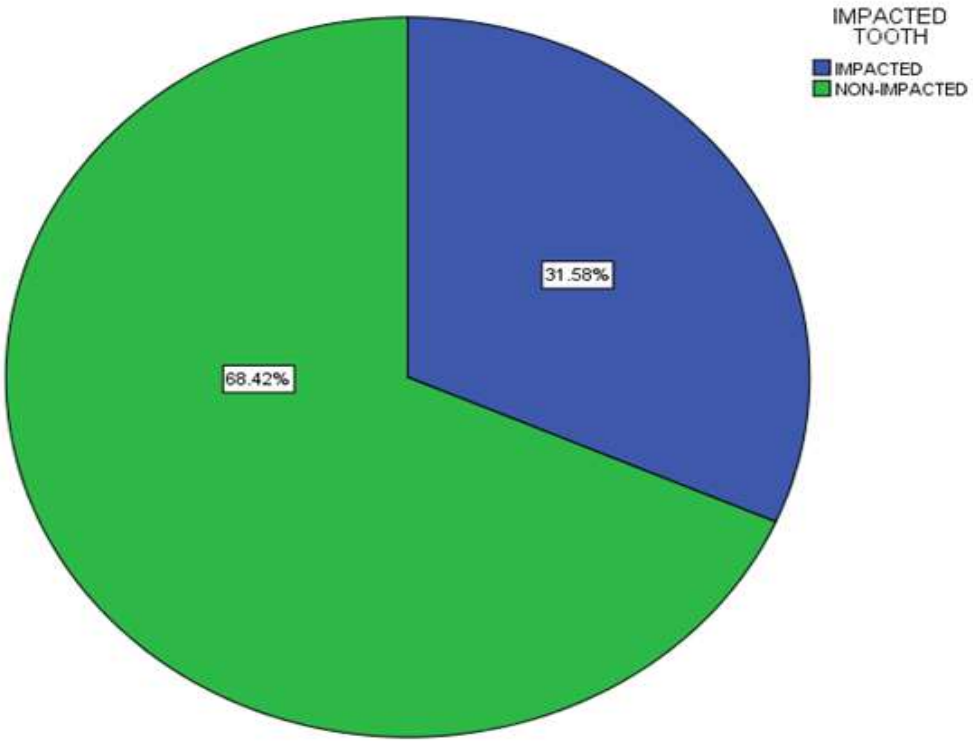

Figure 3 : The pie chart depicts the percentage of the presence of the impacted tooth in the patients who had undergone treatment for mandibular fracture. 31.58% of the lower third molars were impacted whereas 68.42%

of patients had non-impacted teeth. Majority of the patients with mandibular angle fracture had non-impacted third molars (68.42%)

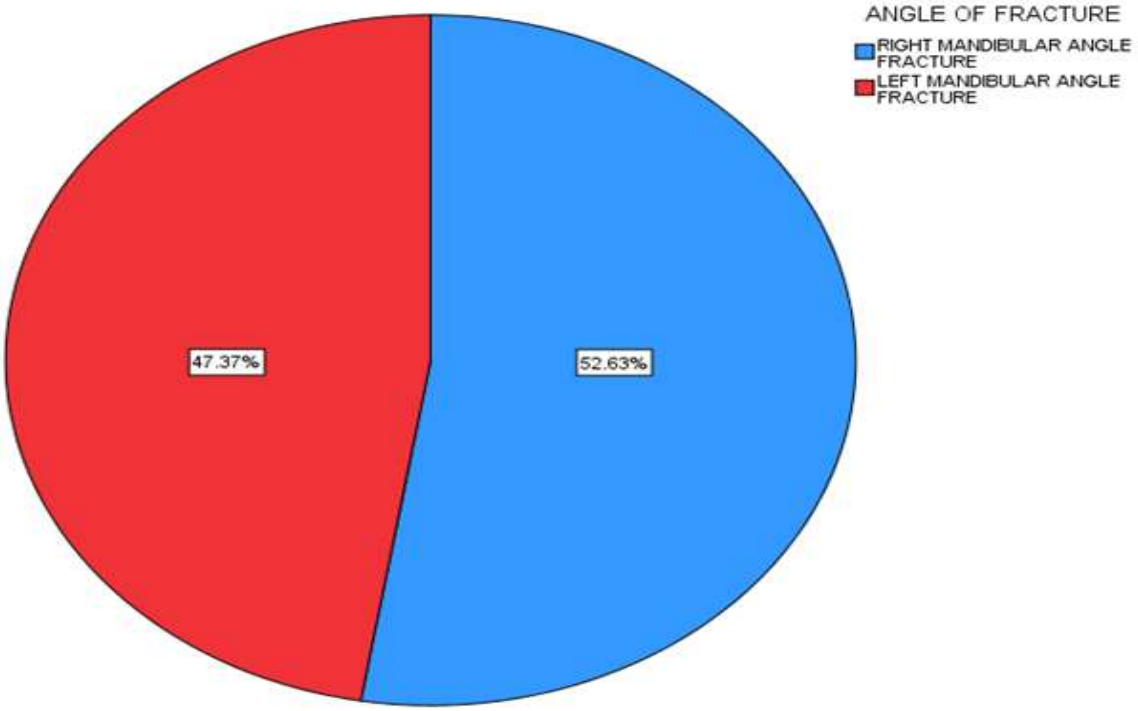

Figure 4 : The pie chart depicts the percentage of the side of angle fracture of the patients who had undergone treatment for mandibular fracture. 52.63% had right mandibular angle fracture (blue), 47.37% had left mandibular angle fracture. Predominance of right mandibular angle fracture was observed (52.63%).

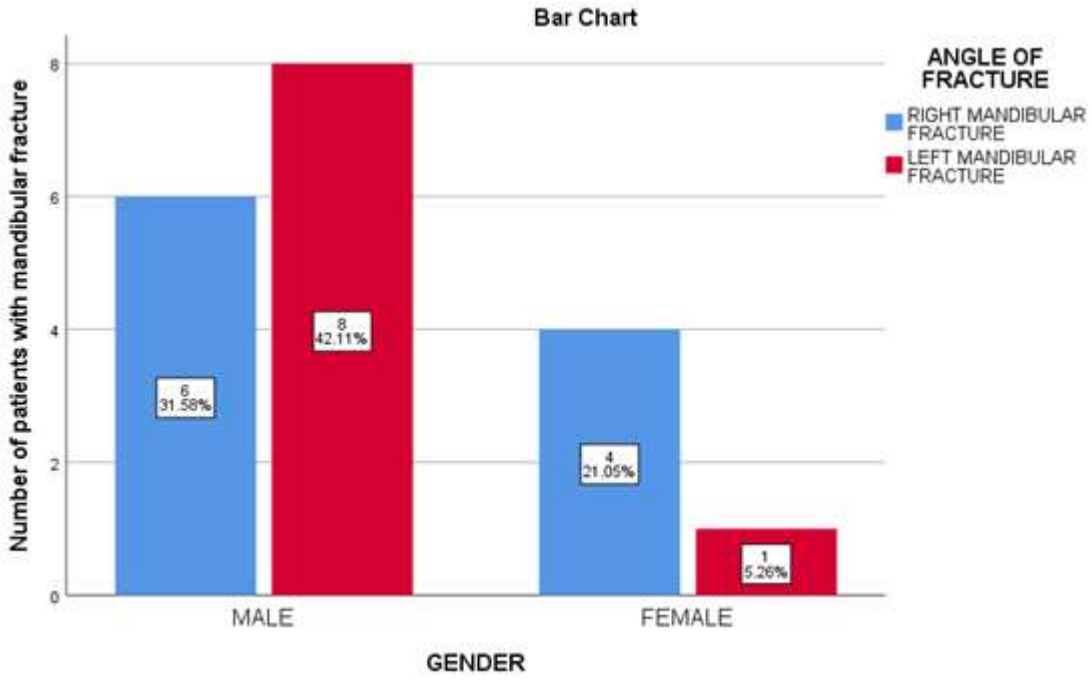

Figure 5: The bar graph depicts the association between gender and mandibular angle fracture. X-axis represents the gender of the patients based on angle fracture as right mandibular fracture (blue), left mandibular fracture (red).Y-axis represents the number of patients with mandibular fracture. Increase in left mandibular angle fracture in males was observed (42.11%). However , this was not statistically significant. Pearson Chi square , P = 0.153 > 0.05.

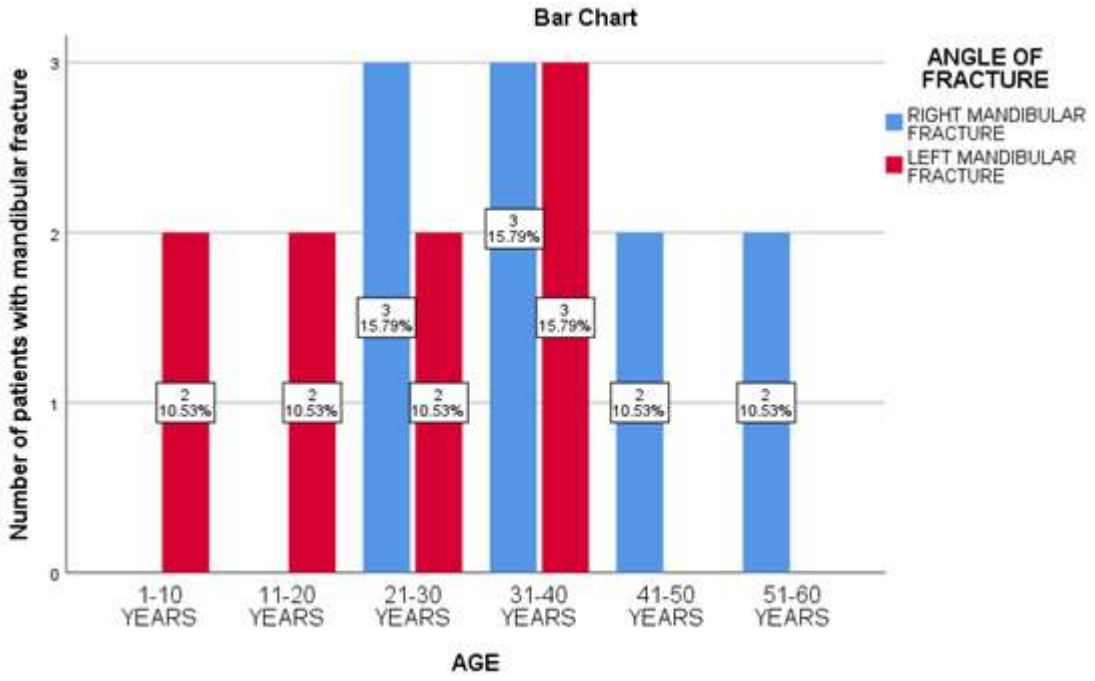

Figure 6: The bar graph depicts the association between age groups and mandibular angle fracture. X-axis represents the age group of patients based on angle fracture as right mandibular fracture (blue), left mandibular fracture (red).Y-axis represents the number of patients with mandibular fracture. Increase of angular fractures in the age group of 31-40 years was observed (31.58%). However , this was not statistically significant. Pearson Chi square , P = 0.147 > 0.05.

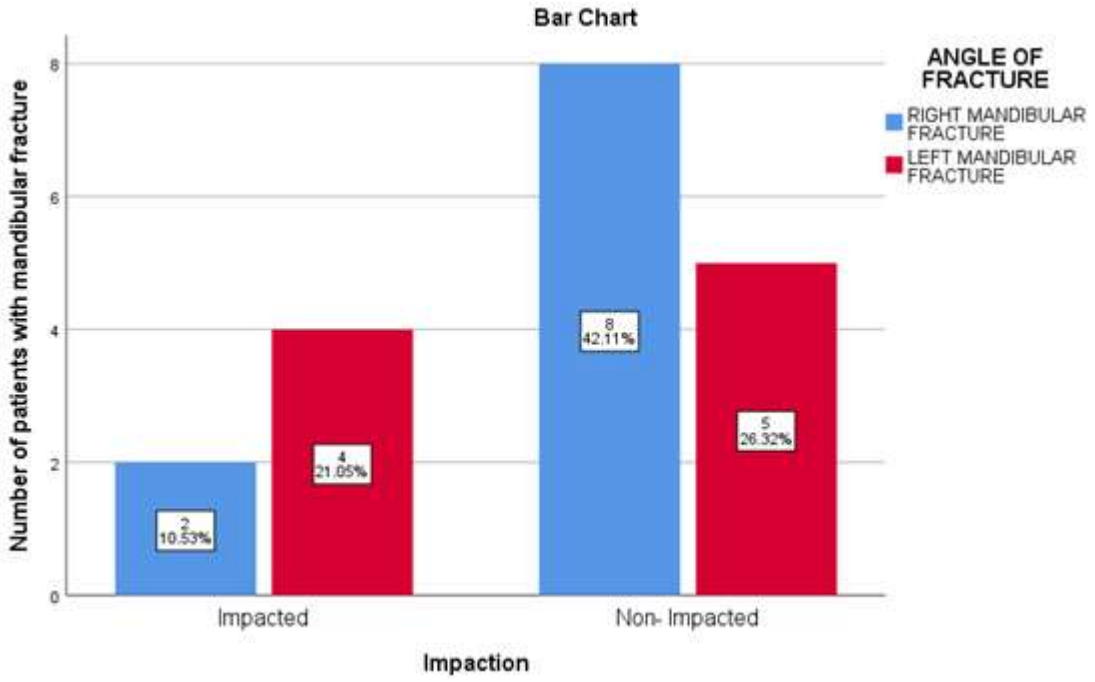

Figure 7: The bar graph depicts the association between impaction of third molar and mandibular angle fracture. X-axis represents the impaction of a third molar based on angle of fracture as right mandibular fracture (blue), left mandibular fracture (red). Y-axis represents the number of patients with mandibular fracture. Increase of right mandibular angle fractures in patients with non- impacted third molar was observed (42.11%). However , this was not statistically significant. Pearson Chi square , P = 0.252 > 0.05.

Discussion

Previously our team had conducted numerous pilot studies[17] , case report study [18], review studies [19,20], meta analysis studies [21,22], awareness studies [23], gene expression studies[24–27] , metabolic studies [28,29], clinical studies [30] over the past 5 years.

Increased incidence of angle fracture is seen when an impacted third molar is present. The external oblique edge and the widest portion of the tooth remains intact when a tooth is in complete occlusion. Incase of an impacted tooth, the external oblique ridge is present above the widest portion of the tooth.In case of partially impacted tooth. Disruption in the tension line is observed making the mandible more susceptible to fracture. [31]

The study reveals that male are more prone to mandibular fractures in comparison to females. According to previous literature, [32] states a similar evidence that male predilection is seen in mandibular fractures. This is because males are subjected to greater exposure to risk factors as facial trauma, road accidents and physical aggression compared to females.There are not many studies which correlate with female predilection.

The study reveals that male patients aged from 21-40 years were more prone for fracture whereas female aged 41-50 years were affected. According to previous literature,[33] states a similar evidence that people aged above 35 years are more prone to fractures. This is because the patient's exposure to physical activity increases by age.[34]

Mandibular angle region is weakened when there is an impacted third molar as it decreases the cross-section area of bone and lowers the resistance to external forces. [35]Based on the hypothesis of decrease in bone in the area of impacted third molar.Knowledge of biomechanics is essential to analyse whether the impacted third molar causes disruption of the cortical bridge of the superior border which leads to a relative osseous defect in the angle of mandible.[36]

The study reveals that in 31.6% of mandible angle fractures, there was presence of an impacted lower third molar. According to previous literature, [37] states a similar evidence that third molars which were impacted caused reduction in bone mass making the region prone to fractures whereas [8] states a different evidence that deep impactions were not associated with increased risk of fracture. [32] states that the risk of condylar fracture is more in case of absence of impacted third molar.

The study reveals that right sided mandibular fractures are more prominent compared to left sided fractures.According to previous literature, [8] states a similar evidence that right side angle fractures are more prominent. Whereas [38] states a different evidence that left sided fractures are more prominent. This is because most of the people are right handed which tends to hurt the left side of the victim during violent actions.[39]

The limitations of the study was that single centered study does not represent ethnic groups. The study further focuses on the position and inclination of third molar impaction, causes for mandibular fracture and on a larger sample size.

Conclusion

Male predilection was observed. Most common age to be affected with mandibular angle fracture is 31-40 years.Right sided mandible angle fracture with presence of both lower third molars impacted was prevalent. Positive relation to impacted third molars and increased incidence of angle fractures is observed. Increased mandibular fragility is seen due to presence of a third molar as a part of bone structure is lost to harbour tissue that does not contribute to the mandible's strength.

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Authors contribution

All authors have equally contributed to the research.

Conflict of interest

There is no conflict of interest.

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