
IS IMPACTED THIRD MOLAR A SIGNIFICANT CONTRIBUTOR TO SUSCEPTIBILITY OF THE ADJACENT SECOND MOLAR TO CARIES?

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ABSTRACT

CONTEXT: Several studies have assessed the association between impacted third molar and presence of distal caries on the second molar, however there is paucity of studies on how significantly impacted third molar contributes to dental caries experience on the second molar

OBJECTIVE: To determine if impacted third molar is a significant contributor to the susceptibility of the adjacent molar to dental caries.

MATERIAL AND METHODS: A prospective cross sectional study of patients with at least one carious second molar. Information on demographic characteristics, number of carious second molar, classification of the carious lesions based on site of occurrence of the caries, extent of the carious lesion, presence of a third molar and status of the third molar (impacted or not impacted). The data so obtained was analyzed using IBM SPSS.

RESULTS: A total of 88 patients with 126 carious second molars with more females. The mandibular left second molar was the tooth with the highest frequency of caries. Occlusal caries accounted for 71.4% of the carious lesions while distal caries was observed in 28.6% of the second molars. Statistically significant association between the surface affected by the carious process and presence of impacted third molar with 75.0% of second molars with a distal carious lesion having an impacted adjacent third molar

CONCLUSION: The second molars are

susceptible to caries however an adjacent impacted third molar could be a significant contributor to susceptibility of the second molar to distal caries.

KEYWORDS: second molar, caries susceptibility, third molar

INTRODUCTION

The molars have been shown to be the most affected teeth by dental caries in both deciduous and permanent dentition^{1,2} with dental caries predominantly found on the occlusal surfaces.^{3,4} Prevalence of dental caries on second molars has been reported to be 7-8% with it being higher in the mandible⁵ though another study reported a higher prevalence in the maxilla.⁶

The three main risk factors associated with dental caries development are diet, microflora and a susceptible tooth with further local and general risk factors identified.⁷ Among the local risk factors are the form and arrangement of the teeth.⁷

Despite the various factors implicated in the aetiology of dental caries several studies⁸⁻¹⁸ have reported the influence of impacted third molar on the caries experience of the adjacent second molar with calls for the prophylactic removal of the third molar.

Tooth position and inclination of the third molar has been observed to play a role in development of caries on the second molar^{14,19} with partially exposed mesioangular and horizontal mandibular third molars' occlusal surfaces forming plaque accumulative crevices against the distal surface of the second molars with subsequent development of distal caries on the second molars.¹⁴

Several studies have assessed the association between impacted third molar and presence of distal caries on the second molar⁸⁻¹⁸ however there is paucity of studies on how significantly impacted third molar contributes

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to dental caries experience on the second molar hence the purpose of this study. This study was designed to determine if impacted third molar is a significant contributor to the susceptibility of the adjacent molar to dental caries.

MATERIALS AND METHODS

This was a prospective cross-sectional study conducted among patients presenting with at least one carious second molar to the department of restorative dentistry of the University of Benin Teaching Hospital between January 2017 and March 2018. A systematic random sampling technique was employed to recruit participants for this study one in every 5 patients who met the inclusion criteria were recruited for the study until the calculated minimum sample size was met.

The data collection instrument was a pre-tested interviewer administered questionnaire. The questionnaire elicited information on demographic characteristics, number of carious second molar, classification of the carious lesions based on site of occurrence of the caries, extent of the carious lesion, presence of a third molar and status of the third molar (impacted or not impacted).

Periapical radiographs were exposed using the long cone paralleling technique to enable classification of the type of impaction of the third molar if impacted, extent of caries and any other radiographic findings associated with the second molar.

On clinical examination, the impacted third

molar was classified as partial impaction when the superficial portion of the tooth is covered only by soft tissue but the height of the tooth's contour is below the level of the surrounding alveolar bone and complete impaction when the tooth is completely encased in bone so that when the gingiva is cut and reflected back, the tooth is not seen.

The third molars were also classified using the Winter's classification based on the inclination of the long axis of the impacted third molar to the long axis of the second molar. The tooth was classified as mesio-angular when the impacted third molar is tilted towards the second molar in a mesial direction; disto-angular when the long axis of the impacted third molar is angled distally / posteriorly away from the second molar; horizontal when the long axis of the impacted third molar is horizontal and vertical when the long axis of the impacted third molar is parallel to the long axis of the second molar.

Inclusion criteria were all consenting patients with at least one carious second molar. Informed consent was obtained from all the participants. Ethical approval was obtained from the Ethics and Research Committee of the College of Medical Sciences, University of Benin, before commencement of the study.

The data so obtained was analyzed using IBM Statistical Package for Social Sciences (SPSS) version 21.0. The analysis was done using frequency distribution, cross tabulations, test of significance with chi square. $P < 0.05$ was considered statistically significant.

TABLE 1: SOCIODEMOGRAPHIC DISTRIBUTION OF THE PARTICIPANTS

Characteristics	Frequency	Percent
Gender		
Male	31	35.2
Female	57	64.8
Marital Status		
Married	32	36.4
Single	56	63.6
Age (years)		
<25	26	29.5
26-40	44	50.0
41-55	13	14.8
>55	5	5.7
Total	88	100.0

TABLE 2: ASSOCIATION BETWEEN TYPE OF CARIOUS LESION ON THE SECOND MOLAR AND PRESENCE OF AN IMPACTED ADJACENT THIRD MOLAR

Characteristics	Impacted third molar		Total n (%)
	Present n (%)	Absent n (%)	
Site of carious lesion			P<0.0001
Occlusal	12 (13.3)	78 (86.7)	90 (100.0)
Distal	27 (75.0)	9 (25.0)	36 (100.0)
Extent of the carious lesion			P=0.02
Enamel	3 (60.0)	2 (40.0)	5 (100.0)
Dentine	13 (20.3)	51 (79.7)	64 (100.0)
Pulp	23 (40.4)	34 (59.6)	57(100.0)
Total	39 (31.0)	87 (69.0)	126 (100.0)

FIGURE 1: DISTRIBUTION OF CARIES ON THE SECOND MOLAR AMONG THE PARTICIPANTS

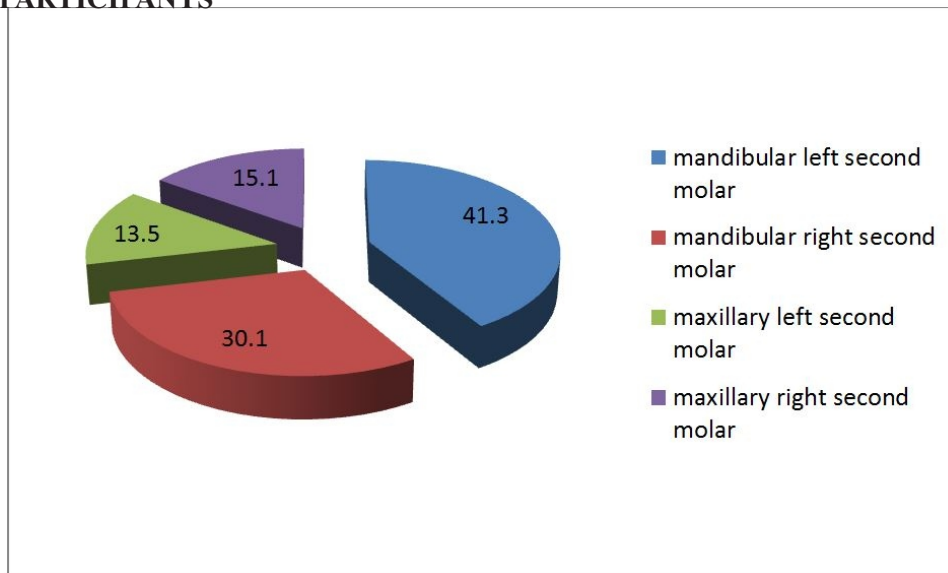
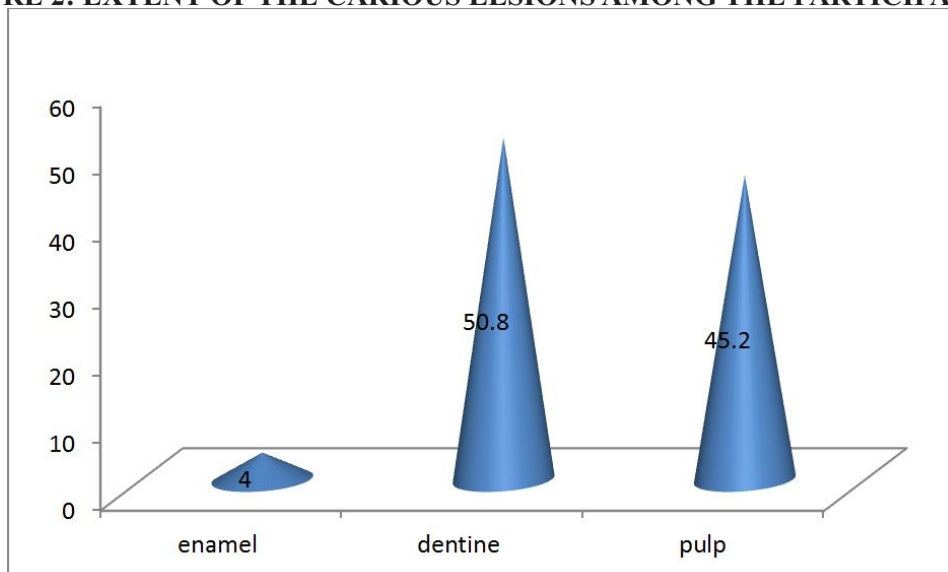


FIGURE 2: EXTENT OF THE CARIOUS LESIONS AMONG THE PARTICIPANTS



RESULTS

A total of 88 adult patients with 126 carious second molars were recruited for the study. There was a female preponderance with male female ratio of 1:1.8. About two-third (63.6%) of the participants were single. The age of the participants ranged from 17 to 73 years with a mean age of 31.81 ± 11.57 years, with 50.0% of the participants aged between 26 to 40 years (Table 1).

The participants presented with 1 to 4 carious second molar with a mean number of 1.43 ± 0.72 second molars. The mandibular left second molar was the tooth with the highest frequency of caries accounting for 41.3% while the maxillary left second molar was the tooth with the least caries experience observed in 13.5% of the cases (Figure 1).

Using the surface affected by dental caries, occlusal caries accounted for 71.4% of the carious lesions while distal caries was observed in 28.6% of the second molars. About half (50.8%) of the carious lesions had extended to the dentine, while 45.2% had involved the pulp (Figure 2).

Only 16.7% of the participants presented without any symptoms related to the second molar. Among those who presented with symptoms associated with the second molar, pain accounted for 64.8% and sensitivity was reported by 35.2%. Majority (86.5%) of the carious second molars had no radiographic findings of diagnostic significance.

Most (96.8%) of the carious second molars had adjacent third molars with 31.0% of the third molars impacted. Most (80%) of the impacted third molars were partially impacted and 75.6% of them had mesioangular impaction.

Table 2 depicts statistically significant association between the surface affected by the carious process and presence of impacted third molar with 75.0% of second molars with a distal carious lesion having an impacted adjacent third molar ($p < 0.0001$). There was also statistically significant association between the extent of the carious lesion on the second molar and the presence of an impacted adjacent third molar with more than half (59.5%) of the carious lesions that extended

to the pulp having no impacted adjacent molar. In like manner, majority (79.5%) of the carious lesions that extended to the dentine had no impacted adjacent molar ($p = 0.02$).

There was no statistically significant association between the surface affected by the carious process and the extent of caries on the second molar and the type of impaction on the adjacent third molar for second molars that had adjacent impacted third molar. Similarly, there was no statistically significant association between symptoms associated with the carious second molar and the presence of an impacted adjacent third molar.

DISCUSSION

Dental caries is one of the main oral diseases worldwide with its prevalence increasing in developing countries.²⁰ The molars have been reported to be the teeth most commonly affected by dental caries with varying reports regarding its distribution between the first, second and third molars.²¹

The reports from a finding suggested that women tend to utilise oral health care services to a greater degree than men.²² This may be the reason why a female preponderance was observed in this study. Furthermore, a sex bias with regards to dental caries among mature adults has been reported with females presenting with higher prevalence.^{6,23}

The age group most affected by dental caries of the second molar was the 26-40 years' age group. This is higher than a previous report in which the most common age group burdened with dental caries was the 17-25 years' age group.⁶ This difference can be attributed to the fact that this study only assessed the dental caries of the second molar teeth.

It has been observed in the primary dentition that the mandibular second molars are more affected by dental caries than the maxillary.²⁰ Although, this study was on permanent second molars the finding is similar with the mandibular second molars being the most affected with dental caries.

Occlusal caries of first and second molars have been reported to contribute significantly to caries frequency.⁶ This may be why

occlusal caries accounted for majority of the carious lesions in this study.

Dental caries is a chronic oral disease which progresses over time. Most of the participants in this study had carious lesions that had extended to the dentine and even involved the pulpal tissue. Giving the fact that most patients present to the dental clinic in Nigeria only as a consequence of symptoms,²⁴ in this study pain as a sequel of dental caries and also dentine sensitivity following exposure of the dentine after enamel demineralization during the caries process was the contributing factor to presentation for treatment.

Three quarters of the carious second molars that had distal caries had adjacent impacted third molars. This is typically associated with third molars in mesioangular and horizontal impaction where the proximal cervical end of the second molar teeth is affected resulting in distal caries. This could be as a result of lack of enough space for cleansing and improper oral hygiene practice, as teeth which are malaligned, malposed, rotated or otherwise not normally situated may be difficult to cleanse and hence favour the accumulation of bacterial plaque and debris,²⁵ a finding similar to that reported by Marques et al.²⁶

Mesioangular impaction of the third molar accounted for the majority of the impacted third molar in this study. This corroborates findings of other studies^{17,27,28} where mesioangular impaction of the third molar was noted to be the most common type of impaction.

Eruption status, type of angulation and nature of tooth contact between both molars have been shown to be useful disease predictors which can be used to indicate likelihood of a caries process occurring on the distal aspect of the second molar.^{13,16}

Distal caries is thought to be tooth specific and limited only to impacted third molar with no case of distal cervical caries associated with the second molar adjacent to a fully erupted third molar.¹⁵ Second molars adjacent to absent third molars have been reported to be at the lowest risk for developing pathology whereas second molars adjacent to soft tissues impacted third molars were at greatest

risk.⁸ This is similar to findings of this study where distal caries on the second molar was observed to be associated with impacted third molar and this was statistically significant.

It was observed that majority of the carious lesions that extended to the dentine had no impacted adjacent third molar. This may be because aside from the position dynamics in terms of impaction, factors such as patient's oral hygiene and level of caries could be contributory to the development of carious lesions on the second molar

CONCLUSION: The second molars are susceptible to caries however an adjacent impacted third molar could be a significant contributor to susceptibility of the second molar to distal caries.

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