PREVALENCE OF CARIOUS LESIONS IN EARLY AND LATE MIXED DENTITION ORTHODONTIC PATIENTS

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ABSTRACT

To investigate the commonly affected carious teeth in the early and late mixed dentition period of male and female orthodontic patients.

A total of 224 (Male: Female ratio 118: 106) patients were diagnosed in the early mixed and late mixed dentition in 3 age subgroups; 6-7 years, 8-10 years and 11-13 years at the patients were investigated regarding carious lesions in the maxillary and mandibular dentition, carious lesions in male and female subjects, carious lesions in primary and permanent teeth. Intra-oral examination and radiographs (orthopantogram and peri-apical) were done for each patient to confirm the carious lesions.

The mandibular dentition was affected 3 times more than the maxillary dentition (mean values for total mandibular dentition 62.3 and total mean value for maxillary dentition 28.6). Males (total mean value 75.7) were affected 3 times greater as compared to the female patients (total mean value 21.9). 8-10 years age group has the highest carious prevalence (total mean value 54.6) followed by the 11-13 years age group (total mean value 24.6) and the 6-7 years age group (total mean value 18-7).

Both primary and permanent mandibular molars had more carious lesions as compared with the maxillary molars. Mandibular 2nd primary and 1" primary molars and permanent lower 1s` permanent molars had the highest carious lesions. 8-9 years age group had the highest carious lesions for both primary and permanent teeth. Males had more (ratio 3:1) carious lesions as compared to the females.

Key words: *caries, dental complications, mixed dentition.*

INTRODUCTION

Caries is the most prevalent dental disease to affect mankind'. Carious lesions are frequently encountered during routine orthodontic diagnosis[2-3]. It complicates orthodontic treatment planning' and has a major contribution towards dental crowding incisor midline shifting, dental arch-shortening and delayed eruption of permanent teeth[5]. Almost 35 percent of children between 6.12 years age suffer from carious lesions of the oral cavity[6], affecting both primary and permanent teeth. The lack of oral hygiene procedures and domestic dental neglect accounts for the etiological factor causing caries'. The newly eruption permanent teeth, and primary molars are the teeth mostly affected by caries in the mixed dentition periods[8]. The child's daily diet at the 6-13 years age is usually junk food, sweet beverages and sticky candy, which cause quick decay of teeth[0]

Furthermore, the lack of professional mother-care and advice combined with sweet-sticky diet intake and pacifiers dipped in honey or sweetened substances causes rampant carious lesions in the infancy and early childhood period[1]0

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In this article, we investigate the various commonly affected carious teeth in routine orthodontic check-up ranging from the early mixed dentition period to the late mixed or early permanent dentition period (6-13 years age) of make and female children and discuss the various reasons and disadvantages.

MATERIALS AND METHODS

A total of224 (Male: Female ratio 118: 106) patients were diagnosed during routine initial examination at the orthodontic department, Jinnah Medical and Dental College, Karachi. The age range was 6-13 years (mean 8.9 years age). The ages were sub-divided into 3 groups: 6-7 years, 8-10 years, 11-13 years respectively.

The patients were investigated regarding carious lesions in the maxillary and mandibular dentition, carious lesions in male and female subjects and carious lesions in primary and permanent teeth in the various age sub-groups encountered. A complete intra-oral examination was conducted for each patient with dental probe and mirror. OPG (orthopantogram) and periapical radiographs were used to confirm the existing carious lesions. In our patient sample, carious lesions ranged from mild pit and fissure caries to inter-proximal caries and grossly decayed lesions. However, the extent of tooth involvement was not noted, only the presence or absence was recorded in every patient during initial examination.

Statistical Evaluation

SPPS 10.0 statistical evaluation computer program was used and the mean values were obtained for each parameter.

RESULTS

Upper and Lower Arch Parameters: The mandibular dentition was affected 3 times more than the maxillary dentition (mean values for total mandibular dentition 62.3 and total men value for maxillary dentition (28.6).

Six Distribution Parameters: The six distribution was calculated and was found that males (total mean value 75.7) were affected 3 times greater as compared to the female patients (total mean value 21.8). Both the sexes had more carious lesions in the mandible as compared to the maxilla (Chart 1). In males, the mean mandibular caries value was 73.7 as compared to the men maxillary value of 26.3, and in females the mean caries mandibular dentition value was 64.8 as compared to the mean maxillary dentition value of 35.2. As evident, males had slightly higher mandibular carious lesions (mean value 73.7) as compared to the female mandibular carious lesions (mean value 64.8).

Sex and Age Distribution Parameters: The carious prevalence was noted in all 3 age groups (Chart 2). In all 3 age groups, male suffered from slightly higher carious primary and permanent molars as compared to their female counterparts. However, the 8-10 years age group has the highest carious prevalence (total mean value 54.6) followed by the 11-13 years age group (total mean value 24.6) and the 6-7 years age group (total mean value 18.7). Both males and females had more primary carious lesions (total mean values 54.8) as compared to permanent teeth (total mean value 32.7).

Primary Teeth Parameters: The most commonly affected primary teeth (Chart 3.a) were the mandibular 2nd molars (mean value 42.3), followed by the mandibular 1st molar (mean value 31.6) and the maxillary 2nd molar (mean value 19.7). The primary mandibular canines showed the least carious parameters (mean value 4.7). When compared to the age sub-groups, females had slightly higher primary tooth carious lesions (mean value 32.8) in the 8-10 years group, while males had slightly higher caries of primary teeth in both the 6-7 years age group and the 11-13 years age group (Chart 3.b).

Permanent Teeth Parameters: The most commonly encountered carious permanent tooth (Chart 4.a) was the mandibular 1St permanent molar (mean value 29.6), followed by the maxillary 1st permanent molar (mean value 18.7) the mandibular 2nd premolar (mean value 12.2), the maxillary 2nd premolar (mean value 7.9) and the maxillary 1st premolar (mean value 4.82). The permanent incisors (mean value 0.87) and canines (mean value 0.08) demonstrated no carious lesions showing insignificant parameters (<1.00). When compared to the age, all sub-groups showed slightly greater male mean values as compared to the female mean values obtained. The highest carious rate was recorded in the 8-10 years age group with male mean value of 28.7 and female mean value of 20.8 (Chart 4.b).

Chart 1: Caries Distribution in Maxilla & Mandible

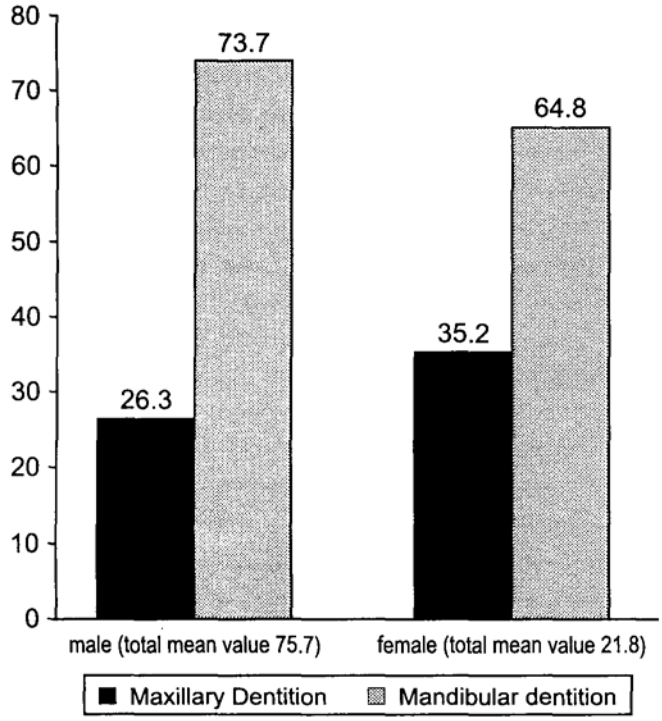


Chart 2: Sex & Age Distribution Parameters

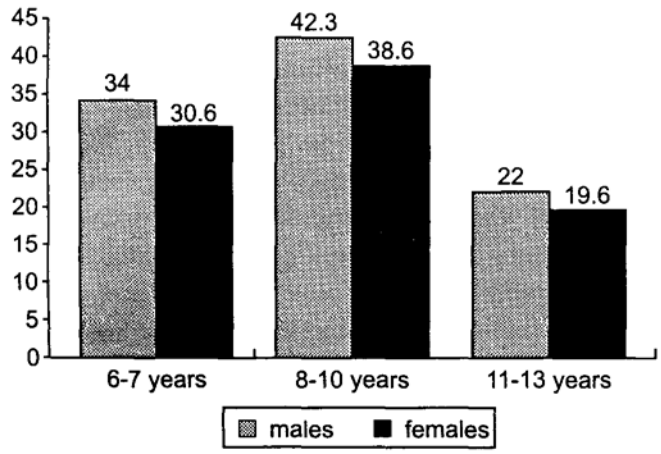


Chart 3a: Primary Teeth Parameters in Maxilla & Mandible

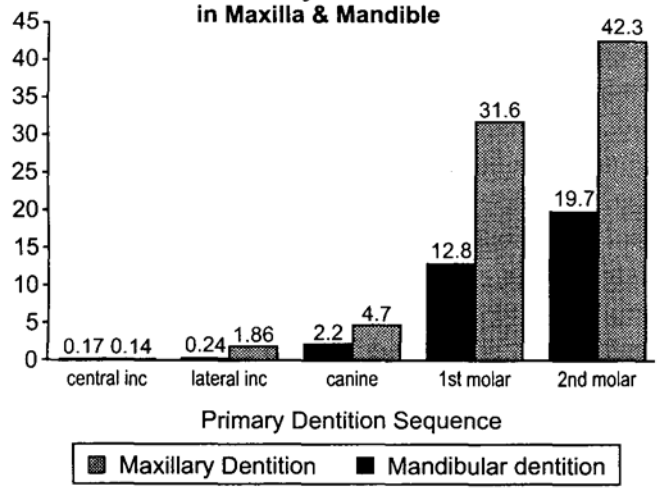


Chart 3b: Primary Teeth Parameters with Age Groups

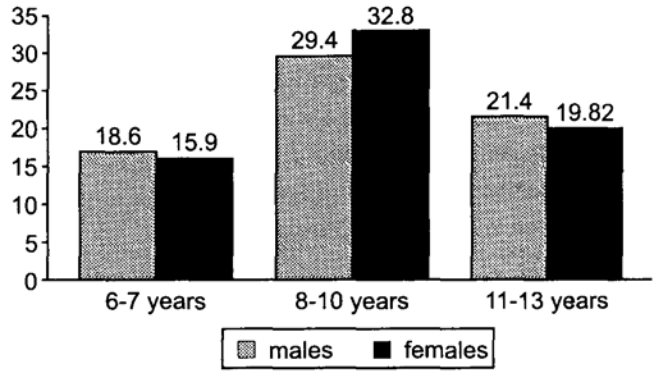


Chart 4a: Permanent Teeth Parameters in Maxilla & Mandible

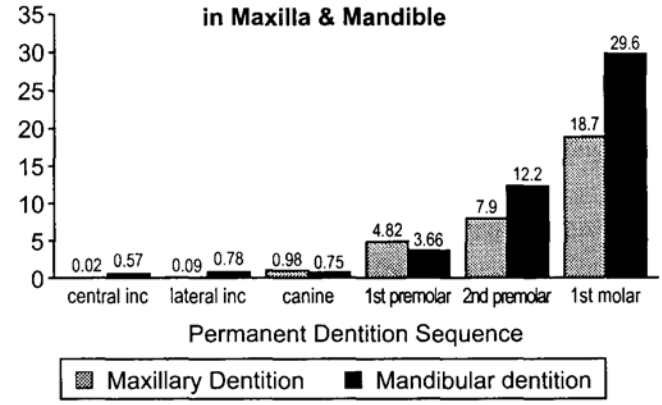
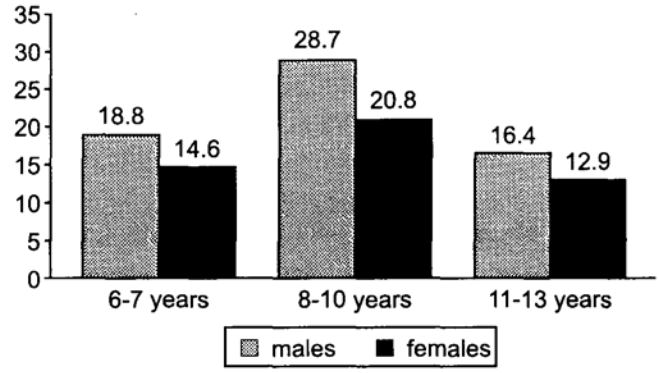


Chart 4b: Permanent Teeth Parameters with Age Groups



DISCUSSION

Primary and permanent tooth carious lesions are routinely encountered during initial intra-oral orthodontic diagnosis [1-4,41]. In our study, both primary and permanent molar teeth showed a high carious prevalence. In the present study only caries lesions in the early mixed dentition to the mixed dentition period recorded in the orthodontic patient samples (6-13 years age group). However, other similar studies[1-3] have investigated carious prevalence in the mixed dentition

together with the preventive dental treatment options to deal with carious prone teeth in the 6-12 years old patients.

Researchers[14-15] investigating carious prevalence have found rampant caries lesions affecting primary teeth till 10 years age. David J and Wang NJ 2005[15] found rampant carious primary and permanent molars in association with urban living conditions.

Cas anova-Ros ado AJ et. all[6] investigated 1644 children aged between 6-13 years age and reported 77.4% overall caries prevalence in both primary and permanent teeth. Primary teeth demonstrated more carious lesions as compared to permanent teeth with mean values of 73.6 for primary molars compared to 49.4% for permanent molars. Irigoyen M and Villanueva R" also investigated greater primary tooth lesions as compared to permanent lesions in young suburban children between 6-10 years age. Our study results agree with these parameters as both males and females recorded greater primary carious lesions as compared to permanent carious lesions.

As evident, our study focused on visual eye-assessment and radiographs (peri-apical and orthopantograms) to detect carious lesions. Vanderas AP et.al[18] and Uprichard KK[19] recommend intra-oral examination with dental probe-mirror and radiographic evaluation as compared to laser examination to detect and identify 1st permanent molar and 2nd primary molar carious lesions. Good clear radiographs can detect even minute occlusal and inter dental carious lesions, while class 5 cervical lesions are detected intra-orally by visual naked eye assessment. DeAraujo DR[20°] also investigated approximal carious lesions in primary teeth and recommended radiographic (OPG and peri-apical) and clinical intra-oral examination.

In this study, mandibular dentition showed greater carious susceptibility as compared to maxillary dentition (mean values for total mandibular dentition 62.3 and total mean value for maxillary dentition 28.6). These findings agree with previous investigations[21-22] that carious lesions are more prevalent in the mandible as compared to the maxilla. Greenwell AL and Johnsen D[23] also evaluated the progression of carious lesions from primary to the mixed dentition period (58 years age) found greater mandibular carious tooth lesions as compared to maxilla.

In our study, patients showed up for initial diagnosis requiring orthodontic treatment. As mentioned earlier, carious lesions in children complicates future orthodontic treatment planning. Investigating orthodontic complications, Thind BS and Hewage S[24] found greater incisor crowding and lack of permanent canine eruption space in the mandibular arch attributed to loss of arch length due to carious lesions and early extraction of primary molars. Loss of inter-dental enamel due to inter-proximal carious lesions also causes loss of leeway space leading to arch length shortening together with mesial drifting of the permanent molars[25]. Furthermore, Proffit WR[26] noted that children with inter-proximal carious lesions had more incisor retroclination and dental crowding as compared with no carious lesions. Little[27] also investigated greater dental arch shortening and lower labial segment crowding associated with carious primary molars.

Nowadays, the prevalence of carious lesions in orthodontic practice increasing[27]. This could be attributed to the change in the modern diet and due to lack of oral awareness programs in schools related to third world under-developed countries[9,28]. Primary and permanent molars have more affinity to develop carious lesions due to their occlusal morphology consisting of pits and fissures. As noted in our patient study sample, both primary and permanent molars were carious. The effect of diet was not investigated in this study. But modern-day diet remains the major contributing factor leading to early decay and loss of both primary and permanent teeth[28-29], complicating future orthodontic treatment planning.

As investigated in our study, males suffered more carious lesions as compared to their female counterparts. This could be attributed to more dental awareness in the females as compared to their male counterparts. In the past very few investigators30-31 have noted higher levels of oral hygiene in females as compared to males. Onyeaso C0[32] however, disagrees with these findings and reported and reported equal dental awareness in males and females and recommends aggressive dental public campaigning as a successful step to ensure greater oral hygiene levels amongst both males and females school-going orthodontic patients. Grossman E[33] reported that orthodontic female patients brushed and mouth-rinsed more frequently for greater periods of time as compared to

the male patients. Our study also agrees with these findings as more dental awareness and self-motivation in the females could be the reason for the decreased carious rate in our patient sample.

In our study, the most commonly encountered carious permanent tooth was the mandibular 1st permanent molar, followed by the maxillary 1st permanent molar and the mandibular 2nd premolar. These results agree with the findings of Leroy R and Bogaerts 2005" who reported significant carious lesions in mandibular 1st and 2nd permanent molars of children in the late mixed dentition period. Most researchers[34-35] agree that permanent 1st molars due to their early eruption at a time when child has a more sweet-intake diet and close proximity to carious primary 2nd molars are more prone to carious lesions than any other tooth. Furthermore, by the time the child reaches 10 years age, most of the **1st** permanent mandibular molars have pit and fissure caries and inter-dental caries. Mejare I and Stenlund **11**[36] reported increased caries of 1st permanent molars and 2nd primary molars amongst. Caucasian populations. The increased prevalence of carious mandibular 1st permanent molars could also be attributed to greater food lodging, more developed occlusal pits and fissures, mesial tilting and lack of fissure sealant application during preventive dental visits, and lastly, due to early loss of primary 2nd molars causing inter-proximal food trapping".

In the present study, the most commonly affected primary teeth were the mandibular 2nd molars, followed by the mandibular Pt molar and the maxillary 2nd molar. Primary teeth "been around longer" as compared to permanent teeth have less resistance to caries lesions and are more prone to become carious. Armfield JM[38] also reported an increased incidence of primary teeth carious lesions in orthodontic examination of teenagers. Crossly carious mandibular primary molars in children were also reported by Leroy R et.a1[39] while detecting the effect of caries in primary molars on cavity formation of adjacent 1st permanent molars. Our results agree with the findings of Peressini S and Leake JL[40]° who reported significant primary mandibular Pt and 2nd molar carious lesions between 7-13 years old aged children.

The patient samples in our investigation were subgrouped into 3 ages. It was found that the 8-10 years group had the highest caries prevalence regarding permanent and primary teeth followed by the 11-13 years and 6-7 years age group. Our findings agree with Irigoyen M and Villanueva R[17] who reported greater primary tooth lesions in the 8-10 years mixed dentition period compared to the late mixed dentition period. However, Soffola 0 et.al[41] reported an overall low carious rate in both the primary and permanent dentition of school children aged between 4-16 years age.

As mentioned earlier that recent research[38-42] also blames parents for the oral hygiene detoriation due to lack of checking the child's brushing habits and food-intake. They have found more positive dental hygiene feedback when parents are involved in manually brushing and checking their children's teeth and have reported decreased carious rates with mother's contribution rather than rely on the child's self-motivation.

CONCLUSION

1. Mandibular dentition had more carious lesions as compared with maxillary dentition.
2. Both primary And permanent dentitions had various lesions, however, primary teeth had greater caries as compared to permanent teeth.
3. Mandibular 2nd primary and 1st primary molars and lower Pt permanent molars had the highest carious lesions.
4. 8-10 years age group had the highest carious lesions for both primary and permanent teeth.
5. Males had more (ratio 3:1) carious lesions as compared to the females group.

Further investigations with greater patient samples is required to substantiate carious prevalence in the children. Furthermore, the etiological factors leading to the carious rate should be investigated.

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