

# ASSOCIATION BETWEEN PULP EXPOSURE ON CLINICAL AND RADIOGRAPHIC EXAMINATION IN FIRST PERMANENT MOLARS WITH CLASS II CARIOUS LESIONS

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## ABSTRACT

*This study was conducted to assess association between clinical and radiographic exposure of the pulp in class II carious lesion in first permanent molars. This observational study was carried out in the Operative Department of Bahria Dental College during the period of January -December 2014.*

*Two hundred fifty eight patients with class II carious lesion were examined clinically and radiographically to confirm either pulp was involved or not by a single operator. Data were entered in SPSS (statistical packages of social science, version 17) for descriptive analysis and to check statistically significant relationship between clinical and radiographic pulp exposure. There were 154 males and 104 females. Frequency of left mandibular first molars was 52.7%, high among all molars. This study showed, out of 258 patients, 150 had exposed pulp on clinical examination and 108 were not having exposed pulp on clinical observation. Radiographic analysis of same teeth showed different result. Out of 258 patients, 216 had pulp exposure on radiograph and 42 teeth did not have pulp exposure. About pulp exposure, significant relationship was found between clinical and radiographic examination with p-value 0.000.*

**Keys Words:** Caries, First permanent molars, periapical radiographs, pulp exposure, clinical examination.

## INTRODUCTION

Dental caries is a common oral disease caused by demineralization of tooth structure, which is caused by acid produced by bacteria in the presence of fermentable carbohydrates.<sup>1</sup> Tooth caries is the most prevalent infectious disease in humans, affecting 97% of the population in their lifetimes.<sup>2</sup> Dental caries can affect various sites of the tooth. The most common sites for caries to occur are pits and fissure and proximal surfaces.<sup>3</sup> These areas are more difficult to clean and thus more prone to caries. When this occurs in the proximal area, carious lesions are often located just below the contact point.<sup>4</sup> Proximal caries can progress silently and may take years to reach pulp. Proximal caries can be difficult to detect by visual inspection alone, so dental

radiographs are required to see the extension of the carious lesion or to confirm either pulp is involved or not.<sup>6</sup>

Although modern research keen to develop better methods for detecting dental caries, current clinical practice is still largely limited to conventional visual and visuo-tactile tools such as sharp explorers and dental radiographs.<sup>7</sup> However, these conventional methods which are aimed at detecting cavitated lesions were found to have low sensitivity in detecting early caries lesions. For example, dental radiographs are useful in detecting larger, advanced and possibly cavitated dental caries, but limited image resolution and poor radiographic contrast of early carious lesions reduces radiographs insensitive for detecting early stage dental caries.<sup>6</sup> In the last decade, several new caries detection methodologies have emerged.<sup>8</sup> Many of these new developments are bitewing radiographs, dyes, fiber-optic light transillumination, and quantitative light (or laser) induced fluorescence.<sup>9</sup>

When proximal caries progress extensively into dentin, resulting in cavity formation.<sup>11</sup> If the caries is not treated in time, it can lead to infection, pain, and

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**Received for Publication:** January 8, 2015

**Revision Revised:** March 3, 2015

**Accepted:** April 1, 2015

tooth loss.<sup>12</sup> First molar is the first among the permanent teeth to erupt and get caries earlier.<sup>4</sup>

Therefore, the goal of the current study was to evaluate the association between pulp exposures on clinical examination with pulp exposure on periapical radiograph in Class II carious lesion affect first permanent molars.

## METHODOLOGY

It was an observational study conducted in Department of Operative Dentistry, Bahria Dental College from January 2014 to December 2014. It comprised of two hundred and fifty eight patients (aged 12 to 35 years) with large Class II carious lesion in first permanent molars. Informed consent of all subjects was obtained after explaining the nature of the study. The inclusion criteria of this study were healthy patients with Class II caries on mesial or distal side of tooth which lead to pulp exposure, maxillary or mandibular first molar involvement, and history of mild pain. Exclusion criteria were patients younger than 12 years and older than 35 years, presence of any syndrome, swelling and severe pain on percussion, if all first molars with class II caries lesion.

Examination was carried out on dental chair using mirror and probe after having a through history of pain. Class II lesions were first explored clinically and then radiograph of the affected teeth were taken. Data were recorded on a preset proforma.

Data was analyzed by using SPSS 17. Frequencies and percentages were computed for gender, age, and tooth number, pulp exposure on clinical examination and pulp exposure on radiograph. Chi-square test was

used to assess the relationship between pulp exposure on clinical examination and pulp exposure on radiograph. The level of significance was set at 0.05.

## RESULTS

The total numbers of subjects were 258 (Fig. 1), out of which 154 (59.7%) were males and 104 (40.3%) were female with age ranged from 12 to 35 year old. Table 4 shows the anatomic distribution of the involved teeth; frequency of left mandibular first molars (n=136) were highest in all teeth followed by right mandibular first

TABLE 1: FREQUENCY OF PULP EXPOSURE ON CLINICAL AND RADIOGRAPHIC BASIS

		Frequency	Percent
Pulp Exposure on Clinical Examination	Yes	150	58.1
	No	108	41.9
	Total	258	100.0
Pulp Exposure on Radiograph	Yes	216	83.7
	No	42	16.3
	Total	258	100.0

TABLE 2: FREQUENCY & CROSSTABULATION OF GENDER WITH PULP EXPOSURE ON CLINICAL AND RADIOGRAPHIC EXAMINATION

Pulp exposure on clinical examination				Chi-square test
Gender	Yes	Not	Total	0.000
Male	74	80	154	
Female	76	28	104	
Total	150	108	258	
Pulp exposure on radiograph				
Gender	Yes	Noe	Total	P-value
Male	121	33	154	0.006
Female	95	9	104	
Total	216	42	258	

TABLE 3: CROSSTABULATION BETWEEN PULP EXPOSURE ON CLINICAL EXAMINATION AND PULP EXPOSURE ON RADIOGRAPH

Pulp Exposure on Radiograph					Chi-square test
	Yes	No	Total	P-value	
Pulp Exposure on Clinical Examination	Yes	141	9	150	0.000
	No	75	33	108	
	Total	216	42	258	

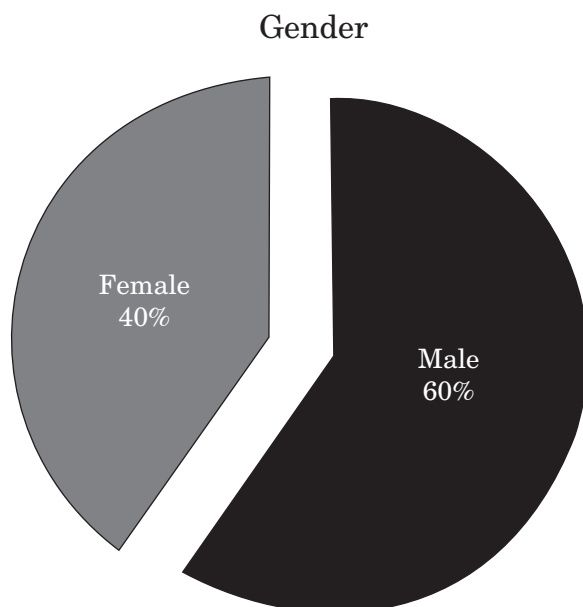


Fig 1: Frequency of Gender

TABLE 4: CROSSTABULATION BETWEEN PULP EXPOSURE ON CLINICAL AND RADIOGRAPHIC EXAMINATION WITH TOOTH TYPE

		Right Max- illary First molars	Left Maxil- lary First molars	Right Man- dibular First molars	Left Man- dibular First molars	Chi-square test p-value
Pulp Exposure on Clinical Examination (N=258)	Yes	19	17	23	91	0.003
	Not	27	08	28	45	
	<b>Total</b>	<b>46</b>	<b>25</b>	<b>51</b>	<b>136</b>	
Pulp Exposure on Radiograph (N=258)	Yes	40	21	43	112	0.907
	Not	06	04	08	24	
	<b>Total</b>	<b>46</b>	<b>25</b>	<b>51</b>	<b>136</b>	

molars (n=51) and right maxillary first molars (n = 46). Out of 258 patients, (Table 1) 150 had exposed pulp on clinical examination with Class II carious lesion and 108 were not having exposed pulp on clinical observation. When radiographic analysis of same teeth was done, different result was obtained. Out of 258 patients, 216 had pulp exposure on radiograph and 42 teeth did not have pulp exposure. Out of 150 teeth that were found exposed on clinical examination, 141 were found to be exposed on radiographic examination as well, while 9 had no sign of radiographic exposure. Out of 108 teeth that were not found exposed on clinical basis, 75 were appeared to be exposed on radiographic examination as well, but 33 had no sign of radiographic exposure.

Out of 154 male patients, (Table 2) 74 were having clinically exposed pulp with Class II carious lesion, while 76 out of 104 female patients had pulp exposure on clinical examination with p-value 0.000. In 154 male patients, 121 had pulp exposure on radiographic examination while 33 had no pulp exposures on radiographic examination with p-value < 0.006. Out of 104 female patients, 95 had pulp exposure on radiographic examination.

Chi-square test was used to observe association between pulp exposure on clinical and radiographic examination in first permanent molars with Class II carious lesion. Significant relationship with p-value 0.000 was found. (Table 3)

Chi-square test also showed significant relationship between pulp exposure on clinical basis and tooth involvement with p-value < 0.003 and insignificant association between pulp exposure on radiograph and tooth involvement with p-value <0.907. (Table 4)

## DISCUSSION

Dental caries is a multi-factorial disease influenced by many factors including age, sex, diet, microorganisms, trace elements, saliva, genetic predisposition and tooth morphology.<sup>13</sup> Reliable, reproducible, and

practical detection and assessment of dental caries lesions as an outcome of dental caries disease has been a challenge for a long time.<sup>14</sup> Clinical examination of caries lesions activity is difficult because visual inspection is a subjective method, and an assessment of etiological factors could facilitate this evaluation.<sup>15</sup> The radiological examination is an integral and essential part of diagnosis and management of teeth, from the initial diagnostic work-up to the monitoring of treatment results.<sup>16</sup> In the present study, the association between some clinical parameters and the presence of active caries lesions was investigated.

In this study, only the first permanent molars were evaluated because they are a key to the permanent dentition and have almost erupted for about 6 years in the mouth. Secondly, they are the biggest teeth, their local position in the occlusal arch supports the main masticatory duty and operation; they influence the vertical distance of upper and lower jaws, the occlusal height, and esthetic proportions.<sup>17</sup> This study showed that majority of the patients reporting to this department had a Class II carious lesion in their first molars. The left mandibular first molars were involved in most case. The number of males attending the hospital was higher as compared to females, but higher percentage of class II carious lesions and pulpal involvements was found in females.

This study also showed that all of the teeth with Class II lesions were detected exposed clinically and radiographically. Diagnosis, treatment planning, and treatment monitoring in teeth depend to a very large extent on results from radiographic examinations.<sup>20</sup> Several studies have shown that between 25% and 42% of caries lesions remain undetected by clinical examination performed without radiographic examination.<sup>21,22</sup> Present study showed that less number of teeth with exposed pulp was observed on clinical examination as compared to radiograph. Sometime clinical diagnosis of pulp exposure was interfered with the presence of plaque, calculus, soft caries, and gingival inflammation

around the tooth. Radiograph is a two dimensional image of three dimensional object.<sup>21</sup> A tooth seems exposed on radio-graph may not actually be exposed. But in this study a significant association between radiographic and clinical pulp exposure was observed. A through and detailed history of pain was recorded to support clinical exposure.

## CONCLUSION

Owing to the difficulties in detecting proximal caries lesions, clinical examination should be supplemented with radiographic examination. Complementing traditional diagnostic methods with advanced, more sensitive methods will improve caries diagnostic routines and hence the dental care and treatment of patients. The application of such complementary methods should offer objective information about the presence and severity of a lesion, to complement the clinician's subjective interpretation, providing evidence-based clinical caries diagnosis.

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