

# EFFECT OF PROPHYLACTIC AMOXICILLIN ON ENDODONTIC FLARE-UP IN TEETH WITH ASYMPTOMATIC, NECROTIC PULPS AND PERIRADICULAR PATHOSIS

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## ABSTRACT

*The objective of this study was to compare the effect of prophylactic amoxicillin used and placebo in preventing endodontic flare-up in teeth with asymptomatic necrotic pulp and periradicular pathosis undergoing root canal treatment. The Quasi experimental study on 125 patients formed the study groups which was conducted at the Department of Operative Dentistry of Khyber College of Dentistry, Peshawar over a period of 10 months (10-09-2009 to 15-8-2010).*

*Patients were randomly divided in to two groups; experimental and control groups by selecting convenient sampling. Internationally recommended doses of prophylactic amoxicillin were given to patients in experimental group and placebo in control group one hour before the start of endodontic treatment. On the first visit complete biomechanical preparation was accomplished. Access cavity was sealed with zinc oxide eugenol. Five patients (4%) developed flare-up in experimental and six (4.80%) in control groups. The results demonstrated that 11/125 or 8.80% patients had developed flare-up. Data analysis revealed no significant differences between flare-up and non-flare-up patients for age, sex and tooth location. Prophylactic amoxicillin did not decrease frequency of the occurrence of flare-up significantly ( $P = .33$ ). Experimental and control groups measured by flare-up index showed almost similar results.*

**Key words:** Endodontic flare-up, Peri-radicular pathosis, Asymptomatic necrotic pulp, Prophylactic Amoxicillin

## INTRODUCTION

Endodontic flare up is an acute exacerbation of an asymptomatic pulpal and or periradicular pathosis following the initiation or continuation of root canal treatment.<sup>1</sup> In such situations patients report moderate to severe pain and or swelling of varying degrees within few hours which lasts at least 48-72 hours. These can be distressing and disruptive events for patients and clinicians.<sup>2-4</sup> The inter-appointment flare-up has been demonstrated to be an unusual occurrence which had been reported in the literature to be 1 to 24% and is unrelated to sex, age and tooth location. As compared to the vital pulp cases the frequency of flare-up has been reported more common in necrotic pulp cases.<sup>5-8</sup> All instrumentation techniques are reported to cause apical extrusion of contaminated debris, even

when the file action is maintained short of the apical terminus.<sup>5,9,10</sup>

The aetiology of flare up is likely multifactorial and dependent on the interactions between the microbial, mechanical, physical and chemical injuries to the periradicular tissues of teeth and immunological response of the host.<sup>11</sup> According to previous studies the most common cause of flare up was microbial injury to the periradicular tissues of the teeth. The intrusions of bacteria from pulp to the periradicular tissues may predispose to postoperative pain and or swelling.<sup>12,13</sup>

Research had been conducted concerning the measures to prevent or minimize the flare up in patients with asymptomatic necrotic teeth. All infected cases with low immunity have increased risk to develop

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inter-appointment flare up. The clinicians should be motivated to follow and adopt some preventive clinical procedures to reduce the incidence. The advised preventive measures included selection of techniques of instrumentation that extrude less amounts of debris apically, completion of the chemo-mechanical procedures in a single visit, use of intracanal antimicrobial medicament between appointments in the treatment of infected root canals, tight sealing of the access cavity (never leave the access cavity open for drainage), maintaining the asepsis during intracanal procedures and administering the prophylactic antibiotic and non-narcotic analgesics.<sup>14-16</sup>

Some research workers claimed that the use of prophylactic antibiotics might be ineffective in preventing flare up.<sup>7, 17-19</sup> A research worker advocated the use of prophylactic antibiotics for preventing flare-up.<sup>20</sup> Many antibiotics are recommended to prevent the flare up but amoxicillin belonging to penicillin group is considered as first choice. Because penicillin is unique in lack of toxicity, better absorption from the gut and can be taken before or after the meal.<sup>21</sup> The American Heart Association (AHA) guidelines propose use of 2 g of amoxicillin, whereas the British Society of Antimicrobial Chemotherapy (BSAC) guidelines propose 3 g of amoxicillin and suppressing the second dose that had previously been recommended to be administered 6 hours after treatment.<sup>22, 23</sup>

## METHODOLOGY

The Quasi experimental study on the 132 patients aged 15-55 years and above having teeth with asymptomatic necrotic pulp and periradicular pathosis who visited the Department of Operative Dentistry of Khyber College of Dentistry, Peshawar over a period of 10 months (10-09-2009 to 15-8-2010) was carried out. Written consents from patients were obtained. After taking a detailed history these patients were examined clinically and radio-graphically (preoperative periapical radiograph) to find out the teeth with asymptomatic necrotic pulp and periapical pathosis. Investigations included thermal and electric pulp tests, explorations of sensitivity of teeth on percussion with the handle of mirror and test cavities were carried out where needed. The pulp status was recorded as vital, if the tooth responded to electric and thermal tests and vice versa. The presence of periapical pathosis was assessed by the presence of periradicular radiolucency from the preoperative radiograph.

The patients were divided into two groups, A and B by convenient sampling. Almost one half of the patients (group A) were given 3 gm of amoxicillin (Cap Amoxil 1gm) and other half (Group B) were given 3 gm of placebo one hour before treatment as internationally recommended.<sup>3</sup> The procedure for patients at the first visit included measurement of estimated working length, caries excavation, and standard access cavity opening, confirmation of the working length, biomechanical preparation using step back technique within working length, irrigation with chlorhexidine mouth wash, drying the canals with paper points, CaOH as intracanal medicament, placement of the sterile cotton palette over the canal orifices, sealing of access cavity with Zinc Oxide Eugenol and the adjustment of the occlusion before discharging the patients. The patients were recalled after two days. They were interviewed about the presence or absence of pain and swelling just after initiation of treatment till date of their interview and their teeth under treatment were also percussed to know the intensity of pain and degree of swelling. According to Table 1 the moderate to severe pain (scoring 2 and 3) and Table 2 the moderate to severe swelling (scoring 2 and 3) were considered as evidences of endodontic flare up. The data were recorded on a preset Proforma and the analysis was done using the descriptive statistics.

The patients 15-55 years old and above of both sexes were examined. One tooth was selected for each patient. All teeth with asymptomatic necrotic pulp and periradicular pathosis, restorable, non-endodontically treated and found suitable for root canal treatment were included in this study. However those patients were excluded from this study who had given the history of prior use of antibiotics within one week or more before the consultation and allergy to penicillin/amoxicillin. Medically compromised patients who were suffering from cardiac, neurogenic, psychogenic and infectious diseases were excluded from this study. Patients on steroid therapy were also not included in this study.

Data analysis was done using SPSS version 13.0 Software. The frequencies and proportions were calculated and presented for ages, gender and locations of the teeth of patients. The investigations were considered to be either positive or negative and presented as proportions. Dental examination taken as outcome variable was clarified as tooth number and flare-up (pain and swelling). The two groups were compared

TABLE 1: SCORING OF PAIN ON PERCUSSION

Characteristics of pain on percussion	Score
1. No discomfort	0
2. Mild, recognizable not discomforting	1
3. Moderate, discomfort but bearable	2
4. Severe, discomfort difficult to bear	3

TABLE 2: SCORING OF SWELLING

Characteristics of swellings, post biomechanical preparation of teeth	Score
1. No swelling	0
2. Mild, puffiness of the face that was not bothersome	1
3. Moderate, swelling that causes facial distortion	2
4. Severe: severe facial distortion	3

regarding the outcome variables, p-value and the comparison was made using Chi –square test as data was qualitative in nature. Amoxicillin was used as the drug of first choice in this study due to its safety and effectiveness against the broad spectrum of bacteria

commonly present in the pulp. It provides high serum level initially and is maintained for 10 to 12 hours. Thus making it as excellent choice for single dose regime.

The purpose of this study was to assess the frequency of flare up and its relationship to age, gender and tooth locations postoperatively in teeth with asymptomatic necrotic pulp and periradicular pathosis after prophylactic administration of Amoxicillin.

## RESULTS

Among 132 patients, males and females were 82(62.12%) and 50(37.88 %) respectively. They were divided into two groups as experimental (antibiotic prescribed) and control (placebo given) in equal halves. Three patients from experimental group and four from control group did not attend the second visit for further treatment, therefore, they were excluded. All patients were interviewed on second visit for recording postoperative symptoms to investigate the flare up. The most prominent age group of patients was 26-35 years as compared to other groups.

In this study the male and female ratios in the experimental and control group were 1.8:1 (41:22) and 1.6:1 (39:23) respectively. The males were almost twice in number than females.

TABLE 3: GROUPING OF PATIENTS

Age groups of patients	Experimental group n	Control group n	Total
15-25 years	16	14	30
26-35 years	20	19	39
36-45 years	13	14	27
46-55 years	10	10	20
56 years and above	05	04	09
<b>Total</b>	<b>64</b>	<b>61</b>	<b>125</b>

TABLE 4: FLARE UPS DISTRIBUTIONS IN GROUPS OF PATIENTS

Groups of patients	Flare up present in patients n (%)	Flare up absent in patients n (%)	Total n (%)
Experimental group	5 (4.00)	59 (47.20)	<b>64 (51.20)</b>
Control group	6 (4.80)	55 (44.00)	<b>61 (48.80)</b>
<b>Total</b>	<b>11 (8.80)</b>	<b>114 (91.20)</b>	<b>125 (100)</b>

Chi-square =0.92 P = 0.33

TABLE 5: ANALYSIS OF FLARE UP IN AGE GROUPS

Age groups	Flare-up	No Flare-up	Total
15-25 years	3(2.40)	27(21.60)	30(24.00)
26- 35 Years	4(3.20)	35(28.00)	39(31.20)
36- 45 Years	2(1.60)	25(20.00)	27(21.60)
46-55 Years	0(0.00)	20(16.00)	20(16.00)
Above 55 years	2(1.60)	07(5.60)	09(07.20)
<b>Total</b>	<b>11(8.80)</b>	<b>114(91.20)</b>	<b>125(100)</b>

TABLE 6: GENDERWISE ANALYSIS OF FLARE UP

Gender of patients	Flare up present in Patients n(%)	Flare up absent in Patients n(%)	Total n(%)
Female patients	4(8.88)	41(91.12)	<b>45(100)</b>
Male patients	7(8.75)	73(91.25)	<b>80(100)</b>
<b>Total</b>	<b>11(8.80)</b>	<b>114(91.20)</b>	<b>125(100)</b>

A higher percentage of flare up was observed in the control group as compared to the experimental group. However, the results were not found to be statistically significant by using Chi-Square analysis (p value=0.33), Table 4.

Flare up may develop in any age group but 15- 25 years and 26-35 years were the more dominant groups.

Among females, 2.40% (4/45) and males, 5.60% (7/80) patients experienced a flare-up in their teeth.

In 125 patients total 125 teeth (one tooth in each patient) were studied in. Incidence of flare up in the

teeth of upper and lower jaws was almost similar. Maxillary teeth (10.71% i.e. 6/56) were observed to have a more chance of flare-up as compared to mandibular teeth (7.25% i.e. 5/69). This difference was not statistically significant as calculated by Chi Square test (p value=0.13).

## DISCUSSION

Endodontic flare ups are displeasing and distressing situations for both the patient and practitioners. Teeth with asymptomatic necrotic pulp and periradicular pathosis were selected for root canal treatment in

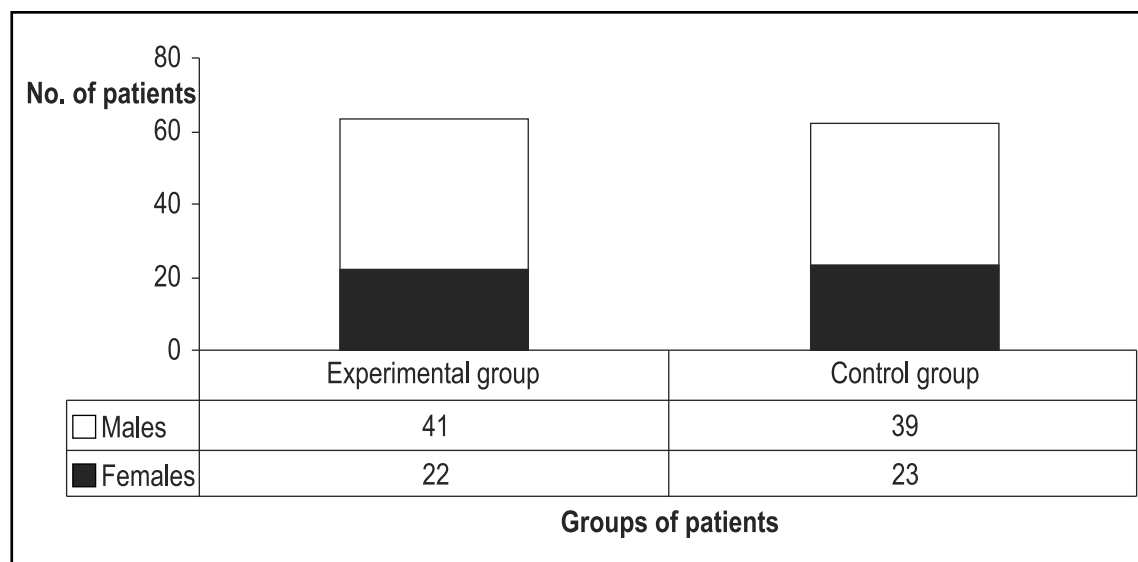


Fig 1: Gender distribution of experimental and control groups

TABLE 7: LOCATION OF THE DISEASED TEETH IN GROUP A AND B

Teeth involved	Frequency in experimental group n(%)	Frequency in Control group n(%)	Total N(%)
Mandibular Anteriors	12(9.60)	11(8.80)	23(18.40)
Mandibular Premolars	10(8.00)	10(8.00)	20(16.00)
Mandibular Molars	14(11.20)	12(9.60)	26(20.80)
Maxillary Anteriors	07(5.60)	08(6.40)	15(12.00)
Maxillary Premolars	09(7.20)	09(7.20)	18(14.40)
Maxillary Molars	12(9.60)	11(8.80)	23(18.40)
<b>Total</b>	<b>64(51.20)</b>	<b>61(48.80)</b>	<b>125(100)</b>

Chi-square = 2.33      p = 0.13

this study to assess the incidence of flare up in relation to gender, age group and tooth location.

According to some studies patient's gender had no statistically significant effect on the frequency of flare up.<sup>24</sup> On the other hand, Fox and Morse found a greater incidence for females.<sup>25</sup> This study found no significant gender difference (flare up developed in 4/45 or 8.88% females and 7/80 or 8.75% in males).

The occurrence of flare up was more frequent in patients below the age of 45 years as compared to higher age groups, however, no statistically significant difference was observed in different age groups in this study. Present study was inconsistent with the results of a previous study that showed no age group more prominent regarding flare up in asymptomatic necrotic teeth.<sup>26</sup>

This study is in accordance with some international studies which showed that the mandibular teeth had slightly more flare-ups as compared to maxillary teeth but not statistically significant.<sup>5,23</sup> The results of this study, however, are contrary to the findings of some other previous studies, in which the frequency of flare-up in mandibular teeth was significantly more than of maxillary teeth. The reason for involvement of more mandibular teeth than maxillary may be due to thickness of cortical plate in mandible. This may cause accumulation of exudates, thus causing more pressure as compared to maxilla.<sup>26-28</sup>

According to this study prophylactic amoxicillin did not significantly prevent the occurrence of endodontic flare-up in asymptomatic necrotic teeth.<sup>5,29</sup> The reason behind the ineffectiveness of prophylactic antibiotic in endodontic flare up in cases of pre-existing bacterial

contamination has been argued by Goodman and Gillman's pharmacological bases of therapeutics. They said that an antibiotic was most effective when administered to control specific bacteria introduced rather than against bacteria already present in the patient or at the surgical site. Antibiotics prophylaxis would then be likely to fail in endodontic situation.<sup>30</sup> Another recognized pharmaco-therapeutics fact is that prophylactic antibiotics are most effective, when their level is adequate in blood and tissues at the site of surgery or injury.<sup>31</sup>

In this study out of 125 patients with asymptomatic necrotic teeth only 11 or 8.80% developed flare up after initiation of root canal treatment within two days. This is in contrasts to a previous study which have reported the incidence of flare up.<sup>25</sup>

It is not possible to screen out all the patients allergic to penicillin / amoxicillin by health history. Despite excluding the known allergic patients from the study, anaphylactic deaths and other allergic reactions occur in persons who gave no history of penicillin allergy.<sup>31</sup> In this study, no undesirable side effects were noted in 64 patients who received amoxicillin orally.

Limitations of this study were noticed. The sample size was small and taken from only one dental hospitals in the province of Khyber Pakhtunkhwa, Pakistan which did not represent the whole population of the province. This study did not include all the related variables to assess the frequency of flare up. The research work was carried out only on a few variables such as age, gender and location of teeth. Due to the lack of good clinical evidence, researchers were unable to include all related variables to assess the frequency



of flare up e.g. sinus tracts, comparison of various sizes of periradicular radiolucencies, comparison of other prophylactic antibiotics, visual pain analogue scale, all degrees of swelling, methods of biomechanical preparation, use of various intracanal irrigants and medications etc.

The patients taken in the sample were treated by various categories of dentists like, demonstrators, specialists and house officers. Regarding the category of dentists, no comparison was carried out between their qualities and methods of treatment to assess the frequency of flare up. The above mentioned factors should be considered for future research work.

## DISCLAIMERS

The authors declared that no financial benefit or any other incentive was obtained by doing research work on "Amoxicillin".

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