

# Assessment of Practice of Endodontic Treatment Protocols among General Dental Practitioners in Pokhara, Nepal

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## ABSTRACT

**Introduction:** Endodontics is specialty field, but the majority of endodontic treatment in Pokhara is provided by the general dental practitioners. The aim of this study was to assess the practice of endodontic treatment protocols among general dental practitioners in Pokhara, Nepal.

**Materials and Methods:** A cross sectional questionnaire based study was conducted among all the general dental practitioners working in various government, private hospital and clinic of Pokhara. Information about the materials and techniques used in endodontic treatment was collected and descriptive statistical analysis was done.

**Results:** Out of 89 respondents, only 82 completely filled the questionnaires which were included in the study. Most general dental practitioners (96.34%) regularly treat single rooted endodontic cases. Only 10.97% occasionally use rubber dam during endodontic treatment. Most general dental practitioners (96.34%) used radiographic technique for working length determination. Ninety two percent used stainless steel hand files and step back was the choice of technique by 90.24%. Sodium hypochlorite irrigation and calcium hydroxide intra canal medicaments were used by 93.9% and 98.78% of general dental practitioners respectively. 75.6% used zinc oxide eugenol as root canal sealer and 95.12% obturated root canals with lateral compaction technique. The common complication encountered was mid treatment pain. They seem to overuse antibiotics in cases requiring endodontic therapy. Only 52.43% used autoclave for sterilization of endodontic files. About 92.68% felt the need of further endodontic training and 74.39% preferred post graduate program.

**Conclusion:** This study indicates that many general dental practitioners of Pokhara are not following well acknowledged endodontic quality guidelines; hence there is a need for further endodontic training.

**Keywords:** Endodontics; general dental practitioners; Treatment protocols

## INTRODUCTION

Endodontic treatment is considered as a highly prevalent treatment option in the practice of dentistry. Success of endodontic treatment depends on obtaining a fluid tight seal which is attained by adequate preparation and obturation of root canal system.<sup>1,2</sup> With numerous innovations in contemporary endodontic practice, like changes in concepts, techniques, instruments and materials, many teeth with guarded prognosis that used to be extracted on the past can be salvaged.<sup>3</sup> These development in the field of endodontics have been so rapid in recent years that the current root canal treatment bears little resemblance to that of a decade ago.

Although endodontics is a speciality field, the majority of endodontic treatment in Pokhara, Nepal is provided by the general dental practitioners (GDP). Consequently GDP are facing dilemma with numerous materials and techniques, hence dental school require modification in curriculum accordingly.<sup>1</sup> Various international investigations were carried out to explore the standard of root canal treatment carried out by GDP. On the other hand few studies investigate the treatment modalities and quality of standard treatment made by GDP in Nepal. Identifying the important areas where GDP require further improvement and regular updating remains a challenge. Thus the purpose of this study was to assess the practice of endodontic treatment protocols among GDP in Pokhara, Nepal which may help to form guidelines to ensure endodontic treatment outcomes.

## MATERIALS AND METHODS

A cross sectional questionnaire based study was conducted among all GDP working in different government hospitals, private hospitals and dental clinics of Pokhara, Nepal. A list of all GDP was obtained from Nepal Dental Association, Gandaki Branch, Nepal. Ethical approval was taken before embarking upon the study from institutional ethical committee (GMC-IRC Ref. No. 14/11/2074) letter dated 26<sup>th</sup> February 2018. The data was collected through self-administered questionnaire and final compilation was carried out in the department of Conservative Dentistry and Endodontics of Gandaki Medical College, Pokhara from March to June 2018. Out of 89 respondents, only 82 completely filled the questionnaires which were included in

the study. Since the study was designed to assess the endodontic practice protocols among GDP, dental specialists in any discipline were excluded. The proforma contained demographic details of respondents and 18 close ended questions that were derived from previously published studies.<sup>1,3</sup> The questions had multiple choice options on root canal instrumentation system, irrigants, intracanal medicaments, working length, sealers, antibiotic prescription, endodontic complication and sterilization of instruments which has been following in routine practice. The participant has to choose only one option except where multiple answers mentioned. The collected data were entered in Microsoft excel and descriptive statistical analysis was done using statistical package for social studies (SPSS) (version 16.0; SPSS Inc.Chicago, IL).

## RESULTS

Out of 89 distributed questionnaires, 82 were returned with completely filled and included for the study. Most of the GDP (37, 45.12%) practiced in dental clinic only whereas (19, 23.17%) practiced in hospital only and (26, 31.7%) practiced in hospital and clinic both. About (47, 57.31%) worked in private setting that belongs to others. The GDP regularly treated more cases of single rooted teeth (96.34%), followed by multi rooted teeth (89%) and retreatment cases (43.9%). The number of endodontic treatment performed per week were 0-5 teeth by 50% while 40.24% did 6-10 teeth, 7.31% did 11-15 teeth and only 2.4% of them performed more than 15 cases per week. Rubber dam was never used by 88.02%, where as occasionally by 10.97% GDP. Most of them (93.9%) preferred always taking preoperative radiograph and 6.09% occasionally. Radiographic technique was used for working length determination by 96.34% followed by 8.53% used both radiographic technique and apex locator. Stainless steel, nickel-titanium hand files, rotary nickel-titanium files were used by 92.68%, 28.04% and 13.41% respectively. Step back technique for root canal instrumentation was the commonest technique (99.24%) followed by crown down technique (15.84%). The most commonly used irrigation solutions were normal saline (96.34%) and sodium hypochlorite (93.9%) followed by hydrogen peroxide (52.43%). Calcium hydroxide was the commonest (98.78%) intracanal medicaments used and lateral compaction was preferred technique for obturation of root canals (95.12%). Majority

of GDP use zinc oxide eugenol(75.6%) followed by endomethasone (52.43%), calcium hydroxide based sealer (9.75%) and epoxy resin (3.65%) as root canal sealer. Antibiotics were prescribed by 89.02% for patients with swelling, for presence of sinus tract by 81.7%, for symptomatic by 54.87% and for tooth tender to percussion by 17.07% of the GDP. Almost all of them (87.8%) prescribed broad spectrum penicillin, followed by metronidazole (80.48%), amoxicillin+clavulanic acid (59.75%), tetracycline (2.43%) and others antibiotics (1.21%). The commonest complication encountered was mid treatment pain (51.21%), followed by under obturation (23.17%), and over obturation (15.85%), post operative pain (10.97%), perforation (3.65%), and irrigants related complication (2.43%). The most common method of sterilization of endodontic files was glass bead sterilization (74.39%) followed by autoclave (52.43%) and by chemical sterilization (14.63%) while none of the GDP disposed the endodontic files after single use. Most of the GDP disposed the files after seeing the signs of distortion (86.58%) or when the file becomes blunt (78.04%). About 76 % of dental graduates thought they required further training in endodontics. The preferred further training was post graduation program (74.39%), followed by continuing education courses with hands on program (47.56%), part time structured program (15.85%) and continuing education courses with lectures (4.87%).

**Table 1:** Demographics detail of the participants

Particulars	Frequency (%)
<b>Sex</b>	
Male	34 (41.46)
Female	48 (58.53)
<b>Practice sector</b>	
Hospital only	19 (23.17)
Clinic only	37 (45.12)
Hospital and clinic both	26 (31.7)
<b>Area of service</b>	
Government only	11 (13.41)
Private only	65 (79.26)
Government and private both	6 (7.31)
<b>Clinical practice</b>	
Self employed	26 (31.7)
Work's in other's practice	47 (57.31)
Self and other's practice	9 (10.97)

**Table 2:** Responses of the participants

Questions	Frequency (%)
<b>1. Do you regularly treat (multiple answers)</b>	
a. Single rooted endodontic cases	79 (96.34)
b. Multi rooted endodontic cases	73 (89.0)
c. Re-treatment cases	36 (43.9)
<b>2. On an average, how many root canal therapies do you perform per week?</b>	
a. 0-5 teeth	41 (50.0)
b. 6-10 teeth	33 (40.24)
c. 11-15 teeth	6 (7.31)
d. 16 teeth or above	2 (2.43)
<b>3. In your endodontic treatment do you use rubber dam?</b>	
a. Always	0 (0)
b. Occasionally	9 (10.97)
c. Never	73 (89.02)
<b>4. Do you take a pre-operative radiograph?</b>	
a. Always	77 (93.9)
b. Occasionally	5 (6.09)
c. Never	0 (0)
<b>5. Which method do you use for working length determination? (multiple answers)</b>	
a. Radiographic technique	79 (96.34)
b. Tactile sensation	5 (6.09)
c. Electronic apex locator	3 (3.65)
d. Combination of radiographic and apex locator	7 (8.53)
<b>6. Which types of root canal system do you use? (multiple answers)</b>	
a) Stainless steel hand files	76 (92.68)
b) Nickel-titanium hand files	23 (28.04)
c) Rotary nickel-titanium files	11 (13.41)

<p><b>7. Which method do you use for root canal instrumentation? (multiple answers)</b></p> <p>a) Step back technique b) Crown down technique c) Push and pull technique</p>	<p>74 (90.24) 13 (15.85) 0 (0)</p>
<p><b>8. Which types of irrigation solution do you use? (multiple answers)</b></p> <p>a) Normal saline b) Sodium hypochlorite c) Hydrogen peroxide d) Ethylene diamine tetraacetate (EDTA) e) 2% chlorhexidine</p>	<p>79 (96.34) 77 (93.9) 43 (52.43) 8 (9.75) 12 (14.63)</p>
<p><b>9. If more than one visit, which dressing/medicaments do you use? (multiple answers)</b></p> <p>a) Calcium hydroxide b) Formocresol c) Iodoform d) Formaldehyde e) Antibiotic paste f) Metapex g) Septomix h) Fresh cotton</p>	<p>81 (98.78) 11 (13.41) 4 (4.87) 2 (2.43) 3 (3.65) 2 (2.43) 1 (1.21) 3 (3.65)</p>
<p><b>10. Which technique do you use for obturation of root canal? (multiple answers)</b></p> <p>a) Single cone technique b) Lateral compaction technique c) Vertical compaction technique d) Thermoplastic technique</p>	<p>11 (13.41) 78 (95.12) 1 (1.21) 2 (2.43)</p>
<p><b>11. Which root canal sealer do you use? (multiple answers)</b></p> <p>a) Zinc oxide eugenol b) Endomethasone c) Epoxy resin d) Calcium hydroxide</p>	<p>62 (75.6) 43 (52.43) 3 (3.65) 8 (9.75)</p>

<p><b>12. Do you prescribe antibiotics for patients undergoing endodontic therapy? (multiple answers)</b></p> <p>a) If symptom or pain is present b) If sinus tract is present c) If swelling is present d) If tooth is tender to percussion</p>	<p>45 (54.87) 67 (81.7) 73 (89.02) 14 (17.07)</p>
<p><b>13. Which antibiotic would you prescribe (multiple answers)</b></p> <p>a) Amoxicillin + clavulanic acid b) Broad spectrum penicillin (eg. Amoxicillin, Ampicillin) c) Tetracycline d) Metronidazole e) Others</p>	<p>49 (59.75) 72 (87.8) 2 (2.43) 66 (80.48) 1 (1.21)</p>
<p><b>14. Which types of endodontic related complication you mostly faced often in your practice? (multiple answers)</b></p> <p>a) Irrigants related b) Perforation c) Mid-treatment pain d) Post-operative pain e) Swelling f) Over obturation g) Under obturation h) Others</p>	<p>2 (2.43) 3 (3.65) 42 (51.21) 9 (10.97) 3 (3.65) 13 (15.85) 19 (23.17) 4 (4.87)</p>
<p><b>15. How do you sterilize your endodontic files? (multiple answers)</b></p> <p>a) Glass bead sterilization b) Autoclave c) Chemical sterilization d) Dispose after single use</p>	<p>61 (74.39) 43 (52.43) 12 (14.63) 0 (0)</p>

<b>16. When do you dispose your endodontic files? (multiple answers)</b>	
a) After single use	0(0)
b) After 3 times of use	2 (2.43)
c) After 4-5 times of use	3 (3.65)
d) After 6 times of use	0 (0)
e) The files becomes blunt (decreased cutting efficiency)	64 (78.04)
f) See signs of distortion	71 (86.58)
<b>17. Do you think you need further endodontic training after graduation?</b>	
a) Yes	76 (92.68)
b) No	6 (7.31)
<b>18. If yes, would you prefer</b>	
a) Post-graduate program (MDS, MSc)	61 (74.39)
b) Part time structured program (post graduate diploma)	13 (15.85)
c) Continuing education courses- lectures	4 (4.87)
d) Continuing education courses- hands on	39 (47.56)

## DISCUSSION

This study of 82 GDP from different types of dental practices revealed the information regarding the practice of endodontic treatment in Pokhara, Nepal. Almost all the GDP in Pokhara valley are frequently treating the single rooted, multi rooted endodontic cases where as almost half of them are also treating the retreatment cases. On an average half of the GDP are performing up to 5 endodontic cases per week whereas 40.24% of them are performing 6-10 teeth per week.

Rubber dam application is always recommended during endodontic treatment to provide isolation, prevent risk of aspiration or inhalation of instruments, improves visibility and protects dentists from contaminated aerosols.<sup>4</sup> In this study, only 10.97% of GDP reported using rubber dam occasionally and not as a routine practice. These results are very much similar to results of other international studies.<sup>1,4,5</sup> The reasons for not using rubber dam could be extra cost, additional time,

lack of adequate skills, and inadequate education in undergraduate teaching curriculum. To promote the use of rubber dam, there has to be emphasis in education and increase awareness of importance of rubber dam in daily practice.<sup>2</sup>

In this study, 93.9% of GDP obtained a pre-operative radiograph which is in accordance to study conducted by Mehta et al.<sup>6</sup> The fundamental necessity of obtaining a pre-operative radiograph cannot be ignored for appropriate case selection, studying the number of canals and canal morphology and for maintaining dental record.<sup>7</sup> The working length determination is the most crucial steps in endodontics, as it facilitates biomechanical preparation and obturation of root canal system and provides better prognosis. A majority of GDP (96.34%) were using radiograph to determine working length, while 6.09% relied on tactile sensation method and 8.53% used apex locator followed by radiographic confirmation. This is in agreement with a study done by Shrestha et al<sup>3</sup> and Iqbal et al.<sup>8</sup> The use of tactile sensation to determine working length cannot be recommended because the instrument may bind against the canal wall at any position along their length or may perforate apically. An accurate working length could be achieved by the combination of conventional radiographic technique with modern electronic apex locator.<sup>2</sup>

Stainless steel hand files were used by 96.28% of the GDP while only 28.04% and 13.41% used hand and rotary nickel-titanium files respectively. Similar responses were observed in a study conducted by Shrestha et al,<sup>3</sup> Mehta et al,<sup>6</sup> and Iqbal et al.<sup>8</sup> Rotary nickel-titanium files have enabled quicker root canal preparation, lesser canal transportations and greater conservation of tooth structure.<sup>9</sup> However, they cannot solve every clinical situation and the use of hand stainless steel file is inevitable. A crown down technique provides certain advantages such as early organic debris removal, the creation of large reservoir for irrigating solutions a straight access to the apical region of curved canals and greater precision with regard to the exact working length and apical size.<sup>10</sup> Only 15.85% of the GDP used crown down technique while 90.24% still followed step back technique.

The presence of microorganisms and accessory canals makes it imperative to irrigate the root canals. The ideal irrigant should combine antimicrobial action and a capacity to dissolve organic remnants.<sup>11</sup>

Most studies like Chan et al,<sup>1</sup> Shrestha et al,<sup>3</sup> Mehta et al<sup>6</sup> showed that sodium hypochlorite and normal saline are the most popular irrigants. In the present study, the majority of GDP were using sodium hypochlorite as it has high tissue dissolving and disinfecting capability. However the use of sodium hypochlorite without isolating the field of operation tightly with a rubber dam presents an obviously hazardous practice in the use of potentially irritant irrigation solutions. Inter appointment intracanal medicaments are intended to reduce bacteria, control pain and reduce inflammation.<sup>12</sup> In the present study, almost all the GDP were using calcium hydroxide as intracanal medicaments. This may be due to the fact calcium hydroxide has effective antimicrobial properties, stable for longer periods, harmless to the body. It also induces hard tissue formation and is effective for stopping inflammatory exudates.

Lateral compaction of gutta-percha in conjunction with a root canal sealer is the most widely accepted and mostly taught technique in undergraduate curriculum for obturating root canals. It is relatively simple and versatile technique that has produced good results and does not require expensive equipment.<sup>13</sup> It is therefore not surprising that it is the technique used by majority of GDP in this study. Root canal sealer is necessary to seal the space between the dentinal walls and obturating core interface, fill the voids and irregularities in the root canal, lateral and accessory canals and provide fluid impervious seal.<sup>14</sup> The preferred root canal sealer was zinc oxide eugenol which was used by 75.6% of GDP.

Majority of GDP prescribed the antibiotics in case of swelling and sinus tract. Most of them used broad spectrum penicillin and metronidazole similar to preferred drugs reported in another studies. Due to the potential risk of adverse effects of systemic antibiotics such as drug interactions, overgrowth of resistant micro-organisms, allergic reactions, nausea, vomiting and other gastrointestinal problems, the local application of antibiotics may be more effective mode for delivery in endodontics.<sup>3</sup> This study shows that GDP have been overusing the systemic antibiotics and patients are at high risk of developing resistance to antibiotics.

During endodontic treatment, a clinician might face various complications even after following standard treatment protocol. In this study more than half of the GDP were facing mid treatment

pain which could be due to activation of infection after instrumentation or may be due to sensitivity of intracanal medicaments. In this study, most of the GDP (74.39%) used glass bead to sterilisation followed by autoclave (52.43%) and chemical sterilisation (12%). Majority of them disposed the files after they became blunt and saw signs of distortion and all of them reuse the endodontic files after sterilisation. Glass bead sterilization is still a common method for chair side sterilization of endodontic files. The common method of using glass bead sterilizer for sterilization time of few seconds is not effective and sterilization time has to be at least 60 seconds.<sup>15</sup> Chemical sterilization may not be adequate sterilization methods for endodontic files. Only proper steam autoclaving reliably produces completely sterile instruments. Therefore proper sterilization of endodontic instruments should be done by manual cleaning, ultrasonic cleaners and steam autoclaving.<sup>16</sup>

Most of the GDP preferred post graduate program (MDS) for further training in endodontics. The limitation of this study is that the data collected from single geographical area, which may be further improved by inclusion of a larger area for future comparisons, also the comparison of protocols between endodontist and dental practitioners may be included in future studies.

## CONCLUSION

Most of the GDP of Pokhara performed procedures which often deviated from well acknowledged endodontic quality guidelines. Despite a variety of new instruments and techniques, most GDP used conventional methods only. There is a need for conduction of appropriately structured continuing education courses in the field of endodontics and implement the new technologies in their practice for the welfare of patients and GDP.

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