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A retrospective study of endodontic treatment among patients in Southwest Nigeria

Adenike Ololade Awotile, Lillian Lami Enone, Temitope Olabisi Omosebi, Olugbenga Adetokunbo Adenuga-Taiwo

ABSTRACT

Aims: To determine pattern of demand, reasons for root canal treatment (RCT) and survey routine practices of RCT in Lagos State University Teaching Hospital, Ikeja (LASUTH).

Methods: A retrospective review of hospital records of patients who had done RCT in Endodontic Unit of Restorative clinic of LASUTH, Lagos State, Nigeria from January 2016 to December 2019. Information on age, gender, ethnicity, tooth treated, indications for treated tooth, obturation techniques, obturation materials, irrigants and intramedicaments used were obtained. Data were analyzed using SPSS Version 23.

Results: A total of 231 patients' records were retrieved. 220 records had complete data, of which 100 (45.4%) males and 120 (54.5%) females. Age range was 18–86 years while mean age was 38.6 ± 1.47. Highest incidence of RCT (24.1%) was found in 30–39 years age group. Commonest indication for RCT was apical periodontitis 145 (58.9%). Total number of teeth treated was 246. Upper central incisors were 56 (22.8%) which were treated most endodontically. More maxillary 176 (71.5%) teeth underwent RCT than 70 (28.5%) mandibular teeth. Step-back technique 226 (92.3%) was the commonest used. Irrigants frequently used were sodium hypochlorite alternating with normal saline 246 (100.0%). More of calcium hydroxide 201 (81.7%) was utilized as canal medicaments. Gutta-percha was solely used as obturation material and endoseal as sealant in this study.

Conclusion: Most of endodontic practices done in this study used conventional preparations and obturation techniques. There was need for community dental awareness to prevent and treat early carious lesions.

Keywords: LASUTH, Prevention, RCT

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INTRODUCTION

Endodontic treatment also known as root canal treatment (RCT) is one of the most technically demanding

procedure and a very specialized aspect in restorative dentistry [1]. The major objective of endodontic treatment is to prevent or heal apical periodontitis [2] by means of biomechanical cleaning, shaping, and disinfection that would allow for three-dimensional obturation of the root canal system [3].

Several risk factors such as caries disease, periodontal diseases, and trauma may affect the dental pulp. One of the most important injurious agents of the dental pulp is caries disease [4–6], caused by oral microorganisms. Dental abscesses [7] and toothache [4, 8–11] have been reported as the most common symptoms found among patients seeking endodontic treatments. The commonest indications for endodontic treatment are complications arising from dental caries [4, 8, 9, 11, 12] and trauma [8, 9, 11].

In previous studies, females are reported to show higher prevalence of root treated teeth compared to their male counterparts [4, 5, 9, 11, 12]. The most frequently reported root treated teeth are the maxillary molars and premolars [4, 5, 11, 12].

Techniques that are usually used in cleaning and shaping of root canal system are crown-down, step-back, double-flare, and standardized. Some African studies [1, 13] revealed that the technique most commonly used was step-back technique. A study [14] was carried out in Turkey by Unal et al. on survey of endodontic practice, it was shown that sodium hypochlorite was the most popular choice (73%) as a root canal irrigant and calcium hydroxide was the most commonly used medicament (53%).

The lateral condensation technique using gutta-percha has been reported as the most universally accepted technique for obturation [15].

The aim of this study is to determine the pattern of demand, reasons for RCT, and to survey the routine practices of RCT in Lagos State University Teaching Hospital (LASUTH), a Tertiary Health Facility in Southwest Nigeria.

This study is of relevance, because the dental clinic of Lagos State University Teaching Hospital is a relatively new tertiary institution, with no baseline data on pattern of endodontic treatment. Likewise, it is to determine the reasons for endodontic treatment and advocate for preventive measures to forestall future occurrence.

MATERIALS AND METHODS

A retrospective review of the hospital records of patients who attended and had RCTs done in Endodontic Unit of the Department of Restorative clinic of the Lagos State University Teaching Hospital, Lagos State, Nigeria from January 2016 to December 2019 was done using a convenience sampling method. Demographic and clinical data, such as age, gender, ethnicity, tooth treated, indication for the treated tooth, obturation techniques, obturation materials, irrigants, and intramedicaments used were retrieved from the patients' records. The data were collected by two trained resident dentists using the pre-designed pro forma for each patient's record. Prior to data collection, the inter-observer variability was tested with data entered into the pro forma by the two data collectors and the principal investigator independently from 10 patients' records and analyzed. The principal investigator also performed random data checks of the pro forma, comparing all the information in the patients' records to that recorded in 20% of the pro forma. Medical records with incomplete data were excluded. Ethical clearance for this study was obtained from the Health Research and Ethics Committee of Lagos State University Teaching Hospital, (HREC, LASUTH) Lagos, prior to commencement of the study. Data were analyzed using a computer software program, Statistical (SPSS) Version 23. The age, gender, ethnicity, tooth treated, indications for the treated tooth, obturation techniques, obturation materials, irrigants, and intramedicaments used were assessed among the participants. Categorical data were presented using sequencing and percentage. Associations between variables were assessed using cross tabulation to reflect chi-square as p-value; $p < 0.05$ was assumed to be statistically significant at 95% CI.

RESULTS

A total of 231 patients' records were retrieved. There were 220 records with complete data of which 100 (45.4%) were males and 120 (54.5%) were females (Table 1). The age range of patients was 18–86 years while the mean age was 38.6 ± 1.47 (Table 1). The highest incidence of RCT (24.1%) was found in the 30–39 years age group, followed by the 20–29 years age group which constituted 22.5% (Table 2). The association between gender and age was statistically significant with p-value of 0.008 (Table 2). The commonest indication for RCT was apical periodontitis 145 (58.9%) (Table 3). The total number of teeth treated was 246. When considering the upper and lower teeth, the upper central incisors 56 (22.8%) were the most endodontically treated teeth. The least endodontically treated teeth were lower first premolar 2 (0.8%) (Table 4). More maxillary 176 (71.5%) teeth underwent RCT than 70 (28.5%) mandibular teeth. Step-back technique 226 (92.3%) was the commonest technique that was used in cleaning and shaping canal system, followed by standardized technique 14 (5.7%) (Table 5). The instruments used in cleaning and shaping of the canals were K-files, hedstron files, and rotary systems, but more of K-files 227 (92.3%) were used. The irrigants frequently used were sodium hypochlorite alternating with normal saline 246 (100.0%) (Table 5). Gutta-percha was solely used as obturation material and endoseal as a sealant in this study.

Table 1: Distribution of demographics of patients

Variable	Frequency, n (220)
Sex	
Female	120 (54.5%)
Male	100 (45.5%)
Age (years)	
<20	20 (9.1%)
20–29	50 (22.7%)
30–39	53 (24.1%)
40–49	40 (18.2%)
50–59	33 (15.0%)
≥60	24 (10.9%)
Mean±SD	38.6 ± 1.47
Ethnicity	
Yoruba	125 (56.8%)
Igbo	59 (26.8%)
Hausa	7 (3.2%)
Others	29 (13.2%)

Table 2: Pattern of demand for endodontic treatment related to age and gender

Variable	Gender		Total, n (%)	Chi-square	p-value
	Male	Female			
Age (years)					
<20	8 (3.6%)	12 (5.5%)	20 (9.1%)		
20–29	20 (9.1%)	30 (13.6%)	50 (22.5%)		
30–39	27 (12.3%)	26 (11.8%)	53 (24.1%)	15.682	0.008
40–49	13 (5.9%)	27 (12.3%)	40 (18.2%)		
50–59	13 (5.9%)	20 (9.1%)	33 (15.0%)		
≥60	19 (8.6%)	5 (2.3%)	24 (10.9%)		
Total	**100 (45.5%)**	**120 (54.5%)**	**220 (100.0%)**		

Table 3: Indications for endodontic treatment

Diagnosis	Frequency (n)	Percent (%)
Trauma	7	2.8
Irreversible pulpitis	66	26.8
Apical periodontitis	145	58.9
Periapical cyst	13	5.3
Dento-alveolar abscess	15	6.1
Total	**246**	**100.0**

Table 4: Endodontic treatment pattern in different age groups

Variable	Age (years)						Total, n (%)	Chi-square	p-value
Location/tooth type	**<20**	**20–29**	**30–39**	**40–49**	**50–59**	**≥60**			
Maxillary									
Central incisors	5 (2.0%)	13 (5.3%)	16 (6.5%)	10 (4.1%)	5 (2.0%)	7 (2.8%)	56 (22.8%)		
Lateral incisors	1 (0.4%)	5 (2.0%)	5 (2.0%)	2 (0.8%)	1 (0.4%)	1 (0.4%	15 (6.1%)		

Table 4: *(Continued)*

Variable	Age (years)						Total, n (%)	Chi-square	p-value
Canines	0 (0.0%)	2 (0.8%)	0 (0.0%)	0 (0.0%)	5 (2.0%)	2 (0.8%)	9 (3.7%)		
First premolars	0 (0.0%)	6 (2.4%)	5 (2.0%)	8 (3.3%)	3 (1.2%)	0 (0.0%)	22 (8.9%)		
Second premolars	1 (0.4%)	7 (2.8%)	9 (3.7%)	5 (2.0%)	4 (1.6%)	5 (2.0%)	31 (12.6%)		
First molars	2 (0.8%)	5 (2.0%)	7 (2.8%)	3 (1.2%)	2 (0.8%)	0 (0.0%)	19 (7.7%)		
Second molars	1 (0.4%)	1 (0.4%)	1 (0.4%)	1 (0.4%)	2 (0.8%)	1 (0.4%)	7 (2.8%)		
Mandibular								85.677	0.044
Central incisors	3 (1.2%)	2 (0.8%)	2 (0.8%)	2 (0.8%)	2 (0.8%)	1 (0.4%)	12 (4.9%)		
Lateral incisors	2 (0.8%)	2 (0.8%)	0 (0.0%)	0 (0.0%)	3 (1.2%)	0 (0.0%)	7 (2.8%)		
Canines	0 (0.0%)	2 (0.8%)	1 (0.4%)	3 (1.2%)	4 (1.6%)	1 (0.4%)	11 (4.5%)		
First premolars	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	1 (0.4%)	0 (0.0%)	2 (0.8%)		
Second premolars	0 (0.0%)	1 (0.4%)	0 (0.0%)	0 (0.0%)	4 (1.6%)	3 (1.2%)	8 (3.3%)		
First molars	5 (2.0%)	8 (3.3%)	7 (2.8%)	2 (0.8%)	2 (0.8%)	3 (1.2%)	27 (11.0%)		
Second molars	3 (1.2%)	5 (2.0%)	5 (2.0%)	5 (2.0%)	1 (0.4%)	1 (0.4%)	20 (8.1%)		
Total	23 (9.3%)	59 (24.0%)	58 (23.6%)	42 (17.1%)	39 (15.9%)	25 (10.2%)	246 (100.0%)		

The association between the location of tooth type and age of patients as chi-square is 85.677 and it is statistically insignificant p > 0.005.

Table 5: Demographics of clinical data/variable

Variable	Frequency, n (246)
Teeth category	
Maxillary	176 (71.5%)
Mandibular	70 (28.5%)
Discoloration	
No	186 (75.6%)
Yes	60 (24.4%)
Restoration	
No	196 (79.7%)
Yes	50 (20.3%)
Previous restoration	
Amalgam	15 (6.1%)
Composite	9 (3.7%)
Root filled	17 (6.9%)
Acrylic crown	2 (0.8%)
First premolars	6 (2.4%)
Gold crown	1 (0.4%)
Technique	
Step-back	226 (92.3%)
Standardized	14 (5.7%)
Crown-down	5 (2.0%)
Re-RCT	
No	226 (91.9%)
Yes	20 (8.1%)

Table 5: *(Continued)*

Variable	Frequency, n (246)
Instruments	
K-file	226 (92.3%)
K-file, hedstron	18 (7.3%)
Rotary	1 (0.4%)
Intracanal medication	
Formocresol	45 (18.3%)
Non-setting Ca (OH)2	201 (81.7%)
Obturation technique	
Lateral	244 (99.2%)
Vertical	2 (0.8%)
Irrigants	
N/saline, NaOCl	246 (100.0%)
Obturation material	
Gutta-percha	246 (100.0%)
Sealant	
Endoseal	246 (100.0%)

DISCUSSION

This study reviewed the pattern of endodontic treatments carried out in Lagos State University Teaching Hospital, Southwest Nigeria, over a period of four years.

The justification for this study was to establish a database line to monitor oral health status and intervene in the sequelae of dental diseases occurring in a relatively new tertiary dental facility and therefore facilitate prevention and early treatment of dental diseases. In this study, the demand for endodontic treatments was higher in females 120 (54.5%) compared to males 100 (45.4%) and this correlates with previous studies [4, 5, 9, 12]. It was suggested that females are more conscious about their health and it is possible they reported earlier and have their cavities filled before progressing to pulpal and periradicular diseases [8]. However, a similar study [8] done favored males.

The greatest percentage of patients who had endodontic treatments done within the period of this study was 53 (24.1%) and occurred in the age group of 30–39 years, followed by 50 (22.5%) in 20–29 years age group. These age groups were corroborated in some previous studies [4, 5]. This can be attributed to the high prevalence of dental caries and its complications reported in young adults [16].

Apical periodontitis 145 (58.9%) was the most frequent indication for endodontic treatment followed by irreversible pulpitis 66 (26.8%), both are sequelae of dental caries as in other studies [4, 8, 11, 12]. In contrast to our results, some studies [5, 9] have reported irreversible pulpitis as the most common indication for endodontic treatment. A study [8] suggested that this finding might indicate a low dental awareness among the patients since most had to wait until they had pain from apical periodontitis which severely disturbed daily activities before seeking treatments. This may support the general facts that pain is the most motivating factor for dental visits among patients.

Comparing the indications among age groups, more of age group 30–39 years had endodontic treatment due to apical periodontitis, while age group 50–59 years had endodontic treatment done due to irreversible pulpitis. Hence, this might suggest that older patients have lower threshold for pain, which made them to present immediately to the clinic for treatment.

A total number of 246 teeth were treated endodontically. Of which K- files were used in treating 226 teeth (92.3%), K-file hedstrom were used to treat 18teeth (7.3%) while Rotary system was used to treat 1 tooth (0.4%). In relation to dental arch, endodontic treatments were done more in maxillary teeth 176 (71.5%) than in mandibular teeth 70 (28.5%) in this study. This was in agreement with the findings of Agholor and Sede [9], who reported an occurrence of 63.6% of treated maxillary teeth and 36.4% for mandibular teeth. This could be attributed to aesthetic reason, as the upper teeth appear more prominent than the lower teeth during smile, resulting in the patient to be more interested in preserving the upper teeth as suggested in a study [12].

In this present study, the maxillary central incisors 56 (22.8%) were found to be the most frequently treated teeth, followed by maxillary second premolars 31 (12.6%) which is similar to studies by Oginni et al. [10] and Umanah et al. [5]. This endodontically treated maxillary central incisors were common among the 30–39 (6.5%) and 20–29 (5.3%) age groups. These could be attributed to the fact that most patients, especially, the younger

age groups are concerned with their appearances; therefore, they are willing to preserve their teeth through endodontic treatment than to extract them. In addition, in this center of study, endodontic treatments of posterior teeth are more costly than anterior teeth; therefore, the patients often opt for extractions of the molars at a cheaper cost. These patterns are however in contrast to previous studies [9, 12] where mandibular first molars received more of endodontic treatments compared to central incisors. However, it was reported by Agholor and Sede [9] that their study reflected the desire for patients to retain posterior teeth that are necessary for optimal masticatory efficiency. In addition, they reported that the susceptibility to caries activity of the mandibular first molar due to early eruption and peculiar anatomical features was accounted for this pattern.

A successful RCT depends largely on achieving the main objectives of the treatment, which include eliminating the causative agent of the disease and providing a suitable environment for healing. This is achieved through the processes involving mechanical debridement of the root canal, irrigation of the root canal with suitable antimicrobial agents, placement of an appropriate intracanal medicament when indicated, obturation of the root canal with a material that elicits minimal inflammatory response and entombs the bacteria not previously eliminated [17, 18].

There are different routine practices in endodontic treatment done at different centers. In this study, the majority of the teeth treated were performed by step-back technique 226 (92.3%) in cleaning and shaping of the canal system, followed by standardized technique 14 (5.7%). Thus, indicating that majority of the clinicians were using more of step-back technique in canal preparation. A similar study [13] in Sudan which was questionnaire-based, 98% of the respondents used step-back preparation technique as their method of choice and also in a study [1] done in Hospital University Sains Malaysia dental clinic, 99.1% used step-back technique. Step-back technique also known as serial or telescopic technique commences preparation at the apex with small instruments [19].

This study showed that K-files, hedstron files, and rotary system were the instruments used in cleaning and shaping of the canals, but more of K-files 227 (92.3%) were used just as the study done 325 (97.6%) in Malaysia dental clinic. The advantage of using files includes good tactile sensation, which is useful in determination of working length, cleaning, and shaping of root canals [20]. However, while those hand files continue to be used, Nicek–Titanium rotary instruments offer new perspectives for root canal preparation and have the potential to avoid some of the major drawbacks of traditional instruments [19].

In this study, the most frequently used irrigants were sodium hypochlorite and normal saline. Most dental practitioners tend to use these irrigants for their patients which are in agreement with Udoye et al. [21], but in contrast to Ahmed et al. [13]; hydrogen peroxide was the main irrigant being used. The use of sodium hypochlorite may be due to its proven usefulness and effectiveness as an antimicrobial agent [22]; it also has tissue dissolving activity [23].

Calcium hydroxide intracanal medicament which accounted for 81.7% was frequently used in the endodontic treatment in the present study. The fundamental goal of intracanal medicament is to reduce the number of bacteria, relieve pain, and reduce inflammation [24]. Calcium hydroxide also aids in the cleaning of a root canal because of its soft tissue-dissolving potential [23]. Therefore, calcium hydroxide is being seen as the standard intracanal medicament for inter-appointment dressing [25]. Most studies utilized the use of calcium hydroxide as their intracanal medicament [1, 14, 21, 26]. In contrast, more of formocresol intracanal medicament was reported in a study done in Sudan; however, the researcher advocated for the use of calcium hydroxide instead of formocresol because of its mutagenic and carcinogenic potentials [27]. The utilization of calcium hydroxide, as intracanal medicament, should be encouraged to be used among dentists at different clinics in our local environment.

The most common technique used for obturating the root canals with gutta-percha in this study was the lateral condensation technique, and this has been reported as the most universally accepted technique [15]. Some African studies [13, 21] reported more of zinc oxide eugenol-based sealant being used for canal obturation which is in agreement with the present study; endoseal sealant, a zinc oxide eugenol-based, was solely used. The use of root canal sealer is an important component of the obturation process, which helps to fill the space between the canal wall and the core obturation material. A study in Malaysia [1] reported more of epoxy resin-based sealer, followed by calcium hydroxide-based sealer. Moreover, studies done in Saudi Arabia [26], Turkey [14], and Belgium [15] reported that more of resin-based sealer was utilized. The introduction of resin-based materials was said to increase the strength of the tooth root by bonding to dentin and forming a monobloc [28].

CONCLUSION

Patient's education, prevention, and early treatment of dental caries will limit endodontic treatment, which is time consuming and relatively expensive in our environment. However, root canal treatment is a useful intervention to maintain sound dentition. Current updates of methods and materials among clinicians are very important; they help to improve their knowledge and skills. Moreover, it aids the hospital administrators regarding the need to upgrade services in the aspect of materials and instruments.

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Authors declare no conflict of interest.

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All relevant data are within the paper and its Supporting Information files.

ABOUT THE AUTHORS

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