



ORIGINAL ARTICLE

# Incidence of postoperative pain after use of calcium hydroxide mixed with normal saline or 0.2% chlorhexidine digluconate as intracanal medicament in the treatment of apical periodontitis



Ifeoma Nkiruka Menakaya<sup>a</sup>, Olabisi Hajarat Oderinu<sup>b,\*</sup>,  
Ilemobade Cyril Adegbulugbe<sup>b</sup>, Olufemi Peter Shaba<sup>b</sup>

<sup>a</sup> Department of Restorative Dentistry, Lagos University Teaching Hospital, Lagos, Nigeria

<sup>b</sup> Department of Restorative Dentistry, Faculty of Dental Sciences, College of Medicine, University of Lagos/Lagos University Teaching Hospital, Nigeria

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## KEYWORDS

Apical periodontitis;  
Calcium hydroxide;  
Chlorhexidine;  
Normal saline;  
Postoperative pain;  
Root canal treatment

**Abstract Objective:** To compare the incidence of postoperative pain after the use of calcium hydroxide powder mixed with normal saline or 0.2% chlorhexidine digluconate as intracanal medicament.

**Participants:** Fifty-five subjects aged 17–60 years with teeth diagnosed to have apical periodontitis.

**Intervention:** Two-visit conventional root canal treatment of seventy teeth. The teeth were divided by randomization (balloting) into two groups: control group and experimental group, each with thirty-five teeth treated with calcium hydroxide mixed with normal saline or with 0.2% chlorhexidine digluconate as intracanal medicament respectively. Incidence of postoperative pain was assessed using the universal pain assessment tool and whether or not analgesic was taken.

**Main outcome measured:** Incidence of post-operative pain.

**Result:** Postoperative pain occurred only at 1-day and 1-week reviews. In the control group, the overall incidence of pain was the same at both review periods (5.7%), while the experimental group showed a slight decrease in incidence between 1-day (17.2%) and 1-week (11.4%) reviews. Incidence

\* Corresponding author at: Department of Restorative Dentistry, College of Medicine, University of Lagos, P.M.B. 12003, Nigeria.

E-mail addresses: [i\\_menakaya@yahoo.com](mailto:i_menakaya@yahoo.com) (I.N. Menakaya), [bisioderinu@yahoo.co.uk](mailto:bisioderinu@yahoo.co.uk) (O.H. Oderinu), [cyadegbulugbe@gmail.com](mailto:cyadegbulugbe@gmail.com) (I.C. Adegbulugbe), [olufemishaba@yahoo.com](mailto:olufemishaba@yahoo.com) (O.P. Shaba).

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of flare-ups was more in the experimental group (11.4%) than in the control group (5.7%). No significant statistical differences between the two groups were observed ( $p > 0.05$ ).

**Conclusion:** The incidence of postoperative pain was lower in the normal saline treatment group, but the difference was not statistically significant.

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## 1. Introduction

Post-operative pain of root treated teeth is defined as pain of any degree after initiation of endodontic treatment (Walton and Fouad, 1992). Therefore, pain after endodontic treatment can occur during intra-appointment or post-obturation in multiple visits or single visit endodontic treatment. Postoperative pain also includes endodontic flare-ups which are defined as strong pain with or without swelling that occurs after initiation or continuation of root canal treatment (Tsesis et al., 2008). Occurrence of post-operative pain can be very unpleasant for both patients and clinicians. Varied postoperative pain incidences have been reported ranging from 1.9% to 48% (El Mubarak et al., 2010) from studies based on various factors including single visit (Ali et al., 2012) versus multiple visit endodontic treatment (El Mubarak et al., 2010; Oginni and Udoye, 2004). Other factors studied in association with post-operative pain include type of intracanal medicament (Siqueira et al., 2002), root canal instrumentation protocol (enlargement /non enlargement of apical foramen) (Silva et al., 2013) and status of the pulp (Gotler et al., 2012).

The most common cause of postoperative pain is micro-organisms while other causes include mechanical or chemical injury to pulpal or periapical tissues (Siqueira et al., 2002). Micro-organisms have also been implicated in the pathogenesis of the periradicular lesions such that success of endodontic treatment depends on their reduction or elimination (Suchitra et al., 2006; Carrotte, 2004; Athanassiadis et al., 2007; Bystrom et al., 1985). Reduction or elimination of micro-organisms from the root canal system is achieved by chemo-mechanical preparation. The chemical preparation involves the use of irrigating solutions and intracanal medicaments. Calcium hydroxide is one of the most widely used intracanal medications in patients undergoing multiple visit endodontics (Siqueira et al., 2007; Manzur et al., 2007; Lee et al., 2009; Law and Messer, 2004; Baker et al., 2004; Tanriverdi et al., 1997; Silveira et al., 2007). Its antibacterial action is via release of hydroxyl ions, which kill or inactivate bacteria (Manzur et al., 2007; Evans et al., 2003). It has also been observed that the vehicle used in mixing calcium hydroxide determines its working characteristics (De Moor, 2003; Siqueira and Lopes, 1999; Balto, 2007). Calcium hydroxide is reported to be ineffective against all bacteria species especially *Enterococcus faecalis* found in the root canal. It was suggested that calcium hydroxide should be used in combination with other medicaments so as to enhance its efficacy (De Moor, 2003; Siqueira and Lopes, 1999; Balto, 2007). Different vehicles that have been used to mix calcium hydroxide powder include distilled water, dental anaesthetic solution, normal saline solution, ringers' solution several others (Fava and Saunders, 1999; Estrelaa et al., 2008) and more recently, chlorhexidine (Estrelaa et al., 2008; Nageshwar et al., 2004). The efficacy

of calcium hydroxide is affected by its dissociation capability which is determined by the type of vehicle used to mix it (Silveira et al., 2007; De Moor, 2003; Lacey et al., 2003). While it has been observed that the mixture of calcium hydroxide and chlorhexidine showed synergistic action and greater efficacy than calcium hydroxide alone (Evans et al., 2003; Nageshwar et al., 2004; Valera et al., 2009). The purpose of this clinical study was to compare the incidence of postoperative pain after the use of calcium hydroxide powder mixed with normal saline or 0.2% chlorhexidine digluconate as intracanal medicament in the treatment of apical periodontitis.

## 2. Materials and method

This study was part of a larger study which was a randomized controlled clinical trial carried out at the Restorative Dental Clinic of the Lagos University Teaching Hospital, Lagos, Nigeria. Approval was obtained from the Hospital's Research and Ethics committee. The study was carried out on patients that were 17 years and above with teeth diagnosed as having apical periodontitis and required endodontic treatment. The patients included in the study gave written informed consent. Treated teeth included those with apical periodontitis with none or minimal (2.0 × 2.0 mm) periapical radiolucency and are restorable, have closed apex and favourable root morphology. Exclusion criteria included teeth with dento-alveolar abscess or swelling, re-treatment cases, periodontally compromised teeth, teeth that require surgical endodontics and those that required more than two endodontic treatment visits. Also, excluded are medically immune compromised patients.

The teeth were divided into two groups by randomization (balloting). Group A was the control group and comprised teeth treated with calcium hydroxide mixed with normal saline intracanal medicament. Group B was the experimental group and comprised teeth treated with calcium hydroxide mixed with 0.2% chlorhexidine digluconate intracanal medicament. Where a subject had more than one tooth for treatment, each tooth was assigned by balloting. Incisor, canine and premolar and molar teeth were treated. The subjects in each group were reviewed at one day, one week, one month, three months and six months. The sample size was calculated (Varkevisser et al., 1992) to be approximately 25 teeth per group based on the results of previous studies representing the control (Zerella et al., 2005) and experimental (Wang et al., 2007) groups respectively. To ensure validity and correctness for possible attrition, teeth treated in each group were increased to 35 giving a total of seventy teeth treated.

### 2.1. Treatment protocol

A detailed history, clinical examination, investigations, diagnosis and treatment planning were done for each patient. Root

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