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Original Research

Comparison of the Cleaning Efficiency and Instrumentation Time of K3 and ProTaper Rotary Files

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ABSTRACT

Aim: The aim of this study was to compare the instrumentation time and cleaning efficacy of K3 and ProTaper rotary files. **Materials and Methods:** Across-sectional study was conducted to investigate the cleaning efficiency and instrumentation time of K3 and ProTaper rotary files. A close-ended questionnaire consisting of 10 questions was distributed online. The participants included dental interns, general practitioners, endodontic residents, and endodontists. Data were analyzed using SPSS Version 22. **Results:** A total of 200 participants responded to the survey. More than half reportedthat ProTaper rotaryNiTi system have better cleaning efficiency, instrumentation time, root canal preparation, and effective in curved canal. Over 50% observed distortion and fracture instrument by K3 rotary NiTi system. **Conclusions:** From the findings of this study it can be concluded that instrumentation time and cleaning efficacy of NiTirotary systems was in agreement with the ProTaper rotary systems.

Key words: Root canal instrumentation, NiTi, ProTaper rotary files, K3 rotary files

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INTRODUCTION

The root canal of a tooth in the last twenty five years has a major objective in the improvement and development of its technique procedure[1]. Proper quality of root canal cleaning is a reflect factor for the success quality of endodontic treatment[2]. The main goal of endodontic treatment is to eliminate the residual microbial population by mechanical instrumentation techniques, irrigation protocols, and intracanal antimicrobial medications[3].

It has been confirmed from most studies that NiTi rotary systems are faster and has better conservation of the tooth structure[4].ProTaper and K3 rotary systems have different characteristics but all have shown excellent results regarding preparation and amount of time required. Moreover, during preparation the canal by rotary system maintaining the canal wall without creating any procedure accident such as instrument fracture, external transportation, ledge, or perforation. Combination of (K3, Protaper) rotary systems acceptable cleaning efficiency, time and procedure accident occur in the root canals of teeth[5].

MATERIALS AND METHODS

Across-sectional survey was conducted using electronic copies of questionnaire distributed through email. The questionnaire included questions investigating instrumentation time and cleaning efficacy of K3 and ProTaper rotary files among dental interns, general practitioners, endodontic residents, and endodontists. Before the study was conducted, the Institutional Review Board (IRB) approval was obtained. The sample was comprised of questions about:

The file more cleaning efficacy.
The file less time consuming.
The file better root canal preparation.

The file better use in curved canals.
The file more probability to be distortion.
The file more probability to be fracture.
The file more probability to perform ledge formation.

The questionnaire was close-ended, the questions had specific answers that participants had to choose from. The data were entered into the computer and analyzed using the SPSS computer software (Statistical Package for the Social Sciences, version 19.0, SPSS Inc., Chicago, IL, USA). Descriptive statistics were performed to present the overview of the findings.

RESULTS

Of the total 200 participants, 50% were male and 50% were female. The results also show that around 29% of participants were endodontic residents. Regarding the cleaning efficacy ProTaper rotary system had significantly greater cleaning efficacy (72%) when compared to that of K3 rotary system (Figure 1). About the time it was found that ProTper NiTi rotary file system was faster than of K3 rotary NiTi system (Figure 2). In general it was found that ProTper NiTi rotary file system has better root canal preparation (70%), followed by K3 rotary NiTi system (50%) (Figure 3).

It was found that ProTper NiTi rotary file system more effective than K3 rotary NiTi system in curved canal(Figure 4). It was found that K3 rotary NiTi system (73%) had greatest distortion (Figure 5) and (72%) more probability of fracture.(Figure 6). An overwhelming around one third (65.70%) of the respondents listed K3 rotary NiTi system has more probability to perform ledge formation (Figure 7).More than 50 % of respondents reported K3 rotary NiTi system has more probability to perform apical root canal transportation.

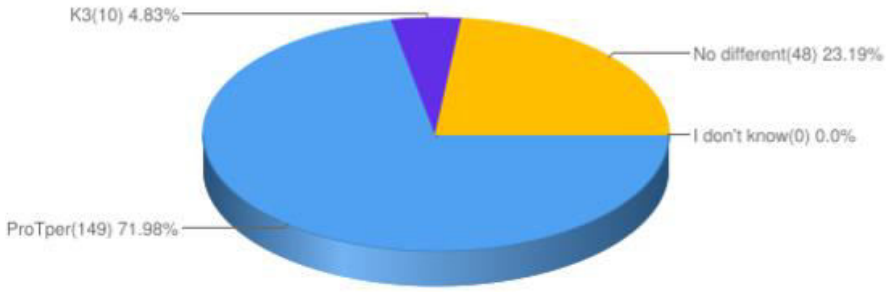

Figure 1. Regarding cleaning efficacy

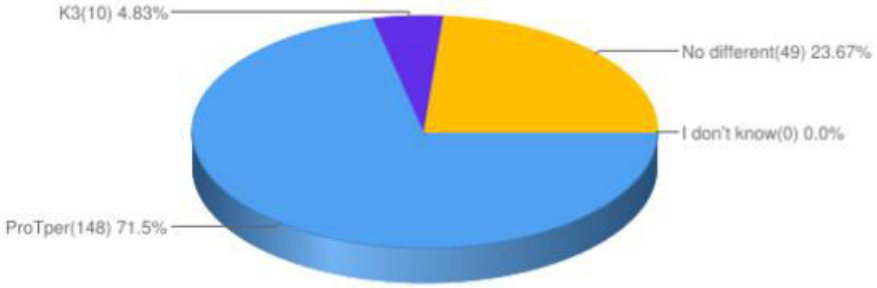

Figure 2.Regarding time

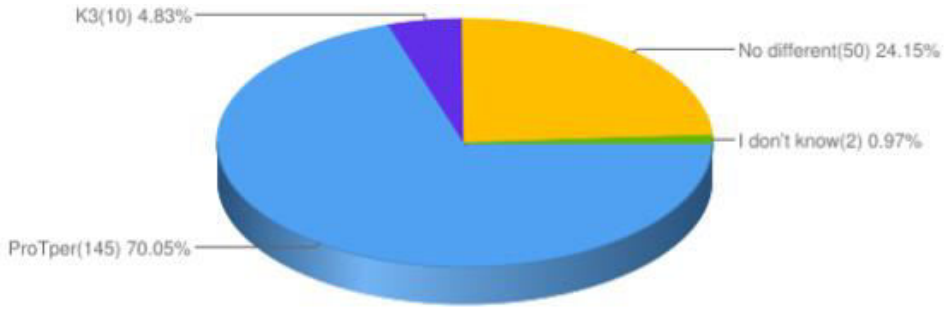

Figure 3.Regarding root canal preparation

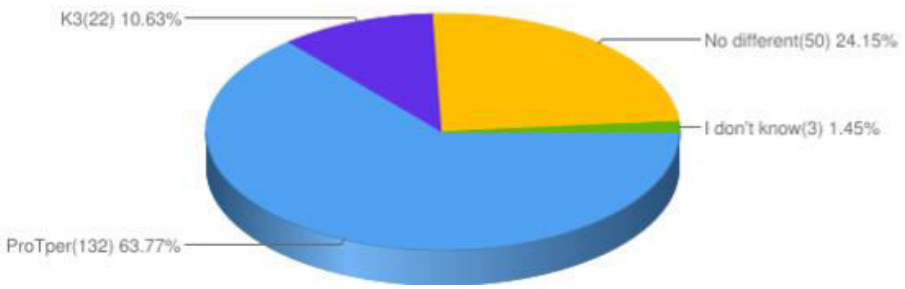

Figure 4. Regarding the use in curved canal

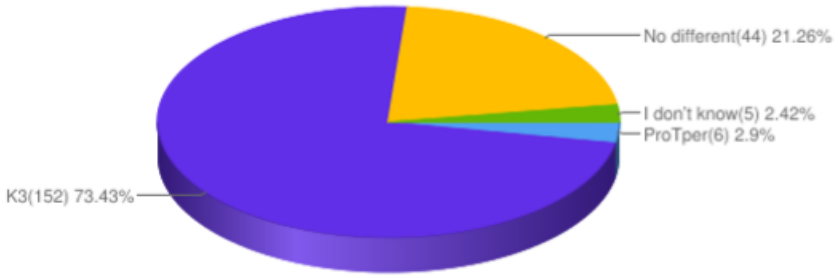

Figure 5. Probability of distortion

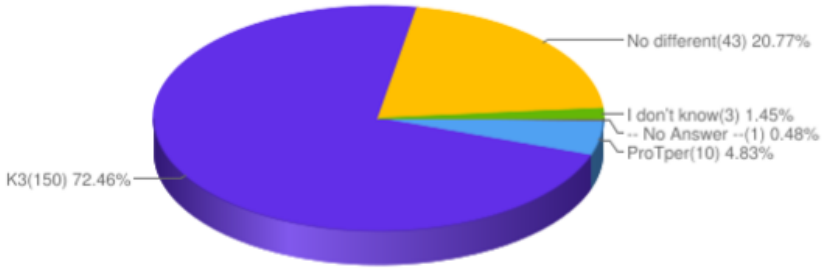

Figure 6. Probability of fracture

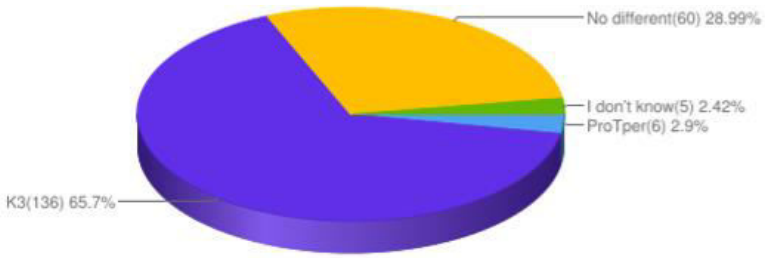

Figure 7.Probability of ledge formation

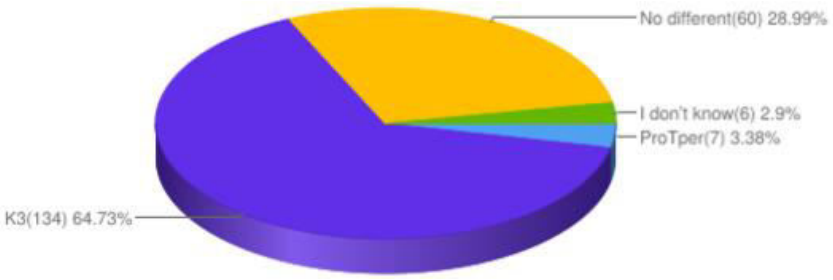

Figure 8.Probability of apical root canal transportation

DISCUSSION

There were 200 participants in this study, 50% of which were female and 50% were male. Of the respondents, 28.99% were endodontic residents, 24.64% were dental interns, 23.67% were endodontists and the remaining 22.71% were general practitioners. The literature shows that no differences in cleaning efficacy of between K3 and ProTaper rotary files[6].However,one study found that Protaper rotary instruments reported more cleaning efficacy resulted in significantly less debris and smear layer compared to K3 rotary system[7].

This study showed that 71.98% of respondents indicating most of cleaning efficacy by the ProTper NiTi rotary file system. A study found K3 and ProTaper rotary files yielded best result regarding the time required[5].Some of the previous studies have reported K3 instruments prepared canals faster than ProTaper[8-9]. The present study revealed that 71.50% of participants reported that ProTper NiTi rotary file system faster than of K3 rotary NiTi system.

Pertaining to root canal preparation, previous studies showed ProTper NiTi rotary file system is effective preparations[5]. The study also showed that most of the respondents (70.05%) supported ProTper NiTi rotary file system in better root canal preparation. The current study showed more distortion and fracture instrument in curved canals by K3 rotary NiTi system. However, Stantoset al., (2006) noticed no difference in K3 and ProTaper rotary files[10].

Regarding ledge formation, past studies reported that K3 system with higher canal centering that means less procedure accident occur as ledge formation [11]. A significant number of participants in the study group indicated having problems with K3 system with probability to perform ledge formation. Lastly, the present study showed that 64.37% of participants reported K3 rotary NiTi system has more probability to perform apical root canal transportation.

CONCLUSION

From the findings of this study it can be concluded that instrumentation time and cleaning efficacy of nickel-titanium rotary systems was in agreement with the ProTaper rotary systems.

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