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## Comparison of apical microleakage during root canal therapy by K-type files and Flex-R files

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### Abstract

**Background:** Canal-shaping is a critical aspect of endodontic treatment because it influences the outcome of the subsequent phases of canal irrigation, filling, and the overall success of the treatment itself. Hence; the present study was undertaken for assessing and comparing apical microleakage dentinal changes during root canal therapy by K-type files and Flex-R files.

**Materials & Methods:** 20 freshly extracted maxillary second premolars were obtained and included in the study. All the tooth specimens were cut from the cement-enamel junction. All the specimens were divided into two study groups depending upon the type of file used, with 10 specimens in each group. Only those teeth were selected which had a straight distal canal. If the apical foramen was open to over # 20 K file the tooth was rejected. The teeth were cleaned and stored in normal saline for 1 week. Working length was assessed radiographically and biochemical preparation was done according to the specific group. After completing the biochemical preparation, microleakage was assessed using stereomicroscope.

**Results:** Mean microleakage of the K-type file group was 3.7452 and mean microleakage of the Flex- R file was 2.9650. Significant results were obtained while comparing the mean microleakage among the K-type file group and Flex-R file group.

**Conclusion:** From the above results, the authors conclude that Flex- R file are better in comparison to K-type files.

**Keywords:** Microleakage, root canal therapy

### Introduction

Canal-shaping is a critical aspect of endodontic treatment because it influences the outcome of the subsequent phases of canal irrigation, filling, and the overall success of the treatment itself. Root canal therapy involves the use of instruments and irrigants to shape and chemomechanically prepare the root canal system to receive a three-dimensional filling of the entire root canal space. The goal of instrumentation is to produce a continuously tapered preparation that maintains the canal anatomy, keeping the foramen as small as possible without any deviation from the original canal curvature [1-4].

Previous studies by Iqbal *et al.* compared the apical transportation between the ProFile and ProTaper instruments and showed that the ability of the file to remain centered may not entirely depend on U-file design or the presence of radial lands. The variable taper design of Protaper dampens the screw-in effect. Thus, a simpler convex triangular design, as seen in the case of Protaper, is capable of performing equally well or slightly better than ProFile [5-8]. Hence; the present study was undertaken for assessing and comparing apical microleakage dentinal changes during root canal therapy by K-type files and Flex-R files.

### Material and Method

The present study was conducted in the department of Dentistry. It included assessment of apical microleakage during root canal therapy by K-type files and Flex-R files. 20 freshly extracted maxillary second premolars were obtained and included in the study. All the tooth specimens were cut from the cement-enamel junction. All the specimens were divided into two study groups depending upon the type of file used, with 10 specimens in each group. Only those teeth were selected which had a straight distal canal. If the apical foramen was open to over # 20 K file the tooth was rejected. The teeth were cleaned and stored in normal saline for 1 week.

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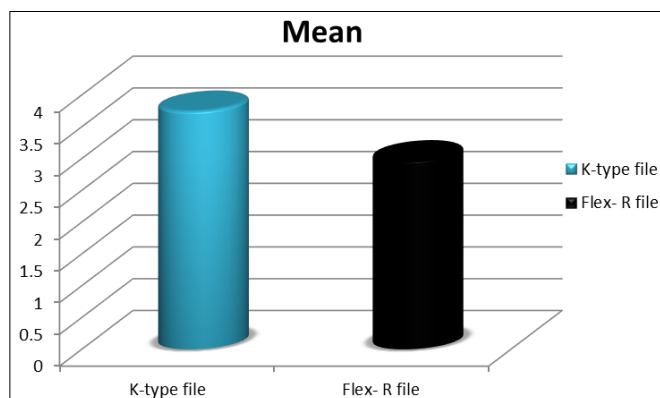
Working length was assessed radiographically and biochemical preparation was done according to the specific group. After completing the biochemical preparation, microleakage was assessed using stereomicroscope. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi-square test was used for assessment of level of significance.

## Results

In the present study, a total of 20 specimens were included and were divided randomly into two study groups; K-type file group and Flex-R file group. Mean microleakage of the K-type file group was 3.7452 and mean microleakage of the Flex-R file was 2.9650. Significant results were obtained while comparing the mean microleakage among the K-type file group and Flex-R file group.

**Table 1:** Comparison of microleakage

Group	Mean	SD	p-value
K-type file	3.7452	1.071	0.00 (Significant)
Flex-R file	2.9650	0.9981	



**Graph 1:** Bar diagram showing comparison of microleakage

## Discussion

It was in late 1988 that Walia *et al.* introduced the magic properties of a corrosion resistant alloy to the manufacturers for making the nickel-titanium (NiTi) rotary instruments. Previously, the simple hand Endo files were made of carbon steel or stainless steel. Stainless steel instruments inherent stiffness that increases as the size of the instruments increases [7, 8]. Hence; the present study was undertaken for assessing and comparing apical microleakage dentinal changes during root canal therapy by K-type files and Flex-R files.

In the present study, a total of 20 specimens were included and were divided randomly into two study groups; K-type file group and Flex-R file group. Mean microleakage of the K-type file group was 3.7452 and mean microleakage of the Flex-R file was 2.9650. Brau-Aguadé E compared, *in vitro*, the machining efficiency of different triangular cross-section K-files made of nickel titanium (Nitiflex, Naviflex), titanium (Microtitane), and stainless steel (Flexofile, Flex-R). Ten instruments of each K-file from size 25 to 40 were tested. The cutting efficiency was assessed in a linear motion using an indentation caliper to measure the depth of grooves. The load applied (in grams) was equal to the ISO file size. Each file was allowed to do 100 back-and-forward movements. Files made of stainless steel were the most effective, in particular Flexofile. There were statistically significant differences between Flexofile and Flex-R in all sizes. In the group of nickel titanium instruments, Nitiflex was significantly more efficient than Naviflex in all sizes. The machining ability of

titanium files was higher than that of Naviflex but lower than that of Nitiflex and stainless steel files [9].

In the present study, significant results were obtained while comparing the mean microleakage among the K-type file group and Flex-R file group. Saunders WP *et al.* assessed the effect of noncutting tipped instruments on the quality of root canal preparation using a modified double-flared technique. Fifty-one extracted human first molar teeth with intact crowns and mature root apices were divided into three groups. Root curvature was determined. One of the root canals in the mesial root of lower molars, or the mesiobuccal root in maxillary molars, was prepared in one of three ways. In group 1 the root canals were instrumented using a modified double-flared technique with noncutting tipped files (Flex R); in group 2 the same files were used with a step-back technique. Group 3 was prepared with conventionally tipped files (K-Flex) using the step-back technique. A low viscosity polyvinyl siloxane impression material was injected into the prepared root canals and the specimens were decalcified, dehydrated, and cleared. The preparation was evaluated subjectively according to various desirable or undesirable criteria. A rating for overall quality of preparation was given. Statistical analysis showed that the teeth in group 1 had better overall preparation than those in group 3 ( $p < 0.05$ ). There were no other statistically significant differences between the groups. The mean time required for each preparation technique was not statistically significantly different ( $p > 0.1$ ). The use of a modified double-flared technique with non-cutting tipped files was shown to be an effective method for the preparation of curved root canals [10].

## Conclusion

From the above results, the authors conclude that Flex-R files are better in comparison to K-type files. However; further studies are recommended.

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