International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "*Society for Scientific Research and Studies*" [Regd.]

ISSN 2455-7803 Index Copernicus value 2016 = 68.10

Original Article

Assessment of the efficacy of canal preparation and canal debridement by hand K-files and Mtwo rotary files

VK Kumar[1], L Chandrashekar[2], Shubha[3], Akshatha LN[4] , Suhas HG[5], Sathyajith thopachiche[6]

[1]Associate professor, [2]Professor, [3]Assistant Professor, Department of Dentistry, [4]Assistant professor, Department of Biochemistry, Shridevi Institute of Medical Science and Research Hospital Tumkur, [5]Assistant Professor, Dept of Oral Pathology, Pariyaram Dental College, Pariyaram, Kannur, [6]Sr lecturer, Department of Oral Pathology, KLE Institute of Dental Sciences, Bangalore, Karnataka, India

***ABSTRACT*:**
Background: In recent years, the use of nickel-titanium (NiTi) rotary files and automated root canal devices has been increasing in endodontic treatments. The advantages of rotary NiTi instruments over hand instruments include facilitating canal preparation, preserving the shape of curved canals and producing smooth surfaces in lesser time than with manual instruments. **Aim of the study:** To assess the efficacy of canal preparation and canal debridement of hand K-files and Mtwo rotary files. **Materials and methods:** The present study was conducted in the Department of Dentistry, Shridevi Institute of Medical Sciences and Research Hospital, Tumkur, Karnataka, India. After approval of the study protocol, we selected 60 extracted first mandibular molars. Only non-carious teeth, with no signs of root resorption and absence of any structural abnormality were selected for the study. The teeth were randomly grouped into two groups, Group A and Group B with 20 teeth in each group. The instrumentation of specimens of the Group A was done using stainless steel K-files and in Group B was done using MtwoNiTi rotary files. **Results:** We observed that in case of both the files, score 0 had the highest frequency; however, frequency of score 0 was higher with Mtwo files as compared to K-files. The lowest frequency was seen in score 3 of canals. **Conclusion**: Based on the findings of present study, we conclude that MtwoNiTi rotary files were more efficient in preparation of teeth root canals.
Keywords: Rotary files, hand files, Mtwo files, K-files.

Corresponding Author: Dr. L Chandrashekar, Professor, Department of Dentistry, Shridevi Institute of Medical Science and Research Hospital Tumkur, Karnataka, India

This article may be cited as: Kumar VK, Chandrashekar L, Shubha, LN Akshatha, HG Suhas, Thopachiche S. Assessment of the efficacy of canal preparation and canal debridement by hand K-files and Mtwo rotary files. Int J Res Health Allied Sci 2018; 4(3):48-51.

INTRODUCTION:

Success in endodontic therapy rests on the pedestal of the endodontic triad "diagnosis + anatomy + debridement = success", with debridement of the canal system through proper cleaning and shaping being of paramount importance in successful treatment.[1, 2] One of the main objectives of root canal preparation is cleaning and shaping of the root canal system, while retaining the original shape of the canal without creating iatrogenic events, such as instrument fracture, apical transportation, ledge or perforation.[3, 4] In recent years, the use of nickel-titanium (NiTi) rotary files and automated root canal devices has been increasing in endodontic treatments. The advantages of rotary NiTi instruments over hand instruments include facilitating canal preparation, preserving the shape of curved canals and producing smooth surfaces in lesser time than with manual instruments. Several studies have compared the effectiveness of rotary NiTi and hand instruments in cleaning root canals. Most studies have confirmed that NiTi rotary systems are faster than hand instruments; eliminate problems during the preparation of curved root canals.[5,6] Hence, the present study was conductedto assess the efficacyof canal preparation and canal debridement of hand K-files and Mtwo rotary files.

MATERIALS AND METHODS:

The present study was conducted in the Department of Dentistry, Shridevi Institute of Medical Sciences and Research Hospital, Tumkur, Karnataka, India. The ethical clearance for study protocol was obtained from ethical committee of the institution. After approval of the study protocol, we selected 60 extracted first mandibular molars. Only non-carious teeth, with no signs of root resorption and absence of any structural abnormality were selected for the study. Organic debris from the teeth surface was cleared by immersing them in Sodium hypochlorite solution for 3 days. Access cavity was prepared using round diamond bur and patency checked using no. 10 K-file. Barbed broaches were used to take out pulp from the canal. After removal of pulp, the root canals were rinsed with 2mL normal saline. Then, using 30-guaze needle root canals were packed with India ink. To assure the penetration of ink, no. 15 K-file was introduced into canal. The teeth were randomly grouped into two groups, Group A and Group B with 20 teeth in each group. The instrumentation of specimens of the Group A was done using stainless steel K-files and in Group B was done using MtwoNiTi rotary files. The cleared specimens were viewed under stereo microscope at 10X for checking the amount of residual India ink at coronal, middle and apical region of the canals and scored from 0 to 3. Score 0 was awarded to clear canal, 1 was awarded to residual ink stains, 2 was awarded to incomplete ink removal and 3 was awarded to no ink removal. The results were evaluated.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS:

Table 1 and 2 depicts the cleaning efficacy of K-files and Mtwo files respectively at Apical, middle and coronal region. We observed that in case of both the files, score 0 had the highest frequency; however, frequency of score 0 was higher with Mtwo files as compared to K-files. The lowest frequency was seen in score 3 of canals. **[Fig 1 and 2]**.

Table 1: Frequency of cleaning efficacy scores of K-files

SCORES	Apical region	Middle region	Coronal region	Total
0	11	16	22	49
1	9	8	7	24
2	9	6	1	16
3	1	0	0	1
Total	**30**	**30**	**30**	**90**

Table 2: Frequency of cleaning efficacy scores of M-two rotary files

SCORES	Apical region	Middle region	Coronal region	Total
0	18	22	26	66
1	8	6	4	18
2	4	2	0	6
3	0	0	0	0
Total	**30**	**30**	**30**	**90**

Figure 1: Cleaning efficacy scores of K-files

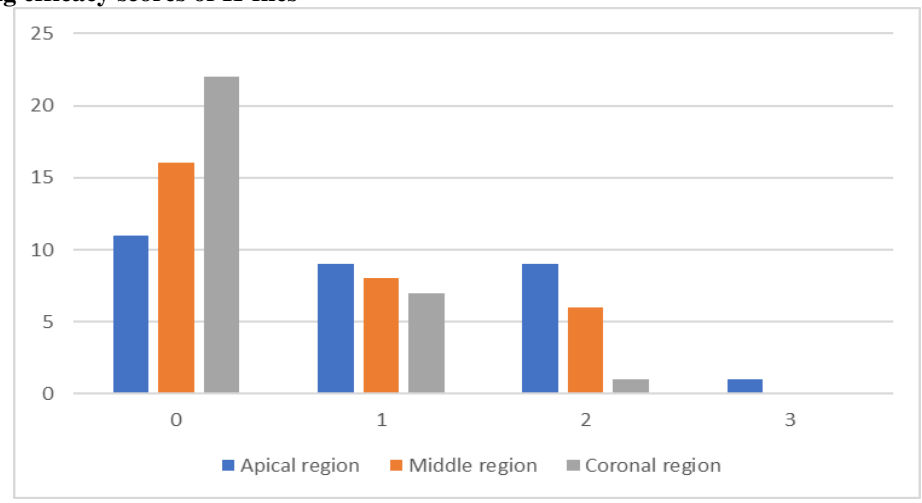
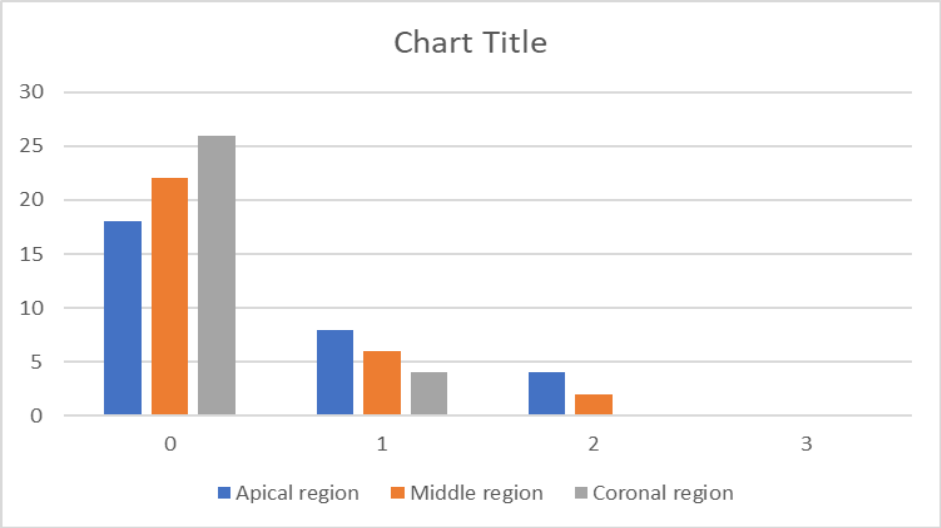


Figure 2: Cleaning efficacy scores of M-two rotary files



DISCUSSION:

In the present study, we evaluated the efficacy of Mtwo rotary NiTi files and hand K-files. We observed that both the techniques were able to efficiently remove the ink from the canals. Statistically significant difference was observed in the apical, middle and coronal thirds of root canals on comparing Group A and B. Hin ES et al observed the incidence of cracks in root dentin after root canal preparation with hand files, self-adjusting file (SAF), ProTaper, and Mtwo. One hundred extracted mandibular premolars with single canals were randomly selected. Two angulated radiographs were taken for each tooth, and the width of the canal was measured at 9 mm from the apex. Five groups of 20 teeth each were comparable in canal width. The control group was left unprepared. Four experimental groups were instrumented with hand files, ProTaper, Mtwo, and SAF. Roots were then sectioned horizontally and observed under a microscope. The presence of dentinal cracks and their location were noted. The difference between the experimental groups was analyzed with a $\chi(2)$ test. No cracks were observed in the control group. In the experimental groups, ProTaper, Mtwo, and SAF caused cracks in 35%, 25%, and 10% of teeth, respectively. The hand-file group did not show any dentinal cracks. ProTaper and Mtwo caused more cracks than hand files ($P < .05$), but SAF did not. They concluded that iInstrumentation of root canals with SAF, Mtwo, and ProTaper could cause damage to root canal dentin. SAF has a tendency to cause less dentinal cracks as compared with ProTaper or Mtwo. Aminsobhani M et al compared the efficacy of Mtwo and RaCe rotary file systems in straightening the canal curvature using only one file or the conventional method. Sixty mesial roots of extracted human mandibular molars were prepared by RaCe and Mtwo nickel-titanium (NiTi) rotary files using the conventional and only one rotary file methods. The working length was 18 mm and the curvatures of the root canals were between 15-45°. By superimposing x-ray images before and after the instrumentation, deviation of the canals was assessed using Adobe Photoshop CS3 software. Preparation time was recorded. Data were analyzed using three-way ANOVA and Tukey's post hoc test. There were no significant differences between RaCe and Mtwo or between the two root canal preparation methods in root canal deviation in buccolingual and mesiodistal radiographs ($P>0.05$). Changes of root canal curvature in >35° subgroups were significantly more than in other subgroups with smaller canal curvatures. Preparation time was shorter in one file only technique. According to the results, the two rotary systems and the two root canal preparation methods had equal efficacy in straightening the canals; but the preparation time was shorter in one file only group.[7, 8]

Azar MR et al compared the effectiveness of manual K-files (Mani Co, Tokyo, Japan) and two rotary systems-Mtwo (Dentsply-Maillefer, Ballaigues, Switzerland) and ProTaper (VDW, Munich, Germany)-for root canal preparation in primary molars. India ink was injected to 160 mesiobuccal and distal root canals of mandibular primary molars. The teeth were randomly divided into three experimental groups and one control group. In each experimental group, either manual instruments (K-files) or rotary instruments (Mtwo or ProTaper) were used to prepare root canals. After cleaning the canals and clearing the teeth, ink removal was evaluated with a stereomicroscope. Statistical analysis was done with Kruskal-Wallis and Friedman tests. There were no significant differences in cleaning efficiency between manual and rotary instruments. Only ProTaper files performed significantly better in the coronal and middle thirds than in the apical third of the root canal. They concluded that manual K-files and the Mtwo and ProTaper rotary systems showed equally acceptable cleaning ability in primary molar root canals. Azar MR et al compared the

cleaning ability and preparation time of rotary instruments (Mtwo) and conventional manual instruments (K-file) in preparing primary and permanent molar root canals. Access cavities were prepared in 70 primary and 70 permanent teeth and India ink was injected into 120 canals of selected molars. The teeth were randomly divided into two main subgroups (n=20) and three control groups (n=10). In each of these main subgroups, either the manual instrument (K-file) or the rotary system (Mtwo) was used to prepare root canals. After cleaning the canals and clearing the teeth, dye removal was evaluated with the help of a stereomicroscope. In addition, the time needed for root canal preparation was recorded by a chronometer. With regard to the cleaning ability of root canals, there were no significant differences between the K-file and Mtwo rotary system in primary and permanent teeth in the apical, middle or coronal third of the canals. Moreover, there were no significant differences between primary and permanent teeth prepared with K-files and rotary instruments. In all the groups, shorter times were recorded with the rotary technique. The working time was shorter in primary than in permanent teeth. It was concluded that the Mtwo rotary system showed acceptable cleaning ability in both primary and permanent teeth, and achieved results similar to those of K-files in less time.[9, 10]

CONCLUSION:

Based on the findings of present study, we conclude that MtwoNiTi rotary files were more efficient in preparation of teeth root canals.

REFERENCES:

1. Nekoofar MH, Sheykhrezae MS, Meraji N, Jamee A, Shirvani A, Jamee J, Dummer PM. Comparison of the effect of root canal preparation by using WaveOne and ProTaper on postoperative pain: a randomized clinical trial. J Endod. 2015;41(5):575–8.
2. Shahi S, Asghari V, Rahimi S, Lotfi M, Samiei M, Yavari H, Shakouie S, Nezafati S. Postoperative Pain after Endodontic Treatment of Asymptomatic Teeth Using Rotary Instruments: A Randomized Clinical Trial. Iran Endod J. 2016;11(1):38–43.
3. Mohammad Hammad, Alison Qualtrough, Nick Silikas. Three-dimensional evaluation of effectiveness of hand and rotary instrumentation for retreatment of canals filled with different materials. J Endod. 2008;34:1370–73.
4. Glickman GN, Vogt MV. Pathways of the pulp. 10th Edition. Mosby, Elsevier; 2011. Chapter 5- Preparation for treatment. In:Cohen S, Hargraveas KM; pp. 88–123.
5. Kuo CI, Wang YL, Chang HH, Huang GF, Lin CP, Li UM,Guo MK. Application of Ni-Ti rotary files for pulpectomyin primary molars. J Dent Sci 2006; 1:10-5.
6. Barr ES, Kleier DJ, Barr NV. Use of nickel-titanium rotaryfiles for root canal preparation in primary teeth. PediatrDent 1999; 21:453-4.
7. Hin ES, Wu MK, Wesselink PR, Shemesh H. Effects of self-adjusting file, Mtwo, and ProTaper on the root canal wall. J Endod. 2013 Feb;39(2):262-4. doi: 10.1016/j.joen.2012.10.020. Epub 2012 Nov 22.
8. Aminsobhani M, Razmi H, Nozari S. Ex Vivo Comparison of Mtwo and RaCe Rotary File Systems in Root Canal Deviation: One File Only versus the Conventional Method. J Dent (Tehran). 2015 Jul;12(7):469-77.
9. Azar MR, Safi L, Nikaein A. Comparison of the cleaning capacity of Mtwo and Pro Taper rotary systems and manual instruments in primary teeth. Dent Res J (Isfahan). 2012 Mar;9(2):146-51.
10. Azar MR, Mokhtare M. Rotary Mtwo system versus manual K-file instruments: efficacy in preparing primary and permanent molar root canals. Indian J Dent Res. 2011 Mar-Apr;22(2):363. doi: 10.4103/0970-9290.84283.

Source of support: Nil **Conflict of interest:** None declared