

# بسم الله الرحمن الرحيم





# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





# جامعة عين شمس

التوثيق الإلكتروني والميكرو فيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
على هذه الأقراص المدمجة قد أعدت دون أية تغييرات



## يجب أن

تحتفظ هذه الأقراص المدمجة بعيدا عن الغبار





**“Evaluation of Shaping Ability, Cleaning Efficacy and Instrumentation Time of Manual and Two Different Rotary Systems in Deciduous Teeth: An In Vitro Study”**

**Thesis Submitted to the Department of Pediatric Dentistry & Dental Public Health, Faculty of Dentistry, Ain Shams University in Partial Fulfillment of the Requirements for the Master Degree in Pediatric Dentistry**

**Submitted By:**

**Sarah Lutf Ahmed Sennain**

**(B.D.S) Faculty of Dentistry, University of Science and Technology,  
Sana'a- Yemen**

**(2009)**

**Faculty of Dentistry**

**Ain Shams University**

**2021**

## **Supervisors**

**Dr. Mariem Osama Mohamed Wassel**

Associate Professor of Pediatric Dentistry and Dental Public Health

Faculty of Dentistry

Ain Shams University

**Dr. Basma Gamal Salah El-Din Awad**

Lecturer of Pediatric Dentistry and Dental Public Health

Faculty of Dentistry

Ain Shams University

بسم الله الرحمن الرحيم

يرفع الله الذين آمنوا منكم  
والذين أوتوا العلم درجات والله  
بما تعملون خبير

صدق الله العظيم

سورة المجادلة - آية 11

## Acknowledgment

All praise and all thanks to Allah, who has given me the strength, guided me, and enabled me to accomplish this work.

It's my honor to express my deepest gratitude to **Dr. Mariem Osama Wassel**, Associate Professor of Pediatric Dentistry and Dental Public Health, Faculty of Dentistry, Ain Shams University for her dedicated support and guidance throughout the writing of this thesis. Also, for her vision and motivation which have deeply inspired me.

I would also like to extend my special gratitude to **Dr. Basma Gamal Awad**, Lecturer of Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Ain Shams University for her guidance, encouragement, and persistent help by which the goal of this project would not have been realized.

Also, I would like to express my gratitude to **Dr. Mohamed Mokhtar Nagy**, Associate Professor of Endodontics, Faculty of Dentistry, Ain Shams University for his support, persistent help, and unique practical advice.

Besides, I would like to thank my professors, colleagues, and staff members of the Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Ain Shams University for their constant help and encouragement.

Also, I would like to thank staff members in Oral Radiology and Oral Pathology Departments, Faculty of Dentistry, Ain Shams University for their help.

Finally, I would like to thank my niece **Dr. Malak Khaled Al-Qatta**, and my friends **Dr. Noha Al-Amri** and **Dr. Monerah Al-Kathiry** who helped me to finish this work.

## ***Dedication***

***This work is dedicated:***

***To My Mother***, for all her love, prayers, caring, and sacrifices.

Above all, ensuring that I got the highest levels of education and providing me with continuous encouragement through my years of studying. Without her support, this project could not have reached its goal.

***To the Soul of My Father***, whose affection encouraged me throughout my life. May the All-Mighty Allah Bless his soul.

***To All My Wonderful Brothers and Sisters.....***



## **List of Contents**

Title	Page No.
List of Tables.....	ii
List of Figures.....	iii
List of Abbreviations.....	viii
Introduction.....	1
Review of literature.....	3
Aim of Study.....	48
Material and Methods.....	49
Results.....	77
Discussion.....	105
Summary.....	118
Conclusion.....	121
Recommendation .....	122
References .....	123
Arabic Summary.....	-

## **List of Tables**

<b>No.</b>	<b>Title</b>	<b>Page No.</b>
<b>1</b>	Various trade names of rotary files in each generation.	16-18
<b>2</b>	Materials used for sample access opening, instrumentation and irrigation.	49-50
<b>3</b>	Materials used for measuring of cleaning, decalcification, dehydration and clearing.	50-51
<b>4</b>	Frequencies and percentages of the distribution of instrumented canals.	78
<b>5</b>	Mean $\pm$ standard deviation (SD)of transportation for different groups (B-L)	81
<b>6</b>	Mean $\pm$ standard deviation (SD)of transportation for different groups (M-D)	85
<b>7</b>	Mean $\pm$ standard deviation (SD) of centering ratio for different groups (B\L).	88
<b>8</b>	Mean $\pm$ standard deviation (SD) of centering ratio for different groups (M\D).	92
<b>9</b>	Mean $\pm$ standard deviation (SD) of instrumentation time(mm:ss)for different groups.	99
<b>10</b>	Mean $\pm$ standard deviation (SD) of cleaning score for different groups.	101

## **List of Figures**

<b>No.</b>	<b>Title</b>	<b>Page No.</b>
1	Two types of root canal instrument tips	10
2	Taper of root canal instrument	11
3	Elements of cutting part of root canal instruments	12
4	External and internal instrument diameter and depth of fluting.	12
5	Volume of instrument fluting.	13
6	Elements of cutting blade	13
7	K-files (Dentsply, Maillefer, Ballaigues, Switzerland).	51
8	ProTaper Next files (Dentsply, Maillefer, Ballaigues, Switzerland).	52
9	Pro AF Baby Gold (Dentobizz, India).	52
10	Sample classification	56
11	Procedure steps	57
12	Access cavity, (a) reaching the pulp chamber using large round bur, (b) removing the overlying dentine using tapered bur.	58
13	Modeling wax blocks of the three groups.	59
14	Showing the block positioning in the CBCT machine for group I Manual K-files.	60
15	i-CATTM Cone Beam 3D Imaging.	60

16	Working length determination using file #10, its tip is visible from the apex.	61
17	Isolation the outside tooth surface with petroleum gel.	61
18	(a)Ink injection inside the canal, (b) inserting #10 K-file into the canal after reinjection of the ink to assure no bubble formation.	62
19	Teeth after injection, placed in wet condition.	62
20	Group M instrumentation technique using manual K- files	63
21	Group PTN instrumentation technique using ProTaper Next (X1, X2)	65
22	Group PAF instrumentation technique using Pro AF Baby Gold (B1, B2)	66
23	Chronometer	67
24	MPR screen represent coronal and axial planes.	68
25	Coronal plane (cross sectional slice)	69
26	Axial plane shows pre and post instrumentation CBCT images of remaining dentine thickness at coronal third (Mesio-Distal direction)	69
27	Schematic diagram showing measurement for image cross section to be used in Gambill's equation.	71
28	Clearing technique, (a) decalcification in 7% HCL, (b) dehydration in 70% Alcohol, (c) after dehydration in 100% Alcohol, (d) clearing the tooth with methyl salicylate.	73

29	Stereomicroscope	74
30	Arrows denote the traces of ink remaining in root canal	75
31	Bar chart showing distribution of instrumented canals.	79
32	Bar chart showing average transportation for different groups (B-L) (A)	82
33	Bar chart showing average transportation for different groups (B-L) (B)	82
34	Bar chart showing average transportation for different groups(M-D) (A)	85
35	Bar chart showing average transportation for different groups (M-D) (B)	86
36	Bar chart showing average centering ratio for different groups (B\L) (A)	89
37	Bar chart showing average centering ratio for different groups(B\L) (B)	89
38	Bar chart showing average centering ratio for different groups(M\LD) (A)	92
39	Bar chart showing average centering ratio for different groups(M\D) (B)	93
40	Group M (manual K- files), (a) pre and (b) post instrumentation CBCT images of remaining dentin thickness at coronal third respectively.	93
	(c) pre and (d) post instrumentation CBCT images of remaining dentin thickness at middle third respectively.	94



	(e) pre and (f) post instrumentation CBCT images of remaining dentin thickness at apical third respectively.	94
41	Group PTN (ProTaper Next files), (a) pre and (b) post instrumentation CBCT images of remaining dentin thickness at coronal third respectively.	95
	(c) pre and (d) post instrumentation CBCT images of remaining dentin thickness at middle third respectively.	95
	(e) pre and (f) post instrumentation CBCT images of remaining dentin thickness at apical third respectively.	96
42	Group PAF (Pro AF Baby Gold files), (a) pre and (b) post instrumentation CBCT images of remaining dentin thickness at coronal third respectively.	97
	(c) pre and (d) post instrumentation CBCT images of remaining dentin thickness at middle third respectively.	97
	(e) pre and (f) post instrumentation CBCT images of remaining dentin thickness at apical third respectively.	98
43	Bar chart showing average instrumentation time (mm:ss) for different groups.	99
44	Bar chart showing average cleaning score for different groups (A)	102

45	Bar chart showing average cleaning score for different groups (B)	102
46	Stereomicroscope image for one sample prepared using K-files, (a) represent coronal third, (b) represent middle third, (c) represent apical third.	103
47	Stereomicroscope image for one sample prepared using ProTaper Next files, (a) represent coronal third, (b) represent middle third, (c) represent apical third.	104
48	Stereomicroscope image for one sample prepared using Pro AF Baby Gold, (a) represent coronal third, (b) represent middle third, (c) represent apical third.	104