

بسم الله الرحمن الرحيم



-Call 4000





شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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



يجب أن

تحفظ هذه الأقراص المدمجة يعبدا عن الغبار













بالرسالة صفحات لم ترد بالأصل



"Efficiency of Newly Designed Prefabricated Polymethyl Methacrylate Crowns for Restoring Pulpotomized Primary Molars in Comparison to Stainless Steel and Zirconia Crowns"

A Thesis submitted to the Department of Pediatric Dentistry and Dental Public Health, Faculty of Dentistry, Ain Shams University

In

Partial fulfilment of the requirements of the Doctorate Degree in Pediatric

Dentistry

By Nada Atef Ahmed Aboushady

Assistant Lecturer

Department of Pediatric Dentistry and Dental Public Health
Faculty of Dentistry, Ain Shams University
B.D.S., Faculty of Dentistry, Ain Shams University, 2009
M.S.C, Faculty of Dentistry, Ain Shams University, 2016
Faculty of Dentistry

Ain Shams University

2021

Supervisors

Prof. Amr Mahmoud Abdel Aziz

Professor of Pediatric Dentistry and Dental Public Health Department Faculty of Dentistry Ain Shams University

Prof. Noha Samir Kabil

Professor of Pediatric Dentistry, Dental Public Health Department Faculty of Dentistry Ain Shams University

Ass. Prof. Ahmed Ezzat Sabet

Associate Professor, Fixed Prosthodontic Department Faculty of Dentistry Ain Shams University

<u>Acknowledgment</u>

First, I would like to express my greatest gratitude to the Almighty *ALLAH*, the one and only who has given me the strength and courage to pursue this work.

No words can express my deepest thanks and sincere gratitude as well as appreciation to *Dr. Amr Abdel Aziz*, Professor of Pediatric Dentistry, Dental Public Health and Community Dentistry, Faculty of Dentistry, Ain Shams University. His valuable advice, devoted effort and unique cooperation, will always be deeply remembered. This work could have never been completed without his extraordinary assistance and sincere guidance.

I would also like to express my special appreciation and thanks to *Dr. Noha Kabil*, Professor of Pediatric Dentistry, Faculty of Dentistry, Ain Shams University, whom have been a tremendous mentor for me. I would like to thank her for encouraging my research and for allowing me to grow as a research scientist. Her advice on both research as well as on my career have been priceless.

I would like to express my deepest gratitude to *Dr. Ahmed Ezzat Sabet*, Associate Professor of Fixed Prosthodontics, Faculty of Dentistry, Ain Shams University, for his endless support who added a lot to me not only from a professional level but also from a personal one.

I would like to thank my dear professors, colleagues and staff members of Pediatric Dentistry, Dental Public Health and Community Department, Faculty of Dentistry, Ain Shams University, for their great support, encouragement and cooperation.

I would like to thank my dear husband for his inspiration and patience, without whom this thesis wouldn't have been possible.

Special thanks to my dear parents for being always there for me, for encouraging me throughout my journey and without whom I would've never achieved anything.

Special thanks also to my beautiful patients and their parents whom without their cooperation, this study wouldn't have been possible.

Last, but certainly not least, to all my friends who contributed in oneway or another to this study. To all of them, please accept my sincere and profound gratitude.

Dedication

This work is dedicated to

To my father

My supporter and my backbone

To my mother

My role model, without her prayers and encouragement I would have never made it

To my husband

My life companion and soul mate

To my son

My angel and sunshine, whose smile makes this world a better place

To my daughter

My happiness and joy

And to my brothers

My lifetime best friends

List of Contents

List of Figures	
List of Tables	ii
List of Abbreviations	iv
Introduction	1
Review of Literature	4
Stainless steel crowns	6
Aesthetic Stainless-Steel Crowns	g
Composite Resin Strip Crowns	11
Zirconia Crowns	12
Poly- methyl methacrylate (PMMA)	17
CAD/CAM Technology	21
Colour Stability	21
Gingival Health	22
Surface Roughness	2 3
Objectives (Aim of the study)	25
Materials and Subjects	26
In-vivo phase:	27
Fabrication of PMMA crowns	41
Clinical Examination	45
Pulpotomy	
Crown Preparation of teeth	
Colour Stability	
Gingival Health	
Gingival Index criteria: (GI) Patient Satisfaction	
In-vitro phase	55
Fracture resistance	57
Surface roughness	60
Statistical analysis	62

Results	S	63
Phase	e 1: In Vivo:	63
1.	Colour stability	
II.	Gingival Health	
III.	Patient Satisfaction	
Phase	e 2: In Vitro:	71
1.	Fracture resistance	
II.	Surface roughness	74
Discuss	sion	79
Summo	ary	90
Conclus	sion	92
Recom	mendation	93
Referei	nces	94
Append	dix 1	121
Append	dix 2	126
Append	dix 3	130
Arabic	Summary	132

List of Figures

Figure 1: Preoperative Picture	32
Figure 2: Patient received SSC (right) and zirconia crown (left) initially	32
Figure 3: Patient received SSC (right) and zirconia crown (left) after 6 mo	nths
follow up	33
Figure 4: Patient received SSC (right) and zirconia crown (left) after 12 mo	onths
follow up	33
Figure 5: Postoperative radiograph of right side SSC	34
Figure 6: Postoperative radiograph of left side Zirconia Crown	34
Figure 7: Preoperative picture	35
Figure 8:Patient received SSC (right) and PMMA crown (left) initially	35
Figure 9: Patient received SSC (right) and PMMA crown (left) after 6 mon	ths follow
up	36
Figure 10:Patient received SSC (right) and PMMA crown (left) after 12 mo	onths
follow up	36
Figure 11: Postoperative radiograph of right side SSC	37
Figure 12: Postoperative radiograph of left side PMMA crown	37
Figure 13: Preoperative picture	38
Figure 14:Patient received zirconia crown (right) and PMMA crown (left)	initially 38
Figure 15:Patient received zirconia crown (right) and PMMA crown (left)	after 6
months follow up	39
Figure 16:Patient received zirconia crown (right) and PMMA crown (left)	after 12
months follow up	39
Figure 17: Postoperative radiograph of right side zirconia crown	40
Figure 18: Postoperative radiograph of left side PMMA crown	40
Figure 19: Nu Smile Zirconia crowns kits	41
Figure 20: 3D scan of the fitting surface	43

Figure 21: 3D printed resin die	43
Figure 22: Scan of the die and the pink try-in crown seated	44
Figure 23: Stl of the proposed crown	44
Figure 24: Milled PMMA crown	45
Figure 25: Intermendiate restorative material	47
Figure 26: Calibra Ceram resin cement	50
Figure 27: PMMA (left), zirconia (Middle), and Stainless steel (right) crowns	50
Figure 28: Vita Easyshade Compact	51
Figure 29: Patient satisfaction questionnaire	54
Figure 30: Crowns placed on their respective dies	57
Figure 31: Fracture resistance test for zirconia crown	58
Figure 32: Fracture resistance test for stainless steel crown	59
Figure 33: Fracture resistance test for PMMA crown	59
Figure 34: Keyence 3D laser microscope	60
Figure 35: PMMA crown scanned using Keyence 3D laser microscope	61
Figure 36: Stainless steel crown scanned using Keyence 3D laser microscope	61
Figure 37: mean ΔE values for all groups	65
Figure 38: mean PI values for all groups	67
Figure 39: mean GI for all groups	69
Figure 40: Mean Fracture Resistance in Newtons	73
Figure 41: Mean surface roughness in µm for all groups	76
Figure 42: 3D surface image of stainless steel crown	77
Figure 43: 3D surface image of zirconia crown	77
Figure 44: 3D surface image of PMMA crown	78