

Treatment trends and attitudes of general dental practitioners in Riyadh, Saudi Arabia

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To Cite:

Aburaisi S, Alshedoukhi A, Abahussain R, Aljerayed H, Altewerki M, Muathen R. Treatment trends and attitudes of general dental practitioners in Riyadh, Saudi Arabia. *Medical Science*, 2021, 25(112), 1432-1441

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Peer-Review History

Received: 03 May 2021
Reviewed & Revised: 04/May/2021 to 09/June/2021
Accepted: 09 June 2021
Published: June 2021

Peer-review Method

External peer-review was done through double-blind method.

ABSTRACT

Aim: This research aims to study the attitude of general dental practitioners in Riyadh city by providing them with certain clinical situations and asking them to choose between endodontic retreatment or extraction and implant placement and determining which factors influenced their decision. **Materials and Methods:** A web-based survey was distributed among dental practitioners (n=702) in Riyadh. The survey contained different clinical scenarios along with radiographs specific to each situation and a choice of either saving the tooth by endodontic retreatment or extraction and implant depending on what they perceive as a better treatment choice. The data was analysed using SPSS version 22 data processing software (IBM Corp, Armonk NY, USA). The significant level is set at P-value ≤ 0.05 . Ethical approval was obtained prior to survey distribution (registration No. FRP/2019/129). **Results:** General dental practitioners in Riyadh favored endodontic retreatment by 56.2%. **Conclusion:** General dental practitioners are no more likely to perceive dental implants as having a better prognosis in comparison to root canal retreatment.

Keywords: Endodontic retreatment; Tooth extraction; Implant; Treatment trends; General dental practitioners.

1. INTRODUCTION

The high prevalence of dental implants nowadays led to a shift in treatment planning and the habit of replacing damaged dentition with dental implants. This may be owed to various points of which, questionable teeth, cost-effectiveness, dentist's skill and patient's desire (Iqbal and Kim, 2008; Avila et al., 2009). It is not uncommon for dental clinicians to suggest extracting a tooth that could be saved by dental restorations, root canal treatment or periodontal therapy (Axelsson and Lindhe, 1981). In the last twenty years, there have been fewer efforts to save compromised teeth. Published literature revealed that clinician's with not so much knowledge about implantology and periodontics usually makes less attempts in saving teeth (Lang-Hua et al., 2013). On the other hand, there has been tremendous growth in endodontic treatment which can be attributed to better-trained dentists as well as patients being more aware of the possibility of managing pain, improved dental techniques, and



success for such cases (Ruddle, 2004). There is also the fact that endodontic retreatment and apical surgeries have improved which translated to more teeth being retained that otherwise would have undergone extraction in the previous years (John et al., 2007).

Healing after endodontic treatment was found to be 86%, 82% for endodontic treatment and retreatment respectively (de Chevigny et al., 2008). Success in endodontics is defined by symptoms and clinical signs: the absence of pain, the disappearance of inflammation, as well as maintaining a functional and firm tooth in its alveolus. Also, it is defined radiographically by complete healing of the periapical area, which takes 6 up to 24 months (Tabassum and Khan, 2016). Whereas implant is considered a success if it still exists in the alveolus with no distinct indication of failure like radiolucency around the implant or mobility (Doyle et al., 2006). Consequently, both choice of treatment and the basis of interpreting a tooth as being jeopardized are arguable (Iqbal and Kim, 2008). The judgment favoring endodontic treatment relies on advances in better reliable results, cost-effective, more conservative, and less invasive. This allows it to be a preferable option for systemically compromised patients, where implant placement is contraindicated. On the other hand, those who favor implant as a treatment option base their decision on that endodontic treatment result in poor outcomes in comparison to implants. Also, the worry that a compromised tooth may be unable to provide support to the final restoration, made the choice of implant more appealing. Giving up on a tooth can be for a superior more reliable option. Additionally, an implant may aid in retaining compromised adjacent teeth and may be a better alternative than extensive restorative treatment (Pradeep et al., 2013).

While deciding on teeth with poor or fair prognosis, dentists will face difficulties in determining the fate of the tooth in question. Decisions should be based on current researches to be able to assess compromised teeth and their long-term prognosis (Pradeep et al., 2013). The decision wither to do endodontic treatment or implant should depend on aspects other that treatment outcomes, as the results for both treatments were equivalent to each other (Iqbal and Kim, 2007). Despite finding similar studies in regard to this topic little data was found regarding decision making among general dental practitioners in Riyadh city and the factors affecting treatment options. Therefore, the present study aimed to determine what factors influence general dental practitioners in Riyadh city to choose root canal retreatment over implant or vise-versa.

2. MATERIALS AND METHODS

A web-based survey that was adapted from a previous study done by Packer (2007), and modified to fit the study population was distributed using social media platforms <https://www.surveymonkey.com/r/79FJ5FTALL> (September 2019). Seven hundred and two surveys were completed, of which five hundred and ninety-eight were general dental practitioners, thirty-four specialists, and seventy dental interns in Riyadh city. Data obtained from specialists and dental intern which equals 104 in total number of participants was excluded in the main study. The questionnaire included gender, designation in dentistry, school of graduation, years of practice, the current practice of dentistry, and whether they perform the endodontic treatment or endodontic re-treatment or place implants to restore the tooth and which treatment they think has a better prognosis. It was asked to choose between endodontic retreatment and extraction followed by an implant depending on what they perceive as a better treatment choice. No personal data was asked. The present study protocol was reviewed and approved by the Institutional Review Board (registration No. FRP/2019/129). Participating in the completion of the survey was accepted as a voluntary consent.

Statistical analysis



The relationship between the treatment choices and the characteristics of each clinician was determined using chi-square analyses and logistic regression analyses. The data was analyzed using SPSS version 22 data processing software (IBM Corp, Armonk NY, USA). The significant level is set at $P\text{-value} \leq 0.05$.




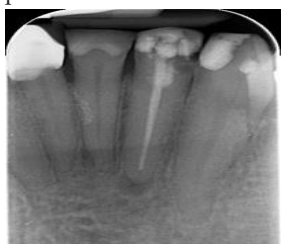
3. RESULTS

The demographics and characteristics of the participants are shown in Table 1. Of the 702 participants, 53.9% were female, 85.2% were general practitioner 70.8% received their bachelor degree from Saudi Arabia, 90.7% were currently practicing dentistry, and 52.8% had 0-5 years of practice, 94.3% perform endodontic treatment, 76.3% perform endodontic retreatment, and 14% either place or restore implants. As Table 1 refers to the total number of participants, table 2, 3, 4, 5, 6, 7, 8, 9 will include general dental practitioner's data only.

The number and percentage of treatment choices for each condition are shown in Table 2. Preference for endodontic retreatment was evident in comparison to extraction and implant placement by (56.2%) according to general practitioners as indicated in question #1. However, in specific instances (Question #2-7), this preference for re-treatment varied between 89.1% and 45.7%.

		Frequency	Percent
Gender	<i>Male</i>	330	47%
	<i>Female</i>	372	53%
Designation in dentistry	<i>Intern</i>	70	10%
	<i>General practitioner</i>	598	85.2%
	<i>Specialist</i>	34	4.8%
From where did you receive your bachelor degree?	<i>Saudi Arabia</i>	497	70.8%
	<i>Other</i>	205	29.2%
Do you currently practice dentistry?	<i>Yes</i>	637	90.7%
	<i>No</i>	65	9.3%
Years of practice	<i>0-5</i>	371	52.8%
	<i>6-10</i>	191	27.2%
	<i>11-15</i>	78	11.2%
	<i>> 16</i>	62	8.8%
Do you perform endodontic treatment in your practice?	<i>Yes</i>	564	94.3%
	<i>No</i>	34	5.7%
Do you perform endodontic-re-treatment in your practice?	<i>Yes</i>	456	76.3%
	<i>No</i>	142	23.7%
Do you place or restore implants in your practice?	<i>Yes</i>	84	14%
	<i>No</i>	514	86%

Questions	Frequency (Percent)	
	<i>Endodontic re-treatment</i>	<i>Extraction/Implant</i>
1. Which treatment do you feel has the best long-term prognosis?	336 (56.2%)	262 (43.8%)
2. The patient presents with a draining sinus tract and tenderness to percussion on tooth #36. The patient says that the root canal was done a couple of years ago. In your opinion, what would you recommend to your patient? 	533 (89.1%)	65 (10.9%)
3. The patient presents with tenderness to palpation and percussion with #11. The patient states periodic swelling in the area, and adjacent teeth are vital. The RCT was done about 1 year ago. In your opinion, what would you recommend to your patient? 	477 (79.8%)	121 (20.2%)
4. The patient presents to your office 7 months after having root canal therapy #47. The radiolucency has increased in size and there	447 (74.7%)	151 (25.3%)

<p>is a sinus tract. The tooth is asymptomatic. In your opinion, what would you recommend to your patient?</p> 		
<p>5. The patient presents to your office due to discomfort with #12. The tooth is tender to palpation and percussion. The tooth has 3mm probe depths and a draining sinus tract. The RCT was done 2 years ago. In your opinion, what would you recommend to your patient?</p> 	<p>348 (58.2%)</p>	<p>250 (41.8%)</p>
<p>6. The patient presents with tenderness to percussion and palpation on #16. Periodontal status within normal limits. The RCT was done 2 years ago, according to the patient. In your opinion, what would you recommend to your patient?</p> 	<p>273 (45.7%)</p>	<p>325 (54.3%)</p>
<p>7. The patient presents with a draining sinus tract adjacent to tooth #32. The tooth is tender to percussion and palpation, and adjacent teeth are vital. The patient states that the RCT was done several years ago. In your opinion, what would you recommend to your patient?</p> 	<p>526 (88%)</p>	<p>72 (12%)</p>

The relationships between the characteristics of the general practitioners and responses to question#1 are shown in Table 3. There was a statistically significant association between question #1 and gender, the country where the bachelor's degree was received, and the use of endodontic re-treatment in practice. Male ($p<0.05$), those who received their bachelor degree from Saudi Arabia ($p<0.05$), and those who donot perform endodontic re-treatment ($p<0.05$) in their practice lean toward extraction/implant as they believe it has the best long-term prognosis.

The relationships between the characteristics of the general practitioners and responses to question #2 are shown in Table 4. There was a statistically significant association between question #2 and gender, and years of practice. Male ($p < 0.05$) participants and those with 0-5 years of practice ($p < 0.05$) have a stronger tendency to recommend endodontic re-treatment to their patients.

Table 3 Relationships Associated with Question #1

Question#1		Frequency		
		Endodontic re-treatment	Extraction/ Implant	
Gender	Male	139 (23.2%)	132 (22%)	0.049*
	Female	197 (32.9%)	130 (21.9%)	
From where did you receive your bachelor's degree?	Saudi Arabia	212 (35.4%)	198 (33.2%)	0.002*
	Other	124 (20.7%)	64 (10.7%)	
Do you currently practice dentistry?	Yes	216 (54%)	143 (35.75%)	0.618
	No	23 (5.75%)	18 (4.5%)	
Years of practice	0-5	162 (27%)	140 (23.5%)	0.070
	6-10	104 (17.4%)	67 (11.3%)	
	11-15	40 (6.6%)	32 (5.4%)	
	> 16	30 (5%)	23 (3.8%)	
Do you perform endodontic treatment in your practice?	Yes	322 (53.8%)	242 (40.4%)	0.106
	No	14 (2.4%)	20 (3.4%)	
Do you perform endodontic re-treatment in your practice?	Yes	276 (46.1%)	180 (30.2%)	0.000*
	No	60 (10%)	82 (13.7%)	
Do you place or restore implants in your practice?	Yes	35 (5.8%)	49 (8.2%)	0.860
	No	301 (50.4%)	213 (35.6%)	

Table 4 Relationships Associated with Question #2

Question#2		Frequency		
		Endodontic re-treatment	Extraction/ Implant	
Gender	Male	252 (42%)	19 (3%)	0.010*
	Female	281 (47%)	46 (8%)	
From where did you receive your bachelor's degree?	Saudi Arabia	371 (62%)	39 (6.5%)	0.294
	Other	162 (27%)	26 (4.5%)	
Do you currently practice dentistry?	Yes	482 (80.6%)	57 (9.5%)	0.808
	No	51 (8.5%)	8 (1.4%)	
Years of practice	0-5	280 (46.8%)	22 (3.6%)	0.014*
	6-10	144 (24%)	27 (4.5%)	
	11-15	63 (10.5%)	9 (1.5%)	
	> 16	46 (7.6%)	7 (1.5%)	
Do you perform endodontic treatment in your practice?	Yes	502 (83.9%)	62 (10.36%)	1.000
	No	31 (5.24%)	3 (0.5%)	
Do you perform endodontic re-treatment in your practice?	Yes	415 (69.3%)	41 (6.8%)	0.252
	No	118 (19.7%)	24 (4%)	
Do you place or restore implants in your practice?	Yes	73 (12.3%)	11 (1.8%)	0.801
	No	460 (76.9%)	54 (9%)	

The relationships between the characteristics of the general practitioners and responses to question #3 are shown in Table 5. The country where the bachelor's degree was received had a statistically significant association with question#3. Those who received their bachelor's degree from Saudi Arabia are more likely to recommend endodontic retreatment to their patients ($p < 0.05$).

Table 5 Relationships Associated With Question #3

Question#3		Frequency		
		Endodontic re-treatment	Extraction/ Implant	
Gender	Male	211 (35.4%)	60 (10%)	0.444
	Female	266 (44.4%)	61 (10.2%)	
From where did you receive your bachelor's degree?	Saudi Arabia	337 (56.4%)	73 (12.2%)	0.014*
	Other	140 (23.4%)	48 (8%)	
Do you currently practice dentistry?	Yes	428 (71.5%)	111 (18.5%)	0.533
	No	49 (8.4%)	10 (1.6%)	
Years of practice	0-5	252 (42.5%)	50 (8.3%)	0.059
	6-10	137 (22.9%)	34 (5.6%)	
	11-15	53 (8.8%)	19 (3.1%)	
	> 16	35 (5.8%)	18 (3%)	
Do you perform endodontic treatment in your practice?	Yes	450 (75.33%)	114 (19%)	0.801
	No	27 (4.5%)	7 (1.17%)	
Do you perform endodontic re-treatment in your practice?	Yes	364 (60.8%)	92 (15.6%)	0.404
	No	113 (18.8%)	29 (4.8%)	
Do you place or restore implants in your practice?	Yes	63 (10.5%)	21 (3.5%)	0.826
	No	414 (69.3%)	100 (16.7%)	

There were no statistically significant relationships between the characteristics of the general practitioners and responses to questioning #4 ($p > 0.05$) (Table 6).

Table 6 Relationships Associated with Question#4

Question#4		Frequency		
		Endodontic re-treatment	Extraction/ Implant	
Gender	Male	213 (35.6%)	58 (9.6%)	0.055
	Female	234 (39.3%)	93 (15.5%)	
From where did you receive your bachelor's degree?	Saudi Arabia	315 (52.6%)	95 (15.8%)	0.136
	Other	132 (22%)	56 (9.6%)	
Do you currently practice dentistry?	Yes	405 (67.7%)	134 (22.5%)	0.714
	No	42 (7%)	17 (2.8%)	
Years of practice	0-5	228 (38.12%)	74 (12.3%)	0.382
	6-10	125 (20.9%)	46 (7.6%)	
	11-15	55 (9.48%)	17 (2.8%)	
	> 16	39 (6.5%)	14 (2.3%)	
Do you perform endodontic treatment in your practice?	Yes	420 (70.33%)	144 (24%)	0.507
	No	27 (4.5%)	7 (1.17%)	
Do you perform endodontic re-treatment in your practice?	Yes	348 (58.4%)	108 (18%)	0.322
	No	99 (16.5%)	43 (7.1%)	
Do you place or restore implants in your practice?	Yes	60 (10%)	24 (4%)	0.846
	No	387 (64.7%)	127 (21.3%)	

The relationships between the characteristics of the general practitioners and responses to question #5 are shown in Table 7. The country where the bachelor degree was received and years of practice had a statistically significant association with question#5. Those who received their bachelor's degree from Saudi Arabia and those with 0-5 years of practice are more likely to recommend endodontic re-treatment to their patients ($p<0.05$).

Table 7 Relationships Associated with Question#5

Question#5		Frequency		
		Endodontic re-treatment	Extraction/ Implant	
Gender	Male	156 (26%)	115 (19.2%)	0.354
	Female	192 (32.3%)	135 (22.5%)	
From where did you receive your bachelor's degree?	Saudi Arabia	253 (42.5%)	157 (26.2%)	0.002*
	Other	95 (15.8%)	93 (15.5%)	
Do you currently practice dentistry?	Yes	312 (52.3%)	227 (37.9%)	0.616
	No	36 (6%)	23 (3.8%)	
Years of practice	0-5	211 (35.2%)	91 (15.2%)	0.000*
	6-10	83 (13.8%)	88 (15%)	
	11-15	30 (5%)	42 (7%)	
	> 16	24 (4%)	29 (4.8%)	
Do you perform endodontic treatment in your practice?	Yes	329 (55%)	235 (39.2%)	0.840
	No	19 (3.3%)	15 (2.5%)	
Do you perform endodontic re-treatment in your practice?	Yes	270 (45%)	186 (31.2%)	0.371
	No	78 (13%)	64 (10.7%)	
Do you place or restore implants in your practice?	Yes	43 (7.4%)	41 (6.8%)	0.724
	No	205 (34.2%)	309 (51.6%)	

The relationships between the characteristics of the general practitioners and responses to question #6 are shown in Table 8. The current dental practice had a statistically significant association with question #6. Those who practice dentistry are currently more likely to recommend endodontic re-treatment to their patients ($p<0.05$).

Table 8 Relationships Associated with Question #6

Question#6		Frequency		
		Endodontic re-treatment	Extraction/ Implant	
Gender	Male	111 (18.6%)	160 (26.9%)	0.918
	Female	162 (27%)	165 (27.5%)	
From where did you receive your bachelor's degree?	Saudi Arabia	178 (29.7%)	232 (38.7%)	0.299
	Other	95 (15.8%)	93 (15.8%)	
Do you currently practice dentistry?	Yes	252 (42.1%)	287 (47.9%)	0.046*
	No	21 (3.7%)	38 (6.3%)	
Years of practice	0-5	151 (25.1%)	151 (25.2%)	0.414
	6-10	81 (13.5%)	90 (15%)	
	11-15	27 (4.5%)	45 (7.5%)	
	> 16	14 (2.7%)	39 (6.5%)	
Do you perform endodontic treatment in your practice?	Yes	256 (42.8%)	308 (51.7%)	0.840
	No	17 (2.8%)	17 (2.8%)	
Do you perform endodontic re-treatment in your practice?	Yes	203 (33.9%)	253 (42.4%)	0.502
	No	70 (11.7%)	72 (12%)	

Do you place or restore implants in your practice?	Yes	27 (4.5%)	57 (9.5%)	0.860
	No	246 (41.2%)	268 (44.8%)	

The relationships between the characteristics of the general practitioners and responses to question #7 are shown in Table 9. Gender, the country where the bachelor’s degree was received, and years of practice had a statistically significant association with question#7. Male, those who received their bachelor's degree from Saudi Arabia, and those with 0-5 years of practice are more likely to recommend endodontic re-treatment to their patient ($p<0.05$).

Table 9 Relationships Associated With Question # 7

Question#7		Frequency		
		Endodontic re-treatment	Extraction / Implant	
Gender	Male	247 (41.4%)	24 (4%)	0.037*
	Female	279 (46.6%)	48 (8%)	
From where did you receive your bachelor's degree?	Saudi Arabia	376 (62.8%)	34 (5.6%)	0.004*
	Other	150 (25%)	38 (6.6%)	
Do you currently practice dentistry?	Yes	474 (79.2%)	65 (10.8%)	0.333
	No	52 (8.6%)	7 (1.4%)	
Years of practice	0-5	279 (46.6%)	23 (3.8%)	0.000*
	6-10	144 (24%)	27 (4.5%)	
	11-15	58 (9.6%)	14 (2.3%)	
	> 16	45 (7.5%)	8 (1.7%)	
Do you perform endodontic treatment in your practice?	Yes	495 (82.7%)	69 (11.5%)	1.000
	No	31 (5.3%)	3 (0.5%)	
Do you perform endodontic re-treatment in your practice?	Yes	404 (67.7%)	52 (8.6%)	1.000
	No	122 (20.4%)	20 (3.3%)	
Do you place or restore implants in your practice?	Yes	73 (12.2%)	11 (1.8%)	1.000
	No	453 (75.8%)	61 (10.2%)	

4. DISCUSSION

According to the results of our study, general dentists favored root canal retreatment 56.2% over-extraction & implant, which is similar to the results found by Packer (2008) where he stated that 66% of practitioners favored endodontic retreatment over implants. This finding was delightful when comparing the decision to endodontically retreat teeth with previous studies. A study by Çiçek et al., (2016), stated that the percentage of general practitioners favoring endodontic retreatment in different scenarios was shown to be 47%, another study that was done in Saudi Arabia by Balto & Al-Madi (2004), showed that 41% of general dentists chose the option of retreatment when compared to endodontists. Studies done by Stockhausen et al., (2011) and Wenteler et al., (2015) in which practitioners perceived implant to have a better prognosis in comparison to root canal retreatment. This shows that despite the recent trends towards implant placement (Azarpazhoo et al., 2013), general practitioners in Riyadh still consider endodontic retreatment as they feel it has a better prognosis. This could be due to several reasons one of which is the reality that general dental practitioners in Riyadh have to receive further education to be able to place implants and so there is a tendency to favor a treatment they perform in their practice.

It is also interesting to discuss a study by Lang-Hua et al., (2012), where general dental practitioner’s choice of implant treatment was not aligned with evidence-based knowledge but more related to dentist factors such as training and experience (Lang-Hua et al., 2012). With this in mind, it is essential to note that the country where practitioners received their bachelor’s degree statistically influenced the choice of treatment in 4 questions out of 7. In a study done in Saudi Arabia by Balto and Al-Madi (2004), educational background had no statistical influence in the choice of general practitioners to treatment. This finding could be because the paper by Balto and Al-Madi (2004), was conducted on an older date, and in recent years education shifted to more evidence-based practice. This may perhaps explain how educational background in this study was a factor that played a role in treatment choice.

It was evident that practitioners who graduated from Saudi Arabia were most likely to recommend endodontic retreatment in most instances compared with those who received it elsewhere, one explanation of why this might be is that practitioners who

studied in other countries might have acquired different dental training in regards of dental implants. Gender, which was not a factor studied by similar published papers (Çiçek et al., 2016; balto and Al-Madi, 2004; Stockhausen et al., 2011; Azarpazhoo et al., 2013; Bigras et al., 2008) was another interesting factor that significantly influenced the judgment of which treatment had better prognosis, where it was apparent that male practitioners were more likely to feel that extraction/implant has a better long-term prognosis.

Furthermore, it was noticeable that those dentists that are not performing endodontic retreatment were more likely to express that implant has a better long-term prognosis. Years of experience was also a factor that had an impact on treatment choice in most instances, those practitioners having 0-5 years of experience were significantly more likely to recommend endodontic retreatment this is in contrast to a study by Di Fiore et al., (2008) which revealed that recent graduates were more likely to recommend implant placement. In most similar studies the factor most likely to influence treatment decision it was noted that specialization (which was not a factor considered in this paper) had a substantial impact on treatment decision (Çiçek et al., 2016; balto and Al-Madi, 2004; Stockhausen et al., 2011; Bigras et al., 2008; Rawski et al., 2003; PAGONIS et al., 2000).

5. CONCLUSION

General dental practitioners are no more likely to perceive dental implants as having a better prognosis than root canal retreatment. This indicates that even though there is a rising trend in placing an implant and this era being viewed as the era of dental implant, general dental practitioners in Riyadh still consider saving natural dentition by choosing to endodontically retreat teeth rather than extraction/implant. This finding, however, was found to differ in certain clinical scenarios, as shown in our results.

Acknowledgements

The authors thank Dr. Gardiner McKay Packer for his cooperation and allowing us to apply this research to a different population.

Author Contributions

Conceptualization: Alshedoukhi HA, Abahussain RM, Aljerayed HJ, Altewerki MM, Muathen RA. Data curation: Altewerki MM, Muathen RA. Formal analysis: Aljerayed HJ. Investigation: Alshedoukhi HA, Abahussain RM, Aljerayed HJ, Altewerki MM, Muathen RA. Methodology: Alshedoukhi HA, Abahussain RM. Project administration: Aburaisi SS. Software: Alshedoukhi HA. Supervision: Aburaisi SS. Validation: Abahussain RM. Visualization: Muathen RA. Writing - original draft: Alshedoukhi HA, Abahussain RM. Writing - review & editing: Alshedoukhi HA, Abahussain RM, Aljerayed HJ, Altewerki MM, Muathen RA.

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there are no conflicts of interests.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval

The study was reviewed and approved by the Institutional Review Board of Riyadh Elm University, Riyadh, Saudi Arabia (registration No. FRP/2019/129).

Author's contribution

All the authors contributed equally in this research paper.

Data and materials availability

All data associated with this study are present in the paper.

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