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## RESEARCH ARTICLE

### Knowledge, Attitude, Practice, Motives and Barriers Towards Scientific Research among Dentists and Dental Students in Saudi Arabia

Somaya Abdulrahman<sup>1,\*</sup>, Khalid Aboalshamat<sup>2</sup>, Malak Muthana<sup>3</sup>, Ghaida Sait<sup>3</sup>, Nuran Bantan<sup>3</sup>, Shuruq Hafiz<sup>3</sup>, Renad Mahrous<sup>3</sup> and Aishah Alsuhaiq<sup>3</sup>

<sup>1</sup>Department of Dentistry, Faculty of Dentistry, Umm Al-Qura University, Makkah, Saudi Arabia

<sup>2</sup>Department of Preventive Dentistry, Dental Public Health Division, Faculty of Dentistry, Umm Al-Qura University, Makkah, Saudi Arabia

<sup>3</sup>Department of Dentistry, Alfarabi College, Jeddah, Saudi Arabia

#### Abstract:

#### Background:

Research is crucial for the scientific progress of the health of individuals, communities, and systems. The aim of this study was to assess the knowledge, attitude, motives and barriers among dentists and dental students in the western region of Saudi Arabia.

#### Objective:

This study aims to assess the level of knowledge, attitude, motives and barriers toward scientific research among dentists and dental students in the western region of Saudi Arabia.

#### Methods:

We conducted a cross-sectional study of 467 dentists and dental students using a convenience sampling method from seven dental colleges, major governmental and private dental clinics in the Western region of Saudi Arabia. We used a validated self-report questionnaire to collect data and assess the knowledge of, attitude towards and barriers to scientific research.

#### Results:

The participants (who are dentists and dental students) have a total knowledge score of  $m=4.57$ ,  $SD=2.46$ , which is slightly lower than the midpoint. Participants who work in governmental clinic were significantly ( $F(2,464)=13.71$ ,  $p<0.001$ ) more knowledgeable than those who worked in private clinic and the students. Most participants had positive general and personal attitudes toward scientific research. Of the participants, 40.5% to 60.4% were involved in research activities, and 37.3% have submitted or published scientific articles. The most common motive for scientific research was receiving credit for post-graduate application (58.46%). The most common organizational barrier to conduct a research was the difficulty of finding research supervisor (39.19%) and lack of time due to work overload (32.55%). While most common personal barriers were lack of knowledge/skills (38.76%), lack of personal time (36.83%) and receiving credit for postgraduate application.

#### Conclusion:

Saudi dentists and dental students had a moderate level of knowledge and practice in research, but their attitude was highly positive. More efforts are needed to facilitate scientific dental research including supervisors' availability and time allocation for research. The study has some limitations including using convenience sample from one region and self-report questionnaire that decreases the external validity of the study and increases the potential for self-reported biases.

**Keywords:** Scientific research, Knowledge, Attitude, Practice, Motives, Barriers, Dental students, Dentists, Saudi Arabia.

#### Article History

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## 1. INTRODUCTION

Health research is defined as synthesizing new knowledge *via* scientific methods to reveal and deal with health issues [1].

\* Address correspondence to this author at the Department of Dentistry, Faculty of Dentistry, Umm Al-Qura University, Makkah, Saudi Arabia;  
Tel: +96655514344; E-mail: Somaya.a@outlook.com

Healthcare providers, especially physicians must have adequate knowledge of and skills for scientific research [2, 3] for optimal practice and high quality and delivery of healthcare services [4]. Health care scientific research is essential for diagnosis and treatment of oral disease and maintenance of oral health. In fact, it is considered a fundamental competency and one of the significant domains in the health care curriculum in

medical education [5 - 7].

Many studies have been conducted to assess the knowledge and attitude of health professionals and medical students toward scientific research [8 - 13]. In contrast, these types of studies among dental students are scarce. Some studies assessed knowledge of dental professionals about research and found it to be between 52.3% to 56.7% among the Indian dentists [14] and 56.9% of Malaysian dental students had a moderate level of knowledge [15]. In Riyadh, Saudi Arabia, only one study assessed the level of knowledge in 10 questions and found the average of correct answer to be 3.36 [16]. The attitude toward dental scientific research varied according to the country and items to be measured, but many studies in general had a positive attitude such in India [14], South Africa [17] and Dammam, Saudi Arabia [18]. Also, it should be noticed that research is mandatory in some dental colleges, while it is not in others [17, 18]. For example, in dental colleges, University of Dammam, Saudi Arabia, the research is mandatory during the internship [18]. In Malaysia, 5.8% did publication in high indexed journal [15]. However, around 21.2% to 32.5% did submit or have accepted papers for publication [16, 19]. It should be highlighted that each of the previous studies in Saudi Arabia was conducted among students in a single governmental university, reducing the external validity of such a study. Also, this study did not include graduated dentists.

Literature reported several barriers toward conducting research among dental professionals such as lack of interest by faculty members, technique problems, lack of undergraduate courses, lack of interest, workload, lack of knowledge, insufficient mentors, personal and familial commitment [14, 18]. However, it is found with different percentages in different researchers.

As many articles highlight the importance of research to the undergraduate medical students [8, 20 - 22]. Whereas, few studies were done among dental students and dentists investigating a larger geographical area. Thus, the aim of this study was to assess the knowledge, attitude, practice, motives and barriers among dentists and dental students in the western region of Saudi Arabia.

## 2. MATERIALS AND METHODS

This is a cross-sectional study aimed to assess the knowledge, attitudes, practice, motives and barriers towards research among dentists and dental students in the western region, Saudi Arabia. The participants were recruited from governmental and private dental colleges from Umm Al-Qura University, Taibah University, Taif University, King Abdulaziz University, Ibn Sina dental college, Alfarabi dental colleges and Al-Battarjee Medical College. Data was also collected from major governmental and private hospitals. A convenience sampling method was used. The inclusion criteria included dentists, interns and dental students in their 4<sup>th</sup> or 5<sup>th</sup> or 6<sup>th</sup> academic year. The exclusion criteria include students in the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> year and retired dentists.

The questionnaire was validated by a pilot study of 20 undergraduates, dental interns and dentists. The validation included language, content, organization, and logical flow. The data were collected, tabulated and analysed using the SPSS

version 23 (IBM Corp., Armonk, NY, USA). ANOVA, t-test and linear regression were used to compare participants' responses from the questionnaire. A statistical significance level at 0.05 will be used. The sample size was calculated by using 50% prevalence estimation, 5% as the precision level and 95% as the confidence interval, resulting in a minimum sample size of 385 participants. A total of 600 participants were invited to overcome the expected dropout rate.

Participants signed the study consent before receiving a hard copy of the anonymous and voluntary self-administered questionnaire at their own time. The questionnaire took four to six minutes to answer. The questionnaire was delivered by members of the research team who were available to answer any questions from the participants when needed.

The content of questionnaire was adapted from the previous studies [8, 14, 15, 23 - 25], and modified for this study. It comprised of 39 items divided into six sections. The first section included demographic data. The second section contained 10 Multiple Choice Questions (MCQ) assessing the respondent's knowledge about research (detection of Scientific research, literature review, best sampling method, sampling method, null hypothesis and referencing). Following the completion of this section, a total knowledge score was generated. The third section had eight general statements and five personal statements to assess participants' attitude toward research. This section was answered by five-point Likert scale ranging from strongly disagree to strongly agree. The fourth section assessed the scientific research practice with a range of yes or no questions. The fifth section of the questionnaire inquired about the motivation to conduct research. The sixth section investigated the institutional and personal barriers to conduct a scientific research. Both the fifth and sixth sections contained multiple answers where participants can choose more than one answer.

## 3. RESULTS

Data were collected from 467 respondents to 600 invitations (response rate of 66.83%). Participants' mean (m) age was 27.95 with a Standard Deviation (SD) of 5.76. Their demographic data are detailed in Table 1.

Participants were asked ten questions about their knowledge regarding scientific research, their answers are detailed in Table 2. When correct answers were summed, the total correct answers were  $m=4.57$ ,  $SD=2.46$ , with a possible score from 10 as the highest knowledge score and zero as lowest knowledge score.

Using ANOVA and Tukey's post hoc test, there was a significant relationship between total knowledge score and working place ( $F(2,464)=13.71$ ,  $p<0.001$ ), as participants who work in the governmental clinic has total research knowledge score ( $m=5.65$ ,  $sd=2.4$ ) significantly higher than those who work in private clinics ( $m=4.01$ ,  $sd=2.19$ ) or the student ( $m=4.4$ ,  $sd=2.49$ ). However, there was no significant difference between those who work in private clinics with the students. Also, using t-test, ANOVA and linear regression tests, there was no relationship between knowledge score and age, gender and nationality.

Participants' different attitudes toward scientific research is shown in Tables 3 and 4.

**Table 1. Demographic data of the participants (n=467).**

	Variable	Count	%
Gender	Male	176	37.7%
	Female	291	62.3%
Nationality	Saudi	370	79.2%
	Non-Saudi	97	20.8%
Current Hospital Working	Private clinic	115	24.6%
	Governmental hospital	98	21%
	Student (college clinics)	254	54.4%
Academic Year	4 <sup>th</sup> year	19	4.1%
	5 <sup>th</sup> year	32	6.9%
	6 <sup>th</sup> year	70	15%
	Interns	132	28.3%
	Post-Graduate	12	2.6%
	Dentist	132	28.3%
	Specialist	48	10.3%
	Consultant	22	4.7%
University of graduation	Al-Battarjee	24	5.1%
	Alfarabi	199	42.6%
	Ibn Sina	38	8.1%
	King Abdulaziz	68	14.6%
	Umm Al-Qura	38	8.1%
	Taiba	19	4.1%
	Others	81	17.3%

**Table 2. Answers of the knowledge questions regarding scientific research (n=467).**

Item	Correct choice	N (%)
Scientific research is:	An investigation of scientific theories or question.	282 (60.4)
What is referencing in scientific research?	Acknowledge source of the information.	260 (55.7)
Which one can be used in literature review?	Governmental document	250 (53.5)
Which one is a better sampling method?	simple random sampling	225 (48.2)
Which one has better research design quality	Longitudinal (cohort)	210 (45)
In the result section in an article, you can find:	Main results of the statistical analysis.	206 (44.1)
What is a literature review?	Gathering trusted information about similar studies.	202 (43.3)
Which one sounds like a null hypothesis?	There is no difference in caries prevalence between males and female.	196 (42)
What is the first step of the research process?	Formulating the research question.	183 (39.2)
Which can be an author in a scientific article?	Participated by ideas in the paper	119 (25.5)

**Table 3. Participants' general attitude regarding scientific research.**

Item	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)
Research is essential for improving health care using evidence-based processes.	54 (11.6)	19 (4.1%)	58 (12.4%)	74 (15.8)	<b>262</b> <b>(56.1%)</b>
Research is essential for improving patient care using evidence-based processes	40 (8.6%)	36 (7.7%)	58 (12.4%)	96 (20.6%)	<b>237</b> <b>(50.7%)</b>
Studying research method should be compulsory in undergraduate years.	32 (6.9%)	51 (10.9%)	99 (21.2%)	94 (20.1%)	<b>191</b> <b>(40.9%)</b>
Undergraduate students should participate in research.	33 (7.1%)	35 (7.5%)	98 (21%)	116 (24.8%)	<b>185</b> <b>(39.6%)</b>
Conducting a research is difficult.	39 (8.4%)	49 (10.5%)	<b>150</b> <b>(32.1%)</b>	118 (25.3%)	111 (23.8%)

(Table 3) contd....

Item	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)
Research is useful for future dental profession in general.	41 (8.8%)	35 (7.5%)	80 (17.1%)	107 (22.9%)	204 (43.7%)
Research conduction secures a better chance for a residency position.	36 (7.7%)	44 (9.4%)	108 (23.1%)	118 (25.3%)	161 (34.5%)
Research conduction secures better chance for taking post graduate programs.	35 (7.5%)	48 (10.3%)	84 (18%)	122 (26.1%)	178 (38.1%)

**Table 4. Participants’ personal attitude regarding scientific research.**

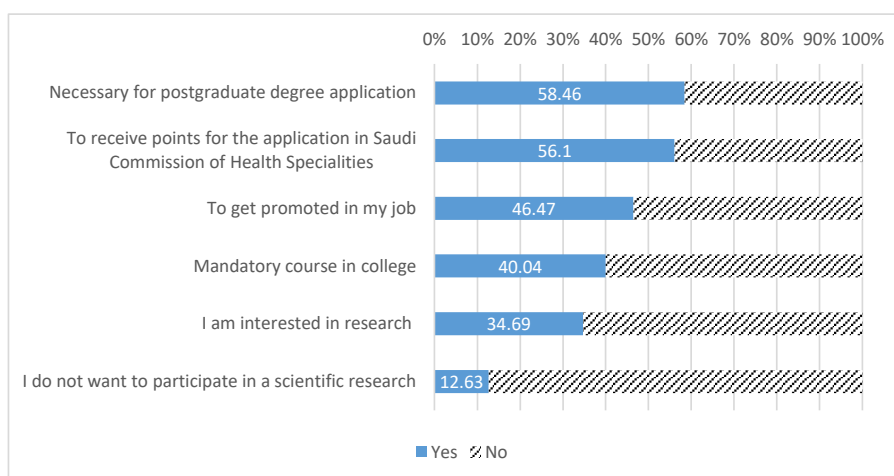
Item	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)
I want to participate in a scientific research as a co-author.	62 (13.3%)	31 (6.6%)	97 (20.8%)	98 (21%)	179 (38.3%)
I want to participate in a scientific research as the first author.	49 (10.5%)	40 (8.6%)	89 (19.1%)	88 (18.8%)	201 (43%)
I want to participate in a scientific research as data collector.	52 (11.1%)	42 (9%)	114 (24.4%)	124 (26.6%)	135 (28.9%)
I want to attend lectures (theoretical) about scientific research.	50 (10.7%)	58 (12.4%)	98 (21%)	97 (20.8%)	164 (35.1%)
I want to attend hands-on workshop (practical) about scientific research.	52 (11.1%)	32 (6.9%)	80 (17.1%)	104 (22.3%)	199 (42.6%)

Participants were asked questions about scientific research practice, their answers are detailed in Table 5. Participants’

motives and barriers regarding scientific research are detailed in Figs. (1-3).

**Table 5. Participants’ scientific research practice.**

Statement	Yes n (%)	No n (%)
Was it mandatory to participate in research in your undergraduate curriculum?	308 (66%)	159 (34%)
Did you attend research course within your undergraduate curriculum/ internship years in faculty?	291 (62.3%)	176 (37.7)
Did you attend research course outside of your college?	233 (49.9%)	234 (50.1%)
Did you do submit a research proposal?	281 (60.2%)	186 (39.8%)
Did you participate in research as a data collector?	282 (60.4%)	185 (39.6%)
Did you participate in research before in your dental college?	200 (42.8%)	267 (57.2%)
Did you participate in research before outside your college?	189 (40.5%)	278 (59.5%)
Do you have scientific publication(s) that was/were published or submitted for publication?	174 (37.3%)	293 (62.7%)
Did you present a poster in a scientific conference before?	181 (38.8%)	286 (61.2%)



**Fig. (1).** The percentage of participants’ motives to participate in scientific research.

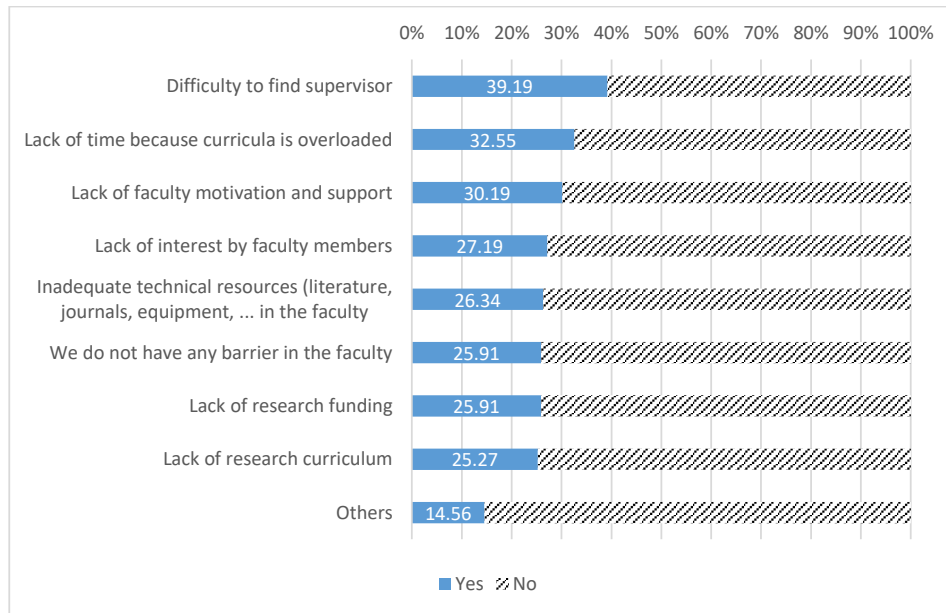


Fig. (2). The self-reported barriers of faculty to participate in research.

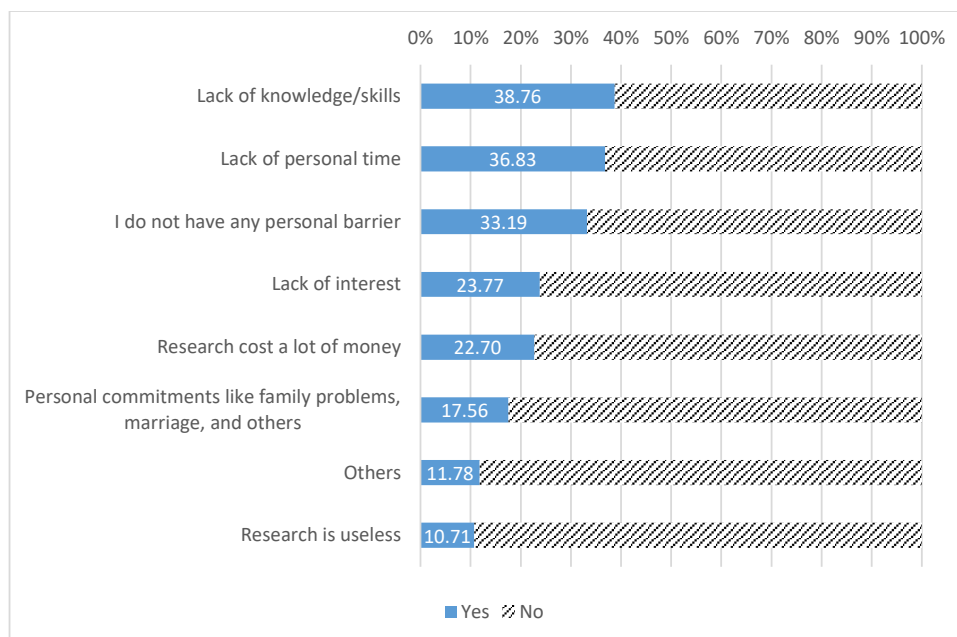


Fig. (3). The self-reported personal barriers to participation in research.

4. DISCUSSION

This study aimed to assess the level of knowledge, attitude, practice, motives and barriers toward scientific research among dentists and dental students in the Western region, Saudi Arabia. Participants' knowledge was slightly lower than the midpoint. Around two-third knew what scientific research is, but only one-fourth were able to know who could be an author of a scientific article. Participants who work in governmental clinics were more knowledgeable than those who work in private clinics and the students. Most participants had a positive general and personal attitude towards scientific research. Around 60% of the participants did participate in a

research proposal or data collection, but around 60% did not have a publication nor a scientific poster. The most common motive for scientific research was post-graduated application and points in the application for Saudi Commission of Health Specialities (SCFHS). The most common organizational barrier to conduct research was finding a research supervisor, while lack of knowledge, skills and time were the most common personal barriers.

The moderate level of knowledge in this study was lower than a study in India where the average percentage of correct responses was 54% among post-graduate dentists [14]. Also, in the Malaysian study, 56.9% of respondents had a moderate

level of knowledge [15]. Our results showed a higher level of knowledge ( $m=4.57$ ,  $SD=2.46$ , out of 10) than a previous study in Riyadh, Saudi Arabia that had a score of ( $m=3.36$ ,  $sd=1.76$ ) out of 10 [16]. None of the other studies in Saudi Arabia [18, 19] assess the scientific knowledge of dentists or dental students. This may be due to different levels of education between cities and countries. In addition, our knowledge assessment tool was different from those in other studies, as our study used different questionnaire set than those in the previous studies [14, 16]. Nevertheless, it should be noticed that the questions in our study and previous studies can be considered the basic question in scientific research. In another word, this moderate level of knowledge might be overestimated. A further study is needed with a sophisticated tool to measure scientific research in-depth for a more precise result.

Regarding attitude assessment, the percentage of agree or strongly agree ranged between 55.5% to 71.9%. In general, our results were similar to those of studies in India [14], South Africa [17] and Saudi Arabia [18] showing that the majority have a positive attitude towards scientific research. However, it was difficult to compare item by item due to the differences in questions asked and method of assessment. One of the commonly measured items was the importance of research, as 71.9% of our participants agree or strongly agree on this point. In a prior research in Dammam, Saudi Arabia [18], 60% to 100% agreed on the importance of research. Also, in our study, 66.6% agree or strongly agree to the usefulness of research in dental profession in the future, while the percentage was 87% to 100 in South Africa [17], and 60% to 100% in Dammam [18]. indicated a high level of positive attitude towards research in the Western region on Saudi Arabia. Nevertheless, there was a considerable percentage for those who do not see the importance of research. In fact, many studies including the Saudi one indicated that research was not a major career goal in studying dentistry [19, 26, 27]. This can direct us to assume that scientific research might be important to many dentists and dental students but is not the main interest.

Regarding to practice scientific research, there was a variability in the data. Our study involved data from the Western region of Saudi Arabia that include seven dental colleges, so data were obtained from different centers. In our study, 66% had mandatory scientific research in their undergraduate, while in South Africa [17] 72% to 92% reported that to be mandatory. In Dammam [18], authors indicated that research project was only mandatory during internship. Our data indicated that 40.5% to 60.4% of the participants participated in research activity (writing proposal or collecting data). This was lower than the percentage in South Africa (52% to 98%) [17] but similar to previous studies in the US (34% to 63%) [28] and Jeddah, Saudi Arabia (40.7% to 59.7%) [19]. More importantly, 37.3% of participants had a scientific publication, or had submitted a paper for publication. This was similar to a previous study in Riyadh (32.5%) [16], but higher than the results in Jeddah (21.2%) [19] and a previous study in Malaysia (5.8%) [15]. In our study, 49.9% to 62.3% attended a research course, while it ranged from 30% to 100% in Riyadh [16] and Dammam, Saudi Arabia [18]. This reflects the different influences of the educational,

organizational system into dental professional experience in scientific research. However, it can be noticed that percentages for the studies in Saudi Arabia do not have a significant difference. In fact, this shows that the research experience in Saudi Arabia is of moderate level in general.

An interesting finding in our study was the motivation to conduct research for receiving SCFHS points on the postgraduate application. It was noticed among the university students that many of them are conducting research for this reason. This might be the first article to document this point. This is important point to highlight, as future studies may explore type, quality, and authenticity in such publication. Also, our results showed that 12.63% were not interested in research publication; this is similar to a previous study in Dammam that showed that 15.63% were not interested in research as well [18], but lower than the percentage in Riyadh (36.4%) for the same item. This may be due to the difference in location-specific institutional/personal barriers that discourage dentists or dental students from conducting a research.

Our result showed that the most common institutional barrier was lack of supervisor, and lack of time due to work overload. While the most common personal barriers were lack of skills/ knowledge and lack of personal time. In fact, lack of time has been mentioned as the main barrier in the previous studies in the US [28], India [14] and Riyadh [16]. However, other studies had different main barriers, such as lacking both interest and opportunities toward research during dental school in China [29]. Also, the main barrier was the absence of adequate technical resources to conduct research in India [14]. Once again, this reflects cross cultural difference for participation in research among dental professionals. In addition, students are struggling to pay for dental school tuitions in several countries [30, 31]. Therefore, limited resources may serve as an obstacle for dental students to engage in research. In Saudi Arabia, education is free in governmental dental colleges, and some students get scholarship in private dental colleges, which might reduce their financial burden. Providing dedicated supervisors to dental students would be helpful to students for research and publication activities.

This study has some strengths, including the investigation of the Western region of Saudi Arabia including different cities and universities, in contrast to previous Saudi studies that mostly investigated one centre [16, 18, 19]. However, this study used a convenience sample and was performed only in western region of Saudi Arabia, so it cannot be generalized to all of Saudi Arabia. We also used a self-report questionnaire, which increases self-reported biases. Future studies might be directed to be conducted on a national scale to an increased potential for bias.

## CONCLUSION

Dentists and dental students had a moderate level of knowledge about scientific research. Most participants had a positive general and personal attitude toward scientific research. Many of them participated in research activity (writing proposal or data collection) but the majority did not publish or submitted article for publication. The most common

motive for scientific research was post-graduation application and points in the application of Saudi Commission of Health Specialities (SCFHS). The most common organizational barrier to conduct research was finding research supervisor, while lack of knowledge, skills and time were the most common personal barriers. More efforts are needed to facilitate scientific dental research including supervisors mentoring and organizational/university time allocation for research. Future studies might be directed to conduct investigation about research among dental professional on a national scale to increase the external validity of the study, and to investigate the type and quality of a published paper by Saudi dental professional.

**ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

The approval has been obtained from the Institutional Review Board of the Faculty of Dentistry of Umm Al-Qura University Saudi Arabia, (No. 171-20).

**HUMAN AND ANIMAL RIGHTS**

Not applicable.

**CONSENT FOR PUBLICATION**

All patients signed informed consent forms prior to participating in this study.

**AVAILABILITY OF DATA AND MATERIAL**

Data were collected from the Dental Teaching Hospital of Umm Al-Qura University and private clinics in Mecca.

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None.

**CONFLICT OF INTEREST**

The author declares no conflict of interest, financial or otherwise.

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Declared none.

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