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Medical Students Experience and Attitudes toward Research

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Abstract

Research is essential aspect of today medical practice. Medical education regulatory bodies and international competence-based frameworks consider research an important competence of physician. All undergraduate medical programs introduce research component in curriculum. Yet students' active involvement in research is variable across programs. Furthermore, pursuing a positive attitude towards scientific research is considered a vital element of modern undergraduate medical education. This study aims to investigate medical students' self-perceptions of research competency, and their experience and attitude towards research. It also explores research barriers among medical students at Faculty of Medicine, Umm AlQura University (UQU), Makkah Saudi Arabia. A cross-sectional, self-administered, electronic survey was designed. The survey was completed by 387 (35%) of medical students at, UQU, Makkah. The result indicted that the majority of respondents 65% (249/387) had contributions in research activities either as requirement aspect of the program or personal interest. There was a significant difference in respondents' participations in research regarding their gender and year of study. Respondents also indicated moderate competence in research (Mean = 3 , SD= 0.75). Nevertheless, positive attitude towards research was reported. Respondents highlighted the importance of conducting and understanding research in contemporary medical practice. The most common barriers form students' perspectives were the lack of protected time for research in medical program, followed by the shortage of students' knowledge or skills. As a major conclusion, participants' reported moderate level of competence in conducting different aspects of research, which was variable across their level of the program. Senior students were significant much self-competent in pursuing research. Also, the reported increased experiences in conducting research among respondents and their positive attitude towards research is clear indication of the success of the curriculum design to develop the core skills and positive attitude towards research among students.

Keywords: *Medical Students, Research, Competencies, Obstacle.*

Introduction

Research is an essential aspect of today's medical practice. It is considered vital component in developing medical practice and ensuring optimal healthcare services. Understanding the principles of research and developing critical appraisal skills empower physicians applying evidence-based clinical decisions, and providing the best patient care. All international competence-based medical education frameworks, such as the Outcome Project (ACGME, 1999), the Scottish Doctor (Simpson et al., 2002), Can MEDs (Frank & Danoff, 2007) and Saudi Medical Education Directives Framework (Saudi MEDs) (ETEC, 2021; Zaini et al., 2011) consider researches as a core competence of today's physicians. The international calls for research as core competence shapes undergraduate and postgraduate medical training programs.

Developing research skills and scholar attributes among medical trainees become an obligation. The Saudi Commission for Health Specialities (SCFHS) includes candidate research publications as admission criterion for postgraduate training programs in the Saudi Arabia (SA).

Remes and colleagues (2000) indicate that physician participations in medical research is related to their pre-existing research interest and experience during undergraduate or postgraduate training programs (Remes, Helenius, & Sinisaari, 2000). Recently, research has been integrated in most undergraduate medical curricula (ETEC, 2021; Frank & Danoff, 2007; Sreedharan, 2012; Zaini et al., 2011). These initiatives in developing research competence in medical curricula aim to foster students skills of research, such as demonstrating research critical appraisal, communicating and disseminating research findings, as well as designing and conducting research. Studies report varied experiences of medical students and graduate trainees in research's contributions, which is ranged from 70% to 55% of respondents in undergraduate programs, and about 30% of respondents among residents (Alghamdi, Moussa, Alessa, Alothimeen, & Al-Saud, 2014; Mitwalli, Al Ghamdi, & Moussa, 2014; Noorelahi, Soubhanneyaz, & Kasim, 2015; Remes et al., 2000).

Several studies investigate medical students' attitude towards research's importance, and its impact on healthcare services and patients' outcomes (Alghamdi et al., 2014; Bilal et al., 2019; Noorelahi et al., 2015; Pallamparthy & Basavareddy, 2019; Remes et al., 2000). A study from King Abdulaziz University medical college, Jeddah SA, detects positive attitude among medical students: 85.9% agree that pursuing research is beneficial for their future career, and 72.7% indorse research contributions to increase their chance of residency placement (Ibrahim, Fetyani, & Bashwari, 2013).

Nevertheless, literature highlights many obstacles that prevent medical students and trainees from conducting research, including the lack of competent supervisors, training courses, protected time, and funding (Alghamdi et al., 2014; Bilal et al., 2019; Ibrahim et al., 2013). Among postgraduate medical trainees the most common barriers are the absence of appropriate research training, lack of time, work-related stress, and absence of appropriate supervisors (Mitwalli et al., 2014).

Faculty of Medicine, Umm AlQura University (UQU), Makkah, Saudi Arabia made major curriculum reform in the *Bachelor of Medicine* and *Bachelor* of *Surgery (MBBS)* program in 2016. One of the major change is introducing longitudinal Research and Evidence (RE) vertical module instead of the two courses of biostatistics and principles of research in year three and four of the program. The reformed longitudinal module is taught across five years of the MBBS program (Year 2-Year 6) and focuses on equipping medical students with essential knowledge and skills to be competent in finding, evaluating and using evidence in their clinical practice, as well as design and performing research. The module links theoretical principles of research with experiential learning: students are engaged in different aspects of research design and proposal writing, as well as disseminating and utilizing research evidence in clinical practice. Up to date, no research study investigate medical students experience, competencies, barriers and attitudes towards research at Faculty of Medicine, UQU.

This study aims to investigate UQU medical students' self-perceptions of competency (capability) in conducting research, and their experience and attitude towards research. It also explores research barriers among medical students. The study tests the following null hypothesis (H_0):

- There is no significant difference in students' experiences, and self-perceptions of research competency regarding their gender.
- There is no significant difference in students' experiences, and self-perceptions of research competency regarding their year of study (Level of the program).

Method

This study is a cross-sectional descriptive study, which investigates UQU medical students' experience, self-perception of the level of competence (capability), and attitude towards research. A self-administered, anonymous online questionnaire was designed using the Google Forms online-survey platform. In alignment with the research questions, the questionnaire items were developed on the basis of comprehensive literature review (Alghamdi et al., 2014; Bilal et al., 2019; Ibrahim et al., 2013; Mitwalli et al., 2014; Noorelahi et al., 2015; Pallamparthy & Basavareddy, 2019; Remes et al., 2000). The questionnaire included questions about demographic data, and items that measured fourfold; (1) students' level of competence in research, (2) students' attitude towards research, (3) students' perception of college support regarding research; which were evaluated on 5-point Likert scales (thirteen , five, and six items, respectively); and Finlay (4) students' perceptions of research obstacles. Four questions required a yes/no response, which were related to "research experience and involvement".

Before demonstrating the survey, the questionnaire was piloted among ten medical students to assess its' relevance and comprehensibility. Students were asked to complete the online survey and then commented on clarity of survey's items and the relevance of response options. Students' comments were taken in consideration on rephrasing some questions' statements. No items were deleted or added.

The number of medical students at Umm Al-Qura university from year 2 to year 6 of the MBBS program was 1100 students, keeping confidence level 95% and confidence interval 4, the sample size was calculated to be 389 participants. All students were recruited to participate in the study by receiving an invitation massage and survey link through their Learning Management System (Blackboard), and university email. The survey was demonstrated between Dec 2020 - January 2021, and completed by 35% (n= 387) medical students at the Faculty of Medicine, UQU, Makkah campus.

All collected data were entered and analysed using statistical package for social science, version 16 (SPSS Inc., Chicago, IL, USA). Data were presented using frequencies, mean, and standard deviation as appropriate. Students' attitude and practice were assessed, analysed, and compared by the students' gender (male vs female) and the study year using unpaired *t*-test for continuous variables, and One-way ANOVA analysis of variance for multiple comparisons. For all purposes, the criteria of significance were considered at a *P*-value of $\leq .05$.

Ethical approval for this study was obtained from the ethics review committee of Faculty of Medicine, Umm AlQura University. The study methods were carried out in accordance with relevant guidelines and regulations: participants agreed to contribute to the study, and the questionnaire was anonymous to ensure confidentiality and enhance the validity of responses. All obtained data were treated with confidentiality.

Results

A total of 387 medical students at the Faculty of Medicine UQU, Makkah, Saudi Arabia were completed the online survey. The majority of students were male 60% (n = 231), with experiences in conducting research, either as part of the program or personal interest 64% (n =249). Also almost half of respondents 51% (n =200) had extracurricular training to develop research skills. Students' involvement in research was variable form single attempt to ten researches contributions with average (1.5) for individual student.

There was a significant difference in respondents' participations in research regarding their gender and year of study, with $P < 0.001$. Students contribution in research increased as they proceeded in the MBBS program. About 97% (n =59) of Year 6 respondents indicated their involvement in research. Also, male students were significant more involved in research comparing to female peers (Table 1-2). Furthermore, the study showed a significant correlation between extracurricular training in research and their contributions in research with ($r = .2$, $n = 375$, $P < .001$).

Table 1: characteristics of the study respondents		
Gender	Frequency	Percent
Male	213	55%
Female	174	45%
Year of study	Frequency	Percent
Year 2	77	20%
Year 3	42	11%
Year 4	125	32%
Year 5	82	21%
Year 6	61	15%
Previous participation in research	213	64%
Had extracurricular training to develop research skills	200	52%

Table 2: Respondents who had involvement and experiences in conducting research		
Gender*	Frequency	Percentage
Male	156	73%
Female	93	53%
Total	249	64%
Year of study*	Frequency	Percentage
Year 2	18	23%
Year 3	18	42%
Year 4	84	67%
Year 5	70	85%
Year 6	59	97%
Total	249/387	64%
*Statistical significance of students' contribution in research regarding their gender and year of study *P*=0.001 significant		

Regarding participants self-perception of their competence in conducting research, the study assessed students' self-perceptions with eight statements. The result showed moderate level of research competence among respondents (Mean = 3, SD= 0.75) (Table 3). The study also investigated, with five statements, students' level of competencies in other aspects of research related to understanding and utilizing research: Results indicted students moderate level of competence in research critical appraisal, and the ability to apply research findings to inform every-day medical decisions (Mean = 3.01 , SD= 1.17), and (Mean =3.01, SD = 1.11) respectively. Yet students showed better level of competence in fulfilling research ethics, and researchers' rights and obligations (Mean = 3.6, SD= 1.04) (Table 4).

There was no statistically significant differences between medical students' perceptions of their competence in research regarding their gender. However, there was significant difference regarding participants' year of study with one-way ANOVA *P* <.001. It has been observed that students' competence in conducting research developed as they proceed in the program.

Table 3: The mean of students' level of competencies in conducting research		
	Mean	Std. Deviation
Conducting research independently	3.2	0.94
Evaluate related literature	3.22	0.98
Write research proposal	3.26	1.08
Design suitable research methodology	2.98	1.06
Choose appropriate data analyse and statistical tests	2.72	1.12
Interpret data and research findings	3.11	1.09
Develop evidence discussion on the reach results and draw a conclusion	3.12	1.07
Write research manuscripts	2.86	1.05
TOTAL MEAN	3.07	0.75

Table 4: The mean of students level of competence in different aspects of research applications		
Statements	Mean	Std. Deviation
Critical appraisal a scientific paper	3.01	1.17
Evaluate paper and present in a journal club	2.91	1.16
Apply evidence-based medicine on every-day medical decision	3.01	1.11
Awareness of my role and right in the research team	3.62	1.21
Apply for IRP or ethical approval	3.68	1.04

The study investigated students' attitudes towards the importance of research in contemporary medical practice, with five statements. The results revealed strong consensus about the importance of research in medical practice. Conducting research and utilizing research in practice were perceived very essential for physicians (Mean = 3.9, SD = 1.15) and (Mean = 4.2, SD = 1.02), respectively. Respondents accentuated the importance of making research participation a compulsory feature of MBBS program (Mean= 3.5, SD= 1.29). However, there was much less agreement of the importance of research in the residency placement criterions (Mean = 3.16 , SD 1.26) (Table 5).

Table 5: Investigation of students' opinion on the importance of conducting research among participated medical students		
Statements	Mean	Std. Deviation
Conducting research is important skills for physicians	3.95	1.15
Understanding and utilising research is important skills for physicians	4.23	1.02
Understanding and utilising research is more important than conduction research for physicians	3.9	1.12
Research participating should be made compulsory to all medical student	3.52	1.29
Candidate research record should be an important criterion for acceptance in residency.	3.16	1.26

Regarding the supporting environment at the Faculty of Medicine UQU, respondents expressed positive views of the role of college and curriculum in preparing students to conduct research independently (Mean = 3.79, SD = 1.15), and evaluate evidence critically to inform medical decision (Mean = 3.89, SD = 1.14),. They had appositive views for the role of staff members and classmate to encourage and support students research initiatives, (Mean = 3.51, SD = 1.29) and. (Mean = 3.44, SD = 1.22), respectively. The role of extracurricular activities and students' club were also perceived positively (Table 6).

Table 6: Investigation of students' opinion the supporting environment		
Statements	Mean	S
Your medical college program prepares you to conduct research by your self	3.79	1.15
Your medical college program prepares you to critically evaluate evidence to inform your medical decision	3.89	1.14
College staff encourage you to get involved in any research activity	3.51	1.29
Your classmate and senior students encourage you to get involved in any research activity	3.44	1.22
The college facilitates extracurricular activities to encourage develop students research skills	3.21	1.3
Students club arranges many activities to encourage students research	3.69	1.18

The major research obstacles that reported in this study were lack of protected time for research in medical program 58% (n = 224/387), followed by the shortage of students' knowledge or skills 55% (n = 213/387); then lack of interested and competent supervisors 41% (n = 159/387). The latest barrier from students perspective, was the lack of funding, equipment and research material 35% (n = 137/387). Respondents also suggested some other obstacles related to the need for incentives to motivate students; the difficulty in finding supporting research mentors, and the early introduction of research module in the program, where students have little interest and understanding of research. they suggested to have extensive teaching of Research and Evidence longitudinal module in the last two years of the program (Figure 1).

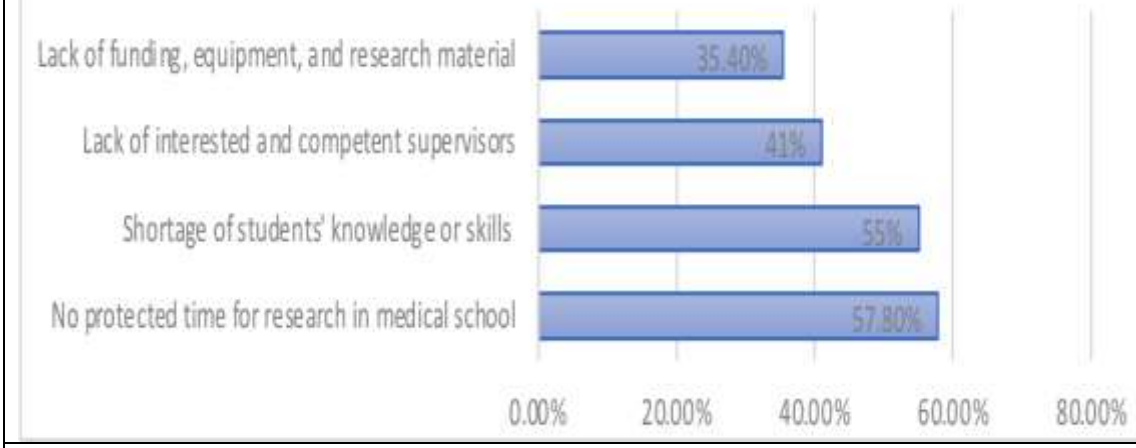

Figure1: Obstacles to conducting research among the 387 students participating in the study

Discussion

Research is an extremely essential competence, which plays an important role in developing the medical practice and ensures optimal healthcare services. Thus, medical students experience, competencies, and positive attitudes towards research are considered an important aspect to promote research (Noorelahi et al., 2015). This study aimed to investigate UQU medical students' experiences, attitude, and self-perception of their research competency. The result indicated that the majority of respondents 64% (n = 249/387) had experience in research contribution either as part of the program or personal interest. This concurred with other studies in Saudi medical schools (Alghamdi et al., 2014; Amin et al., 2012; Noorelahi et al., 2015). This indicates Saudi medical schools emphasis on research to fulfil Saudi MEDs framework (ETEC, 2021; Zaini et al., 2011). In addition, introducing research publication as part of the admission criterion in Saudi

medical residency programs, encouraged students contributions in research either as obligatory requirement of MBBS program or as personal effort.

Regarding students practice of medical research, study indicted significant differences in respondents' participations in research regarding their gender and year of study. Most students with experience were male (62.6% , n = 156/249) at senior years of the program; year 5 and Year 6, 85% (n= 70) and (97%, n= 59), respectively. Gender in different studies were significant variable in respondents' experiences in research, yet there is no common trend. A study in Qatar reported significant higher research participation rate among male students (Tohid et al., 2017). Another study form Helsinki reported that male medical students were significantly more often involved in scientific research and had published more than female peers (Remes et al., 2000). On the other hand, a study from Saudi Arabia at King Abdulaziz University reported a significant higher percentage of female students with researches contributions (Ibrahim et al., 2013).

Involvement in research was significantly more likely for medical students and trainees at an advance level of training than at earlier levels as indicated in this study. This concurred with a study of residency training in Saudi Arabia that suggested the level of training of the program is a significant variable in trainees' contribution in research along with other variable such as, having family responsibilities with children (Mitwalli et al., 2014).

The study indicated students' positive attitude towards research. They agreed about the importance of research as essential competence of physician in contemporary medical practice to provide evidence-based medicine and ensure optimal patient outcomes. This concorded with many studies (Amin et al., 2012; Ibrahim et al., 2013; Noorelahi et al., 2015). Also medical students at Ain Shams University, Egypt emphasised the importance to involve undergraduate in clinical research (Abushouk et al., 2016). Medical students at the University of Helsinki also agreed that medical undergraduates should be encouraged to carry out research work (Remes et al., 2000).

Students' positive views on the role of the UQU medical college to prepare students as researcher and scholar was reported in this study. Students also demonstrated positive views on role of students' club and senior students to develop skills and practice of medical students regarding research.

However, students represented positive views of research importance and the value of the reformed longitudinal research module and the supporting environment, the study indicted students moderate level of competence in performing research regarding their self-perception (Mean= 3, SD=0.75). Students' self-perception of research competence was developed as they proceed in the program. This could be related to the longitudinal feature of the Research and Evidence vertical module, which allowed students to develop their knowledge and skills gradually. Nevertheless, creating a milestones of research for each phase of the curriculum, could allow students to reflect on their progress, and enhanced their self-perceived competence of research. Train students to reflect on their progress in research skills, may develop their self-learning skills and confidence.

In the present study a number of research obstacles were reported by medical students. The greatest barriers were lack of protected time for research in medical program, followed by the shortage of students' knowledge or skills, then lack of interested and competent supervisors. More or less the same difficulties were reported in most of related studies (Abushouk et al., 2016; Amin et al., 2012; Mitwalli et al., 2014; Remes et al., 2000). Yet among postgraduate medical trainees, the most common barriers were the absence of structural training, lake of time, and the unavailability of research mentors (Giri, Bangal, & Phalke, 2014; Mitwalli et al., 2014). However, UQU reformed MBBS program and Research and Evidence longitudinal module aimed to eliminate such barriers by providing structure engaging learning experience, the protected time to demonstrate different aspect of research, and the right supporting environment. Thus

MBBS curriculum committee need to consider students' views and suggested barrier to deliver better learning experiences.

This study aimed to investigate UQU medical students' experiences, level of competence in research, and their attitude. Yet, many limitations should be awarded; the study sampling technique that recruited all UQU medical students to participate in the self-administered, online survey made the study vulnerable to nonresponse bias, self-reported bias, and confounding biases. Also the closed-ended questionnaire may promote an incorrect or deliberately wrong answer. Further research may investigate some of these limitations. Despite the limitations, the study highlight major aspects that should be considered by UQU medical college for better education outcomes regarding research competency.

Conclusion

The study indicated that UQU medical students have a positive view of the importance of research in medical practice and appreciate all efforts arranges by the college, stuff and peers to promote research initiatives and supporting environment. The reported moderate self-perceived competence in conducting different aspects of research among participants varies among students' year of study. Senior students were more conference in demonstrating different aspect of research than juniors. The reformed curriculum longitudinal Research and Evidence vertical module, which integrated research skills in most of the program modules facilitate building this competence and promote the importance of research in clinical practice. This study suggested to review the module considering the study result by outlining and communicating the module outcomes and milestones, reinforcing pragmatic learning experience, fostering students research initiatives, and providing appropriate incentives.

Abbreviations

(UQU): Umm AlQura University
(*MBBS*) : *Bachelor of Medicine*, *Bachelor* of *Surgery*

Declarations

Ethics approval and consent to participate:

Ethical approval for this study was obtained from the ethics review committee of Faculty of Medicine, Umm AlQura University. The study methods were carried out in accordance with relevant guidelines and regulations: Informed consent was obtained from all the study participants, and the questionnaires was anonymous to ensure confidentiality and enhance the validity of responses. All obtained data were treated with confidentiality.

Consent for Publication

Informed consent was obtained from all the study participants

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