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ORIGINAL RESEARCH

How Do Medical Students Perceive Their Research Experiences and Associated Challenges?

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Introduction: Undergraduate medical students' research experience is essential for their career progress. Understanding the perceived challenges undergraduate medical students face in conducting research can improve the research experience in the undergraduate curriculum. This study explores the medical students' perception of medical research and assesses their practices and perceived barriers encountered in carrying out medical research.

Methods: A descriptive cross-sectional study was carried out among medical students of the college of medicine of King Saud University in Riyadh. They were invited to enroll in a web-based survey composed of four sections; demographic data, attitudes toward science and research, perceived barriers to participating in scientific research activities, and medical students' research practice and experience.

Results: A total of 389 students responded to the survey. The most commonly reported barrier to participation in scientific research was lack of time due to being overburdened with educational activities (74.6%). Gender (P <0.008), age (P <0.0001), academic year (P <0.0001), grade of the research course (P <0.0001), and the rank of supervisor (P <0.0001) were identified as significant contributors to success in publication. The only barrier identified as a significant factor is the inadequate research supervisors' guidance and support (P 0.015). Clinical students are more confident in research skills than pre-clinical students.

Conclusion: Although participation in the research was high among medical students, most reported a lack of time and the lack of mentors as significant barriers to conduct research. This required interventions to improve the mentorship and tailor it to the student's needs throughout the curriculum.

Keywords: medical research, medical student, medical education, mentoring

Introduction

Research is essential to advance medical knowledge. It is crucial to understand problems that affect the health of individuals, communities, and health systems.[1] Unfortunately, in the previous two decades, the number of physician-scientists on staff in medical school faculties has declined by approximately 25%. The learning environment in how research methodologies are integrated within the medical schools' curricula could be an essential contributor.[2]

Medical students reported positive attitudes toward research.[1–3] Studies have shown that students' involvement in research is strongly associated with post-graduate research initiatives.[4] Students must develop a positive attitude toward scientific research from the start of their medical careers. Some medical schools realized that and constantly worked to equip their future physicians with medical research skills and considered this from the main goals of the medical curriculum. Additionally, Undergraduate medical research is critical not just for scientific learning but also for professional advancement. Research principles must be integrated into the undergraduate curriculum to ensure improvement in the quality and quantity of student medical research.[3] However, some barriers restrict undergraduate research.[5]

In response to all current data, medical students at the College of Medicine, King Saud University (KSU), Riyadh, Saudi Arabia, started a research methodology course in 2011.[6] It is a mandatory course to learn research methodology

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principles. This course aims to teach students how to conduct a research project, through a step-by-step approach, including choosing research questions, developing a protocol, collecting data and analyzing it, and finally, writing the manuscript.[7]

Several international and national studies researching the barriers to research among students were found.[1–5,8–15] It showed that lack of time was the main barrier,[1–5,8,10,11,16] and lack of knowledge,[1,3,5,17] lack of mentors,[2,3,5,8,10,17] and lack of rewards.[1] Furthermore, the absence of proper guidance or mentorship was a common challenge among students who have pursued research.[8] A study provided insight into the need for interested mentors and intensive guidance, especially in finding a research topic.[14,16] Interestingly, "lack of supervising research mentors" was reported as a major issue as the facilitator for research will build students' motivation towards research.[8]

Therefore, our study aims to explore medical students' research experience by understanding their perception, practice, and perceived barriers. This will provide helpful information that can be used by medical education faculty and administrators, which will result in a better educational outcome that is beneficial to all parties by understanding the challenges faced by undergraduate medical students.

Materials and Methods

A cross-sectional web-based survey was conducted among undergraduate medical students at King Saud University (KSU) in Riyadh region of Saudi Arabia. The target population is about 1450 students. For this study, the sample size was calculated to be 365 students determined by a single population proportion formula, based on 50% prevalence, 95% confidence interval, and 5% margin of error, using this formula: $n = (Z\alpha/2)2\ p(1\text{-}p) / d2$.

All KSU undergraduate medical students, males and females, all levels, from 1st to 5th year during the data collection period with no exclusion criteria. A total of 365 participants were randomly selected using a stratified random sampling technique. A proportionate stratified random sampling technique was used to allocate a sample for students each year (1st year to 5th year) from each gender. The students' names and emails were retrieved from the academic affairs department. Multiple reminders were sent to the students through their contact details till they submitted their responses.

Independent variables include personal data, ie, age, gender, grade point average (GPA) score, parental educational status, grade of the research course, and previous extra-curricular research training. Items about attitudes towards scientific research and perceived barriers to participation in scientific research activities. Dependent variables include medical students' research practice and experience, including confidence in some research skills and their research production.

The questionnaire's content was adopted from previous similar studies after a comprehensive literature review.[1,3,4,18–20] The questionnaire is composed of four sections with a total of forty-nine items. The first section includes the personal data and demographics; gender, age, Academic year, parental education GPA score, the grade obtained in the research course (if passed), academic supervisor rank, medical school, and attending any additional extra-curricular research training. It is worth mentioning that the mandatory research course is taught in the second year, but second-year students did not start the course at the time of data collection.

The second section includes 21 Likert-type statements (agree, neutral, and disagree) on beliefs toward science and research previously and validated by Vodopivec et al.[18] Items include eleven positive and ten negative statements. This tool was used in previous studies such as Soe et al study[1] and nationally by Al-Shalawy.[4] To measure the degree of agreement with statements related to medical students' beliefs about science and medical research, for positive items, the agreement was scored as three; the neutral response was scored as two; and disagreement was scored as one, while for negative items, the agreement was scored one, the neutral response was scored two, and disagree was scored three. A higher score indicates a better attitude. The maximum score per statement is 3. The maximum total points for all statements is 63.

The third component comprises thirteen statements on a three-point Likert scale (agree, disagree, and undecided) about perceived barriers to participation in scientific research activities.[1,20] The fourth component is about medical students' research practice and experience, including confidence in some research skills and their research production.

The study was conducted in September 2021 at the college of medicine at King Saud University using an online google form. A pilot study was conducted with 20 medical students to rule out any ambiguity in the questionnaire. The pilot study data was not included in the final analysis.

Data was exported to and analyzed by the Statistical Package for Social Sciences software (SPSS 24.0 version (IBM Inc., Chicago, USA). For quantitative variables, mean and standard deviation (SD) were calculated. Frequency and percentage were described for qualitative variables. Pearson's Chi-square test was used to assess the association between categorical study variables and outcome variables. Fisher's exact test was used if the Chi-square test was not applicable. Differences in medical students' belief scores in relation to clinical and pre-clinical years were analyzed by a one-sided independent sample *t*-test. A p-value of ≤ 0.05 was used to report the statistical significance of the results.

Ethical approval was obtained from the institutional review board of the college of medicine, King Saud University. A written consent indicating the purpose of the study and the participant's right to withdraw at any time without any obligation towards the study team was obtained from each participant.

Results

A total of 389 students responded to the survey. Table 1 shows the socio-demographic characteristics of the participants. About fifty-four percent were males. Most participants (60.9%) had a GPA score between 4.51 and 5.00. Pre-clinical students (first and second year) are 153 (39.4%). Most of the student's fathers' and mothers' educational status are college or higher, ie, (78.7%) and (73%), respectively. About a quarter of the participants (24.2%) have attended extra-curricular training in research skills. Nearly a quarter of the participants scored A/A+ in the research course (24.2%). The association between the participants' socio-demographic characteristics and their publication success is shown in Table 1. Gender (P <0.008), age (P <0.0001), academic year (P <0.0001), and the rank of supervisor (P <0.0001) were identified as significant contributors.

Table 2 shows the degree of agreement of medical students with statements related to science and medical research. The total mean score was (52.83±5.98). The highest mean was for the statement: "science gives us a better understanding of the world (2.90±0.38). The lowest mean was for the statement: "physicians believing only in science are small-minded" (2.03±0.81). No significant difference in belief scores was found between pre-clinical and clinical years (p 0.384).

Table 3 shows the differences between Pre-clinical and Clinical medical students in mastering some research skills. It shows that the clinical students are more confident in "creating research questions", "searching the literature, and" critical appraisal of literature (P <0.0001).

Table 4 shows the participants' current research experience. More than half of them had previous participation in research 229 (58.9%). The most common type of research was cross-sectional, ie, 203 (52.2%). The most common area of research was epidemiology and public health, ie, 129 (33%). The least type of research to be conducted was a meta-analysis, ie, 5 (1.3%). Most of the participants (88.2%) did not publish their work. The most published researches were cross-sectional and mostly published in Pubmed.

Figure 1 shows the medical students' perceived barriers to participate in scientific research activities. The most common barriers stated by the participants were lack of time due to being overburdened with educational activities (74.6%), lack of adequate knowledge in the area of research (56%), and lack of knowledge and skills (49.4%). About half of the participants reported a lack of motivation and interest (47.6%). The lowest barrier reported by the participants was Family problems and other commitments (24.2%).

Table 5 shows the association between the perceived barriers among medical students to participate in scientific research activities and success in publication. The only barrier identified as a significant factor is the inadequate research supervisors' guidance and support (P 0.015).

Table 1 Distribution and Association of Socio-Demographic Characteristics of Participants and Its Association with the Success in Publication (n=389)

Student Characteristics	N (%)	Publication		P-value	Chi-Square
		Yes	No		
Age					
18–19	69 (17.7)	2 (0.5)	67 (17.2)	<0.0001*	39.968
20–21	162 (41.6)	6 (1.5)	156 (40.1)		
22–23	138 (35.5)	35 (9)	103 (26.5)		
24–25	20 (5.1)	3 (0.8)	17 (4.4)		
Gender					
Male	208 (53.5)	33 (8.5)	175 (45)	0.008*	6.998
Female	181 (46.5)	13 (3.3)	168 (43.2)		
Academic year					
1st year	68 (17.5)	3 (0.8)	65 (16.7)	<0.0001*	61.113
2nd year	85 (21.9)	1 (0.3)	84 (21.6)		
3rd year	72 (18.5)	3 (0.8)	69 (17.7)		
4th year	74 (19)	8 (2.1)	66 (17)		
5th year	90 (23.1)	31 (8)	59 (15.2)		
Father's educational status					
Illiterate	1 (0.3)	0 (0)	1 (0.3)	-	1.304
Primary/preparatory	19 (4.9)	2 (0.5)	17 (4.4)		
Secondary	63 (16.2)	10 (2.6)	53 (13.6)		
College or higher	306 (78.7)	34 (8.7)	272 (69.9)		
Maternal educational status					
Illiterate	8 (2.1)	1 (0.3)	7 (1.8)	-	1.489
Primary/preparatory	30 (7.7)	4 (1)	26 (6.7)		
Secondary	67 (17.2)	5 (1.3)	62 (15.9)		
College or higher	284 (73)	36 (9.3)	248 (63.8)		
GPA score					
3.50 or less	17 (4.4)	2 (0.5)	15 (3.9)	0.107	6.089
3.51–4.00	31 (8)	0 (0)	31 (8)		
4.01–4.50	104 (26.7)	10 (2.6)	94 (24.2)		
4.51–5.00	237 (60.9)	34 (8.7)	203 (52.2)		

(*Continued*)

Table 1 (Continued).

Student Characteristics	N (%)	Publication		P-value	Chi-Square
		Yes	No		
Grade of the research course					
A/ A+	94 (24.2)	28 (7.2)	66 (17)	-	43.466
B/B+	66 (17)	9 (2.3)	57 (14.7)		
C/C+	10 (2.6)	1 (0.3)	9 (2.3)		
D/D+	1 (0.3)	0 (0)	1 (0.3)		
Do not have it yet	218 (56)	8 (2.1)	210 (54)		
Attended previous extra-curricular research training					
Yes	94 (24.2)	11 (2.8)	83 (21.3)	0.966	0.002
No	295 (75.8)	35 (9)	260 (66.8)		
Most recent research supervisor's academic rank					
Professor	109 (28)	20 (5.1)	89 (22.9)	<0.0001*	23.026
Associate professor	44 (11.3)	9 (2.3)	35 (9)		
Assistant professor	72 (18.5)	12 (3.1)	60 (15.4)		
Consultant, not academic staff	30 (7.7)	3 (0.8)	27 (6.9)		
Do not have	134 (34.4)	2 (0.5)	132 (33.9)		

Notes: *Statistically significant ($p<0.05$) (-): Due to the small number of frequency values, the statistical test is not applicable.

Table 2 The Mean Score of Agreement Level of Statements Related to Medical Students' Beliefs About Science and Medical Research (n=389)

Statement	Mean	Std. Deviation
Science has Prolonged human life	2.89	0.36
There would be no progress of humankind without the progress of science	2.76	0.51
Valid discoveries are impossible without scientifically sound research	2.64	0.61
Science gives us a better understanding of the world	2.90	0.38
The scientific approach facilitates a better understanding of problems	2.86	0.44
The use of scientific methodology is the basis of medical her progress	2.80	0.47
Every physician has to be well acquainted with the scientific methodology	2.74	0.55
The knowledge of scientific methods is essential for obtaining accurate and objective data	2.87	0.40
A fact can be established only by a scientific approach	2.41	0.76
Scientists are creative and interesting people	2.47	0.66
Undergraduate students should participate and research	2.60	0.68
Physicians believing only and science are small-minded	2.03	0.81

(*Continued*)

Table 2 (Continued).

Statement	Mean	Std. Deviation
The scientific approach limits a physicians choices	2.04	0.78
Science is the main cause of ecological catastrophe we face	2.17	0.77
If science continues in the same direction it has so far it will lead to the destruction of the humankind	2.30	0.80
The scientific approach lacks humanity	2.31	0.77
Scientific methods impose unnecessary rules	2.24	0.75
Scientific methodology only makes the implementation of medical research more difficult	2.28	0.79
Negative effects of science exceeds positive ones	2.58	0.71
If there were no science we would lead less troubled and healthier lives	2.60	0.71
Difficult way of thinking it's dull and boring	2.35	0.77
Total beliefs score	**52.83**	**5.98**

Table 3 Comparison of Responses Between Pre-Clinical and Clinical Medical Students in Relation to the Degree of Mastery of Some Research Skills (n=389)

Research Skill	Degree of Mastery	Academic Year n(%)		p-value	Chi-Square
		Pre-Clinical	Clinical		
Creating a research question	Limited	74 (48.4)	52 (22)	<0.0001*	33.006
	Somewhat	63 (41.2)	124 (52.5)		
	Extensively	16 (10.5)	60 (25.4)		
Searching the literature	Limited	66 (43.1)	47 (19.9)	<0.0001*	42.497
	Somewhat	63 (41.2)	82 (34.7)		
	Extensively	24 (15.7)	107 (45.3)		
Critical appraisal of the literature	Limited	94 (61.4)	91 (38.6)	<0.0001*	19.775
	Somewhat	47 (30.7)	110 (46.6)		
	Extensively	12 (7.8)	35 (14.8)		
Improving patient outcomes using evidence-based medicine skills	Limited	62 (40.5)	91 (38.6)	0.789	0.475
	Somewhat	55 (35.9)	93 (39.4)		
	Extensively	36 (23.5)	52 (22)		

Note: *Statistically significant (p<0.05).

Discussion

Although there has been a reduction in medical school graduates who became medical scientists in recent decades, more medical students gained research interests, possibly because of the incorporation of research in the curriculum and the expansion of the culture of consolidating research as an essential element of the medical school.

Table 4 Participants' Current Research Experience (n=389)

	N (%)
Participation in research	
Yes	229 (58.9)
No	160 (41.1)
Type of Research	
Case report/case series	21 (5.4)
Cohort / case-control	53 (13.6)
Cross-sectional	203 (52.2)
RCT	9 (2.3)
Meta-analysis	5 (1.3)
Area of research	
Basic medical science	30 (7.7)
Clinical	117 (30)
Epidemiology and public health	130 (33.3)
Medical education	52 (13.4)
Publication of research	
Yes	46 (11.8)
No	343 (88.2)
Type of published research	
Case report/case series	4 (1)
Cohort / case-control	7 (1.8)
Cross-sectional	37 (9.5)
RCT	4 (1)
Meta-analysis	0 (0)
Article appeared in	
Saudi University peer-reviewed journal or Saudi society peer-reviewed journal	15(3.9)
PubMed	30 (7.7)
Web of Science (ISI)	12 (3.1)
Other	5 (1.3)

Note: Multiple responses were allowed.

This study showed a positive attitude score of medical students who participated in the survey. A similar finding was reported by a study involving eleven health sciences colleges of five randomly selected universities in the Riyadh region.[4] A Malaysian study reported a moderate attitude toward research.[1]

A study showed that 87% of American University of Beirut undergraduate students are willing to participate in a medical research project even if it does not lead to a publication.[13] A study that included three Arab universities showed that 39.7% of students participated in non-mandatory research projects.[3] This indicates that most of the

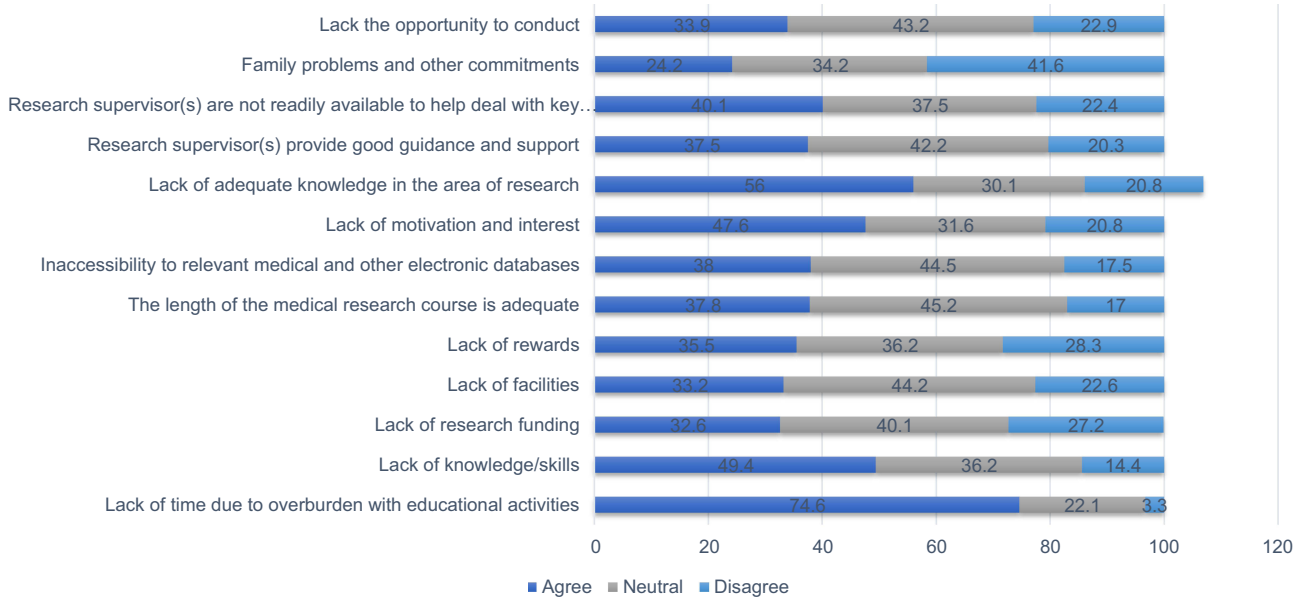

Figure 1 Perceived barriers among medical students to participate in scientific research activities (n=389).

students' main aim is to gain knowledge and experience, not publication. A longitudinal study by Vukaklija et al showed a definite increase in attitude scores as the students moved from the first year to the sixth year of the undergraduate course.[21] This contradicts the current study's finding; in clinical and pre-clinical years, both had a highly positive attitude toward research without significant differences.

Table 5 Association Between the Perceived Barriers Among Medical Students to Participate in Scientific Research Activities and Publication (n=389)

Statement		N (%)	Publication		P-value	Chi-Square
			Yes	No		
Lack of time due to overburdening with educational activities	Disagree	13 (3.3)	2 (0.5)	11 (2.8)	0.865	0.290
	Neutral	86 (22.1)	11 (2.8)	75 (19.3)		
	Agree	290 (74.6)	33 (8.5)	257 (66.1)		
Lack of knowledge/skills	Disagree	56 (14.4)	9 (2.3)	47 (12.1)	0.085	4.919
	Neutral	141 (36.2)	10 (2.6)	131 (33.7)		
	Agree	192 (49.4)	27 (6.9)	165 (42.4)		
Lack of research funding	Disagree	106 (27.2)	13 (3.3)	93 (23.9)	0.575	1.108
	Neutral	156 (40.1)	21 (5.4)	135 (34.7)		
	Agree	127 (32.6)	12 (3.1)	115 (29.6)		
Lack of facilities	Disagree	88 (22.6)	10 (2.6)	78 (20.1)	0.254	2.742
	Neutral	172 (44.2	16 (4.1)	156 (40.1)		
	Agree	129 (33.2)	20 (5.1)	109 (28)		

(*Continued*)

Table 5 (Continued).

Statement		N (%)	Publication		P-value	Chi-Square
			Yes	No		
Lack of rewards	Disagree	110 (28.3)	13 (3.3)	97 (24.9)	0.824	0.387
	Neutral	141 (36.2)	15 (3.9)	126 (32.4)		
	Agree	138 (35.5)	18 (4.6)	120 (30.8)		
The length of the medical research course is adequate	Disagree	66 (17.0)	12 (3.1)	54 (13.9)	0.102	4.569
	Neutral	176 (45.2)	15 (3.9)	161 (41.4)		
	Agree	147 (37.8)	19 (4.9)	128 (32.9)		
Inaccessibility to relevant medical and other electronic databases	Disagree	68 (17.5)	10 (2.6)	58 (14.9)	0.061	5.584
	Neutral	173 (44.5)	13 (3.3)	160 (41.1)		
	Agree	148 (38.0)	23 (5.9)	125 (32.1)		
Lack of motivation and interest	Disagree	81 (20.8)	11 (2.8)	70 (18)	0.659	0.833
	Neutral	123 (31.6)	16 (4.1)	107 (27.5)		
	Agree	185 (47.6)	19 (4.9)	166 (42.7)		
Lack of adequate knowledge in the area of research	Disagree	54 (13.9)	6 (1.5)	48 (12.3)	0.365	2.016
	Neutral	117 (30.1)	10 (2.6)	107 (27.5)		
	Agree	218 (56.0)	30 (7.7)	188 (48.3)		
Research supervisor(s) guidance and support	Disagree	79 (20.3)	5 (1.3)	74 (19)	0.015*	8.430
	Neutral	164 (42.2)	15 (3.9)	149 (38.3)		
	Agree	146 (37.5)	26 (6.7)	120 (30.8)		
Research supervisor(s) are not readily available to help deal with key challenges	Disagree	87 (22.4)	6 (1.5)	81 (20.8)	0.133	4.027
	Neutral	146 (37.5)	16 (4.1)	130 (33.4)		
	Agree	156 (40.1)	24 (6.2)	132 (33.9)		
Family problems and other commitments	Disagree	162 (41.6)	23 (5.9)	139 (35.7)	0.464	1.538
	Neutral	133 (34.2)	13 (3.3)	120 (30.8)		
	Agree	94 (24.2)	10 (2.6)	84 (21.6)		
Lack of the opportunity to conduct	Disagree	89 (22.9)	11(2.8)	78(20.1)	0.962	0.078
	Neutral	168 (43.2)	19(4.9)	149(38.3)		
	Agree	132 (33.9	16 (4.1)	116 (29.8)		

Note: *Statistically significant ($p<0.05$).

Even though medical students globally might have a positive attitude toward research, a positive learning environment is needed to improve their research experience. This study showed that more than half of the medical students had previous participation in research. This is considered a higher participation rate than other reported percentages nationally.[22] This can be explained by the early introduction of the mandatory research course taught to medical students

at King Saud University. It is complemented by an obligatory research project to pass this course. This also can explain the higher research participation among this sample of students.

The new Saudi Commission for Health Specialties Matching System (SCFHS-MS 2022) encouraged medical students to participate in research and publication.[23] The matching system adds two points for the applicants if he/she had participated in a research activity (eg, collecting or analyzing data, writing a proposal, or writing a manuscript), whether published or not. Also, it adds additional four points if the applicant had published a research article in a peer-reviewed journal (eg, indexed in PubMed, cited in the web of science platform, or an official Saudi medical journal.[23] This will motivate the medical students who apply to this system and encourage them to try their best to participate in research to have more chances of being accepted for post-graduate training programs.

The most common type of research in which students participated was reported to be cross-sectional studies, which is similar to other published results.[24,25] Moreover, the cross-sectional study design is the most common type of published research, which is constant to the published findings.[25] Published research mostly appeared in PubMed. This is similar to another study in New Zealand that revealed that student publication is associated with higher rates of PubMed publications.[26]

In this study, 74.6% of participants stated lack of time due to being overburdened with educational activities as a major reason for not conducting research. Lack of time was a significant barrier in a study conducted at the college of medicine at KSU University found that lack of time was the leading hindrance to the publication of research projects.[7] A study conducted at Al-Faisal University College of Medicine reported that 77.4% of the participants stated that lack of time was a significant barrier.[27] Similar findings were also stated in a study conducted in Egypt.[15] The results were echoed by similar studies regarding lack of time as the main barrier.[1–5,8,10,11,16]

In this study, 37.5% of participants considered the lack of mentors a barrier. It was reported as 23.7% in a study that included medical students from five medical schools across Saudi Arabia.[2] In another national study, 70.1% of the participants stated that a lack of mentors is a major barrier to conducting research.[27] This study showed a positive association between the rank of supervisor and students' success in publication, possibly because of the improvement in the research mentor skills and experience throughout his career. A systematic review highlighted that supporting medical students in acquiring research skills can be achieved by providing appropriate mentors, resources, and guidance to facilitate their learning.[28]

Lack of funding was considered a barrier by 32.6% of participants. Hegde et al reported a lack of funding as the single most significant barrier.[29] Furthermore, in this study, 47.6% considered lack motivation and interest a barrier, whereas, in another study, only 7% reported it as a barrier.[6] Lack of adequate knowledge in the area of research was reported to be one of the major barriers by 56% of the respondents in this study. Also, Kumar et al reported it as a major barrier.[5] Moreover, a study at the University of Rwanda considered lack of knowledge the most reported barrier.[17] Similarly, a study in Malaysia found that 72.1% of both dental and medical private college students reported a lack of knowledge as a significant obstacle.[1]

Compared to a study done at King Saud University,[7] this study reported a lower publication rate due to the sample difference, in which we included pre-clinical students. This suggests that clinical students have more skillful in conducting medical research. A study conducted by Khan et al showed that students' knowledge and attitude toward health research significantly improved with increasing years of education at medical school.[30] These findings signify a relatively satisfactory contribution of the medical curriculum in developing research skills among medical students through well-structured intensive training.[30] This was evident in this study as the clinical students are more likely to be confident in their research skills.

Although this study included a randomly stratified sample from all years of medical students registered in KSU medical school at the time of the study with a good response rate, it was limited to being a cross-sectional, single-center, and questionnaire-based study. A national, multi-colleges mix type of study, including qualitative evaluation for both medical students, and supervisors, could give a better understanding of the factors that can improve research experience among medical students.

Conclusion

This study explored medical students' practices and perceived barriers encountered in carrying out medical research. This study found that most students reported a lack of time as the main barrier to conducting research. Participation in the research was high due to the mandatory research course at King Saud University (KSU) medical school. Furthermore, clinical years students reported mastering research skills more than pre-clinical students. Communicating these results to the organizers of the research course and the curriculum committee in medical education personnel at the college is vital to setting up interventions to improve the students' research experience. Most students highlighted the lack of mentors as a significant obstacle in their research journey. This issue should be explored in depth from medical students' and supervisors' points of view. This finding might require interventions to improve the mentorship program and tailor the process to the medical students' research needs throughout the curriculum.

Data Sharing Statement

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

Ethical approval was obtained from the institutional review board, College of Medicine, King Saud University (No. E-21-6121/CMED-305/F2). A written consent indicating the purpose of the study and the participant's right to withdraw at any time without any obligation towards the study team was obtained from each participant.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; have drafted, revised, or critically reviewed the article; read and approved the final manuscript; have agreed on the journal to which the article would be submitted; and agree to take responsibility for the contents of the article.

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Disclosure

The authors report no conflicts of interest in this work.

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