

# Attitudes of Saudi Arabian Undergraduate Medical Students towards Health Research

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## سلوك طلبة الطب السعوديون تجاه الأبحاث في المجال الصحي

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**ABSTRACT: Objectives:** This study aimed to evaluate attitudes, perceptions and perceived barriers towards health research among Saudi Arabian undergraduate medical students. **Methods:** This cross-sectional study took place between August and October 2014 and included 520 students from five medical schools across Saudi Arabia. An anonymous online survey with 21 close-ended questions was designed to assess students' attitudes towards research, contribution to research-related activities, awareness of the importance of research, perception of available resources/opportunities for research, appreciation of medical students' research contributions and perceived barriers to research. Responses were scored on a 5-point Likert scale. **Results:** A total of 401 students participated in the study (response rate: 77.1%). Of these, 278 (69.3%) were female. A positive attitude towards research was reported by 43.9% of the students. No statistically significant differences were observed between genders with regards to attitudes towards and available resources for research ( $P = 0.500$  and  $0.200$ , respectively). Clinical students had a significantly more positive attitude towards research compared to preclinical students ( $P = 0.007$ ). Only 26.4% of the respondents believed that they had adequate resources/opportunities for research. According to the students, perceived barriers to undertaking research included time constraints ( $n = 200$ ; 49.9%), lack of research mentors ( $n = 95$ ; 23.7%), lack of formal research methodology training ( $n = 170$ ; 42.4%) and difficulties in conducting literature searches ( $n = 145$ ; 36.2%). **Conclusion:** Less than half of the surveyed Saudi Arabian medical students had a positive attitude towards health research. Medical education policies should aim to counteract the barriers identified in this study.

**Keywords:** Research; Medical Students; Attitudes; Perceptions; Medical Education; Saudi Arabia.

**المخلص: الهدف:** هدف البحث إلى تقييم سلوك وتصورات طلاب الطب السعوديون، والعقبات الملحوظة من قبلهم نحو إجراء الأبحاث في المجال الصحي. **الطريقة:** أجريت هذه الدراسة المقطعية في الفترة ما بين شهر أغسطس وأكتوبر 2014. وشملت 520 طالبا وطالبة من خمس كليات طب في المملكة العربية السعودية. صمم استبيان للاستطلاع على الانترنت يحتوي على 21 سؤالاً مغلقاً وتم إرساله عبر شبكة الإنترنت لتقييم سلوك الطلبة تجاه الأبحاث، مقدار مشاركتهم في أنشطة متعلقة بالأبحاث، مدى وعيهم بأهمية البحوث ومصادرها وفرص المساهمة في الأبحاث، ومدى تقدير مساهمة الطلبة في البحوث والعقبات الملحوظة نحو إجرائها. تم حساب الأجوبة باستخدام مقياس ليكرت المكون من خمس نقاط. **النتائج:** شارك 401 طالب وطالبة في استكمال الاستبيان (معدل الاستجابة = 77.1%)، منهم 278 (69.3%) من الإناث. وجد سلوك إيجابي تجاه البحث بين 43.9% من الطلبة. لم يتم العثور على اختلاف ذو قيمة إحصائية بين الجنسين فيما يخص السلوك تجاه الأبحاث في المجال الصحي وتوفر الموارد البحثية ( $P = 0.500$  و  $P = 0.200$  بالتوالي). وجد سلوك إيجابي أكبر لدى طلبة الطب في السنوات الإكلينيكية مقارنة بطلبة الطب في السنوات ما قبل الإكلينيكية، ( $P = 0.007$ ). نسبة الطلبة الذين يؤمنون بأن هنالك مصادر وفرص كافية لإجراء الأبحاث في المجال الصحي في كلياتهم هي 26.4%. كانت العوائق التي يواجهها الطلاب وتمنعهم من المشاركة في إجراء الأبحاث هي كالتالي: ضيق الوقت (49.9%؛  $n = 200$ )، عدم توفر مشرف على البحث (23.7%؛  $n = 95$ )، عدم فعالية التدريب بمنهجية البحث (42.4%؛  $n = 170$ ) وصعوبة إجراء المسح الأدبي (36.2%؛  $n = 145$ ). **الخلاصة:** أقل من نصف طلبة الطب السعوديين في هذه الدراسة لديهم سلوك إيجابي تجاه البحث الطبي. يجب أن تهدف خطط التثقيف الطبي للتوصل إلى حلول للعقبات المذكورة في هذه الدراسة.

مفتاح الكلمات: بحث؛ طلبة الطب؛ سلوك؛ تصورات؛ التعليم الطبي؛ المملكة العربية السعودية.

### ADVANCES IN KNOWLEDGE

- To the best of the authors' knowledge, this study is the first to investigate the attitudes and perceptions of Saudi Arabian medical students towards health research.
- Less than half of the surveyed medical students were found to have a positive attitude towards research.

### APPLICATION TO PATIENT CARE

- Understanding of the attitudes and barriers faced by undergraduate medical students with regards to research may help educators to identify key areas that need to be addressed in medical education.

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- *Positive attitudes towards scientific research among undergraduate medical students is likely to enhance the quality of future patient care.*

THE NUMBER OF PHYSICIAN-SCIENTISTS IN medical practice is declining; over the last two decades, the number of physician-scientists on staff at medical school faculties has decreased by nearly 25%.<sup>1-3</sup> This suggests that the learning environment in medical schools is not conducive to clinical and basic research.<sup>2,3</sup> While certain medical schools do include instruction in research methodologies within their curricula, it is also essential to evaluate how medical students respond to these strategies in order to further enhance their medical education. To date, most of the data regarding medical students' attitudes and perceptions towards research have originated from industrialised countries.<sup>1-4</sup>

Saudi Arabia is the largest country in the Middle East, with a gross domestic product of USD \$24,911 per capita.<sup>5</sup> Over the last decade, there has been a significant shift in medical education in Saudi Arabia and surrounding countries in the Gulf Cooperation Council (GCC) region; Saudi Arabia is currently moving towards a knowledge-based economy, of which research is an important component.<sup>6,7</sup> New medical schools have been established and large numbers of medical graduates are expected over the next decade. Other GCC and Southeast Asian countries also have greater numbers of graduating medical students and are opening new medical schools.<sup>8,9</sup> In Saudi Arabia, national efforts are increasingly focused on strengthening the education and health systems; in 2014, 6.9% of government expenditures were directed towards the health sector and there were almost 1,200 medical graduates from Saudi Arabian schools in 2009.<sup>7,10</sup> The government promotes evidence-based education and policy-making within the medical community.<sup>11</sup> Evidence suggests that Saudi Arabian medical students are increasingly participating in and contributing to health research.<sup>12</sup>

The development of a positive attitude towards scientific research is a fundamental element of modern undergraduate medical education.<sup>13</sup> However, to the best of the authors' knowledge, there is a paucity of data regarding undergraduate medical students' attitudes towards research and their perceptions of available resources and opportunities for research. Additionally, no studies from Saudi Arabia on this topic yet exist in the peer-reviewed literature. This study therefore aimed to evaluate attitudes and perceived barriers towards participating in health-based research among a cohort of Saudi Arabian undergraduate medical students.

## Methods

This cross-sectional study took place between August and October 2014 and included undergraduate medical students from medical schools across Saudi Arabia. For an estimated population of 3,900 Saudi Arabian medical students, a sample size of at least 407 respondents (370 + 10% to compensate for non-participation) was needed to achieve a 95% confidence interval and a 7% margin of error with a study design effect of two.<sup>14</sup> To calculate the sample size, it was assumed that 57% of medical students were involved in research projects.<sup>1</sup> At least one university from each of the central, eastern, western and northern regions of Saudi Arabia were contacted for permission to access their email database of medical students; of these, six universities (one private and five public universities) from the central, eastern and western regions gave their consent. Five of the six medical schools were randomly selected and all 520 students of these schools were included in the study. Two senior researchers and two medical students were field investigators for the study. First- and second-year students were grouped as preclinical students and students in their third, fourth and fifth years of medical school were grouped as clinical students.

An anonymous self-reported online survey was developed by an information technology expert from the Research Department of the King Khaled Eye Specialist Hospital in Riyadh, Saudi Arabia. The English-language survey was based on a previously validated survey and used LimeSurvey<sup>®</sup> (LimeSurvey Project, Hamburg, Germany).<sup>1</sup> A pilot study on 10 medical students who were excluded from the subsequent study was performed to ensure that the survey was easily accessible and that the language utilised was appropriate and clear. Based on the results of the pilot study, no changes to the questionnaire were required. The survey included 21 close-ended questions to determine the students' demographic information, past contributions to research-related activities, awareness of the importance of research, attitudes towards health-based research, perceptions of available resources/opportunities for research, appreciation of medical students' contributions to research and perceived barriers to research.

Each questionnaire item was scored on a 5-point Likert scale; positive responses (completely agree and agree) received scores of 2 and 1, respectively, while negative responses (completely disagree and disagree)

**Table 1:** Participation in and perceptions of health-based research among surveyed Saudi Arabian undergraduate medical students (N = 401)

Item	n (%)	95% CI
Participation in research projects	278 (69.3)	64.8–73.8
Participation in medical school research projects	250 (62.3)	57.6–67.1
Publication of research papers as first author in peer-reviewed journals	13 (3.2)	1.5–5.0
Positive attitude towards research	178 (44.4)	39.5–49.3
Adequate resources/opportunities for research	106 (26.4)	22.1–30.7
Appreciation of contribution to research	161 (40.2)	35.2–44.8

CI = confidence interval.

received scores of -2 and -1, respectively. A score of zero was given to neutral answers (do not know). Total scores for questions in each category were then summed and divided by the maximum possible score in order to calculate the percentage proportion of the score. Percentages >75% were considered to be positive.

Data were analysed using the Statistical Package for the Social Sciences (SPSS), Version 22 (IBM Corp., Chicago, Illinois, USA). A univariate analysis was performed to calculate frequencies and proportions of the responses. To compare responses by gender, odds ratios and 95% confidence intervals were estimated. To review the frequency of responses by academic year, a Chi-squared analysis was performed. A *P* value of <0.050 was considered statistically significant.

The Institutional Research Board at the King Khaled Eye Specialist Hospital granted ethical approval for this study (#1467-P). As responses were anonymous, the written consent of participants was waived; however, the online survey began with a participation agreement form. Additionally, an introductory email was sent with each survey confirming the voluntary nature of participation and stating the research objectives of the study.

## Results

A total of 401 respondents participated in the survey (response rate: 77.1%), including 123 (30.7%) male and 278 (69.3%) female students. The proportion of students within each academic year was similar and the number of students per year ranged from 73–102 (18.2–25.4%). A positive attitude towards research was reported by 178 respondents (44.4%) and 106 (26.4%) believed that they had adequate resources/opportunities for research in their medical school

**Table 2:** Variations by gender in perceptions of health-based research among surveyed Saudi Arabian undergraduate medical students (N = 401)

Item	n (%)		OR (95% CI)	P value*
	Male (n = 123)	Female (n = 278)		
<b>Attitude towards research</b>				
			1.2 (0.8–1.8)	0.500
Positive	58 (47.1)	120 (43.2)		
Negative	65 (52.9)	158 (56.8)		
<b>Resources/opportunities for research</b>				
			1.4 (0.9–2.2)	0.200
Adequate	38 (30.9)	68 (24.5)		
Inadequate	85 (69.1)	210 (75.5)		
<b>Appreciation of contribution to research</b>				
			2.0 (1.3–3.1)	0.001
Appreciation	64 (52.0)	97 (34.9)		
Lack of appreciation	59 (48.0)	181 (65.1)		

OR = odds ratio; CI = confidence interval.

\**P* < 0.050 was considered statistically significant.

[Table 1]. Of the participants, 188 (46.9%) were aware of the usefulness of research in achieving their long-term medical career goals and 233 (58.1%) were aware of the importance of research in medical education.

Gender variations in attitudes towards and perceptions of available resources/opportunities for research were not statistically significant (*P* = 0.500 and 0.200, respectively). However, significantly more male students appreciated contributions to research compared to female students (*P* = 0.001) [Table 2]. Clinical students had a significantly more positive attitude towards research compared to their preclinical counterparts (*P* = 0.007). In addition, significantly more clinical students believed they had adequate resources/opportunities for research compared to preclinical students (*P* = 0.007); however, the difference was not significant with regards to appreciation of research contributions (*P* = 0.060) [Table 3].

According to the participants, there were several perceived barriers to undertaking research. These included time constraints (n = 200; 49.9%), lack of research mentors (n = 95; 23.7%), lack of formal research methodology training (n = 170; 42.4%) and lack of training/difficulties in conducting literature searches (n = 145; 36.2%).

## Discussion

Half of the surveyed Saudi Arabian medical students in the current study reported an awareness of the

**Table 3:** Variations by academic year in perceptions of health-based research among surveyed Saudi Arabian undergraduate medical students (N = 401)

Item	n (%)							OR (95% CI)	P value*
	Preclinical			Clinical					
	First year	Second year	Total	Third year	Fourth year	Fifth year	Total		
<b>Attitude towards research</b>								1.9 (1.3–3.0)	0.007
Positive	22 (30.1)	29 (38.2)	51 (34.2)	41 (54.0)	35 (47.3)	51 (50.0)	127 (50.4)		
Negative	51 (69.9)	47 (61.8)	98 (65.8)	35 (46.0)	39 (52.7)	51 (50.0)	125 (49.6)		
<b>Resources/opportunities for research</b>								1.9 (1.2–3.2)	0.007
Adequate	11 (15.1)	17 (22.4)	28 (18.8)	27 (35.5)	27 (36.5)	24 (23.5)	78 (31.0)		
Inadequate	62 (84.9)	59 (77.6)	121 (81.2)	49 (64.5)	47 (63.5)	78 (76.5)	174 (69.0)		
<b>Appreciation of contribution to research</b>								2.0 (1.3–3.1)	0.060
Appreciation	23 (31.5)	22 (29.0)	45 (30.2)	38 (50.0)	38 (51.4)	41 (40.2)	117 (46.4)		
Lack of appreciation	50 (68.5)	54 (71.0)	104 (69.8)	38 (50.0)	36 (48.6)	61 (59.8)	135 (53.6)		

OR = odds ratio; CI = confidence interval.

\*P < 0.050 was considered statistically significant.

importance of undertaking research. Less than half of the surveyed students had a positive attitude towards participating in research activities. No significant differences in attitudes towards or perceptions of research were noted between genders. However, appreciation for student contributions to research was greater among male students compared to females. Gender equality is an important consideration worldwide, particularly with regards to education.<sup>15</sup> Although Saudi Arabia was ranked 130 out of 142 countries for gender equality in the Global Gender Gap Report for 2014, the educational attainment score was 0.987, suggesting that Saudi females attain a very high educational level.<sup>16</sup> Due to their positive attitude towards research evidenced in the present study, educated Saudi females seem to be committed to enhancing education and healthcare through research. The higher number of female participants in the current study is also notable, particularly as the average male-to-female ratio of student enrolment in undergraduate medical education in Saudi Arabia was nearly 3:1 in 2011.<sup>17</sup>

In the current study, clinical students were significantly more likely to have a positive attitude towards research than preclinical students, with half of the fifth-year students having a positive attitude compared to less than a third of the first-year students. An increased awareness and maturity among students in their clinical years could explain this observation; this suggests a steady increase in awareness of research throughout the course of a student's medical education. Similarly, Khan *et al.* found that both knowledge and

attitudes improved significantly the longer a medical student was enrolled in college.<sup>18</sup> Clinical students in the current study were also significantly more inclined to perceive that they had adequate resources/opportunities for research compared to students in their preclinical years. In addition, they were more inclined to value contributions to research. Again, this is likely because older students are more likely to be aware of available resources within their respective medical schools. Furthermore, at this stage in their careers, research participation is considered an asset when applying for residency and postgraduate training programmes.

Medical students in the current study revealed four main barriers to conducting research, including time constraints, lack of mentorship and inadequate training in literature searches and research methodology. Similar barriers to research were reported by medical students in Canada.<sup>1</sup> These results also concur with those of an Irish study which found that lack of time was the greatest barrier to pursuing scientific research among a cohort of undergraduate medical students in the UK.<sup>19</sup> Unnikrishnan *et al.* observed that time constraints were the main barrier reported by undergraduate medical students in India; medical professors and mentors also confirmed that time constraints precluded supervision of student research projects.<sup>20</sup> The second most important factor was limited training in research among undergraduate students.<sup>20</sup> A randomised controlled trial in the UK found that insufficient instruction on the basics of scientific research in medical colleges hindered

students from participating in or leading research projects.<sup>21</sup> Similarities in results between the current study and those of international research suggest that unified solutions should be developed to overcome these obstacles to research participation.

The survey used in the current study assessed the attitudes of medical students towards health research and related factors. A Croatian study reported a more positive attitude towards science among students who took mandatory research courses compared to those who did not.<sup>2</sup> Another study found that students enrolled in problem-based learning courses had a healthier attitude towards research compared to those participating in lecture-based learning.<sup>22</sup> This outcome indicates the positive impact of a problem-based curriculum on the attitude of medical students towards health research.<sup>22</sup> Medical schools should consider offering online self-paced courses to address the issues of time constraints and inadequate training as well as web-based consultancy services to guide students who are interested in conducting research studies. The Saudi Digital Library offers unlimited access to over 310,000 articles and offers tutorials on how to search for content and navigate their website.<sup>23</sup> Saudi medical students should therefore be encouraged to use this resource. Databases of available qualified research professionals within Saudi Arabia and the GCC region willing to provide mentorship services could also be made available to medical students.

A previous study from Saudi Arabia reported that publications in medical sciences increased between 1996–2012.<sup>12</sup> This resulted in Saudi Arabia being ranked 45<sup>th</sup> in the world in 2012 in terms of research productivity.<sup>12</sup> More than half of the students believed that research was relevant to medical education in Saudi Arabia. These findings imply that, with effective policies and opportunities, current medical students will soon be willing to participate in research and further increase Saudi Arabia's ranking in the near future. Administrative, research and medical education departments in Saudi Arabia should seek to develop policies targeting students to enhance their understanding of the importance of research. Telmesani *et al.* noted challenges in executing changes in the Saudi medical education system.<sup>8</sup> They also opined that reforms were directed more toward changing curricula rather than defining the essential skills, knowledge and standards needed for graduating physicians.<sup>8</sup> The results of the current study indicate a need for reforms that will lead to improved perceptions of research among medical students and increased research productivity within the country.

Certain limitations to the current study should be noted when interpreting the results. The findings were

based on responses from a self-reported web-based anonymous survey. Furthermore, there are a total of 28 medical schools in Saudi Arabia;<sup>24</sup> only six were targeted in this study. Additionally, these schools were highly ranked and may therefore have had greater research-related resources than other universities in Saudi Arabia. Further studies are recommended to survey the attitudes of students from all medical schools in the country. Nevertheless, despite these limitations, it is important to note that participant responses to the anonymous survey used in the current study may have been more honest than those from other research utilising different methods of data collection.<sup>25</sup>

## Conclusion

Half of the surveyed Saudi Arabian medical students were aware of the importance of undertaking research although less than half had a positive attitude towards research. Four main barriers to research participation were identified—time constraints, lack of mentorship and inadequate training in literature searches and research methodology. In order to strengthen the medical research environment in Saudi Arabia, policy-makers should take these barriers into account.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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