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Research Article

Knowledge, Attitudes, Practice, and Barriers Facing Medical Students Regarding Scientific Research: A Cross-Sectional Study

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Abstract

Background: Scientific research is a fundamental element for practicing evidence-based medicine and improving the quality of healthcare services. Exposure to training programs and workshops in research is critical in the medical curriculum. ***Objective***: To evaluate knowledge, attitudes, practices, and barriers toward research and assess research participation experience among medical students. ***Methods***: A descriptive cross-sectional study was conducted on students at Wasit University, College of Medicine. A simple random sampling procedure was used to recruit students from 3rd-year students onwards. A self-administered questionnaire comprising 33 questions, categorized into five parts (personal data, knowledge, attitudes, practice, and possible barriers), was used for data collection. ***Results***: 360 participants completed the forms. The knowledge score was on the lower margin (3.86 on 10 questions); adequate knowledge was reported in 37.8%. Most of the students (89.7%) had a highly positive attitude towards scientific research. Approximately 55.6% of students had experience in research activities, while 9.7% of students had published articles. The students declared many perceived barriers, including a lack of time (70.3%) and a lack of knowledge and appropriate skills (56.9%). ***Conclusions***: Even though the students have a good attitude towards research, they had an inadequate knowledge score. The integration of research workshops and training programs into the undergraduate curriculum may help to improve the student's knowledge and practices.

Keywords: Attitude; Knowledge; Publications; Research; Students.

المعرفة والمواقف والممارسة والعوائق التي تواجه طلاب الطب فيما يتعلق بالبحث العلمي: دراسة مقطعية

الخلاصة

الخلفية: يعد البحث العلمي عنصرا أساسيا لممارسة الطب القائم على الأدلة وتحسين جودة خدمات الرعاية الصحية. يعد ادخال البرامج التدريبية وورش العمل في مجال البحث أمرا بالغ الأهمية في المناهج الطبية. **الهدف**: تقييم المعرفة والمواقف والممارسات والعوائق التي تحول دون البحث وتقييم تجربة المشاركة البحثية بين طلاب الطب. **الأساليب**: أجريت دراسة وصفية مقطعية على طلاب جامعة واسط بكلية الطب. تم أخذ عينات عشوائي بسيط لأشراك الطلاب من السنة الثالثة فصاعدا. تم استخدام استبيان ذاتي الإدارة يتألف من 33 سؤالا، مصنفة إلى خمسة أجزاء (البيانات الشخصية، والمعرفة، والمواقف، والممارسة، والحواجز المحتملة)، لجمع البيانات. **النتائج**: أكمل 360 مشاركا الاستمارات. كانت درجة المعرفة على الهامش الأدنى (3.86 على 10 أسئلة). تم الإبلاغ عن معرفة كافية في 37.8٪. كان لدى معظم الطلاب (89.7٪) موقف إيجابي للغاية تجاه البحث العلمي. ما يقرب من 55.6٪ من الطلاب لديهم خبرة في الأنشطة البحثية ، بينما نشر 9.7٪ من الطلاب مقالات. أعلن الطلاب عن العديد من العوائق المتصورة ، بما في ذلك ضيق الوقت (70.3٪) ونقص المعرفة والمهارات المناسبة (56.9٪). **الاستنتاجات**: على الرغم من أن الطلاب لديهم موقف جيد تجاه البحث، إلا أن لديهم درجة معرفة غير كافية. قد يساعد دمج ورش العمل البحثية والبرامج التدريبية في المناهج الدراسية الجامعية على تحسين معرفة الطالب وممارساته.

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INTRODUCTION

Scientific research is a planned study with a systematic collection of data that is interpreted and evaluated [1]. It is the most credible approach to increase scientific knowledge and enhance the provision of health care. Additionally, it is one of the most important indicators of scientific progress in a country [2]. In medicine, scientific research is considered the bedrock of future medicine and has provided more evident perspectives in medicine [3]. Health research practice is considered an important part of medical education because the rapid expansion and advancement in scientific research may transform medical care [4]. Nowadays, the orientation toward biomedical research has increased in both developed and developing countries [5]. Updated knowledge of scientific principles and methods is essential to conducting research [6]. Within the last three decades, efforts have increased to encourage research at the undergraduate level. In 1978, the Council on Undergraduate Research (CUR) was established in the United States [7]. The "General Medical Council" (GMC) found that research was a top priority in medical education according to "Outcomes for Graduates 2018." The curriculum of many medical

schools in the United Kingdom used student-selected components (SSCs) to introduce students to research [8]. However, it is a neglected part in many countries, including Iraq, but it is a crucial element in the development of medical science, including health care [9]. Undergraduate research experience may be essential for future medical professionals because it will familiarize them with the method of producing scientific evidence and the health issues and challenges that people, societies, and health systems face. Students' participation in research will enhance self-directed learning, self-confidence, specific research skills, critical appraising, and communication skills [10]. On the other hand, for medical students, integration and participation in basic research workshops could be a way to handle the lack of medical scientists [11]. In general, medical students' involvement in research was less because of many obstacles that deterred them from pursuing research, including the heavy demands of their medical education, lack of time, and less exposure to research methodology [12]. However, medical students engaged in medical research projects at the undergraduate level become familiar with the methods of clinical research because they will be future doctors who will have to practice “evidence-based medicine” in medical care [3]. A researcher must possess a wide range of abilities and an in-depth understanding of research methodology to function effectively. Research methodology training is a crucial but underappreciated component of the medical education curriculum that requires more focus [13]. To increase students' comprehension of research, their ability to learn on their own, and their potential to produce research articles, research education ought to be a component of the medical school curriculum [10]. Several tactics can be used to promote students' involvement in clinical research activities, such as initiating effective research training sessions at the undergraduate level, hosting conferences, and indexing student journals dedicated to student research [14]. Unfortunately, there is a research deficit in all academic fields [15], including medicine, because of a lack of research interest and research framework. Currently, a research project has become mandatory in some Iraqi universities to obtain a university degree, including Wasit University. This college adopted the integrated curriculum, or the modules system, according to the curriculum of the University of Leicester in the UK. Students study basic medical sciences during the first three preclinical years and clinical sciences during the final three years. They obtain a clinical research course enclosed in a health and disease module during the third year, in which they study biostatistics, research methodology, and scientific writing. They work on their statistics, write a research paper, and discuss it at the end of the course. In the fifth year, they are distributed among the supervisors to write a graduation paper that is discussed in the sixth year. This research is part of the prerequisites for graduation from the College of Medicine, Wasit University. No studies are measuring the development of undergraduate research in our region. Therefore, in the current study, researchers attempt to evaluate medical students' knowledge, attitudes, practices, and perceived barriers toward undergraduate medical research and take appropriate measures to improve students' research skills. Furthermore, the findings may assist medical communities in similar circumstances to develop plans and suggestions for improving undergraduate research in their respective countries.

METHODS

Study design and setting

A cross-sectional questionnaire survey was carried out among medical students at the College of Medicine, Wasit University, Wasit Province, Iraq. Data was collected from the 2nd of March till the end of May 2024.

Study population, sampling, and sample size

All medical students at Wasit University, College of Medicine, were recruited to participate in the study. A simple random sampling procedure was used to recruit students in this study from each college stage after obtaining a list of the students' names. The sample size was calculated according to the sample size equation for cross-sectional study design. The prevalence of students who correctly answered each question on the knowledge scale from a previously published study was 37.5% [16], with a 95% confidence interval (CI) and alpha error = 0.05. The calculated sample size was at least 360.

Inclusion criteria

Students who are from the third-year stage to the last (6th year) stages.

Exclusion criteria

The first 2 years were excluded because of their comparatively limited understanding of the scientific research, which could distort these results. Those who refused to participate or returned incomplete questionnaires were also excluded.

Data collection tool

A structured questionnaire was administered to the selected students. The surveyor remained present to answer any questions asked by participants while they were filling out the forms. The questionnaires were administered directly to students and were collected immediately after completion. This questionnaire was adapted from previously validated questionnaires from published studies with some modulations and arrangements [2,3,17]. It consisted of 5 parts to determine students’ knowledge of, attitudes toward, and perceived barriers to scientific research. Part 1: Includes personal data such as gender, stage, residence, previous year score, and parental educational status. Part 2: includes knowledge about scientific research: ten questions to determine knowledge of different sorts of research studies, scientific writing, statistics, and database resources. Each question has five options, including the ‘I don’t know’ option, with one correct answer per question. Each correct answer earned 1

score, and each incorrect answer obtained a 0 score. Part 3 evaluates students' attitudes toward scientific research using 8 questions. On a 5-point Likert scale, the responses assigned scores ranging from strongly agree (score 5) to strongly disagree (score 1). The negative attitudes were coded in reverse. The total attitude for each student was computed as a sum of the total number of scores (5-point Likert) answered for the questions. Part 4 consisted of a few practice questions that students had to respond "yes" or "no" to. These statements focused on finding out about students' prior research experience, participation in research projects and conferences, and desire to attend workshops for research. Part 5: The perceived barriers by students that prevent them from active participation in the research were assessed through 10 questions and evaluated by a three-item Likert scale (agree, no opinion, and disagree).The questions were about research limiting factors such as lack of proper facilities, issues in conducting research (i.e., lack of research idea and lack of skills), inadequate rewarding or motivation, lack of time, and inadequate mentoring. An open-ended question about motivation for writing and learning research was added at the end of the questions. Before implementation, the research supervisor (a community medicine specialist) evaluated the questionnaire's comprehensibility and relevance to make sure there would be no difficulties in comprehending and responding to the questions. It was pretested on 7 selected students who were finally excluded from the final analysis.

Ethical considerations

Ethical approval was obtained from the ethical committee at the College of Medicine, Wasit University. Verbal consent from all the participants was obtained. Names of the participants were not recorded, and data were kept safely and used for medical educational research purposes only. The student was made aware that participation was entirely voluntary and that their response would be kept anonymous to protect privacy. Also, information and the purpose of each part of the research were included in the questionnaire.

Statistical analysis

The collected data were analyzed by using the software program Statistical Package for Social Science (IBM SPSS) version 26 for Windows (IBM Corp., Armonk, NY, USA). Categorical variables were presented in frequency and percentage. Means and standard deviations (SD) were used to present continuous variables. The Chi-Square test, or Fisher's Exact test, was used to assess the association between variables. Considering the *p*-value less than 0.05 as significant.

RESULTS

A total of 360 medical students were included in the study, and both genders were considered. Among them, 62.8% were female and 37.2% were male students. Response rates based on academic year were 21.4%, 27.5%, 25.8%, and 25.3% from 3rd, 4th, 5th, and 6th-year students, respectively. Personal and demographic characteristics of participants are displayed in Table 1.

Table 1: Demographic profile of study participants

Socio-demographic features		Frequency (%)
Sex	Male	134(37.2)
	Female	226(62.8)
Place of living	Urban	331(91.9)
	Rural	29(8.1)
College stage	3rd	77(21.4)
	4th	99(27.5
	5th	93(25.8)
	6th	91(25.3)
Previous year score	Not pass	5(1.4)
	Acceptable	37(10.3)
	Average	89(24.7)
	Good	145(40.3)
	Very good	71(19.7)
	Excellent	13(3.6)
Parent education	Both have a university degree	166(46.1)
	One has a university degree	115(31.9)
	None has a university degree	79(21.9)

Table 2 represents knowledge items. Most of the students (78.6%) were knowledgeable about the use of the SPSS program in statistical analysis. While only 15.3% knew that Medline is a medical database for research.

Table 2: The level of knowledge in research of the medical students concerned about scientific research

Knowledge questions	Correct answers	Incorrect answers
A Scale from 1 to 5 (like grades for examination) is called: * Ordinal.	76(21.1)	284(78.9)
Which of the following software can be used for statistical analysis? * SPSS	283(78.6)	77(21.4)
In which part of the research do you talk about the study limitations: * Discussion	144(40)	216(60)
In which part of the research do you talk about the aims of your study: * Introduction	198(55)	162(45%)
Which of the following types of research studies sees sample loss more commonly: * Cohort	76(21.1)	284(78.9)
A characteristic of a good sample: * Representative	129(35.8)	231(64.2)
Which item is not part of scientific research: * Letters to the editor	223(61.9)	137(38.1)
Which of the following is not an element of a structured abstract? * Acknowledgment	106(29.4)	254(70.6)
What does P indicate when it is less than 0.05? * The result is statistically significant	100(27.8)	260(72.2)
Medline is: * Medical database	55(15.3)	305(84.7)

Values were expressed as frequencies and percentages. * Correct answer.

Table 3 demonstrates the attitudes-related items among the study sample. Around three-quarters (72.2%) of the students agreed and strongly agreed that they are confident in interpreting and writing

research. About 70.6% believed that research methodology should be included in the medical school curriculum. A slightly smaller percentage (67%) of students agreed and strongly agreed that conducting research should be mandatory for all undergraduate medical students. Only (12%) of the students were conflicted that research was stressful and an extra burden, and (18.3%) didn't have a difficult understanding of the concept of research. Around two-thirds (65.5%) of the sample believed they may benefit from research in the medical field.

Table 3: Frequency distribution of the participants in the research attitude scale

Attitude questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Confident in interpreting and writing research	75(20.8)	185(51.4)	70(19.4)	22(6.1)	8(2.2)
Research should be taught to all students (be a part of the medical school curriculum)	86(23.9)	168(46.7)	68(18.9)	33(9.2)	5(1.4)
Undergraduate students should participate in research (mandatory)	82(22.8)	159(44.2)	81(22.5)	30(8.3)	8(2.2)
Research is stressful and an extra burden	87(24.2)	130(36.1)	100(27.8)	38(10.6)	5(1.4)
Find it difficult to understand the concept of research	58(16.1)	155(43.1)	81(22.5)	49(13.6)	17(4.7)
Willingness to conduct clinical research	55(15.3)	124(34.4)	133(36.9)	33(9.2)	15(4.2)
Willingness to conduct community-related research	41(11.4)	128(35.6)	148(41.1)	26(7.2)	17(4.7)
Most students benefit from research in the medical field	79(21.9)	157(43.6)	65(18.1)	36(10.0)	23(6.4)

In Table 4, the students scored a mean of 29.19 out of a total attitude score of 40. The students' mean knowledge score was 3.86 out of 10. Out of the total study participants, more than half of the students (55.6%) had experience in writing a research paper. According to the results from this table, 136 (37.8%) of the students recorded adequate knowledge scores regarding research, and 244 (62.2%) had inadequate scores. The majority, 323 (89.7%), of the students had a positive attitude toward conducting research, and only 37 (10.3%) had a negative attitude score toward research. Only (9.7%) had research published in a journal, and (8.9%) had presented their research paper or poster at a scientific meeting or conference.

Table 4: Descriptive measures of positive attitudes and knowledge scores

Variable	Range	Value	Scoring
Knowledge grade	0-10	3.86±1.99	Adequate ≥5 Inadequate <5
Attitude grade	8-40	29.19±3.61	Positive ≥25 Negative <25

Results were expressed as mean±SD.

However, most of the students (65%) were willing to participate in a workshop on research methodology, as seen in Table 5.

Table 5: Research practice of study participants

Practice questions	Yes	No
Do you have experience in writing a research paper?	200(55.6)	160(44.4)
Do you have publications in journals?	35(9.7)	325(90.3)
Have you presented a research paper or a poster at a conference?	32(8.9)	328(91.1)
Are you willing to participate in a workshop on research methodology?	234(65)	126(35)

Results were expressed as frequencies and percentages.

Table 6 provides details on the various associations that have been found to exist between participants' knowledge and their demographic characteristics. Males had more knowledge than females (p= 0.020). In the academic year, this study presented that sixth-year students had more knowledge when compared to other years, which was revealed to be statistically significant (p= 0.001). Finally, in the previous year's score, students with very good scores had more knowledge than others about scientific research (p= 0.005).

Table 6: The correlation between knowledge and participant's demographic characteristics.

Variable	Category	Knowledge score		p-value
		Adequate	Inadequate	
Sex	Male	61(45.5)	73(54.5)	0.020
	Female	75(33.2)	151(66.8)	
Stage of college	3rd	27(35.1)	50(64.9)	0.001
	4th	38(38.4)	61(61.6)	
	5th	23(24.7)	70(75.3)	
	6th	48(52.7)	43(47.3)	
Residence	Urban	128(38.7)	203(61.3)	0.238
	Rural	8(27.6)	21(72.4)	
Education of mother/father	Both have a university degree	65(39.2)	101(60.8)	0.748
	One has a university degree	44(38.3)	71(61.7)	
	None has a university degree	27(34.2)	52(65.8)	
Previous year score	Not pass	0(0)	5(100)	0.005
	Acceptable	7(18.9)	30(81.1)	
	Average	34(38.2)	55(61.8)	
	Good	52(35.9)	93(64.1)	
	Very good	38(53.5)	33(46.5)	
	Excellent	5(38.5)	8(61.5)	

Values were expressed as frequencies and percentages.

In Table 7, the attitude scores of medical students towards scientific research were demonstrated in

association with their demographic features. There was a higher percentage of positive attitudes among females (90.7%) than males (88.1%) for medical research. For the academic year, 4th-year students obtained the highest percentage (93.9%), 3rd-year students came in second (90.9%), and 5th-year students came in third (88.2%). Regarding residency, students from rural and urban areas recorded the same percentage of scores (89.7%). Students who obtained excellent and good grades (92.3% and 92.4%, respectively), and the lowest percentage was for students who obtained a very good grade (83.1%). However, there was no significant association between students' attitudes and their demographics.

Table 7: Association between attitudes and participant's demographic characteristics

Variable	Category	Attitude score		*p*-value
		Positive	Negative	
Sex	Male	118(88.1)	16(11.9)	0.424
	Female	205(90.7)	21(9.3)	
Stage of college	3rd	70(90.9)	7(9.1)	0.278
	4th	93(93.9)	6(6.1)	
	5th	82(88.2)	11(11.8)	
	6th	78(85.7)	13(14.3)	
Residence	Urban	297(89.7)	34(10.3)	1.0
	Rural	26(89.7)	3(10.3)	
Education of mother/father	Both have a university degree	143(86.1)	23(13.9)	0.097
	One has a university degree	108(93.9)	7(6.1)	
	None has a university degree	72(91.1)	7(8.9)	
	Not pass	5(100)	0(0)	
Previous year score	Acceptable	33(89.2)	4(10.8)	0.438
	Average	80(89.9)	9(10.1)	
	Good	134(92.4)	11(7.6)	
	Very good	59(83.1)	12(16.9)	
	Excellent	12(92.3)	1(7.7)	

Values were expressed as frequencies and percentages.

Table 8 shows that (60.4%) of males and (52.7%) of females had experience in research. However, 13.4% of males and 7.5% of females had published an article. Third-year students showed the highest experience in research, 62.3% (48/77), followed by fourth-year students, 58.6% (58/99), and the lowest participation rate was among sixth-year students, 50.5% (46/91).

Table 8: Association of students' research experience and publishing articles according to their demographics

Variable	Category	Having experience in research		*p*-value	Having a published article		*p*-value
		Yes	No		Yes	No	
Sex	Male	81(60.4)	53(39.6)	0.150	18(13.4)	116(86.6)	0.067
	Female	119(52.7)	107(47.3)		17(7.5)	209(92.5)	
Stage of college	3rd	48(62.3)	29(37.7)	0.346	4(5.2)	73(94.8)	0.362
	4th	58(58.6)	41(41.4)		9(9.1)	90(90.9)	
	5th	48(51.6)	45(48.4)		10(10.8)	83(89.2)	
	6th	46(50.5)	45(49.5)		12(13.2)	79(86.8)	
Residence	Urban	179(54.1)	152(45.9)	0.057	30(9.1)	301(90.9)	0.337
	Rural	21(72.4)	8(27.6)		5(17.2)	24(82.8)	
Education of mother/father	Both have a university degree	91(54.8)	75(45.2)		14(8%.4)	152(91.6)	
	One has a university degree	65(56.5)	50(43.5)	0.961	11(9.6)	104(90.4)	0.579
	None has a university degree	44(55.7)	35(44.3)		10(12.7)	69(87.3)	
Previous year score	Not pass	4(80)	1(20)	0.125	1(20)	4(80)	0.594
	Acceptable	21(56.8)	16(43.2)		5(13.5)	32(86.5)	
	Average	45(50.6)	44(49.4)		9(10.1)	80(89.9)	
	Good	85(58.6)	60(41.4)		15(10.3)	130(89.7)	
	Very good	34(47.9)	37(52.1)		5(7)	66(93)	
	Excellent	11(84.6)	2(15.4)		0(0)	13(100)	

Values were expressed as frequencies and percentages.

While the highest percentage of published articles was among sixth-year students, 13.2% (12/91), and the lowest percentage was among third-year students, 5.2% (4/77). However, no significant differences were found in research experience and student demographic characteristics. Moreover, there is no significant association between students who have published articles and their demographics. Figure 1 illustrates the result of an open-ended question regarding the motivation of medical students to conduct research. Out of the 50 students who answered the open-ended question, there were 18 who were interested in researching to obtain more knowledge. At the same time, 4 of them wanted to improve their skills in research writing, and 4 students wanted to get extra marks to improve their score.

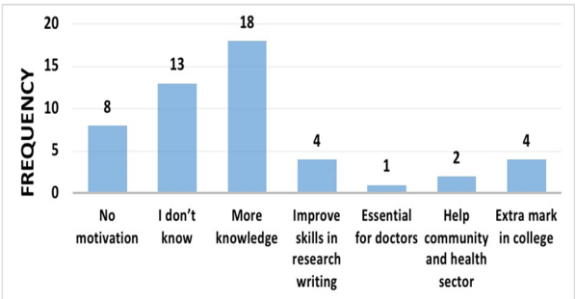

Figure 1: Frequency of motivation for research conduction among medical students.

One of them said a doctor must learn to conduct research, and two other students had a desire to perform research that improves healthcare services. However, eight students had no motivation to conduct research. Table 9 reveals the perceived barriers faced by undergraduate medical students towards scientific research. The major barrier to research, according to students' answers, was lack of time (70.3%); followed by the lack of training courses in college (62.5%), motivation (59.7%), appropriate knowledge and necessary skills (56.9%), and familiarity with statistical analysis (56.1%). Inappropriate or insufficient guidance for writing (53.3%) and lack of good research ideas (45.6%) were also reported.

Table 9: Perceived barriers faced by medical students towards practicing scientific research

Barriers	Agree	No opinion	Disagree
Lack of proper mentoring or professional supervisors from the faculty staff	219(60.8)	70(19.4)	71(19.7)
Lack of time because of educational tasks	253(70.3)	27(7.5)	80(22.2)
Lack of proper facilities	204(56.7)	73(20.3)	83(23.1)
Lack of reward and/or motivation	215(59.7)	80(22.2)	65(18.1)
Lack of appropriate Knowledge and necessary skills	205(56.9)	61(16.9)	94(26.1)
Lack of familiarity with statistical analysis	202(56.1)	78(21.7)	80(22.2)
Lack of good research idea	164(45.6)	60(16.7)	136(37.8)
Boring and difficult to research because of a lack of skill	195(54.2)	59(16.4)	106(29.4)
Inappropriate or insufficient guidance for writing	192(53.3)	65(18.1)	103(28.6)
Lack of training courses in a college	225(62.5)	56(15.6)	79(21.9)

Values were expressed as frequencies and percentages.

DISCUSSION

Although the authors were aware of the limitations of employing a self-reporting questionnaire for evaluations in the current study, it remains an effective tool for assessing medical students' knowledge, attitudes, and impediments to research. Although the goal of this study is not to evaluate student research, its findings may offer a valuable perspective on research and curriculum development. The study found that medical students had a poorer knowledge score, with an average of 3.86±1.99 on 10 questions. Only 37.8% of students demonstrated adequate knowledge of research, which is like other studies conducted in India and six Arab nations (Egypt, Algeria, Sudan, Jordan, Syria, and Palestine) [2,18]. Similarly, Mosa *et al*. [19] conducted a similar study in Iraq's Kurdistan area to assess the "knowledge and attitude of undergraduate medical students toward scientific research." This study found that the knowledge scores on a percentage scale were 37.7%, while attitude scores toward scientific research were very good. This could be because undergraduate students do not prioritize scientific research. A prior study on Turkish students found the same result [20]. The current study's findings contrasted with prior undergraduate studies in Saudi Arabia and India that demonstrated good research knowledge [3,21]. Students ascribed this to positive encouragement from instructors [3]. Mosa *et al*. [19] found that gender was not an important factor of knowledge about scientific research. In the current study, males had more knowledge about research than females. Females had a higher attitude score than males, but not statistically significant. Regarding the academic year, this study found that sixth-year students had more research knowledge than in other years. This contradicts the findings of Ibrahim Abushouk *et al*. [14] at Ain Shams University in Egypt, where fourth-year students took a mandated research course and achieved the best knowledge scores and percentage of research engagement. This highlights the significance of the academic curriculum in improving research knowledge among undergraduate students [14]. In the current study, around 89.7% of medical students had a positive attitude toward scientific research, which is consistent with other studies conducted in Jordan, Syria, Egypt, Turkey, and India [14,20, 22-24]. Forty-four percent (44.2%) of students agreed, with 22.8% strongly agreeing, that research performance should be required for all undergraduate students. This percentage was lower than that observed in an Egyptian study (74.2%) [14]. This discrepancy could be related to Egypt's large number of highly ranked journals, which may boost the likelihood of medical students being accepted and participating in scientific research. Another intriguing finding was that most respondents had significantly lower sentiments about community-based research. This could be because students prefer hospital- and lab-based research. Early participation in epidemiology and field research is likely to improve medical students' attitudes towards community-based research. However, the education system can have an impact on encouraging students to conduct research; a previous study in Pakistan found that medical students enrolled in problem-based curricula (PBL curricula) had significantly higher levels of knowledge and attitudes toward scientific research than medical students enrolled in the traditional LBL curriculum. The findings indicate that the PBL program has a favorable and encouraging effect on medical students' knowledge and attitudes toward medical research [25]. Fifty-five percent (55.6%) of the students polled have experience conducting research. Only 9.7% of students had their research papers published in a journal. This could be attributed to a lack of student forums and access to scholarly publications. This percentage was lower than that revealed in research done among medical students at King Saud University in Saudi Arabia. Because of the college's mandatory research classes, there was a high participation rate (58.9%). However, many participants (88.2%) did not disclose their findings [26]. This distinction can be seen in the lack of suitable research facilities at Wasit College of Medicine, which may contribute to the gap. In contrast, high-income countries equip their universities with research offices, financial possibilities, and mentorship, encouraging them to incorporate research early in their curriculum. This institutional culture fosters an enthusiasm for research [27]. Many impediments, both direct and indirect, inhibit

undergraduate students from participating in research projects. The primary barriers identified in this study were a lack of time, training classes at a college, and mentoring. However, some hurdles, such as time limits caused by academic overload, are ubiquitous. Other significant impediments, such as a lack of reward and/or motivation, as well as the essential research abilities, were recognized in a substantial proportion of the current study. Fida *et al*. [28] at King Edward Medical University in Pakistan reported comparable results. According to a study conducted at an Egyptian medical school, a lack of mentoring and the difficulty in obtaining a research supervisor were identified as significant barriers by 72.8% of questioned students [14]. Another study in Karachi found that financial constraints and a preference for academic instruction over research were the most significant barriers to participation in research [29]. The approach would be to simply incorporate research into all phases of the curriculum (without making it an elective topic) as short research projects overseen by faculty members. As assessment is the most crucial component of learning, an assessment method should be implemented to evaluate students' research activities, and intercalated degrees should be used to develop good attitudes toward research during undergraduate training. When the results of the motivation-related question were analyzed, the least stated motivations were that research is necessary for doctors and that it benefits the health sector and the community. This could be because medical students are more likely to focus on their clinical knowledge and skills, which are culturally connected with patient care and illness management. Some students identified receiving extra marks as a motivator for participating in research projects; this may reflect students' desire to receive higher results on exams. Even though this may encourage them to perform research while an extra mark option is offered rather than for long-term participation. The current study has a few drawbacks. First, even though the survey used a previously authorized questionnaire, the questions may not provide a thorough or precise assessment of students' grasp of scientific research due to the self-reported nature of the data. Furthermore, only undergraduate medical students from a single government medical university were considered. Including more government and private medical universities from across the country could help us better identify research patterns in Iraq's medical schools. It will also assist in identifying the barriers to research that other medical university students encounter, allowing for the implementation of more complex legislation to encourage research in Iraq. Finally, due to the study's volunteer nature, the sample may not include all medical students.

Conclusion

Medical students showed inadequate knowledge and practice of research, despite their positive attitudes. Most students had barriers to research conduction.

Recommendations

It is crucial to comprehend the obstacles that students may encounter and their attitudes toward research to enhance medical education. The organization of research workshops and training programs to equip medical students with the requisite knowledge and skills, the integration of research as an educational endeavor, and the provision of appropriate supervision by faculty members can significantly improve the student's ability to conduct scientific research in the future. The authors believe that the data collected from this survey will be helpful in recognizing the opportunities that undergraduate medical students have to conduct research and in overcoming the obstacles that prevent them from engaging in research activities.

Conflict of interests

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Data sharing statement

Supplementary data can be shared with the corresponding author upon reasonable request.

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