

Assessment of the understanding of evidence-based medicine among undergraduate medical students in Gadarif University, Sudan

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ABSTRACT

Introduction: Evidence-based Medicine (EBM) has become important for integrating critical appraisal of research evidence into routine clinical practice. Increasingly, acquiring knowledge and skills for this new concept is becoming a core competence for all doctors. This study aimed to assess knowledge and attitudes toward EBM among undergraduate medical students at the Faculty of Medicine, Gadarif University, Sudan.

Method: This cross-sectional descriptive study was conducted during the 2019-2020 academic year, and 150 undergraduate students from Gadarif University's Faculty of Medicine participated. Convenience sampling was employed to gather data. A self-administered questionnaire was used to assess students' knowledge and attitudes towards EBM. SPSS version 23 was used to analyse the data.

Results: Of the 150 students involved, 94 (62.7%) of them were not aware of EBM, and 96 (64%) did not understand the concept; 133 (88.7%) had poor knowledge of the basic components of EBM; 14 (9.3%) understood the term PICO (Problem, Information/Intervention, Comparison, Outcome) which is the standard method for searching evidence. Participants considered/mentioned the following methods for obtaining evidence: Google search 81 (54%), Cochrane Library 10 (6.7%), TRIP (Turning Research Into Practice) 3 (2%), others 42 (28%), and 14 (9.3%) did not respond. Students' perceptions of the validity of EBM implementation across learning phases were as follows: 35 (23.3%) for basic science, 88 (58.7%) for clinical practice, and 27 (18%) considered it not useful.

Conclusion: The study found that students had poor knowledge of EBM but positive attitudes towards it, supporting the recommendation to implement EBM in the curriculum.

Keywords: evidence-based medicine; clinical practice; undergraduate medicine; Sudan

Introduction

In today's fast-paced medical landscape, imagine a cardiac unit where physicians lack the skills to seamlessly integrate evidence-based medicine (EBM) into their practice. The consequence? Potentially outdated treatments could be administered, leading to suboptimal patient outcomes. This underscores the urgency of ingraining EBM training into medical education. EBM involves the systematic review, evaluation, and application of clinical research findings to optimise patient care. This approach has been widely endorsed by physicians globally.^[1]

Research indicates significant gaps between available evidence and routine clinical practice. Consequently, the instruction of EBM skills has become increasingly important in undergraduate, postgraduate, and continuing medical education programmes.^[2] While conducting studies on this topic, it is crucial to recognise the potential limitations of using convenience sampling, which may introduce selection bias. Such bias could undermine the generalizability of the findings to similar medical schools, thereby affecting the validity of the study results. Addressing these limitations transparently can strengthen readers' trust in the findings and emphasize the need for cautious interpretation.

The primary objective of EBM is to optimise patient care by integrating current research evidence with patient preferences and clinical expertise, including history-taking and physical examination.^[3] The EBM process consists of five key steps (5 As): Asking questions, Answering by identifying the best available evidence, Appraising its validity, Applying it to clinical scenarios, and Assessing the outcomes.^[4]

Many studies have assessed the knowledge, attitudes, barriers, and potential of EBM among health providers and have reported varied results with limited success in developing a strong strategy for implementing EBM. From an educational perspective, applying EBM requires multiple high-level skills, such as critical thinking and judgment. It also requires clinical expertise to make judgments and decisions.^[5] However, there are considerable challenges facing medical schools and health professional educators worldwide in meeting the high standards required for a competent medical graduate.

A descriptive study in Yemen assessed physicians' knowledge and awareness of EBM. Most participants had positive attitudes toward EBM (87%). However, only 14.7% had used EBM resources in their clinical decisions, and about 46.9% knew the basic EBM methods.^[6] In Iran,

a study of 143 medical students found that 24.5% had good basic knowledge and familiarity with EBM. Most students (89.3%) had a positive attitude and agreed that EBM is helpful for patient care, but 80.2% had little or no awareness of EBM resources.^[7] In Saudi Arabia, a large study among medical students showed poor knowledge and attitudes toward EBM: 80.8% answered incorrectly on EBM components, 40.4% knew that systematic reviews are the strongest evidence, and 95% were unaware of the Cochrane Library.^[8] In Ethiopia, a survey of physicians in public hospitals found that they supported the inclusion of EBM in the medical curriculum.^[9]

In Sudan, the sole undergraduate study on this topic was conducted at Shendi University in Northern Sudan to evaluate medical students' knowledge, attitudes, and perceptions of EBM. Over 50% of students had poor knowledge of EBM, 72% believed in its validity.^[10]

This study aimed to assess knowledge and attitudes toward EBM among undergraduate medical students at the Faculty of Medicine, Gadarif University, Sudan.

Method

This cross-sectional descriptive study was conducted during January and February of the academic year 2019 – 2020 at the Faculty of Medicine, University of Gadarif in Sudan. The faculty offers an integrated medical curriculum. The programme comprises 174 credit hours over 10 semesters and uses various teaching methods.

The sample included current undergraduate medical students in the clerkship phase of the medicine programme, who were selected via convenience sampling. Yamane's formula ($n = N/1 + N(d^2)$, where (n) was the sample size, (N) was the population size, and (d) was the degree of accuracy desired (0.05), was used to determine the sample size. Based on the Faculty's annual active student records, the population was estimated at 221 clerkship students. Using a 0.05 margin of error, the required sample size was determined to be 139 students. To account for potential attrition (estimated at 10%), the adjusted target sample size was increased to 150 participants.

A questionnaire with three sections was designed to collect participants' demographic characteristics and to assess their knowledge and attitudes towards EBM.

Although self-report questionnaires are standard tools for data collection, they are subject to response bias. To mitigate this, responses were anonymised, and participants were assured that their evaluations would not affect

their academic standing or grades. The questionnaire's validity and reliability were thoroughly evaluated. Ten knowledgeable faculty members with expertise in educational research were asked for their opinions to assess the validity of the qualitative content. The experts' level of agreement was measured using the Content Validity Index (CVI). Since the Kuder-Richardson-20 (KR-20) formula is suitable for instruments with dichotomous items, it was used to assess reliability. Reliability was tested with a sample of 30 participants.

The CVI and KR-20 reliability results are as follows: The questionnaire was a modified version to be compatible with the objectives of our study. The standard questionnaire is typically used for comprehensive KAP studies, but in our study, we omitted the practical section because EBM had not been incorporated into Sudanese medical schools at the time of the research. A discussion with experts in EBM, medical education, and research was held to obtain feedback on the questionnaire.

The researcher provided potential respondents with an orientation about the study. The main aims were to overcome knowledge bias, achieve uniformity in awareness of the questionnaire's technical details, and ensure confidentiality and the use of numbers rather than names. Sets of questionnaires (predesigned) and reviewed by the expert reviewers (content of the questionnaires) were distributed to participants, who then filled them out individually in the lecture room under the researcher's observation. The researcher collected the questionnaires after allowing the participants time to complete them. The questionnaire was designed by the researcher and included questions to assess knowledge and attitudes using personal

scaling methods identified by the researcher.

The principal investigator distributed the questionnaire and informed consent to target students in lecture halls. Participants received a 20-minute orientation by the investigator to ensure understanding of questionnaire sections and questions. Questionnaires were self-administered under the supervision of researchers and in a manner that ensured anonymity.

Data were analysed using SPSS/v26 software (SPSS Inc., Chicago, IL, USA).

Ethical approval was initially obtained from the Research Committees of Gezira University and Gadarif University in Sudan. Informed consent was obtained from medical students.

Results

150 students responded to the survey. On knowledge of EBM, 94 (62.7%) of them were not aware of EBM, and 96 (64%) did not understand the concept; 133 (88.7%) had poor knowledge of the basic components of EBM; 14 (9.3%) understood the term PICO (Problem, Information/Intervention, Comparison, Outcome which is the standard method for searching evidence), while 136 (90.7%) did not understand. Participants mentioned the following methods for obtaining evidence: Google search 81 (54%), Cochrane Library 10 (6.7%), TRIP 3 (2%), Others 42 (28%), and 14 (9.3%) did not respond (Table 1).

Regarding attitudes towards validity in clinical practice, 116 (77.3%) had a positive perception, and 34 (22.7%) had a negative perception. Regarding the implementation of EBM in the curriculum, 129 (86%) agreed, and 21 (14%) did not. Their attitudes towards the validity of implementing EBM were as follows: 35 (23.3%) for basic

Table 1. Study population's knowledge of evidence-based medicine

Knowledge	Who knew n (%)	Who did not know n (%)
Awareness about EBM	56 (37.3)	94 (62.7)
Understanding of concept of EBM	54 (36)	96 (64)
Familiar with term 5As	17 (11.3)	133(88.7)
Familiar with the term PICO	14 (9.3)	136 (90.7)
Ideal searching method	13 (8.7)	137 (91.3)

Table 2. Study population's attitudes towards evidence-based medicine

Attitude	Positive perception n (%)	Negative perception n (%)
Validity in clinical practice	116 (77.3)	34 (22.7)
Introduction in the curriculum	129 (86)	21(14)
Increasing the student competency	136 (90.7)	14 (9.3)

science, 88 (58.7%) for clinical practice, and 27 (18%) considered it not useful. Considering attitudes towards the value of EBM in increasing student competency, 136 (90.7%) thought it would increase it, and 14 (9.3%) thought it would not (Table 2).

Discussion

This study was conducted during the academic year 2019 – 2020 to evaluate the knowledge and attitudes of final-year undergraduate medical students toward EBM in Sudan. EBM is one of the WFME (World Federation for Medical Education) accreditation standards.

A striking finding was the limited awareness of EBM fundamentals among students, consistent with studies from similar settings. For instance, Ghahremanfard et al.^[7] reported comparable knowledge gaps among Iranian medical students, underscoring a regional deficit in early EBM education. The absence of structured EBM training likely contributes to this trend.

While students rarely applied EBM principles in clinical learning, they recognised its validity. Nearly 76% believed EBM enhances diagnostic and therapeutic decision-making, and 86% advocated for its inclusion in the curriculum, mirroring findings from Saudi Arabia.^[8] This enthusiasm parallels studies from Ethiopia^[9] and Sudan,^[10] suggesting a universal appreciation of EBM's theoretical value despite practical barriers.

Participants predominantly recommended introducing EBM in the final five semesters; this preference may reflect an understanding that EBM's utility becomes most apparent during advanced clinical training.

Notably, students associated EBM training with institutional accreditation (e.g., WFME standards). While this highlights awareness of global medical education benchmarks, it may also indicate a superficial grasp of EBM's role in accreditation processes. Further research should explore whether this perception stems from faculty advocacy or broader curricular reform discussions.

Limitations and future directions

This study's single-institution design and reliance on self-reported data limit generalizability. Future studies should incorporate objective assessments (e.g., EBM competency tests).

Conclusion

Sudanese medical students recognise the importance of EBM but lack the foundational skills to apply it. Curriculum reforms, including early, hands-on EBM training and faculty development, are urgently needed to align theoretical appreciation with clinical practice. Addressing these gaps will empower future physicians to deliver evidence-based care and meet global medical education standards. Although the master-apprentice model of teaching is more applicable to the current situation, we believe implementing EBM learning is important for properly preparing our future doctors to cope and compete.

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