



Knowledge and perceptions of artificial intelligence in medical writing among medical and health sciences students: a comparative study of Saudi and Non-Saudi students

Imrana Tanvir ¹, Manal Ahmed Halwani ², Marwah Ahmed Halwani ³,
Amber Hassan ⁴, Humaira Waseem ⁵, Samah Said Elbasateeny ⁶,
Fehmida Bibi⁷, Syed Kashif Zaidi ⁸, Muhammad Imran Naseer ⁸ ✉

ABSTRACT

Objective: To determine the knowledge, perceptions, and perceived benefits of artificial intelligence (AI) in medical writing among Saudi and non-Saudi undergraduate medical and health sciences students.

Methods: This comparative cross-sectional study was conducted from May to July 2024 among undergraduate medical and health sciences students enrolled at universities in Saudi Arabia and other countries. Using convenience sampling, 116 participants (52 non-Saudi and 64 Saudi students) were recruited. Data were collected using a structured, face-validated questionnaire assessing demographics, knowledge, perceptions, and perceived benefits of AI in medical writing. Data were analyzed using SPSS version-25.0.

Results: The mean age was higher among non-Saudi students than Saudi students (29.03 ± 7.1 vs. 23.29 ± 6.9 years). Overall, 109 (94.0%) participants demonstrated knowledge of AI, 108 (93.1%) reported positive perceptions, and 94 (81.0%) recognized its benefits in medical writing. No significant differences were observed between non-Saudi and Saudi students regarding knowledge (96.2% vs. 92.2%; $p=0.372$), positive perceptions (94.2% vs. 92.2%; $p=0.720$), or awareness of AI benefits (82.7% vs. 79.7%; $p=0.681$). The most frequently reported concerns included data privacy, accuracy and reliability of AI-generated content, and fear of being identified for using AI tools. Approximately half of the participants believed AI could potentially replace human medical writers.

Conclusion: Medical and health sciences students demonstrated high knowledge and positive perceptions regarding AI in medical writing irrespective of nationality. However, concerns regarding privacy, reliability, and ethical implications highlight the need for formal training on the responsible use of AI in medical education.

Keywords: Artificial Intelligence (MeSH); Medical Writing (MeSH); Students, Medical (MeSH); Health Knowledge, Attitudes, Practice (MeSH); Education, Medical (MeSH); Surveys and Questionnaires (MeSH); Cross-Sectional Studies (MeSH).

THIS ARTICLE MAY BE CITED AS: Tanvir I, Halwani MA, Halwani MA, Hassan A, Waseem H, Elbasateeny SS, et al. Knowledge and perceptions of artificial intelligence in medical writing among medical and health sciences students: a comparative study of Saudi and Non-Saudi students. *Khyber Med Univ J* 2026;18(2):128-33. <https://doi.org/10.35845/kmu.2026.24286>

INTRODUCTION

Artificial intelligence (AI) refers to computational systems capable of simulating human intelligence by analyzing data and generating autonomous or assisted outputs. It encompasses technologies such as machine learning, deep learning and

natural language processing, which are increasingly being applied across healthcare, medical education, and biomedical research.^{1,2} In recent years, AI-powered tools have transformed academic writing by facilitating literature searching, language editing, summarization, data synthesis, and manuscript preparation, thereby

- 1: Department of Pathology, King Abdulaziz University (KAU), Jeddah, Rabigh Br. Kingdom of Saudi Arabia (KSA)
- 2: Department of Paediatrics and Pediatric emergency consultant, KAU Hospital, Jeddah, KSA
- 3: College of Business-Rabigh, KAU, Jeddah, KSA
- 4: Faculty of Allied Health Sciences, University of Lahore, Lahore, Pakistan
- 5: Fatimah Jinnah Medical University, Lahore, Pakistan
- 6: Department of Pathology, Rabigh Faculty of Medicine, KAU, Jeddah, KSA
- 7: Special Infectious Agents Unit-BSL3, King Fahd Medical Research Centre, KAU, Jeddah, KSA
- 8: Institute of Genomic Medicine Sciences (IGMS), KAU, Jeddah, KSA

Cell #: +966-536353260

Email ✉: mimrannaseer@yahoo.com

Date Submitted: December 30, 2025

Date Revised: April 23, 2026

Date Accepted: April 24, 2026

improving writing efficiency and research productivity.^{3,4}

Medical writing is a fundamental competency in medical education, requiring scientific accuracy, critical thinking, effective communication, and adherence to ethical principles. Despite its importance, many undergraduate medical and health sciences students receive limited formal training in scientific writing.⁵ AI-assisted writing tools have the potential to enhance learning, improve the quality of academic writing, and support research activities.^{6,7} However, their increasing use has also raised concerns regarding the accuracy and reliability of AI-generated content, fabricated references, plagiarism, authorship, data privacy, and academic integrity. Although generative AI tools such as ChatGPT can facilitate scientific writing by generating and refining text, their potential to generate inaccurate

information, fabricated references, and hallucinated content necessitates careful human oversight and responsible use in academic settings.

Although previous studies have investigated medical students' knowledge and perceptions of AI, most have focused on its applications in healthcare delivery, medical education, or clinical decision-making rather than its role in medical writing. Furthermore, comparative evidence regarding students' knowledge, perceptions, and use of AI-assisted tools for medical writing across different educational and cultural settings remains limited. In Saudi Arabia, ongoing educational reforms, including the SaudiMEDs competency framework¹⁰, have emphasized the development of research, communication, and scholarly writing skills among healthcare students.^{11,12} However, little is known about students' understanding, acceptance, and perceived benefits of AI-assisted medical writing. Such evidence is essential for identifying educational needs, informing curriculum development, and guiding institutional policies on the ethical and responsible integration of AI into medical education and scientific writing. Therefore, this study was planned to compare the knowledge, perceptions, and perceived benefits of AI in medical writing among Saudi and non-Saudi undergraduate medical and health sciences students.

METHODS

This comparative cross-sectional study was conducted from May to July 2024 among undergraduate medical and health sciences students enrolled at universities in Saudi Arabia and other countries. Participants were recruited using a convenience sampling technique. Ethical approval was obtained from the institutional ethics committee (Reference #: 6271/GMTH dated: May 12, 2024), and the study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. Written informed consent was

obtained from all participants before enrolment.

A total of 116 undergraduate medical and health sciences students were enrolled and categorized into two groups based on nationality: Saudi (n=64) and non-Saudi (n=52). As no prior studies were available to inform formal sample size estimation, a convenience sample of eligible participants was recruited during the study period. Eligible participants included undergraduate students enrolled in medicine, pharmacy, nursing, or allied health sciences programs who provided informed consent. Students enrolled in non-health sciences disciplines and those who submitted incomplete questionnaires were excluded from the analysis.

The questionnaire was adapted from previously published studies⁴ and modified to meet the objectives of the present study and consultation with subject experts. The questionnaire underwent face validation to assess its clarity, relevance, and comprehensibility. It comprised two sections: (1) participants' demographic characteristics and (2) assessment of knowledge, perceptions, and perceived benefits of AI in medical writing.

The knowledge domain consisted of seven items, with each correct response assigned a score of one and each incorrect response a score of zero. A total knowledge score was calculated by summing the scores for all items. The perception domain

included seven statements, and participants with a score of $\geq 60\%$ were considered to have a positive perception of AI. This threshold was adopted based on cut-offs used in previous perception-based survey studies.

Formal reliability testing, such as Cronbach's alpha, was not performed.

Data were collected using either paper-based questionnaires or an online Google Form according to participants' preferences. Participants were given one month to complete the questionnaire, and periodic reminders were sent to maximize the response rate.

Data were analysed using SPSS version 25.0. Quantitative variables were presented as mean $\pm$ standard deviation (SD), while categorical variables were expressed as frequencies and percent-ages. The normality of continuous data was assessed using the Shapiro-Wilk test. Associations between categorical variables were evaluated using the Chi-square test or Fisher's exact test, as appropriate. A p-value < 0.05 was considered statistically significant. Missing data were excluded from the final analysis.

RESULTS

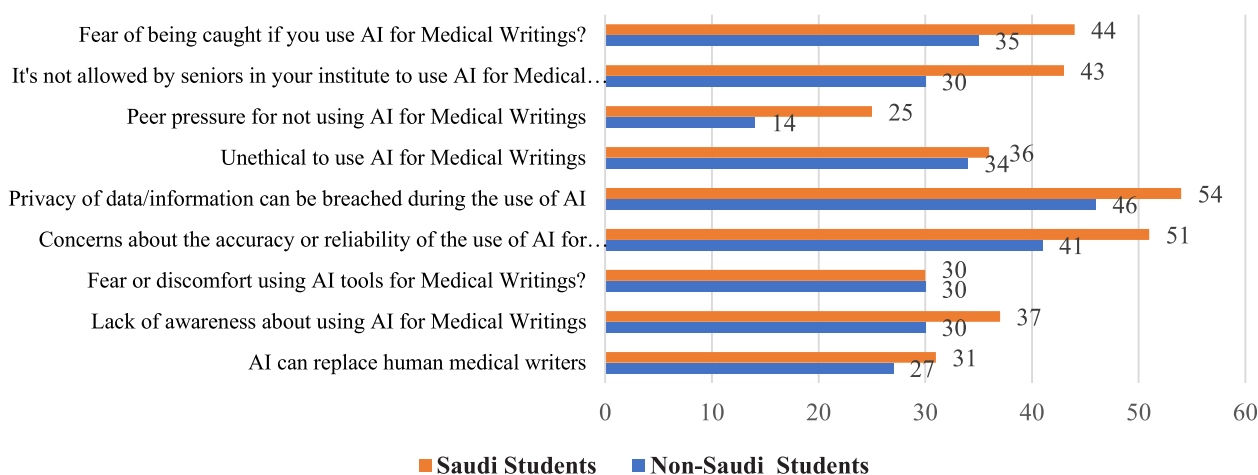
A total of 116 students were enrolled in the study, including 52 non-Saudi and 64 Saudi participants. The mean age of non-Saudi students was higher (29.03 ± 7.1 years) than that of Saudi

Table 1: Characteristics of the study participants

Variable		Non-Saudi students (n=52)	Saudi students (n=64)
Age in years (Mean $\pm$ SD)		29.03 $\pm$ 7.1	23.29 $\pm$ 6.9
Gender	Male	16 (30.8%)	14 (21.9%)
	Female	36 (69.2%)	50 (78.1%)
Type of Institution	Public	30 (57.7%)	51 (79.7%)
	Private	22 (42.3%)	13 (20.3%)
Health Profession	Allied	16 (30.8%)	14 (21.8%)
	Medical students	6 (11.5%)	19 (29.7%)
	Medicine	28 (53.8%)	26 (40.6%)
	Nursing	1 (1.9%)	4 (6.3%)
	Pharmacy	1 (1.9%)	1 (1.9%)

Table II: Comparison of knowledge, perceptions, and awareness of the benefits of artificial intelligence in medical writing among Saudi and non-Saudi students

Variable		Non-Saudi students (n=52)	Saudi students (n=64)	Total	p-value
Knowledge about Artificial Intelligence	Yes	50 (96.2%)	59 (92.2%)	109 (94.0%)	0.372 ^a
	No	2 (3.8%)	5 (7.8%)	7 (6.0%)	
Perception about Artificial Intelligence	Positive	49 (94.2%)	59 (92.2%)	108 (93.1%)	0.72 ^b
	Negative	3 (5.8%)	5 (7.8%)	8 (6.9%)	
Knowledge about the Benefits of Artificial Intelligence in medical writing	Yes	43 (82.7%)	51 (79.9%)	94 (81.0%)	0.681 ^a
	No	9 (17.3%)	13 (20.3%)	22 (19.0%)	

^a Chi-square test ^b Fisher Exact Test**Figure 1: Challenges face while using artificial intelligence (AI) for Medical writing**

students (23.29 ± 6.9 years). Overall, 30 (25.9%) participants were male, including 16 (30.8%) non-Saudi and 14 (21.9%) Saudi students. Most participants were female (86, 74.1%), of whom 36 (69.2%) were non-Saudi and 50 (78.1%) were Saudi. Regarding institutional affiliation, 81 (69.8%) participants were from public institutions, including 30 (57.7%) non-Saudi and 51 (79.7%) Saudi students. The largest proportion of participants belonged to the medicine discipline (54, 46.5%), comprising 28 (53.8%) non-Saudi and 26 (40.6%) Saudi students (Table I).

With respect to knowledge and perception, 109 (94.0%) participants demonstrated knowledge of artificial intelligence (AI), including 50 (96.2%) non-Saudi and 59 (92.2%) Saudi students. 108 (93.1%) participants

reported a positive perception of AI. Additionally, 94 (81.0%) participants were aware of the benefits of AI in medical writing, with comparable proportions among non-Saudi (43, 82.7%) and Saudi (51, 79.9%) students. No statistically significant differences were observed between the two groups in terms of knowledge, perception, or awareness of benefits ($p=0.372$; $p=0.720$; $p=0.681$) [Table II].

Regarding challenges associated with AI use in medical writing, many participants expressed concerns about data privacy (non-Saudi = 46; Saudi = 54) and the accuracy and reliability of AI-generated content (non-Saudi = 41; Saudi = 51). Fear of being identified for using AI tools was also reported by both non-Saudi (35) and Saudi (44) students. Furthermore,

27 of 64 non-Saudi students and 27 of 52 Saudi students believed that AI could potentially replace human medical writers, reflecting uncertainty about its role (Figure 1).

Among students who demonstrated knowledge of AI, females constituted the majority in both groups. Of the 50 non-Saudi students with AI knowledge, 34 (68.0%) were female and 16 (32.0%) were male. Similarly, among the 59 Saudi students with AI knowledge, 45 (76.3%) were female and 14 (23.7%) were male.

DISCUSSION

The present study provides important insights into the knowledge, perception, and perceived benefits of AI in medical writing among medical and health sciences students. Overall, a high level of awareness (94.0%),

positive perception (93.1%), and recognition of benefits (81.0%) were observed. However, no significant differences were identified between Saudi and non-Saudi students, suggesting that familiarity with AI in academic contexts is widespread across diverse student populations. These findings indicate that AI has already become an integral component of students' academic environments, particularly in supporting medical writing tasks.

The high level of awareness observed in this study is consistent with previous research among medical students in the United States and the United Kingdom, in which the majority of participants anticipated a significant impact of AI on their future professional practice. Similarly, studies from Canada and Europe have reported growing acceptance of AI in medical education, with students recognising both its potential benefits and associated ethical challenges.^{16,17} However, unlike many previous studies that focused primarily on clinical applications of AI, the present study specifically highlights its role in academic writing, thereby addressing an important gap in the literature.

Despite the generally positive perception, several concerns were identified. Participants expressed apprehension regarding data privacy, accuracy, and the reliability of AI-generated content. Additionally, fear of being penalized for using AI tools suggests uncertainty regarding institutional policies and ethical guidelines. These findings align with earlier studies reporting that students are aware of the ethical and professional risks associated with AI use, including plagiarism, authorship, and content validity.^{16,17} The persistence of these concerns underscores the need for structured education that not only promotes AI literacy but also clarifies acceptable and responsible use.

Another important finding was that a proportion of students believed that AI could potentially replace human medical writers. Although this view was not dominant, it reflects ongoing

uncertainty about the role of AI in academic and professional settings. Evidence from studies among physicians suggests that AI is more likely to serve as a supportive tool rather than a replacement, particularly given its current limitations in critical thinking, contextual understanding, and human interaction.¹⁸⁻²⁰ Therefore, it is essential to emphasise the complementary role of AI in medical writing, where it can enhance efficiency while still requiring human oversight and expertise.

From an educational perspective, these findings have important implications. The integration of AI into medical curricula should be accompanied by formal training on its appropriate use, limitations, and ethical considerations. Developing clear institutional guidelines can help reduce uncertainty and prevent misuse, while also enabling students to leverage AI tools for academic purposes effectively. Such strategies are crucial for preparing future healthcare professionals to engage responsibly with emerging technologies.²¹⁻²³

This study has several limitations that should be acknowledged. First, the use of a convenience sampling method may limit the generalizability of the findings. Second, the relatively small sample size may reduce the statistical power to detect subtle differences between groups. Third, the reliance on self-reported data introduces the possibility of response bias. Additionally, the questionnaire was not subjected to extensive psychometric validation, which may affect the reliability of the measurements. Future studies should consider larger, multi-centre samples and validated instruments to strengthen the evidence base. The absence of formal reliability testing may affect the questionnaire's internal consistency.

CONCLUSION

Medical and health sciences students demonstrated good knowledge, positive perceptions, and recognition of the perceived benefits of AI in medical writing, with no significant differences between Saudi and non-

Saudi students. Although participants acknowledged the potential of AI to support scientific writing, they also expressed concerns regarding data privacy, the accuracy and reliability of AI-generated content, and academic integrity. These findings emphasize the need to integrate AI literacy and ethical guidance into undergraduate medical and health sciences curricula to promote the responsible and effective use of AI-assisted writing tools while maintaining scientific integrity. Further multicenter studies with larger and more diverse student populations are warranted to validate these findings. Future longitudinal studies should evaluate the effectiveness of structured AI training programs in improving students' competencies and promoting the responsible use of AI in medical writing.

REFERENCES

1. Lanzetta M. Machine learning, deep learning, and artificial intelligence. In: Artificial intelligence for autonomous networks. Boca Raton (FL): Chapman & Hall/CRC; 2018. pp:25-47. <https://doi.org/10.1201/9781315360079-3>
2. Gómez-González E, Gómez Gutiérrez E. Artificial intelligence in medicine and healthcare: applications, availability and societal impact. Luxembourg: Publications Office of the European Union; 2020. <https://doi.org/10.2760/047666>
3. Pellecchia R. Leveraging AI via speech-to-text and LLM integration for improved healthcare decision-making in primary care. 2022. [Accessed on: April 23, 2026]. Available from URL: <https://www.politesi.polimi.it/handle/10589/218053>.
4. Sarker IH. AI-based modelling: techniques, applications and research issues towards automation, intelligent and smart systems. SN Comput Sci 2022; 3(2): 158. <https://doi.org/10.1007/s42979-022-01043-x>

5. Ormond JL. Soft skills in higher education and graduate employability: a Delphi study [dissertation]. Huntsville (TX): Sam Houston State University; 2023. [Accessed on: April 23, 2026]. Available from URL: <https://shsu-ir.tdl.org/server/api/core/bitstream/s/d7c8d3a5-07ad-49b6-83a3-bbabdb9a6b56/content>
6. Abeldina Z, Moldumarova Z, Abeldina R, Moldumarova ZI. Virtual learning space in the system of e-learning. *Mediterr J Soc Sci* 2015; 6 (5) : 4 7 8 - 8 3 . <https://doi.org/10.5901/mjss.2015.v6n5p478>
7. Fitria TN. Artificial intelligence (AI) in education: Using AI tools for teaching and learning process. *Pros Sem Nas Call for Paper* 2021;4(1):134-47.
8. Aydın Ö, Karaarslan E. Is ChatGPT leading generative AI? What is beyond expectations?. *Acad Platform J Eng Smart Syst* 2023;11 (3) : 1 1 8 - 3 4 . <https://doi.org/10.21541/apjess.1293702>
9. Buholayka M, Zouabi R, Tadinada A. The readiness of ChatGPT to write scientific case reports independently: a comparative evaluation between human and artificial intelligence. *Cureus* 2023; 15 (5) : 3 9 3 8 6 . <https://doi.org/10.7759/cureus.39386>
10. Zaini R, Bin Abdulrahman K, Al-Khotani A, Al-Hayani A, Al-Alwan I, Jastaniah S. Saudi medics: a competence specification for Saudi medical graduates. *Med Teach* 2011; 33 (7) : 5 8 2 - 4 . <https://doi.org/10.3109/0142159x.2011.578180>
11. Akinrinmade AO, Adebile TM, Ezuma-Ebong C, Bolaji K, Ajufo A, Adigun AO, et al. Artificial intelligence in healthcare: perception and reality. *Cureus* 2023; 15 (9) : 4 5 5 9 4 . <https://doi.org/10.7759/cureus.45594>
12. Topol E. Deep medicine: how artificial intelligence can make healthcare human again. 1st edition 2019. Hachette UK. ISBN: 978-1541644632
13. Buabbas AJ, Miskin B, Alnaqi AA, Ayed AK, Shehab AA, Syed-Abdul S, Uddin M. Investigating students' perceptions towards artificial intelligence in medical education. *Healthcare* 2023;11(9):1298. <https://doi.org/10.3390/healthcare11091298>
14. Sit C, Srinivasan R, Amlani A, Muthuswamy K, Azam A, Monzon L, Poon DS. Attitudes and perceptions of UK medical students towards artificial intelligence and radiology: a multicentre survey. *Insights Imaging* 2020; 11 (1) : 1 4 . <https://doi.org/10.1186/s13244-019-0830-7>
15. Park CJ, Paul HY, Siegel EL. Medical student perspectives on the impact of artificial intelligence on the practice of medicine. *Curr Probl Diagn Radiol* 2021;50(5):614-9. <https://doi.org/10.1067/j.cpradiol.2020.06.011>
16. Mehta N, Harish V, Bilimoria K, Morgado F, Ginsburg S, Law M, Das S. Knowledge of and attitudes on artificial intelligence in healthcare: a provincial survey study of medical students. *Medrxiv* 2021:2021-01. <https://doi.org/10.15694/mep.2021.000075.1>
17. Civaner MM, Uncu Y, Bulut F, Chalil EG, Tatli A. Artificial intelligence in medical education: a cross-sectional needs assessment. *BMC Med Educ* 2022;22(1):772. <https://doi.org/10.1186/s12909-022-03852-3>
18. Oh S, Kim JH, Choi SW, Lee HJ, Hong J, Kwon SH. Physician confidence in artificial intelligence: an online mobile survey. *J Med Internet Res* 2019;21(3):e12422. <https://doi.org/10.2196/12422>
19. Krittawong C. The rise of artificial intelligence and the uncertain future for physicians. *Eur J Int Med* 2018;48:e13-4. <https://doi.org/10.1016/j.ejim.2017.06.017>
20. Inkster B, Sarda S, Subramanian V. An empathy-driven, conversational artificial intelligence agent (Wysa) for digital mental well-being: real-world data evaluation mixed-methods study. *JMIR Mhealth Uhealth* 2018;6(11):e12106. <https://doi.org/10.2196/12106>
21. Ahmed Z, Bhinder KK, Tariq A, Tahir MJ, Mehmood Q, Tabassum MS, et al. Knowledge, attitude, and practice of artificial intelligence among doctors and medical students in Pakistan: A cross-sectional online survey. *Ann Med Surg* 2022; 76 : 1 0 3 4 9 3 . <https://doi.org/10.1016/j.amsu.2022.103493>
22. Swed S, Albrahim H, Elkalagi NKH, Nasif MN, Rais MA, Nashwan AJ, et al. Knowledge, attitude, and practice of artificial intelligence among doctors and medical students in Syria: a cross-sectional online survey. *Front Artif Intell* 2022; 5 : 1 0 1 1 5 2 4 . <https://doi.org/10.3389/frai.2022.1011524>
23. Al Saad MM, Shehadeh A, Alanazi S, Alenezi M, Eid H, Alfaouri MS, et al. Medical students' knowledge and attitude towards artificial intelligence: an online survey. 2022;15(1):e187494452203290. <https://doi.org/10.2174/18749445-v15-e2203290>

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

IT & AH: Conception and study design, acquisition of data, drafting the manuscript, approval of the final version to be published

MAH, MAHaI, HW, FB & SKZ: Acquisition of data, drafting the manuscript, approval of the final version to be published

SSE: Conception and study design, critical review, approval of the final version to be published

MIN: Acquisition, analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

The Deanship of Scientific Research at King Abdulaziz University (KAU), Jeddah, Saudi Arabia has funded this project under grant no G: 275-666-1443.

DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.



This is an Open Access article distributed under the terms of the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

KMUJ web address: www.kmuj.kmu.edu.pk
Email address: kmuj@kmu.edu.pk