

Research Article

Navigating Artificial Intelligence ethics: A comparative study of medical undergraduate and postgraduate students of public sector medical institutes of Lahore

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Abstract

Background: The huge usage of artificial intelligence in healthcare has raised numerous ethical dilemmas, which needs to be understood between different educational levels.

Objectives: To compare the knowledge about ethical dilemmas regarding AI usage among undergraduate and postgraduate students of public sector medical institutes of Lahore.

Methods: A literature-validated survey (June-July 2024) examined AI-related knowledge, attitudes, and practices, focusing on privacy, consent, ownership, attitude, and accountability. Descriptive statistics and chi-square tests were used to analyse responses and determine significance.

Results: We include 134 participants including both undergraduates and postgraduates. Undergraduates made the majority of respondents (52.2%), followed by postgraduates (47.8%). Undergraduate students expressed higher concerns about AI-driven privacy breaches (41.4% vs. 35.9%) and unauthorized data access (60% vs. 54.7%) than postgraduates. While, Both groups agreed that data breaches are unacceptable (undergraduates 74.3%, postgraduates 62.5%). Undergraduates (60%) were more sceptical about broad consent for future research than postgraduates (57.8%). Undergraduates (72.9%) showed significantly higher concern about ethical risks in data management than postgraduate (51.6%). Postgraduates (54.7%) were slightly more concerned about economic inequality from AI than undergraduates (40%), with differences in regulatory awareness significant between the groups.

Conclusion: Our study looked at what undergraduate and postgraduate students at public sector medical institutes of Lahore think about using Big Data and AI in healthcare. We found that undergraduate students worry more about privacy and data protection and postgraduate students worry more about AI making healthcare unfair and increasing health inequalities.

We recognise creating guidelines and rules for using AI in healthcare, protecting patient data and privacy, watching AI systems closely to make sure they're working correctly. Our study helps us understand the benefits and risks of using AI in healthcare, and how we can use it to improve patient care while avoiding potential problems.

Keywords: Ethics, Artificial intelligence, Ownership, Privacy, inequality, undergraduate students

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Introduction

Artificial intelligence pertains to computer programs that are capable of carrying out tasks that are typically associated with cognitive processes in humans. In short, AI allows computers to mimic human behavior.¹ AI systems typically pick up this skill by processing vast volumes of data and searching for patterns to mimic their

own decision-making.^{2,20} The digital age has seen unparalleled technical progress, altering the essence of human-computer interaction. With AI systems, we enter a new age in medicine where AI can be applied to clinical practice through risk assessment models, improving diagnostic accuracy and workflow efficiency.³ Lately, AI is playing a monumental role in overturning healthcare through medical chat bots, robotics automated tasks, medical imaging analysis, and personalized medicine, streamlining patient care and treatment.⁴ Today in healthcare, one of the most common application of Information technology is precision medicine. Using AI we can predict the course of disease and likelihood of some treatment protocols to be successful on a patient based on various patient characte-



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ristics and the treatment context.^{5,16} However, AI has advanced to a point that a non-expert with little or no computer or coding experience or specialized medical understanding can use the technology. Given how quickly the field of adaptable AI is expanding, this is a big concern. Its use in medical field brings up ethical issues that need to be properly thought through, such as plagiarism, accountability, consent¹⁸, false information, privacy¹⁵, bias¹⁷ and a lack of transparency⁶. Ethical principles help us to differentiate between right or wrong at a given time, in a given culture, according to the perceived moral outcomes of the action⁷. Leslie (2019) offered a well-known description of AI ethics, defining it set of values, principles, and techniques that employ widely accepted standards of right and wrong to guide moral conduct in the development and use of AI technologies.⁸ Involvement of ethicists and philosophers collaborating with AI researchers is essential to safeguard the rights of individuals affected by AI technologies in medicine. Moreover to ensure the right use of AI, organizations like the institutions, hospitals, government need to monitor the ethical use of growing AI.¹⁹ So, it is necessary to highlight the need for algorithmic safety measures to reduce potential errors and ensure fairness⁹. It is our utmost duty to explain that how ethical considerations shape the conceptual frameworks within AI research, highlighting the complex interplay between moral principles and technical advancements. By exploring these moral roots, researchers aim to navigate the ethical dilemmas inherent in AI design and implementation, ultimately striving for ethically sound and socially responsible AI systems in medical field and education¹⁰. The European Commission released a preliminary version of "Ethical guidelines for a reliable AI" in April 2019 and followed up with the release of a "White Paper on AI" in February 2020. This gave rise to the April 2021 "Artificial Intelligence Law Proposal."¹¹ The use of AI technology in healthcare was authorized by European legislation in February 2017, provided that robots obey human directions, protect human safety, and do no harm to users. The European Commission's proposed legislation requires AI technology to be documented, along with data sheets that provide details on training modalities and the deployment process, including its scope and characteristics.¹²

Therefore, it is important to remember that using AI in the medical area necessitates thorough thought and evaluation by professionals in the field to guarantee the trustworthiness and correctness of the work. Despite the fact that it is a well-researched topic in the modern world, Pakistan is still lagging behind in the field of artificial intelligence. Research on the moral dilemmas raised by the application of AI in medical field is essential if we are to keep up with the times and reap the full reward of this technology. So in this study we will compare the knowledge about ethical dilemmas regarding AI usage among undergraduate and postgraduate students of King Edward Medical University Lahore and its affiliated hospitals. Moreover, if we raise awareness through this study, we can find measures to gain maximum benefits fr-

om AI with minimum drawbacks involved and can see Pakistan flourishing in this domain.

Methods

We conducted a comparative cross-sectional study set in public sector medical institutes of Lahore namely King Edward Medical University for undergraduate students and affiliated hospitals of King Edward Medical University (Mayo hospital, Lady Willington, Lady Aitchison) for postgraduates. In this study we compared the knowledge, attitude and practices of undergraduates and postgraduates regarding ethical dilemmas arising with the use of AI in healthcare system. Study was conducted from June to July 2024, with data collection carried out from 1st June to 15th June, and data analysis carried out from 16th June to 15th July. The sample size was measured with margin of error of 7% and confidence level of 90%, and with prevalence of 59 % who said the breach in information using AI was justifiable.⁽⁴⁾ The estimated sample size is calculated to be 134. Convenient type of sampling was used using respondents who were convenient for us. Students from 1st to final year who gave informed consent were included in the study. On the other hand inclusion criteria for postgraduates was that they must be enrolled in the affiliated hospitals of KEMU (Mayo hospital, Lady Willington, Lady Aitchison). Exclusion criteria for the undergraduates include Students who have been absent from the university for a long period of time or have been dropped out due to disciplinary issues, failure to pass the professional exams in repeated attempts or involvement in some illegal activity. Students with intellectual disabilities (Learning disabilities, cognitive dysfunction, ADHD, traumatic brain injury) were also excluded. Exclusion criteria for the postgraduates included those postgraduates who are not currently enrolled in a program at KEMU or an affiliated hospital and those who do not have access to the necessary technology (e.g. computer, internet) to participate in the study. Postgraduates with a conflict of interest (e.g. working in industry related to AI in healthcare) were also excluded from this study. After getting the ethical approval for the study from IRB board of King Edward Medical University, data was collected from a total of 134 undergraduates and postgraduates. Our research was conducted on those participants falling on our eligibility criteria. Preformed Questionnaire formulated by Al-ani et.al was distributed to assess the knowledge, attitudes, and practices (KAP) of healthcare workers towards the AI ethics.⁽⁴⁾ The literature validated questionnaire comprised of 3 distinct domains including 1) knowledge, with total of 23 questions 2) attitudes with 7 questions, and 3) practices which included 4 questions. (4) The responses of all 34 questions were recorded by a 3- point Likert scale (1 = Disagree, 2= Neutral, 3= Agree). Data was entered and analyzed by SPSS version 24. Mean & standard deviation were calculated for quantitative variables like age and ethical dilemmas. Frequency and Percentages were calculated for qualitative variables like age, gender, education level and familiarity with AI in healthcare. Associations between c-

categorical variables were examined using chi-square test, keeping p value <0.05 as significant.

Results

134 participants responded to our survey. The included sample was characterized by a mean age of 25.08 years (age range 19-56) and a male-to-female ratio of approximately 1:1.9. Undergraduates made the greater majority of respondents (52.2%), followed by postgraduates (47.8%). The greater majority of respondents were affiliated with King Edward Medical university (53%). The lady Wallington and Lady Aitchison were the least represented (8.2% and 6.7%, respectively). Table 1.1 shows further demographic details.

In terms of familiarity with AI applications in healthcare, the majority of respondents declared a moderate familiarity. In comparison postgraduates were reported to be more familiar with AI application in healthcare than undergraduates which are depicted in Fig 1.1.

In the domain of Knowledge participants were assessed on their knowledge about AI application in healthcare and ethical issues related to it. Undergraduates were more concerned about AI-driven privacy breaches (41.4% vs 35.9%) and unauthorized data access (60% vs 54.7%) than postgraduates, but the differences were not statistically Significant. The table 1.2 shows the statistical figures. Both undergraduate and postgraduate students overwhelmingly agreed that data breaches are unacceptable and figures are shown in the table 1.3 A.

Table 1.1: Demographics Characteristics of the participants.

Demographics		
Age	Mean	25.08
	Mode	24
	Minimum Age	19
	Maximum Age	56
Gender	Female	88 (65.7%)
	Male	46 (34.3%)
Education Level	Undergraduates	70 (52.2%)
	Postgraduates	64 (47.8%)
Institution	KEMU	71 (53%)
	Mayo Hospital	43 (32.1%)
	Lady Willington	11 (8.2%)
	Lady Aitchison	9 (6.7%)

Undergraduate students (72.9%) showed a significantly higher level of concern about ethical risks being present throughout all stages of data management, compared to postgraduate students (51.6%), with a statistically significant difference ($p = 0.007$). Both groups largely agreed that legal authorities should determine data usage permissions. Postgraduate students were more concerned about AI exacerbating economic inequality compared to undergraduate students (54.7% vs 40%) but the difference was not statistically significant ($p = 0.224$). Both groups showed similar levels of concern regarding health discrimination. The rest are shown in the table 1.3 A.

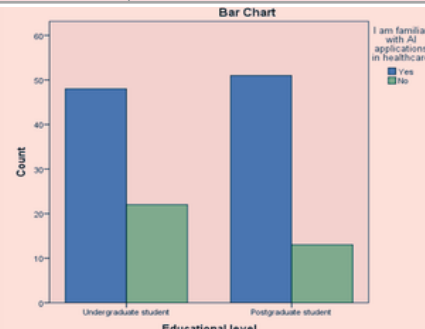


Figure 1.1 Familiarity of AI

Table 1.2: Knowledge assessment of participants

Questions	Education Level	Disagree N(%)	Neutral N(%)	Agree N(%)	P value
1)AI applications in healthcare may increase the chance of privacy breaches of patients' personal details.	Undergraduate students	22(31.4%)	19(27.1%)	29(41.4%)	0.438
	Postgraduate students	17(26.6%)	24(37.5%)	23(35.9%)	
2)Under no circumstances, should the breaching of patients' data be permitted.	Undergraduate students	8 (11.45%)	10(14.3%)	52(74.3%)	0.307
	Postgraduate students	9(14.1%)	15(23.4%)	40(62.5%)	
3)AI applications in healthcare could make patients' data vulnerable to misuse by external parties.	Undergraduate students	17(24.3%)	11(15.7%)	42(60%)	0.539
	Postgraduate students	21(32.2%)	8(12.5%)	35(54.7%)	
4) Patients' personal data can be used for alternative processes.	Undergraduate students	11(15.7%)	15(21.4%)	44(62.9%)	0.46
	Postgraduate students	7(10.9%)	19(29.7%)	38(59.4%)	
5)The use of AI in healthcare carries potential ethical issues at every stage of data management, including collection, connecting, and deployment.	Undergraduate students	4(5.7%)	15(21.4%)	51(72.9%)	0.007
	Postgraduate students	15(23.4%)	16(25%)	33(51.6%)	

6) Integrating data from multiple sources raises new and substantial ethical concerns.	Undergraduate students	8(11.4%)	16(22.9%)	46(65.7%)	0.497
	Postgraduate students	8(12.5%)	20(31.3%)	36(56.3%)	
7) Taking consent is an ethical limitation of AI projects in healthcare	Undergraduate students	7(10%)	20(28.6%)	43(61.4%)	0.49
	Postgraduate students	9(14.1%)	22(34.4%)	33(51.6%)	
8) Legal authorities must decide if informed consent permits for data utilisation.	Undergraduate students	5(7.1%)	16(22.9%)	49(70%)	0.257
	Postgraduate students	10(15.6%)	11(17.2%)	43(67.2%)	
9) "Informed" consent is not satisfied when consent is obtained for a wide range of unplanned future research endeavours.	Undergraduate students	6(8.6%)	22(31.4%)	42(60%)	0.62
	Postgraduate students	14(21.9%)	13(20.3%)	37(57.8%)	
10) Because of the intricate inner workings of innovative AI algorithms, informed consent in AI projects in the healthcare industry lacks transparency.	Undergraduate students	9(12.9%)	25(5.7%)	36(51.4%)	0.227
	Postgraduate students	13(20.2%)	15(23.4%)	36(56.3%)	
11) Data, even at the individual level, cannot be owned in general, and in AI initiatives in the healthcare industry specifically.	Undergraduate students	10(14.3%)	23(32.9%)	37(52.9%)	0.650
	Postgraduate students	13(20.3%)	20(31.3%)	31(48.4%)	

12)Healthcare organizations working with AI should control patients' personal data to protect it. They should balance using data for good purposes with keeping it private and secure.	Undergraduate students	9(12.9%)	9(12.9%)	52(74.3%)	0.128
	Postgraduate students	8(12.5%)	17(26.6%)	39(60.9%)	
13)Under some circumstances, data generated from use of AI in healthcare could be utilized for corporatization.	Undergraduate students	12(17.1%)	26(37.1%)	32(45.7%)	0.169
	Postgraduate students	17(26.6%)	15(23.4%)	32(50%)	
14)AI usage in healthcare can perpetuate economic inequality.	Undergraduate students	13(18.6%)	29(41.4%)	28(40%)	0.224
	Postgraduate students	10(15.6%)	19(29.7%)	35(54.7%)	
15)Health discrimination can be enhanced by using AI in healthcare.	Undergraduate students	20(28.6%)	21(30%)	29(41.4%)	0.071
	Postgraduate students	8(12.5%)	25(39.1%)	31(48.4%)	
16) AI models in healthcare are inherently prone to magnifying the prejudices of the people they were designed for or the developers' own.	Undergraduate students	11(15.7%)	23(32.9%)	36(51.4%)	0.713
	Postgraduate students	13(20.3%)	22(34.5%)	29(45.3%)	

17) The data-driven methodology used by AI algorithms in the healthcare industry is comparable to, and occasionally better than, the theory-based methodology used by traditional scientists.	Undergraduate students	11(15.7%)	23(32.9%)	36(51.4%)	0.301
	Postgraduate students	17(26.6%)	19(29.7%)	28(43.8%)	
18) The same mistakes that can be made in traditional research can also be made in use of AI in healthcare.	Undergraduate students	18(25.7%)	24(34.3%)	28(40%)	0.799
	Postgraduate students	16(25%)	19(29.7%)	29(45.3%)	
19) Analysis of AI algorithms is virtually "blind" in the healthcare industry because to our limited understanding.	Undergraduates Students	9 (12.9%)	31 (44.3%)	30 (42.9%)	.536
	Postgraduates Students	8 (12.5%)	23 (35.9%)	33 (51.6%)	

Table 1.3: *Assessment of Participants*

A. Knowledge Assessment of Participants

Questions	Education Level	Disagree N(%)	Neutral N(%)	Agree N(%)	P value
1)AI applications in healthcare may increase the chance of privacy breaches of patients' personal details.	Undergraduate students	22(31.4%)	19(27.1%)	29(41.4%)	0.438
	Postgraduate students	17(26.6%)	24(37.5%)	23(35.9%)	

20)Individual researchers have to ensure the ethical use of AI in healthcare.	Undergraduate Students	8(11.4%)	10(14.3%)	52(74.3%)	0.4380
	Postgraduate Students	10(15.6%)	13(20.3%)	41(64.1%)	
21)Institutions are responsible to ensure the ethical use of AI in healthcare	Undergraduate Students	6(8.6%)	10(14.3%)	54(77.1%)	0.2460
	Postgraduate Students	8(12.5%))	15(23.4%)	41(64.1%)	
22)Legislative and regulatory bodies have to ensure the responsible use of AI in healthcare.	Undergraduate Students	1(1.4%)	16(22.9%)	53(75.7%)	0.038
	Postgraduate Students	8(12.5%))	13(20.3%)	43(67.2%)	
23)AI application in healthcare might affect environment.	Undergraduate Students	5(7.1%)	22(31.4%)	43(61.4%)	0.110
	Postgraduate Students	11(17.2%)	13(20.3%)	40(62.5%)	
B. Attitude Assessment of Participants					
24) Using AI in healthcare without obtaining informed consent is unethical, even if the technology may improve patient outcomes.	Undergraduate students	7(10%)	19(27.1%)	44(62.9%)	0.115
	Postgraduate Students	14(21.9%)	19(29.7%)	31(48.4%)	

25) A neutral third party who is separate from both the data owner and the researcher and has no conflicts of interest should be able to access AI in healthcare.	Undergraduate Students	7(10%)	22(31.4%)	41(58.6%)	0.221
	Postgraduate Students	13(20.3%)	20(31.3%)	31(48.4%)	
26) AI uses in healthcare could worsen power imbalances by, for example, providing a great deal of authority to individuals who already have it over others.	Undergraduate Students	9(12.9%)	28(40%)	33(47.1%)	0.279
	Postgraduate Students	15(23.4%)	22(34.4%)	27(42.2%)	
27) Ethical processes create hindrance in the use of AI.	Undergraduate Students	14(20%)	32(45.7%)	24(34.3%)	0.630
	Postgraduate Students	12(18.8%)	25(39.1%)	27(42.2%)	
28) AI platform could help in future research and education in healthcare.	Undergraduate Students	2(2.9%)	19(27.1%)	49(70%)	0.059
	Postgraduate Students	9(14.1%)	14(21.9%)	41(64.1%)	
29) Role of physicians can be complemented by the AI application in healthcare.	Undergraduate Students	10(14.3%)	20(28.6%)	40(57.1%)	0.410
	Postgraduate Students	10(15.6%)	12(18.8%)	42(65.6%)	

30)The role of physicians can be substituted by the AI usage in healthcare.	Undergraduate Students	25(35.7%)	23(32.9%)	22(31.4%)	0.799
	Postgraduate Students	23(35.9%)	18(28.1%)	23(35.9%)	
C. Attitude Assessment of Participants					
31) I have successfully negotiated the legal and regulatory ramifications of using AI apps in the medical field.	Undergraduate Students	20(28.6%)	32(45.7%)	18(25.7%)	0.175
	Postgraduate Students	16(25%)	22(34.4%)	26(40.6%)	
32)I have used AI powered diagnostic tools to diagnose different diseases.	Undergraduate Students	28(40%)	20(28.6%)	22(31.4%)	0.621
	Postgraduate Students	26(40.6%)	14(21.9%)	24(37.5%)	
33)Pakistan has laws that regulate the use of AI applications in healthcare practice.	Undergraduate Students	22(31.4%)	35(50%)	13(18.6%)	0.022
	Postgraduate Students	24(37.5%)	18(28.1%)	22(34.4%)	
D. Practice Assessment of Participants					
31) I have successfully negotiated the legal and regulatory ramifications of using AI apps in the medical field.	Undergraduate Students	20(28.6%)	32(45.7%)	18(25.7%)	0.175
	Postgraduate Students	16(25%)	22(34.4%)	26(40.6%)	

32)I have used AI powered diagnostic tools to diagnose different diseases.	Undergraduate Students	28(40%)	20(28.6%)	22(31.4%)	0.621
	Postgraduate Students	26(40.6%)	14(21.9%)	46(34.3%)	
33)Pakistan has laws that regulate the use of AI applications in healthcare practice.	Undergraduate Students	22(31.4%)	35(50%)	13(18.6%)	0.022
	Postgraduate Students	24(37.5%)	18(28.1%)	22(34.4%)	

While assessing the participants on their attitude regarding Application of AI in healthcare, both Undergraduates and Postgraduates gave similar responses with no statistically significant difference. However, a significant difference emerged in opinions on the role of legislative and regulatory bodies, with undergraduates (75.7%) more likely to believe these bodies should ensure ethical AI use compared to postgraduates (67.2%), with a statistically significant difference ($p = 0.038$) and the responses of the rest questions are shown in table 1.3C.

Both undergraduates and postgraduates showed similar attitude towards the usage of AI in healthcare. However, a significant difference emerged in their perceptions regarding the regulation of AI applications in Pakistan. Undergraduates (18.6%) were less likely to believe that regulatory laws exist, compared to postgraduates (34.4%) who showed more faith in regulatory bodies of Pakistan. Here a statistically significant difference was seen ($p = 0.022$) This highlights a notable knowledge gap between the two groups regarding local regulatory frameworks governing AI applications. The responses of rest questions are shown in table 1.3 D

Discussion

This study aimed to explore the perceptions and knowledge of undergraduate and postgraduate students regarding AI applications in healthcare. The study revealed differences in concerns, knowledge, and practices between undergraduate and postgraduate students. Our study shows that both undergraduates and postgraduates show equal interest and concern about ethical use of AI in medical field in nearly all aspects except regarding the ethical risks in data management, role of legislative bodies in ensuring ethical AI use and existence of regulatory laws.

Moving into further details, it was seen that undergraduates expressed higher concerns about privacy

breaches and ethical risks, while postgraduates showed a higher level of concern about AI exacerbating economic inequality and health discrimination. Our study shows that undergraduates were more concerned about privacy breaches (41.4% vs 35.9%) as compared to postgraduates. This is in contrast to the previously done research on undergraduates and postgraduates in Jordan by Al-Ani, et al. where postgraduates were more concerned about privacy breaches. This shows that undergraduates at MAYO and affiliated hospitals have better awareness about online privacy and data protection than undergraduates of the Medical colleges in Jordan where the study was conducted. (4) The integration of AI in healthcare offers immense potential to enhance patient care and streamline healthcare systems, but it also poses major privacy risks that require meticulous attention. One of the most pressing concerns is the risk of data breaches and unauthorized access to sensitive information of patients, which can be exacerbated by the de-identification process intended to protect patient privacy. Despite security measures, this process can introduce new vulnerabilities, underscoring the need for rigorous safeguards and continuous evaluation to ensure that patients' data is handled securely.

Participants have mixed views on AI's role in healthcare and research. On one hand, our study shows 70% of undergraduates and 64.1% of postgraduates are optimistic about AI's potential to support research and education. On the other hand, in previously mentioned study by Al-Ani et al., 39.9% of participants are concerned that AI methodologies are prone to the similar errors as traditional research, and 42.3% agree that analytical interpretations lack proper context for clinical integration. (4) This suggests that while there is enthusiasm for AI's potential, there are also significant concerns about its limitations and potential risks. Regarding the practice our study shows that there was similar lack of direct experience with use of legal and regulatory aspects of AI in healthcare. While a similar study shows greater lack of this aspect in both under and postgraduates. This shows t-

that use of AI in legal and medical aspects is consistently increasing over time.(4)

Furthermore, comparing to a study by Gandhi,et.al , there was greater experience in postgraduates with respect to use of AI tools, research and integration into future practice(141/201, 70% vs. 137/404, 34%, $p < 0.001$), but here our study highlights the similar lack of experience among both groups in navigating legal and regulatory aspects of AI, with a comparable proportion of postgraduates and undergraduates reporting having successfully negotiated these legal and regulatory ramifications (40.6% vs 25.7%, $p = 0.175$). So conclusion can be made that the exposure to AI usage is greater in other countries regarding ethical and research aspects.(13) In a study held in China, Undergraduates were divided on the reliability of ChatGPT, with around 40% considering its responses unreliable, particularly when asking questions about everyday life, culture, entertainment, and history. In contrast, postgraduate students were more sceptical about ChatGPT's ability to tackle academic challenges, which aligns with the findings of Van der Westhuizen et al. that research ability is a key predictor of academic success among postgraduates, indicating a more cautious approach to relying on ChatGPT for academic purposes. (14) Similar to this, postgraduates of KE and Mayo showed more distrust in AI application in healthcare than undergraduates saying that AI is susceptible to the same mistakes as of traditional research methods, particularly in the acquisition and pre-processing of data. (45% vs 40 %)

Our study has several limitations, including a small sample size of only 134 participants from a single institution, King Edward Medical University Lahore and its affiliated hospitals, which may not be representative of the larger population and limits generalizability to other medical institutions. Secondly, the use of a convenience sampling strategy may have introduced selection bias, as respondents who were more accessible or more interested in the topic may be over-represented relative to the wider student population. Thirdly, the study relies on self-reported data, which may be prone to biases and inaccuracies. Furthermore, the study only provides a snapshot of the current state of knowledge and ethical awareness, without exploring how this may change or evolve over time, which may impact the validity and reliability of the findings.

This study highlights the need for education and training programs to address knowledge gaps and concerns among students. Establish clear guidelines and regulations for AI development and deployment. Implement robust data protection and privacy measures. Ensure transparency and explain ability in AI decision-making processes. Conduct regular audits and impact assessments of AI systems. Foster a culture of accountability and responsibility among AI developers and users.

Conclusion

In conclusion, our study provides valuable insights into the perceptions and knowledge of undergraduate and postgraduate students at King Edward Medical University and its affiliated hospitals regarding AI applications in healthcare. It reveals distinct differences in concerns between undergraduates and postgraduates, particularly regarding privacy breaches and ethical risks. While undergraduates exhibit heightened concerns about privacy, postgraduates are more focused on issues of economic inequality and health discrimination exacerbated by AI. These findings underscore the importance of tailored educational programs to address these disparities and enhance understanding among future healthcare professionals.

Moreover, the integration of AI in healthcare presents significant opportunities to advance patient care and streamline systems, yet it necessitates stringent safeguards against privacy breaches and ethical lapses. Our study advocates for the establishment of clear guidelines and regulations, robust data protection measures, and ongoing oversight of AI systems to mitigate risks effectively. Despite its limitations, including sample size and reliance on self-reported data, this research contributes to ongoing discussions on the ethical and practical implications of AI in healthcare, emphasizing the imperative for continuous education and ethical awareness in this rapidly evolving field.

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Authors' Contributions:

All the authors contributed equally in accordance with ICMJE guidelines.

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