Unlocking Potentials: Exploring Awareness, Utilization, and Perceptions related to Benefits and Challenges of Artificial Intelligence in Research - A Study amongst Aspiring Healthcare Professionals of Islamabad

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ABSTRACT

Objective: To assess level of awareness, utilization pattern, and perceptions regarding benefits and challenges of artificial intelligence in research among aspiring healthcare professionals in Islamabad.
Study Design: Cross Sectional Analytical study
Place and Duration of Study: Foundation University School of Health Sciences (FUSH), Islamabad from 25th May to 25th September 2024
Methodology: A stratified random sample of 355 students was surveyed after ethical approval using structured Google Form. After informed consent, data were collected on demographics, AI awareness, utilization, benefits, challenges and training needs, and analyzed using SPSS v25. Chi-square, t-tests, correlation, and regression were applied ($p \leq 0.05$).
Results: Of 355, 327 responded, among these, 236 (72.2%) were generally aware of AI in research, though 209 (88.5%) had no formal AI training. The mean awareness score 10.44±3.19, with 174 (73.7%) showing adequate awareness. However, only 75 (31.8%) showed sufficient AI tool utilization (mean score 6.4±4.29). Popular AI platforms included ChatGPT, Grammarly, and Mendeley. A majority (68.2%) agreed that AI improves research efficiency. Key barriers included lack of training (54.6%), limited technological access (46.2%), 93.6% expressed willingness to use AI in future research. Significant associations were found between awareness, utilization, and demographic variables.
Conclusion: Aspiring healthcare professionals in Islamabad showed high AI awareness but low utilization, with limited formal training. Positive perceptions prevailed despite concerns over plagiarism, data security, and technical understanding. Formal AI training remains essential for developing responsible, effective, and ethical use of AI in research

 Keywords: Artificial Intelligence, Awareness, Challenges, Research, Utilization.

INTRODUCTION

Artificial Intelligence (AI) is transforming medical research by enabling advanced data analysis, evidence synthesis, and support for scientific writing. Tools such as ChatGPT, Grammarly, and Mendeley are increasingly used in academic settings to aid literature reviews, abstract generation, and language refinement.[1],[2] Recent studies have shown that AI-generated abstracts can closely resemble human-written ones, prompting concerns around authorship and academic integrity.[3] AI is also transforming academic publishing by enhancing editorial workflows and supporting content development.[4] Benefits of AI in research include data handling. Figure-1.

In the UK, 88% of medical students viewed AI as important for their academic future, yet only 44.2% felt adequately trained.[5] In South Korea, 83% supported its inclusion in medical curricula, although most lacked formal exposure.[6] A Pakistani study found that while 74% of doctors and 68.8% of students had basic AI knowledge, only 27.3% understood its practical applications.[7] Another national survey showed that 77% were unaware of AI's diagnostic capabilities.[8] Recent findings from Lahore, Karachi, and Islamabad show growing student interest in tools like ChatGPT, but gaps in training and ethical guidance poersist.[9],[10]

Understanding the perceptions of future users of AI is essential for effective curriculum development. This study aims to assess level of awareness, utilization patterns, and perceptions regarding benefits and challenges of artificial intelligence in research among aspiring healthcare professionals in Islamabad. It seeks to identify educational gaps and guide structured AI training integration into health sciences programs. Findings will contribute to developing skilled, ethically aware healthcare

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professionals, capable of utilizing AI to enhance research and evidence-based practices.
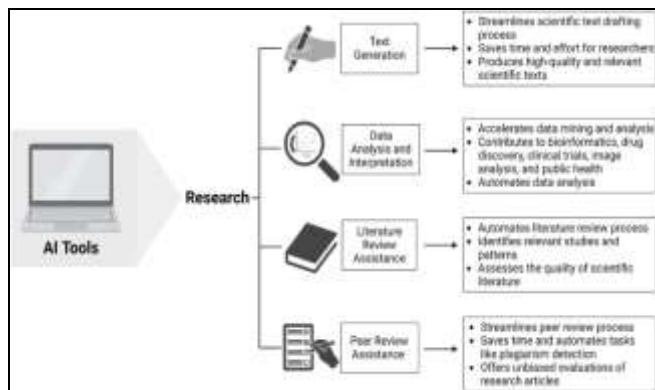

Figure-1: Benefits and applications of using AI NLM tools in Research

METHODOLOGY

This cross-sectional analytical study was conducted over four months, from 25th May to 25th September 2024, at FUSH, Islamabad. Ethical approval was granted by Ethical Review Committee of Foundation University Medical College (Ref. No. FF/FUMC/215-432 Phy/24, dated 23 May 2024). Aspiring Healthcare Professionals in this study referred to the students from disciplines of Medicine, dentistry, Physical Therapy and nursing. The study population included currently enrolled students from the four constituent colleges of FUSH: Foundation University Medical College (FUMC), Foundation University College of Dentistry (FUCD), Foundation University College of Physical Therapy (FUCP), and Foundation University College of Nursing (FUCN), with a total student population of. [1,8,11] Using the Raosoft online sample size calculator, a sample size of 318 was estimated based on a 95% confidence interval, 5% margin of error, and 50% assumed prevalence. Accounting for a 12% anticipated non-response rate as recommended in standard references manual by Lwanga & Lemeshow, WHO 1991, final adjusted sample was 355. Stratified random sampling was applied across four strata of colleges. A sample proportionate to the size of each Stratum was calculated out of total size of each stratum (FUMC: 145 /740, FUCD: 40 / 202, FUCP: 95 / 487 and FUCN: 75/382). Electronic student lists were obtained from all the strata, and participants were selected using simple random sampling techniques.

Inclusion Criteria: Currently enrolled students at FUSH who consented to participate

Exclusion Criteria: Students unavailable during data collection, transferred from other institutions within the past three months, and 4th-year MBBS students as exposed to recent AI training.

Informed consent was obtained electronically. Data collectors created WhatsApp groups within each academic stratum and shared a Google Form link. Thorough literature search was carried out to develop a structured questionnaire.[2,3,5,7] Content validity was established through expert review by two public health specialists, two IT/AI experts, and one biostatistician. Cronbach Alpha was calculated on the pilot study results.

The questionnaire had five sections on demographic characteristics (age, gender, discipline, year of study), AI awareness (15 binary items, scored 0–15), AI utilization (17 binary items, scored 0–17), perceived benefits and challenges (30 five point Likert-scale items), and Section five evaluated attitudes and future training needs related to AI in research, workflow incorporation, and peer advocacy toward future AI integration. Mean awareness (10.44±3.19) and utilization (6.40±4.29) scores were taken as cutoff values to categorize adequate and inadequate levels. Data were collected anonymously and analyzed using appropriate statistical tests. Data were collected anonymously and analyzed using IBM Statistical Package for Social Sciences (SPSS)version 25. Descriptive statistics applied for means, standard deviations, frequencies, percentages. Chi-square test was applied to test null hypothesis (H_0) of no association between awareness and utilization of AI in research among future healthcare professionals, against the alternative hypothesis (H_1) of a significant association. One-sample t-tests applied to compare mean awareness and utilization scores against neutral midpoint, Pearson correlation to assess relationship between academic discipline and AI utilization, and linear regression to predict AI utilization from awareness scores. Statistical significance was set at $p \leq$ 0.05. Cronbach's alpha was calculated to assess internal consistency, with values ≥0.7 considered acceptable for reliability.

RESULTS

Out of 355, a total of 327 students responded to the questionnaire with a response rate of 92%. Mean Age was 20.97±1.71 years and 231 (70.6%) were female participants. Table I. *Foundation University School of Health Sciences (FUSH), Foundation University Medical College (FUMC), Foundation University

College of Dentistry and Hospital (FUCD&H), Foundation University College of Physical Therapy (FUCP), and Foundation University College of Nursing (FUCN).

Table-I: Demographic Profile of Respondents. n=327

Age in years (Mean/SD)	20.97±1.71
Variables	n (%)
Gender	
Female	231 (70.6)
Male	96 (29.4)
***Academic Disciplines of FUSH**	
FUMC (MBBS)	133(40.7)
FUCD (BDS)	48(14.7)
FUCP (DPT)	91(27.8)
FUCN (Nursing)	55(16.8)
Residence	
Day Scholar	210(64.2)
Boarder	117(35.8)

General awareness regarding AI integration in research was reported by 236(72.7%), of whom only 27(11.4%) had received formal training. ChatGPT was the most frequently used AI tool by 183(77.5%). Awareness was assessed using a 15-item binary scale with acceptable internal consistency (Cronbach's Alpha=0.72). The mean awareness score was 10.44±3.19; based on this threshold, 174(73.7%) demonstrated adequate awareness (score≥10.44). Utilization of AI tools was measured using a 17-item binary scale with good reliability (Cronbach's Alpha =0.85). Mean utilization score was 6.40±4.29, and only 75(31.8%) scored ≥ mean, indicating adequate utilization Table-II.

Table-II: Exploration of AI Awareness, Training and Utilization for Research Among Future Healthcare Professionals

Variable	n (%)
Prior General Awareness of AI usage for research purposes. n=327	
No	91 (27.8)
Yes	236 (72.2)
Formal education or training on use of AI in research. n=327	
No	209(88.5)
Yes	27 (11.4)
Awareness Levels categorized on Mean Awareness Score= 10.44. n=236	
Adequate ≥ 10.44	174(73.7)
Inadequate< 10.44	62 (26.3)
Most used AI Tools. n=236	
ChatGPT	183(77.5)
Quill Bot	41(17.4)
Grammarly	96 (40.7)
Mendeley	25 (10.6)
Zotero	13(5.5)
Endnote	16 (6.8)
AI Utilization categorized on Mean Utilization Score= 6.40 n=236	
Adequate ≥ 6.40	75 (31.8)
Inadequate< 6.40	161 (68.2)

Perceptions on benefits and challenges of AI usage in research were explored using 15 Five point Likert Scale items each, completed by 236 participants. A majority (68.2%) agreed that AI integration enhances research efficiency. Most mean item scores were ≥ 3.5, reflecting overall positive perceptions. The combined 30-item scale demonstrated excellent internal consistency, with a Cronbach's Alpha of 0.97. Among respondents, 77.5 agreed that use of AI in research saves time, 47.9% identified limited understanding of AI use in research as a challenge, 59.3% expressed concern to face accusations of plagiarism or academic misconduct due to use of AI-generated content. Table-III.

Table-III: Perceived Benefits and Challenges of utilizing AI for research. n=236

Variable	n (%)
Most agreed Benefits of AI for research	
Improves research efficiency	160 (68.2)
Saves your time	183(77.5)
Assists in literature search	150 (63.5)
Cost effective	156(66)
Assist in medical writing	141(59.7)
Create visual representations of findings	142(60.2)
Improve quality and impact	142(60.2)
Detects plagiarism in publications	138(58.4)
Most agreed challenges of AI for research	
Limited understanding of AI technology	113(47.9)
Reliability of AI generated results	121(51.2)
Data Security	134(56.8)
Accusations of plagiarism/misconduct	140(59.3)
Lack of training opportunities	129(54.5)

A statistically significant association was observed between awareness and AI utilization categories (χ^2=4.534, p=0.033). As the p-value was <0.05, the null hypothesis was rejected in favor of the alternative hypothesis. The findings indicate a significant relationship between awareness and utilization of AI in research, suggesting that higher awareness was associated with greater utilization. Table-IV.

One sample t-test revealed that mean AI awareness score was significantly higher (Mean=10.44, t (235) = 50.272, p<0.001), indicating a high level of awareness. Also, AI utilization was statistically significant (Mean =6.40, t (235) = 22.866, p< 0.001).

Pearson correlation analysis demonstrated a positive and statistically significant association between FUSH academic disciplines and AI utilization score (r=0.206, p=0.001).

Linear regression analysis showed that AI awareness was a significant predictor of AI utilization

Table-IV: Association of AI Utilization with Awareness, Gender, Formal Training, and Academic Disciplines (n = 236)

| Variable | Subcategory | *AI Utilization Categories | | Total n (%) | **p-value |
		Inadequate Utilization (<6.40) n=161	Adequate Utilization (≥6.40) n=75		
*Awareness Level	Inadequate (<10.44)	49(20.8%)	13(5.5%)	62(26.3)	0.033
	Adequate (≥10.44)	112(47.4%)	62(26.3%)	174(73.7)	
Gender	Male	46(19.5%)	21(8.9%)	67(2 8.4)	0.928
	Female	115(48.7%)	54(22.9%)	169(71.6)	
***Formal AI Training	No	145(61.4%)	64(27.1%)	209(88.5)	0.288
	Yes	16(6.8%)	11(4.7%)	27(11.5)	
Academic Disciplines of FUSH	FUMC (MBBS)	72(30.5%)	24(10.2%)	96(40.7)	0.046
	FUCD (BDS)	24(10.2%)	15(6.4%)	39(16.6)	
	FUCP (DPT)	49 (20.8%)	20(8.5%)	69(29.3)	
	FUCN (Nursing)	16(6.8%)	16(6.8%)	32(13.6)	

*Utilization and Awareness level, categorization based on mean score values of 6.40 and 10.44 respectively.

**p-values calculated using Pearson Chi-Square; significant values shown in bold (p ≤0.05).

***Formal AI training refers to any prior education or training received and those with yes response had AI Self-directed learning

****FUSH- Foundation University School of Health Sciences

$F_{(1, 234)}$ =4.584, p=0.033), although it accounted for a small portion of the variance in utilization (R^2 =0.019).

Most respondents strongly supported integrating artificial intelligence (AI) into research. Nearly 78.4% considered AI training for researchers extremely or moderately important. A significant majority (93.6%) were likely to use AI in future research, 84.3% would advocate for its broader adoption, and 85.6% expressed interest in further training, highlighting high motivation and perceived relevance of AI in healthcare research.

DISCUSSION

This cross-sectional analytical study assessed awareness, training, utilization, and perceptions of AI tools in research among future healthcare professional (students of medicine, dentistry, rehab and nursing) in Islamabad. With a high response rate (92%) and female predominance (70.6%), the study found encouraging awareness (mean score =10.44±3.19; 73.7% adequate) but lower utilization (mean=6.40± 4.30; 31.8% adequate), revealing a knowledge–practice gap similar to Nasir et al.[7] While 72.2% reported general awareness, only 11.4% had formal training, consistent with Imran et al.[8] and Aslam et al.[9] ChatGPT was most used (77.5%), followed by Grammarly and Quill Bot, reflecting trends in Lower Middle Income Countries where AI adoption is limited by infrastructure and ethics (Asif et al.[11] Concerns about plagiarism (59.3%) were like Patel & Johnston,[12] and have also been linked to the need for strong regulatory support as noted by Yousif et al.[13]

Positive perceptions were common, with 68.2% citing improved efficiency and 63.5% literature aid, aligning with Ahmad T et al.[14] Shahid et al.[15] and Zubair et al.[16] while ethical concerns remain consistent with Khan & Jawaid.[17] Association of Awareness and Utilization categories were also found significant and One-sample t-tests confirmed awareness and utilization scores significance above-average (p<0.001) similar to Ahmad T et al.[14] Our one-sample t-test confirmed both awareness and utilization scores were significantly above average (p<0.001), though variation in utilization likely reflects disparities in access, confidence, or mentorship. Correlation analysis showed a significant association between academic discipline and AI use (r=0.206, p=0.001), MBBS/BDS students showing greater use (Rizwan et al.[18]). Regression confirmed awareness predicted utilization (F=4.584, p=0.033), though other factors such as access and mentorship may play a role (Ahmad MN et al.[2]).

Interestingly, 27.1% without training still had adequate utilization, as reported by Ahmad MN et al.[2] and Habib et al.[19], while similar patterns were also seen in Almarri et al.[20] Rimmer,[5] similarly noted under preparedness due to lack of curriculum coverage. Core challenges like plagiarism, data security, reliability was also reported by Gao et al.[3] Zubair et al.[1] and Patel & Johnston.[12] Encouragingly, 93.6% intended future AI use and 85.6% wanted further training, consistent with Asif et al.[11] and Savage.[21]

Formal AI education should be integrated into healthcare curricula with hands-on training, ethics, and research applications. Institutions should expand access to tools, mentorship, and clear guidelines to address plagiarism and authorship issues. Longitudinal studies are needed to evaluate the

impact of structured AI training on research competence and ethical practice.

Zubair *et al*., (2025, Pakistan) emphasized ethical policy frameworks,[16] while Patel and Johnston (2021) cautioned about accountability and data bias.[12] Encouragingly, 93.6% of our respondents intended to use AI in future research, and 85.6% wanted further training, reflecting global trends observed by Asif et al. (2023).[11] Most viewed AI as a valuable research and clinical support tool, aligning with Savage (2021, USA), who stressed critical AI appraisal in medical education.[21]

This study contributes to existing literature beyond descriptive KAP methods, quantifying AI-related perceptions and behavior through inferential statistics with actual utilization and predictive factors. It also highlights that students are independently engaging with AI tools despite lack of formal training, offering insight into their adaptability and readiness for technology-driven research.

The findings emphasize the need for structured AI education in undergraduate curricula, incorporating hands-on learning, ethics, and research application. Institutions should expand AI access and provide mentorship and workshops. Development of ethical guidelines is essential to address plagiarism and authorship concerns. Longitudinal research is recommended to assess the long-term effects of formal AI training on research skills and ethical competence.

LIMITATIONS OF STUDY

This study's findings may not be generalizable due to its single institution setting in Islamabad. The cross-sectional design limits causal inferences, and reliance on self-reported data may introduce response bias. Additionally, the rapid evolution of AI technology may render current insights outdated. Future studies should explore broader institutional contexts, support, and AI infrastructure availability.

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CONCLUSION

This study showed that aspiring healthcare professionals in Islamabad possessed a high level of awareness regarding AI in research, yet actual utilization was comparatively low. ChatGPT was the most frequently used tool, while formal training remained limited. Participants expressed largely positive perceptions about AI's role in enhancing efficiency and research support, but concerns persisted around plagiarism, data security, and limited technical understanding. A significant association between awareness and utilization highlighted that knowledge influenced practice, though many students were already engaging with AI tools informally. Overall, the findings reflect both the enthusiasm for AI in research and the existing gaps between awareness and practical application among future healthcare professionals.

PRESENTATION DISCLOSURE
This research was presented as a poster and oral presentation at 2024 Annual Research Conferences Shifa School of Medicine and FUSH. The full manuscript was not submitted elsewhere prior to this.

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