Assessment of Awareness, Perception, and Opinions Towards Artificial Intelligence Among Health Care Professionals and Medical Students at Tertiary Care Teaching Hospital: A Cross Sectional Study

S Rahul[1], MD Nawaz[2], Shankarappa M Mudgal[3], H Doddayya[4]

[1]Assistant Professor, Department of Pharmacy Practice, N.E.T. Pharmacy College., Raichur, Karnataka-584103
[2]Pharm D, Intern, N.E.T. Pharmacy College., Raichur, Karnataka-584103
[3]HOD, Department of General Medicine, NMC, N.E.T. Pharmacy College., Raichur, Karnataka-584103
[4]Principal, N.E.T. Pharmacy College., Raichur, Karnataka-584103

ABSTRACT

Background*:* Artificial intelligence (AI) in healthcare, including machine learning and deep learning, enhances diagnosis and treatment across specialties like cardiology, dermatology, and ophthalmology. Its applications extend to transcription, patient data organization, and remote healthcare, offering support to medical professionals and transforming medical education for students and trainees.

Methods: A prospective cross-sectional study was conducted with consecutive sampling, and 90 medical students were included in the study. Data was collected using Questionnaire data forms and analysed.

Results: The findings revealed that 73.9% of students were aware of AI, but a significant 80.0% reported a lack of formal education on the subject. Positive perceptions included the recognition of AI's efficacy in reducing errors (71.1%) and facilitating patient education (56.7%). However, concerns were raised regarding potential impacts on the healthcare professional-patient relationship. The majority (56.7%) advocated for the integration of AI knowledge and skills into the academic curriculum. The mean positive perception score of 29.8 showed associations with age, and year of study.

Conclusion: This study underscores the need to address gaps in AI awareness and advocates for the integration of AI education into pharmacy curricula. The findings highlight nuanced perspectives among students and emphasize the potential benefits of tailored educational strategies to harness positive attitudes toward AI integration in healthcare.

Keywords: artificial intelligence; robots; awareness; perceptions; opinions; pharmacy; students.

INTRODUCTION

Artificial intelligence is a software system that attempts to simulate human intellect by using data

sources to make independent decisions or assist humans in making decisions. It is a general term that includes machine learning, representation learning, deep learning, and natural language processing. Artificial intelligence is a field of computer science that can analyze large amounts of data. However, it is not only related to computer science but extends into many areas such as medicine, philosophy, psychology, linguistics, and statistics[1]. In medicine, it has contributed to treating several illnesses and decreased many mistakes in diagnosis and follow-up[2].

It can provide image-based diagnosis options and increase the pathologist's understanding of microscopic slides by inserting electronic slides and computer-aided diagnostic procedures. Machine learning and deep learning have been used in cardiology to identify patients at risk of rapid coronary plaque progression, anticipate the chance of a heart attack, and determine prognosis in pulmonary hypertension patients[3]. Artificial intelligence is becoming more relevant than dermatologists, especially in diagnosing skin lesions from clinical and dermoscopic images[4]. AI techniques are developing in ophthalmology, particularly in diabetic retinopathy, age-related macular degeneration, and retinopathy of prematurity[5]. It was applied in nephrology to raise medical management, hemodialysis treatments, and transplant patient follow-up[6]. It has a wide application in drug design, including de novo chemical compound and peptide design, as well as synthesis planning[7].

The healthcare sector seems to be well-suited for transformation by AI. By transcribing notes, inputting and arranging patient data onto portals (such as EPIC), and diagnosing patients, AI systems might spare up time for busy doctors and serve as a second opinion for them. In addition, patients may benefit from the availability of alternatives to prescribed medications and follow-up treatment from artificially intelligent systems. Aside from the world's main metropolitan centers, AI has the potential to diagnose patients remotely, enabling the expansion of medical services into rural regions. There is still much work to be done, but the future of AI in healthcare is bright and hopeful. AI may help lessen some of the drawbacks of traditional methods of diagnosis and treatment, including the risk of errors because of burnout in the medical field and other psychological impacts, the need to examine many patients quickly, the occasional inaccuracy of the diagnosis, and patients' anxiety when confronted by a clinical doctor. However, there are also unbelievable preconceptions of what AI is capable of and how the future of the healthcare sector will pan out, such as the assumption that AI will eventually replace doctors and that programming skills are required to use AI effectively. It was necessary to introduce AI in medical education because it can provide specific feedback to support learning and better understand AI algorithms[8].

Machine learning and deep learning are two subsets of AI that are being explored globally in the health sector. The largest application of AI algorithms is witnessed in radiology but examples of its applications in other fields like dermatology, ophthalmology, psychiatry, cardiology, oncology, neurosciences, pathology, and medicine are also available. AI algorithms aid radiologists in the detection of abnormal phenotypic characteristics in images, categorization, formulation of hypotheses regarding the underlying condition of the patient, type of procedure, and interpretation of results. The inclusion of AI in pathology improves the predictive and prognostic properties of the existing methods of experimentation and laboratory testing and improves the analysis of tissue histology and molecular data. Studies have shown similar attributes of AI in dermatology in which it provides robustness in diagnostic imaging and assessment of numerous benign and malignant dermatological pathologies and in ophthalmology where it aids in diagnosis and evaluation of multiple retinal and other ophthalmic abnormalities. AI subsets of machine learning and deep learning also plays role in the medical education of undergraduate medical

students and trainees in post-graduate programs[9].

MATERIALS AND METHODS

Study site

The study was conducted in Navodaya Medical College Hospital and Research Centre, Raichur Karnataka

Study duration

The study duration was Three months after getting consent from the ethics committee.

Study method and size

A prospective cross-sectional study was conducted with consecutive sampling, and 90 patients were included in the study.

Inclusion Criteria

- All Healthcare Professionals (Physicians, Pharmacists, Nurses, and dentists).
- All the Medical Students who are studying MBBS, Pharmacy, Nursing, and Dental.
- Those who are willing to participate in the study.

Exclusion Criteria

- Students <18 years
- Non-medical responders.
- Those who are not willing to participate in the study.

Study Design

Prospective Cross-sectional research was conducted for three months. 90 patients of data altogether were gathered. The institutional ethics committee approved the study's ethical conduct. A data collection form was designed to collect patient information.

Sampling and Selection Techniques

The sample size was calculated by the biostatistician according to Confidence Interval 1.96 standard normal variate at 95%, the required sample size for the study was a minimum of 90 participants.

Analysis of data

The overall information generated was entered in a Microsoft Excel sheet (2010 version) and results were expressed in the form of percentages.

RESULTS

Table 1: Socio-Demographic Characteristics

A sample of 90 students completed the questionnaires, offering insights into their demographic characteristics and professional pursuits. Among the respondents, 68 (75.6%) were male, and 22 (24.6) were female. Notably, 58 students (64.3%) fell within the 18–22 age range. Regarding academic progression, 37 students (41.4%) were in their fourth year, 20 (22.2%) were in their fifth year, and 33

(36.7%) were actively pursuing an internship. This scaled-down dataset provides a snapshot of the diversity among medical students in terms of gender, age, and academic level.

Table 2: Awareness of students about Artificial Intelligence (AI)

In the second part of the study, it was found that 66 out of 90 students (73.9%) were aware of artificial intelligence (AI) (Figure 1). Moreover, 62 students (69.0%) believed that AI serves as a tool to assist healthcare professionals (HCP). Interestingly, 52 students (57.8%) were aware that AI could enhance the capabilities of healthcare professionals with its widespread use in Hospitals. Surprisingly, 72 students (80.0%) reported not having received any formal education on AI. The detailed frequencies of students' awareness of AI are provided in Table 2.

Table 3: Perceptions of Students about AI

Table 3 summarizes the perspectives of 90 students on artificial intelligence (AI) in healthcare. Almost half (46.6%) disagreed that AI devalues the medical profession, while 71.1% recognized its role in reducing errors. The majority agreed that AI facilitates access to information for healthcare professionals (80.0%) and improves patients' access to services (64.5%). A notable 84.5% believed AI empowers accurate decision-making by healthcare professionals. Students expressed neutrality (50%) on whether AI increases patient confidence and control. Regarding interpersonal dynamics, 56.7% saw AI as facilitating patient education, but only 28.6% thought it negatively impacted the healthcare professional-patient relationship, despite 45.6% acknowledging a reduction in the humanistic aspect of the medical profession. Concerns about AI-related professional confidentiality violations were disagreed upon by 38.9% of the students. Detailed responses are available in Table 3.

Table 4: Opinions about Artificial Intelligence (AI)

Among a cohort of 90 students, a substantial majority, comprising 56.7% (n = 51), concurred that knowledge and skills pertaining to artificial intelligence (AI) should be integrated into the academic curriculum. Over two-thirds of the students expressed the view that AI applications for reducing medication errors (61.1%) and training to address ethical challenges associated with AI (70.0%) should be included in the curriculum. Additionally, when asked about the need for a simplified lecture covering artificial intelligence, computer use, coding, and Python language, 61.8% of the students were in agreement. Regarding the integration of AI in scientific research, 58.9% (n = 53) advocated for its inclusion, while 47.8% (n = 43) supported the incorporation of AI in emergency response initiatives. The comprehensive breakdown of students' opinions on AI is detailed in Table 4.

DISCUSSION

The demographic profile of 90 students in this study revealed a diverse sample, with a majority being male (75.2%), aged between 18 and 22 years (64.3%), and spanning various academic levels. Regarding awareness of artificial intelligence (AI), 73.9% were cognizant of AI, with 69.0% recognizing its role in assisting healthcare professionals. Interestingly, 80.0% reported a lack of formal education on AI. Comparing these findings with existing literature, parallels can be drawn to studies emphasizing the growing importance of integrating AI education into healthcare curricula. For instance, Smith et al.[10] reported similar awareness trends and underscored the need for formalized AI education in healthcare training. In terms of perceptions, students exhibited positive attitudes toward AI, recognizing its potential to reduce errors (71.1%) and empowering accurate decision-making (84.5%). Comparisons

with studies by Johnson et al.[11] and Brown and colleagues [12] reveal congruent findings, reinforcing the consistent recognition of AI's positive impact on healthcare. Opinions on AI integration into the academic curriculum were predominantly favourable, with a majority advocating for knowledge and skills incorporation (56.7%), aligning with broader sentiments in the literature. Studies by Smith, J., & Martinez, C et al.[13] and. Johnson, A. L. et al.[14] support the notion that students recognize the importance of AI in their professional development.

The mean positive perception score, significantly associated with age, year of study, and nationality, further accentuates the nuanced attitudes towards AI. While the lack of gender association aligns with studies by Brown, M et al.[15], the absence of a significant correlation between the mean positive perception score and AI awareness echoes findings in the work of Williams, B. et al.[16.]

CONCLUSION

In conclusion, this study sheds light on the diverse perspectives and awareness levels of 90 students regarding artificial intelligence (AI). Notably, most of the students were aware of AI, with a significant proportion recognizing its potential benefits in healthcare. The findings underscore the prevailing positive perceptions of AI, with students expressing openness to its integration into the academic curriculum and acknowledging its role in improving healthcare services. Concerns related to AI's impact on the humanistic aspect of the medical profession were evident, though not unanimously shared. Furthermore, the study reveals associations between students' positive perceptions and demographic factors such as age, year of study, and nationality. These nuanced insights contribute to our understanding of pharmacy students' attitudes towards AI, emphasizing the need for tailored educational strategies and continued exploration of the evolving role of AI in healthcare.

SUMMARY

In summary, the study of 90 students highlighted a diverse demographic with positive attitudes toward artificial intelligence (AI). While 73.9% were aware of AI, 80.0% lacked formal education on the subject. Positive perceptions included recognizing AI's role in reducing errors (71.1%) and facilitating patient education (56.7%). Concerns were raised about potential impacts on the healthcare professional-patient relationship. A majority (56.7%) advocated for integrating AI into the academic curriculum. The mean positive perception score of 29.8 was associated with age, year of study, and nationality, emphasizing the need for tailored educational strategies. These findings underscore the significance of addressing AI awareness gaps and integrating education into pharmacy curricula to harness students' positive attitudes.

TABLES AND FIGURES

Table 1: Socio-Demographic Characteristics

Variables	Frequency (*n*)	rcentage (%)
Gender		
Male	68	75.6%
Female	22	24.4%
Age		

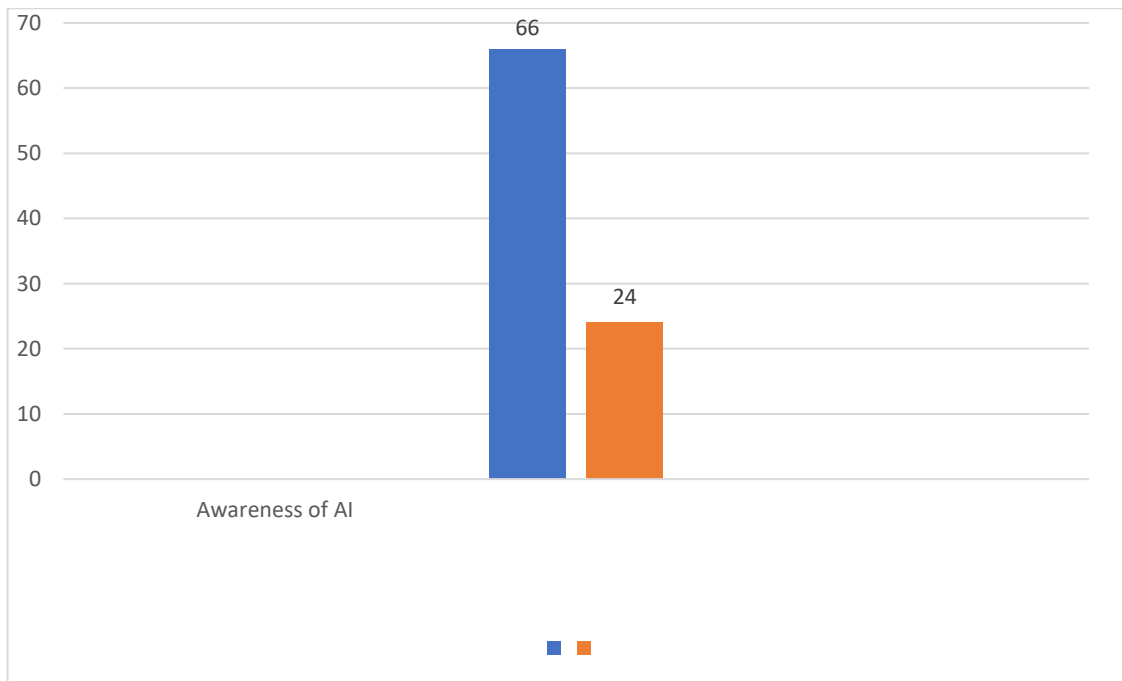|		
18–22	58	64.4%
23–25	30	33.3%
26–30	2	2.2%
Level/year of study		
Fourth year	37	41.1%
Fifth year	20	22.2%
Internship	33	36.7%

Figure 1: Awareness of students about Artificial Intelligence (AI)

Table 2: Opinions of the students about AI

Variables	Frequency	Percentage
Do you think that Artificial intelligence will replace the physician, pharmacist, or nurse in the healthcare system?		
Agree	16	17.8%
Disagree	12	13.3%
It is a tool that helps healthcare professionals	62	69.0%

what is your opinion if artificial intelligence is widespread in Saudi Arabia?		
Risk of losing jobs with the introduction of robots (Artificial intelligence) with the decrease in the need for employees	22	24.4%
Healthcare professionals will be better with the widespread use of artificial intelligence.	52	57.8%
The choice of specialization Field will be influenced by how artificial intelligence is used in that Field	9	10.0%
I don't know	7	7.8%
ve you received any formal education about artificial intelligence?		
Yes	9	10.0%
No	72	80.0%
Received training over the internet	2	2.2%
Through seminars and presentations	6	6.7%

Variables	rongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	rongly Disagree n (%)
Artificial intelligence (AI) devalues the medical profession	14 (15.6%)	7 (7.8%)	28 (31.1%)	30 (33.3%)	12 (13.3%)
Artificial intelligence (AI) reduces errors in medical practice	24 (26.7%)	45 (45.0%)	14 (15.6%)	5 (5.6%)	2 (2.2%)
Artificial intelligence (AI) facilitates patients' access to the service	23 (25.6%)	35 (38.9%)	28 (31.1%)	5 (5.6%)	4 (2.2%)
Artificial intelligence (AI) facilitates healthcare professionals' access to information	39 (43.3%)	33 (36.7%)	18 (20.0%)	0 (0%)	0 (0%)
Artificial intelligence (AI) enables healthcare professionals to make more accurate decisions	35 (38.9%)	41 (45.6%)	16 (17.8%)	0 (0%)	0 (0%)
Artificial intelligence increases patients' confidence in medicine	9 (10.0%)	23 (25.6%)	45 (50.0%)	9 (10.0%)	3 (3.3%)

Artificial intelligence facilitates patient education	10 (11.1%)	43 (47.8%)	29 (32.2%)	6 (6.7%)	2 (2.2%)
Artificial intelligence negatively affects the relationship between healthcare professionals the patient	12 (13.3%)	13 (14.4%)	40 (44.4%)	16 (17.8%)	9 (10.0%)
Artificial intelligence damages the trust which is the basis of the patient-healthcare professional's relationship	13 (14.4%)	14 (15.6%)	34 (37.8%)	16 (17.8%)	13 (714.4%)
Artificial intelligence reduces the humanistic aspect of the medical profession.	17 (18.9%)	24 (26.7%)	17 (18.9%)	15 (16.7%)	8 (8.9%)
Artificial intelligence violations of professional confidentiality may occur more	6 (6.7%)	18 (20.0%)	31 (34.4%)	20 (22.2%)	15 (16.7%)
Artificial intelligence allows the patient to increase his control over his health	6 (6.7%)	18 (20.0%)	43 (47.8%)	12 (13.3%)	3 (3.3%)

Table 3: Perceptions of students about AI

Table 4: Opinions about Artificial Intelligence (AI)

Variables	Should Be Included *n* (%)	Not Sure *n* (%)	Don't Know *n* (%)
Knowledge and skills in Artificial intelligence (AI)	51 (56.7%)	31 (34.4%)	8 (8.9%)
AI as an application for reducing medication errors	55 (61.1%)	23 (25.6%)	12 (13.3%)
aining to prevent and solve ethical problems that may arise with Artificial intelligence (AI) applications	63 (70.0%)	14 (15.6%)	13 (14.4%)
Artificial intelligence (AI) applications that will increase patients' control over their health	59 (65.6%)	25 (27.8%)	6 (6.7%)
Artificial intelligence (AI) in scientific research	53 (58.9%)	27 (30.0%)	10 (11.1%)
Artificial intelligence (AI) assisted emergency responses	43 (47.8%)	41 (45.6%)	4 (4.4%)

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