RESEARCH PAPER

Awareness and Acceptance of Artificial Intelligence in Medical Imaging with Emerging Implications for Precision Drug Therapy

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Abstract

Background: Artificial intelligence (AI) is rapidly transforming the field of medical imaging by enhancing diagnostic accuracy, improving workflow efficiency, and supporting clinical decision-making. In recent years, AI applications have extended beyond image interpretation to include therapeutic response evaluation and imaging-guided precision drug therapy. The successful implementation of AI technologies in radiology practice largely depends on the awareness, attitudes, and acceptance of radiology professionals who are directly involved in diagnostic and treatment monitoring processes.

Aim: To assess the awareness and acceptance of artificial intelligence among radiology professionals and to explore its emerging implications in medical imaging-guided precision drug therapy.

Materials and Methods: A cross-sectional descriptive study was conducted among 100 radiology professionals, including radiologists, radiographers, CT and MRI technologists, and radiology students or interns working in hospitals and diagnostic imaging centres. Data were collected using a structured, self-administered questionnaire that comprised demographic details and items related to knowledge, attitudes, and acceptance of AI applications in diagnostic imaging and therapeutic response evaluation. Descriptive statistical analysis was performed, and results were expressed as frequencies and percentages.

Results: The study revealed that 78% of participants were aware of AI applications in medical imaging, whereas only 32% had received formal training related to AI technologies. Most respondents demonstrated basic knowledge (52%), while 28% reported good knowledge of AI-based imaging applications. A majority agreed that AI could improve diagnostic accuracy (72%), enhance workflow efficiency (70%), and reduce workload (68%) in radiology departments. Furthermore, 65% of participants believed that AI could support therapeutic response evaluation and precision drug therapy planning. Regarding acceptance, 74% were willing to use AI tools in clinical practice, 76% supported integration of AI into routine workflow, and 82% expressed interest in AI training programs. However, concerns related to job security (40%) and ethical issues such as data privacy and system reliability (35%) were also reported.

Conclusion: Radiology professionals demonstrated high awareness and positive acceptance of artificial intelligence in medical imaging, with growing recognition of its role in therapeutic response monitoring and precision drug therapy. Nevertheless, limited formal training and concerns regarding ethical and professional implications highlight the need for structured educational initiatives and institutional support. Enhancing workforce preparedness will be essential for the effective integration of AI technologies into imaging-guided personalized treatment strategies and future healthcare practice.

Keywords: Artificial intelligence, medical imaging, radiology professionals, awareness, acceptance, precision drug therapy, and therapeutic response evaluation.

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Introduction

Artificial intelligence (AI) has emerged as one of the most transformative technological developments in modern healthcare, significantly influencing diagnostic accuracy, clinical workflow, and patient management. Advances in machine learning, deep learning, and data analytics have enabled the development of intelligent computational systems capable of processing large volumes of medical data efficiently and accurately. These systems are increasingly being integrated into healthcare environments to support clinical decision-making, improve diagnostic performance, and optimise therapeutic strategies (Jiang et al., 2017; Topol, 2019).

Radiology is widely recognized as one of the most suitable medical specialities for artificial intelligence implementation due to its reliance on digital imaging technologies and quantitative data interpretation. Imaging modalities such as computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), digital radiography, and ultrasonography generate high-resolution anatomical and functional information that requires careful interpretation by trained professionals. AI-based techniques, particularly deep learning algorithms such as convolutional neural networks, have demonstrated significant potential in automated image analysis, lesion detection, image segmentation, and disease classification. These technologies can enhance diagnostic accuracy, reduce inter-observer variability, and improve workflow efficiency in busy radiology departments (Litjens et al., 2017; Najjar, 2023).

Beyond diagnostic applications, artificial intelligence is increasingly contributing to therapeutic planning and response evaluation, thereby supporting the growing field of precision medicine. Precision medicine emphasises individualised treatment approaches based on patient-specific clinical, genetic, and imaging characteristics. Radiological imaging plays a crucial role in monitoring treatment effectiveness, particularly in pharmacological therapies such as chemotherapy, targeted drug therapy, immunotherapy, and anti-inflammatory treatment regimens. AI-driven imaging analysis, including radiomics and predictive modelling, enables the extraction of advanced imaging biomarkers that can assist clinicians in evaluating disease progression, predicting therapeutic outcomes, and optimising drug selection (Ashley, 2016; Mak & Pichika, 2019).

In oncology, for instance, AI-assisted imaging tools can quantitatively assess tumour size, volumetric changes, metabolic activity, and vascular characteristics to determine response to therapeutic interventions. Early identification of treatment response allows clinicians to modify drug regimens, reduce unnecessary toxicity, and improve patient survival outcomes. Similarly, AI-based imaging evaluation has shown potential in assessing therapeutic response in cardiovascular diseases, neurological disorders, and chronic inflammatory conditions. These developments highlight the increasing role of artificial intelligence in imaging-guided precision drug therapy and personalised patient care (Barragán-Montero et al., 2021).

Despite the promising clinical benefits of artificial intelligence, its successful implementation in radiology practice largely depends on the awareness, perception, and acceptance of radiology professionals. Radiologists, radiographers, imaging technologists, and radiology trainees are key stakeholders responsible for integrating technological innovations into clinical workflows. Their level of knowledge, confidence, and readiness to adopt AI technologies can significantly influence the effectiveness of technological transformation in healthcare institutions (Hardy & Harvey, 2020).

However, several challenges may hinder the acceptance of artificial intelligence in medical imaging. Limited formal training in AI technologies, lack of technical understanding, concerns about job security, ethical issues related to patient data privacy, and uncertainty regarding the reliability and accountability of automated systems are commonly reported barriers. Addressing these challenges requires structured educational programs, interdisciplinary collaboration, and the development of clear clinical guidelines to ensure safe and effective integration of AI-based systems into healthcare practice (Char et al., 2018; Pesapane et al., 2018).

Therefore, assessing the awareness and acceptance of artificial intelligence among radiology professionals is essential for understanding workforce preparedness for technological advancement. Furthermore, exploring the emerging implications of AI in imaging-guided

precision drug therapy can provide valuable insights into the future direction of radiology practice. In this context, the present study aims to evaluate the knowledge, attitudes, and acceptance of artificial intelligence among radiology professionals and to examine its potential role in therapeutic response evaluation and personalised treatment planning.

Aim

The present study aimed to assess the awareness and acceptance of artificial intelligence among radiology professionals and to explore its emerging implications in medical imaging–guided precision drug therapy and therapeutic response evaluation.

Objectives

1. To evaluate the level of awareness and knowledge of artificial intelligence applications among radiology professionals in diagnostic imaging.
2. To assess the understanding of radiology professionals regarding the role of artificial intelligence in therapeutic response evaluation and imaging-guided precision drug therapy.
3. To determine the attitudes of radiology professionals toward the impact of artificial intelligence on diagnostic accuracy, workflow efficiency, and clinical decision-making.
4. To assess the level of acceptance and willingness of radiology professionals to adopt artificial intelligence technologies in routine imaging practice.
5. To identify perceived benefits, challenges, and ethical concerns related to the implementation of artificial intelligence in medical imaging and treatment monitoring.
6. To explore the perceived need for structured training programs and educational initiatives to improve workforce preparedness for artificial intelligence-driven healthcare technologies.

Methodology

Study Design: A cross-sectional descriptive study design was employed to evaluate the awareness, attitudes, and acceptance of artificial intelligence among radiology professionals. This design was considered appropriate as it allows the collection of data from participants at a single point in time and facilitates the assessment of perceptions regarding emerging technological innovations in healthcare.

Study Setting: The study was conducted in the radiology departments of selected tertiary care hospitals and diagnostic imaging centres equipped with advanced imaging modalities, including computed tomography (CT), magnetic resonance imaging (MRI), digital radiography, ultrasonography, and other imaging systems used for diagnostic and therapeutic monitoring.

Study Population: The study population comprised radiology professionals directly involved in imaging services, including radiologists, radiographers, CT technologists, MRI technologists, and radiology students or interns in clinical training. These professionals were selected because of their direct interaction with imaging technologies and their potential exposure to artificial intelligence-based applications in clinical practice.

Sample Size: A total of 100 participants were included in the study. The sample size was considered adequate for obtaining preliminary insights into awareness levels, acceptance trends, and workforce preparedness related to artificial intelligence integration in radiology practice.

Sampling Technique: A convenience sampling method was used to recruit participants who were available during the data collection period and fulfilled the inclusion criteria.

Inclusion Criteria

• Radiology professionals working in diagnostic imaging departments
• Radiology students and interns undergoing clinical training
• Participants willing to provide informed consent

Exclusion Criteria

• Healthcare professionals not associated with radiology services
• Participants who declined to participate or submitted incomplete questionnaires

Data Collection Tool: Data were collected using a structured self-administered questionnaire developed after an extensive literature review and expert consultation. The questionnaire consisted of four main sections:

• Section A – Demographic characteristics
• Section B – Awareness and knowledge of artificial intelligence in medical imaging
• Section C – Attitudes toward artificial intelligence in diagnostic and therapeutic applications
• Section D – Acceptance and readiness for adoption of AI technologies

Attitude-related items were measured using a five-point Likert scale ranging from strongly agree to strongly disagree.

Data Collection Procedure: Participants were informed about the purpose, significance, and

voluntary nature of the study before data collection. Written or electronic informed consent was obtained. Questionnaires were distributed in printed form during departmental visits or electronically through online survey platforms. Participants completed the questionnaire independently within the allocated time.

Data Analysis: Collected data were coded and entered into statistical software for analysis. Descriptive statistical methods such as frequency, percentage, mean, and standard deviation were used to summarise the findings. Results were presented using tables, bar charts, and pie diagrams. Where applicable, inferential statistical tests such as the chi-square test were used to evaluate associations between demographic variables and acceptance of artificial intelligence in medical imaging and precision drug therapy applications.

Results

A total of 100 radiology professionals participated in the present study, conducted to assess awareness and acceptance of artificial intelligence in medical imaging and its emerging implications in precision drug therapy and therapeutic response evaluation.

Demographic Characteristics of Participants

The demographic distribution of participants is presented in Table 1 and illustrated in Figure 1. Most respondents belonged to the 20–30 years age group (48%), followed by 31–40 years (32%), 41–50 years (15%), and above 50 years (5%).

Regarding gender distribution, 58% were male, and 42% were female.

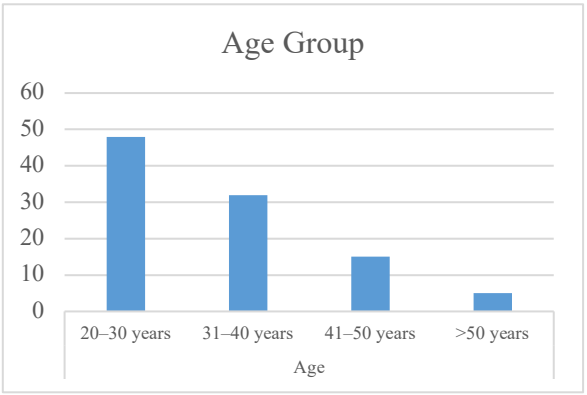
With respect to professional designation, radiographers constituted the largest group (46%), followed by CT/MRI technologists (22%), radiologists (18%), and radiology students or interns (14%).

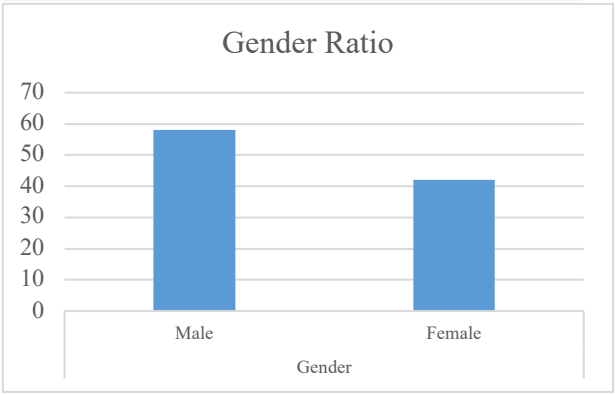
Analysis of work experience revealed that 44% of participants had 1–5 years of experience, 25% had 6–10 years, 16% had less than one year, and 15% had more than 10 years of experience. These findings indicate that the study population mainly consisted of early-career imaging professionals.

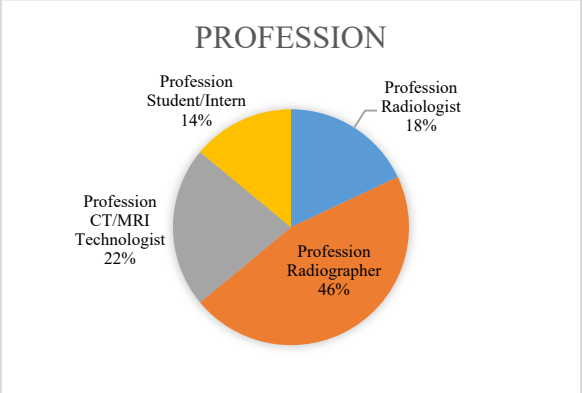
Table 1: Demographic Characteristics of Participants (n = 100)

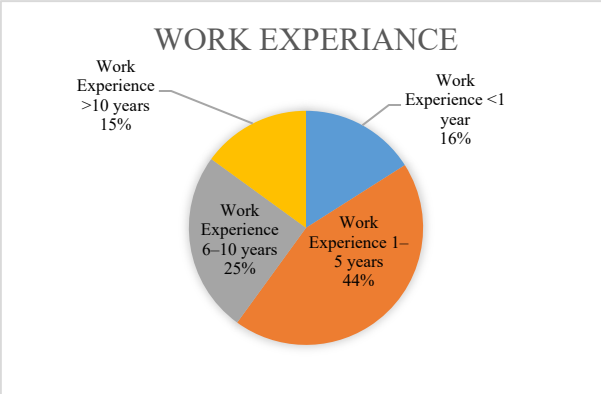
Variable	Category	Frequency	Percentage
Age	20–30 years	48	48%
	31–40 years	32	32%
	41–50 years	15	15%
	>50 years	5	5%
Gender	Male	58	58%
	Female	42	42%
Profession	Radiologist	18	18%
	Radiographer	46	46%
	CT/MRI Technologist	22	22%
	Student/Intern	14	14%
Work Experience	<1 year	16	16%
	1–5 years	44	44%
	6–10 years	25	25%
	>10 years	15	15%

Figure 1: Charts showing demographic distribution of radiology professionals according to age group, gender, profession, and work experience.









Awareness of Artificial Intelligence in Medical Imaging

Awareness levels regarding artificial intelligence are summarised in Table 2 and depicted in Figure 2. The results indicated that 78% of participants were aware of artificial intelligence applications in medical imaging, while 22% reported no prior awareness.

However, only 32% of respondents had received formal education or training related to artificial intelligence, whereas 68% had not undergone structured training programs.

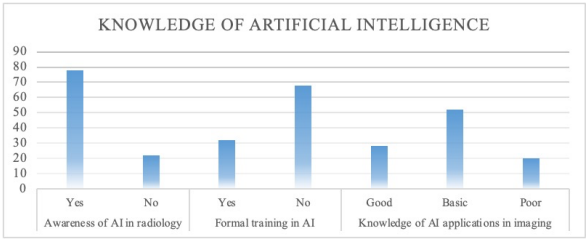
Regarding knowledge level, 28% of participants demonstrated good knowledge, 52% had basic knowledge, and 20% reported poor knowledge of AI applications such as automated image analysis, lesion detection, and workflow optimisation.

Importantly, awareness regarding the role of AI in therapeutic response monitoring and imaging-guided drug therapy was comparatively lower, with many participants indicating limited exposure to AI-assisted precision medicine applications.

Table 2: Awareness and Knowledge of Artificial Intelligence (n = 100)

Parameter	Response	Frequency	Percentage
Awareness of AI in imaging	Yes	78	78%
	No	22	22%
Formal AI training	Yes	32	32%
	No	68	68%
Level of knowledge	Good	28	28%
	Basic	52	52%
	Poor	20	20%

Figure 2: Chart showing awareness and level of knowledge of artificial intelligence among radiology professionals.



Attitudes Toward Artificial Intelligence and Precision Drug Therapy

Participants' attitudes toward artificial intelligence and its role in therapeutic response evaluation are presented in Table 3 and illustrated in Figure 3.

Most participants agreed that artificial intelligence could:

- Improve diagnostic accuracy (72%)
- Enhance workflow efficiency (70%)
- Reduce workload in radiology departments (68%)

Additionally, 65% of respondents believed that AI could support therapeutic response assessment and precision drug therapy planning, particularly in oncology imaging and chronic disease monitoring.

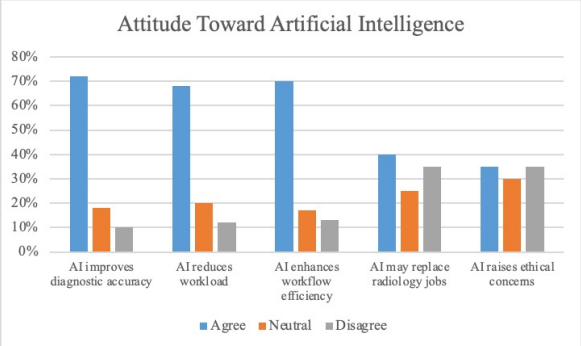
Despite these positive perceptions, 40% of participants expressed concern that AI might replace certain professional roles, while 35% reported ethical concerns related to data privacy, algorithm transparency, and reliability of AI-based clinical decisions.

Table 3: Attitude Toward Artificial Intelligence (n = 100)

Statement	Agree	Neutral	Disagree
AI improves diagnostic accuracy	72%	18%	10%
AI reduces workload	68%	20%	12%
AI enhances workflow efficiency	70%	17%	13%
AI supports precision drug therapy evaluation	65%	20%	15%

AI may replace radiology jobs	40%	25%	35%
AI raises ethical concerns	35%	30%	35%

Figure 3: Clustered bar diagram showing attitudes toward AI applications in diagnostic imaging and therapeutic response evaluation.



Acceptance and Readiness for AI Integration

Acceptance and workforce readiness for artificial intelligence adoption are summarized in Table 4 and illustrated in Figure 4.

The results showed that 74% of participants were willing to use AI-based tools in clinical imaging practice, while 26% were hesitant or unwilling.

Furthermore:

• 76% supported integration of AI into routine radiology workflow

• 82% expressed interest in AI training programs

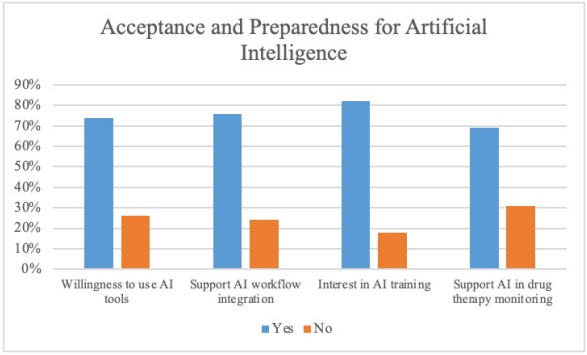
• 69% supported the use of AI for monitoring drug response and treatment outcomes

These findings indicate a strong perceived need for educational initiatives and institutional support to enhance workforce preparedness.

Table 4: Acceptance and Preparedness for Artificial Intelligence (n = 100)

Parameter	Yes	No
Willingness to use AI tools	74%	26%
Support AI workflow integration	76%	24%
Interest in AI training	82%	18%
Support AI in drug therapy monitoring	69%	31%

Figure 4: Bar chart showing acceptance and readiness of radiology professionals for AI adoption in imaging and therapeutic evaluation.



Discussion

The present study was conducted to evaluate the awareness and acceptance of artificial intelligence (AI) among radiology professionals and to explore its emerging implications in medical imaging–guided precision drug therapy and therapeutic response evaluation. The findings of this study indicate that most participants were aware of artificial intelligence applications in diagnostic imaging; however, only a limited proportion had received formal education or structured training related to AI technologies. This observation suggests that although AI has gained significant visibility in the healthcare sector, detailed technical understanding and practical exposure among radiology professionals remain insufficient. Similar trends have been reported in previous studies, where healthcare professionals demonstrated general awareness but lacked confidence in the clinical application of AI systems.

The results further demonstrated that most participants had a positive attitude toward the integration of artificial intelligence in radiology practice. A substantial proportion of respondents believed that AI could improve diagnostic accuracy, reduce reporting time, and enhance workflow efficiency in imaging departments. These findings reflect the growing recognition of AI as a supportive technology capable of assisting radiology professionals in managing large imaging datasets and improving clinical productivity. The ability of AI algorithms to automate repetitive tasks such as lesion measurement, image segmentation, and prioritization of urgent cases may contribute to improved service delivery and reduced workload in high-volume healthcare settings.

An important aspect of the present study was the evaluation of participants' perceptions regarding the role of artificial intelligence in therapeutic response assessment and precision drug therapy. A considerable number of respondents acknowledged that AI-assisted imaging could support monitoring of treatment effectiveness, particularly in oncology and chronic disease management. The use of quantitative imaging

biomarkers derived from AI-based analysis has the potential to enable early identification of treatment response or disease progression, thereby facilitating timely modification of pharmacological interventions. This approach aligns with the principles of precision medicine, where individualized treatment decisions are guided by objective clinical and imaging data.

Despite the generally favourable perceptions observed in this study, several concerns were identified among participants. A notable proportion of radiology professionals expressed apprehension regarding potential job displacement due to the increasing automation of imaging processes. This concern highlights the uncertainty associated with rapid technological advancements and changing professional roles in healthcare. Additionally, ethical issues such as data privacy, algorithm transparency, and accountability for AI-assisted clinical decisions were frequently reported. These findings emphasise the need for clear regulatory frameworks, professional guidelines, and institutional policies to ensure the safe and responsible use of artificial intelligence in medical imaging.

The study also revealed a strong interest among participants in receiving structured training and educational support related to artificial intelligence applications. Most respondents expressed willingness to participate in workshops, continuing education programs, and curriculum-based learning initiatives focused on AI technologies. This finding suggests that radiology professionals are open to technological transformation and are motivated to enhance their competencies in response to evolving healthcare demands. Integration of artificial intelligence education into radiography and radiology training programs may therefore play a crucial role in improving workforce preparedness and facilitating effective implementation of AI-based systems.

Furthermore, the positive acceptance of AI for therapeutic response monitoring observed in this study highlights the expanding role of radiology in multidisciplinary patient management. As imaging increasingly contributes to treatment planning and drug response evaluation, collaboration between radiologists, clinicians, pharmacologists, and data scientists will become essential. AI-driven predictive models and radiomics-based analysis may support personalised treatment strategies, improve patient outcomes, and optimise resource utilisation in healthcare institutions.

Overall, the findings of this study indicate that while awareness and acceptance of artificial intelligence among radiology professionals are relatively high, gaps in formal training and concerns regarding ethical and professional implications remain significant barriers to adoption. Addressing these challenges through targeted educational programs, institutional support, and policy development will be essential for maximising the benefits of artificial intelligence in medical imaging and precision drug therapy.

Conclusion

Artificial intelligence is increasingly emerging as a transformative technology in medical imaging, with significant potential to enhance diagnostic accuracy, optimise workflow efficiency, and support clinical decision-making. The findings of the present study indicate that radiology professionals demonstrate a generally favourable level of awareness and acceptance toward the integration of artificial intelligence in imaging practice. Most participants recognised the potential benefits of AI in improving image interpretation, reducing workload, and enhancing productivity within radiology departments. These positive perceptions suggest that imaging professionals are receptive to technological innovation and are willing to adapt to evolving digital healthcare environments.

Importantly, the study also highlights the emerging role of artificial intelligence in therapeutic response evaluation and precision drug therapy. Participants acknowledged that AI-assisted imaging could facilitate more accurate monitoring of disease progression and treatment effectiveness, particularly in conditions such as cancer and chronic inflammatory disorders. The ability of AI-based imaging tools to provide quantitative and reproducible assessment of treatment outcomes may contribute to individualised therapeutic planning and improved patient management. This evolving role reflects the growing integration of radiology within multidisciplinary approaches to precision medicine.

However, despite high awareness and acceptance, the findings reveal a significant gap in formal training and technical competency related to artificial intelligence applications. Concerns regarding job security, ethical implications, data privacy, and reliability of automated systems were also identified among participants. These factors may influence workforce preparedness and hinder the effective implementation of AI technologies in clinical practice. Therefore, addressing educational needs and providing institutional support will be essential for maximising the benefits of artificial intelligence in radiology.

Overall, the successful integration of artificial intelligence in medical imaging and imaging-guided precision drug therapy will depend on continuous professional development, interdisciplinary collaboration, and the establishment of clear regulatory and ethical frameworks. By enhancing workforce preparedness and promoting responsible technological adoption, healthcare systems can harness the full potential of artificial intelligence to improve diagnostic services and patient outcomes.

Limitations of the Study

The present study has several limitations that should be considered while interpreting the findings. Firstly, the study was conducted with a relatively small sample size, which may limit the generalizability of the results to broader populations of radiology professionals. Secondly, the use of a convenience sampling technique may have introduced selection bias, as participants who were more interested in artificial intelligence or technological advancements may have been more likely to participate.

Another limitation is the reliance on self-reported questionnaire data, which may be subject to response bias, recall bias, or social desirability bias. Participants may have overestimated or underestimated their level of knowledge and acceptance of artificial intelligence technologies. Additionally, the cross-sectional design of the study does not allow for assessment of changes in perceptions or attitudes over time as artificial intelligence becomes more widely integrated into clinical practice.

Furthermore, the study primarily focused on general awareness and acceptance of artificial intelligence and did not include a practical evaluation of participants' competency in using AI-based imaging tools. The specific clinical applications of artificial intelligence in precision drug therapy were explored from a perceptual perspective rather than through objective clinical outcome measures.

Future Recommendations

Future research should consider conducting studies with larger sample sizes and multi-centre participation to obtain more comprehensive and generalizable insights into the awareness and acceptance of artificial intelligence among radiology professionals. Longitudinal studies may also be useful in evaluating how knowledge, attitudes, and acceptance evolve as artificial intelligence technologies continue to develop and become integrated into routine clinical workflows. There is a need for structured educational programs, training workshops, and continuing professional development initiatives focusing on artificial intelligence applications in diagnostic imaging and therapeutic response evaluation. Incorporating artificial intelligence concepts into undergraduate and postgraduate radiology curricula may enhance workforce preparedness and improve confidence in using AI-based systems.

Further studies should explore the practical impact of artificial intelligence on clinical outcomes, particularly in the context of imaging-guided precision drug therapy and personalised treatment planning. Collaborative research involving radiologists, clinicians, pharmacologists, and data scientists may contribute to the development of robust AI-driven decision support systems that optimise therapeutic strategies and improve patient outcomes.

Additionally, future investigations should address ethical, legal, and regulatory aspects of artificial intelligence implementation in healthcare to ensure safe, transparent, and accountable use of these technologies. Establishing standardised guidelines for AI integration in radiology practice will be essential for promoting trust and facilitating widespread adoption.

Overall, the study demonstrated that radiology professionals had high awareness and positive acceptance of artificial intelligence in diagnostic imaging, but moderate preparedness regarding its role in precision drug therapy and therapeutic response evaluation. While most participants recognised the benefits of AI in improving diagnostic performance and workflow efficiency, limited formal training and concerns about ethical and professional implications remain significant barriers to implementation.

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