



Research Article

Awareness & Preparedness for AI and Emerging Technologies in Healthcare- A Cross-Sectional Study

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Abstract

Background: Artificial intelligence (AI) and emerging technologies are increasingly becoming part of healthcare. Developing awareness and preparedness among future healthcare professionals is therefore important. However, information regarding AI awareness and educational needs among allied health students remains limited.

Objective: To assess awareness, knowledge, preparedness, perceptions, and educational needs regarding AI and emerging technologies among allied health students.

Methods: A descriptive cross-sectional survey was conducted among undergraduate allied health students from different healthcare disciplines. Data were collected using a structured, researcher-developed 25-item questionnaire covering demographic characteristics, AI awareness, emerging technologies, preparedness, perceived benefits and concerns, training needs, and self-evaluation. The questionnaire was administered electronically through Google Forms after obtaining informed consent. Data were analyzed using descriptive statistics and presented as frequencies and percentages.

Results: A total of 402 students participated, of whom 69.7% were physiotherapy students. Basic awareness of AI was reported by 58.7% of participants, while 15.4% reported detailed knowledge. Although 73.2% had heard of machine learning and deep learning, only 29.4% reported clear understanding of these concepts. Regarding curriculum exposure, 40.3% reported very minimal training and 14.9% reported that AI was not included in their curriculum. Despite these gaps, 84.1% expressed moderate-to-very-high willingness to learn AI-related skills, and 84.1% supported the integration of AI and emerging technologies into allied health education. Hands-on workshops were the most preferred learning format (40.3%).

Conclusion: Allied health students demonstrated basic-to-moderate awareness of AI but limited understanding of advanced AI concepts and insufficient curricular exposure. The findings support the need for structured and practical AI education within allied health curricula to improve students' preparedness for technology-driven healthcare.

Keywords: AI, Emerging Technologies, Healthcare, Allied Health Sciences

1. Introduction

Technological advancements are rapidly transforming healthcare delivery in recent years, revolutionizing the way patients receive care and healthcare professionals provide services [1]. Emerging technologies are revolutionizing healthcare by boosting clinical performance, enhancing patient results, and optimizing administrative workflows. Tools like artificial intelligence (AI), the Internet of Things (IoT),

Block chain, and wearable gadgets hold immense promise for diagnostics, therapy, and real-time patient monitoring [2].

In recent years, several studies have highlighted the growing importance of AI literacy among healthcare practitioners; Research conducted by (Jack Hood, 2023); demonstrated that The incorporation of artificial intelligence into radiology is revolutionizing medical imaging. Leveraging machine learning and deep learning methods like convolutional neural networks, AI boosts the accuracy of image analysis, refines the identification of anomalies, and accelerates diagnostic and therapeutic decision-making. Additionally, it enables predictive modeling and

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process efficiency by anticipating patient results and handling repetitive duties automatically.

Even with its promise, obstacles including patient data security, uniform standards, and the clarity of algorithmic decisions hinder broad implementation. Through ongoing partnerships and tech progress, AI holds potential to drive tailored medical care and redefine diagnostic approaches in contemporary healthcare [3].

Emerging technologies are also reshaping rehabilitation sciences and allied health practices. In physiotherapy, applications such as AI-assisted gait analysis, virtual reality rehabilitation, and sensor-based monitoring systems are gaining prominence [4].

As AI technology continues to progress rapidly, it is important for nursing education programs to equip their nursing students with the skills to utilize AI in their practice. This preparation is vital to ensure that they can effectively leverage AI to benefit patients and the healthcare system [5].

Artificial intelligence holds the promise of revolutionizing healthcare through greater personalization, accuracy, foresight, and mobility. Regardless of whether these advancements are embraced slowly or swiftly, healthcare systems must adapt strategically to navigate the shifting digital environment [6]. Hereby; Understanding healthcare professionals' perspectives, knowledge levels, and readiness to integrate AI into practice is therefore essential [7].

Despite growing global research on AI in healthcare, limited data exist regarding the awareness, preparedness, and training needs of allied health students in the context of emerging technologies. As future healthcare providers, their readiness to adopt and effectively utilize AI will significantly influence the success of technological integration in clinical settings [8, 9].

In light of these considerations, this study aims to assess the awareness, knowledge, and preparedness of health sciences students regarding AI and emerging technologies in healthcare. Additionally, it seeks to evaluate their perceived benefits, concerns, and training needs to provide actionable insights for curriculum development and institutional policy planning.

Methodology, Study Design:

A descriptive cross-sectional survey study design was adopted to assess the awareness and preparedness for

Artificial Intelligence (AI) and emerging technologies in healthcare among allied health students.

Study Population and Sampling:

The study population comprised undergraduate allied health students (Physiotherapy, Radiography/Imaging Technology, Medical Laboratory Technology, Nursing, Optometry, Occupational Therapy, and other allied health courses).

A self-developed structured validated questionnaire was circulated. Participants who met the inclusion criteria and provided prior informed consent voluntarily completed the questionnaire, and the collected responses were used for data analysis; All eligible responses received during the data collection period were included.

Inclusion Criteria:-

- Undergraduate allied health students (1st year to internship).
- Students willing to participate.
- Students providing informed consent.

Exclusion Criteria :-

- Postgraduate students and faculty members.
- Incomplete questionnaire responses.

Data Collection Tools:-

Data were collected using a structured, self-administered questionnaire developed by the researchers. The questionnaire consisted of 25 multiple-choice questions divided into sections:

- Demographic information
- Awareness of AI
- Awareness of emerging technologies
- Preparedness and skills
- Perceived benefits and concerns
- Training needs
- Self-evaluation

The tool was reviewed for content validity by subject experts before administration.

Procedure:-

Participants were informed about the purpose of the study. The questionnaire was distributed in online format through Google form, and participants were given adequate time to complete it. Confidentiality and anonymity were maintained throughout the study. Collected data were coded and entered for statistical analysis.

Results :

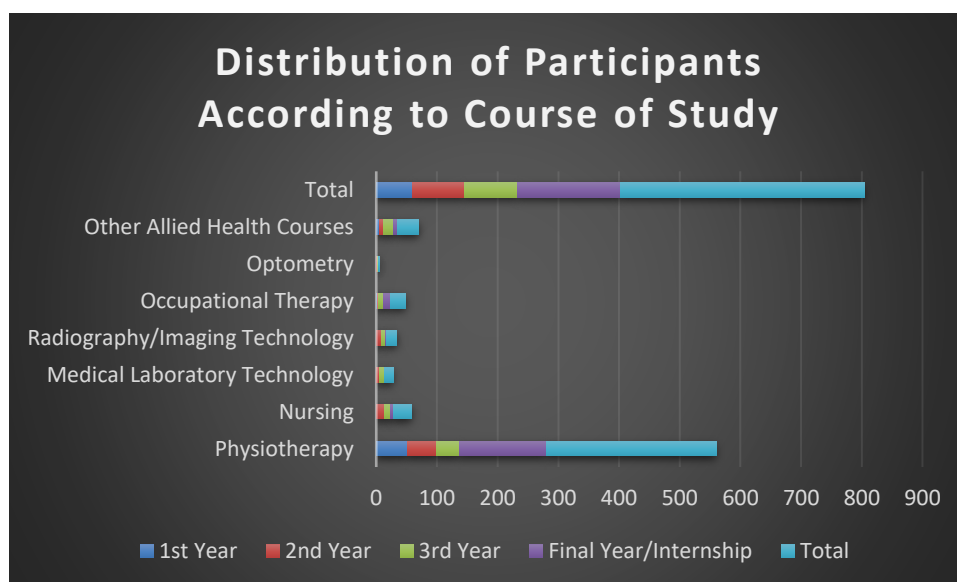
This presents the analysis and interpretation of data collected for the study titled **“Awareness & Preparedness for AI and Emerging Technologies in Healthcare.”** The study was conducted among allied healthcare students to assess their awareness,

familiarity, preparedness, perceptions, and willingness to adopt Artificial Intelligence (AI) and emerging healthcare technologies. A total of **402 participants** were included in the study. The collected data were analyzed using descriptive statistics and presented in the form of frequency and percentage distributions.

Demographic Characteristics of Participants

Table 1 Distribution of Participants According to Course of Study

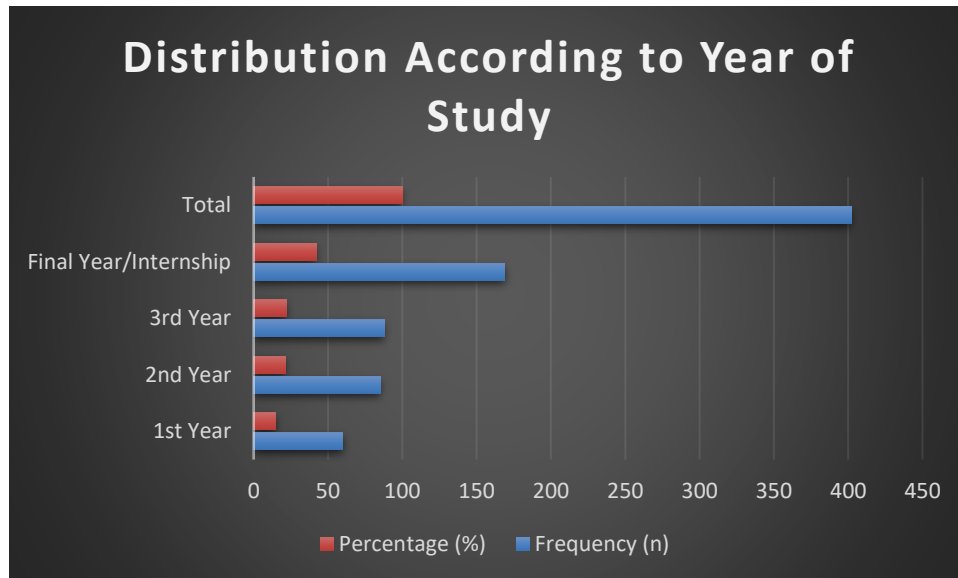
Course of Study	1st Year	2nd Year	3rd Year	Final Year/Internship	Total
Physiotherapy	52	47	39	142	280
Nursing	0	14	9	6	29
Medical Laboratory Technology	0	6	8	0	14
Radiography/Imaging Technology	0	9	6	2	17
Occupational Therapy	2	1	9	12	24
Optometry	0	2	1	0	3
Other Allied Health Courses	6	6	16	7	35
Total	60	85	88	169	402



The majority of participants belonged to the **Physiotherapy program (69.7%)**, followed by Other Allied Health courses (8.7%), Nursing (7.2%), Occupational Therapy (6.0%), Radiography/Imaging Technology (4.2%), Medical Laboratory Technology (3.5%), and Optometry (0.7%). This indicates that physiotherapy students constituted the largest proportion of the study sample.

Table 2 Distribution According to Year of Study

Year of Study	Frequency (n)	Percentage (%)
1st Year	60	14.9
2nd Year	85	21.1
3rd Year	88	21.9
Final Year/Internship	169	42.0
Total	402	100

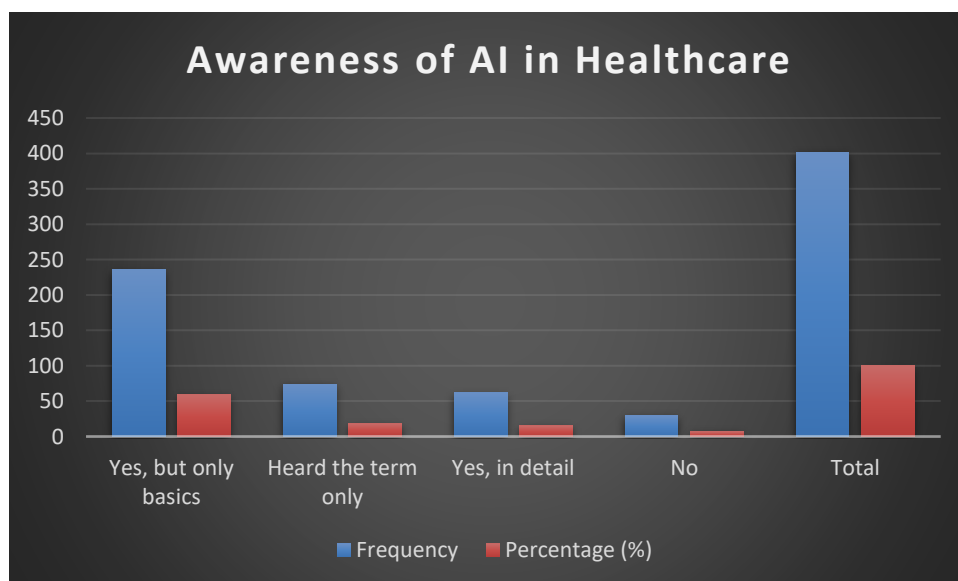


Among the participants, **42.0%** were in their final year or internship, while 21.9% were third-year students, 21.1% were second-year students, and 14.9% were first-year students. This reflects a higher representation of senior students with greater clinical exposure.

Awareness of Artificial Intelligence in Healthcare

Table 3 Awareness of AI in Healthcare

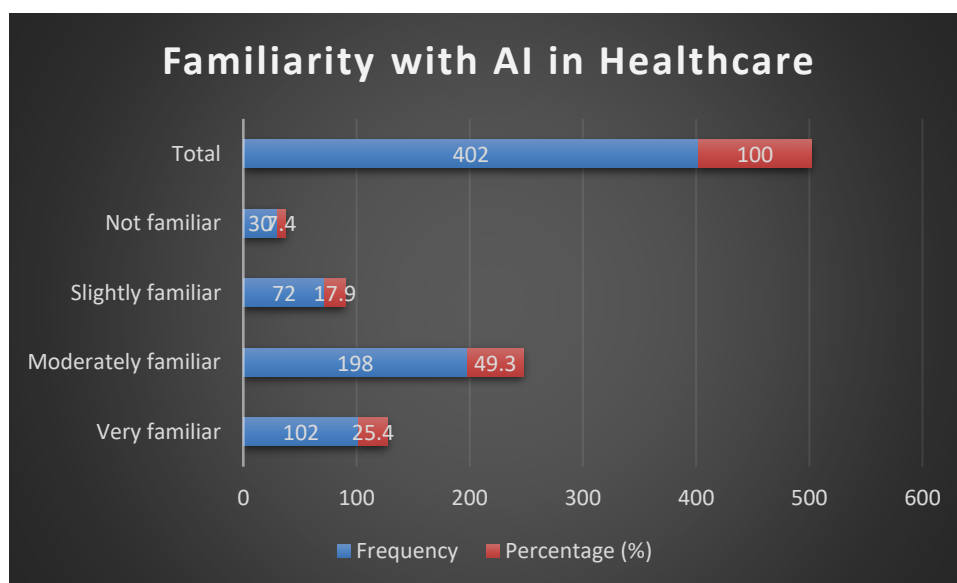
Response Category	Frequency	Percentage (%)
Yes, but only basics	236	58.7
Heard the term only	74	18.4
Yes, in detail	62	15.4
No	30	7.5
Total	402	100



A majority of respondents (**58.7%**) reported having basic awareness of AI in healthcare. Only **15.4%** possessed detailed knowledge, whereas 18.4% had merely heard the term and 7.5% were completely unaware of AI applications in healthcare.

Table 4 Familiarity with AI in Healthcare
Response Category Frequency Percentage (%)

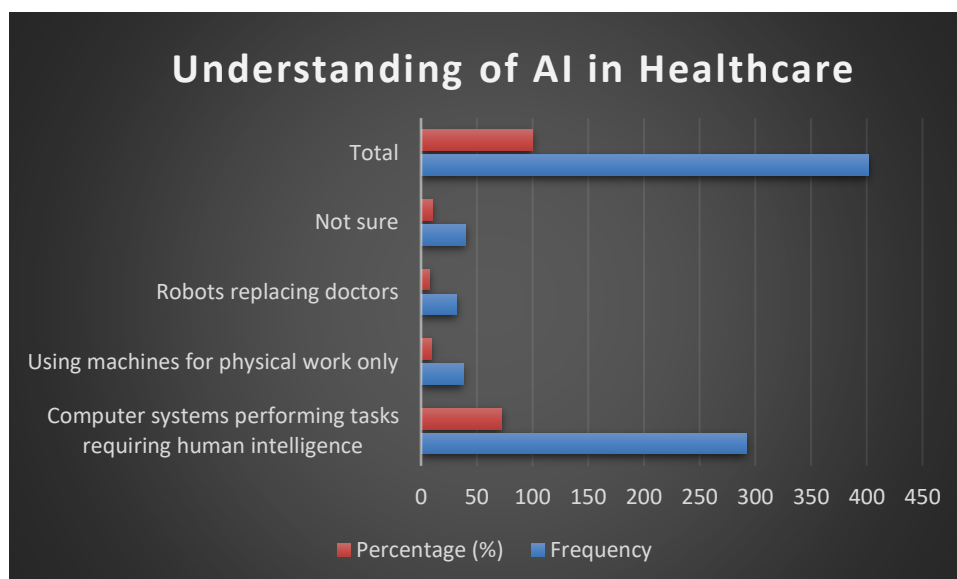
Very familiar	102	25.4
Moderately familiar	198	49.3
Slightly familiar	72	17.9
Not familiar	30	7.4
Total	402	100



Nearly half of the participants (**49.3%**) were moderately familiar with AI, while 25.4% reported being very familiar. Only 7.4% indicated that they were not familiar with AI technologies.

Table 5 Understanding of AI in Healthcare

Response Category	Frequency	Percentage (%)
Computer systems performing tasks requiring human intelligence	292	72.6
Using machines for physical work only	38	9.4
Robots replacing doctors	32	8.0
Not sure	40	10.0
Total	402	100

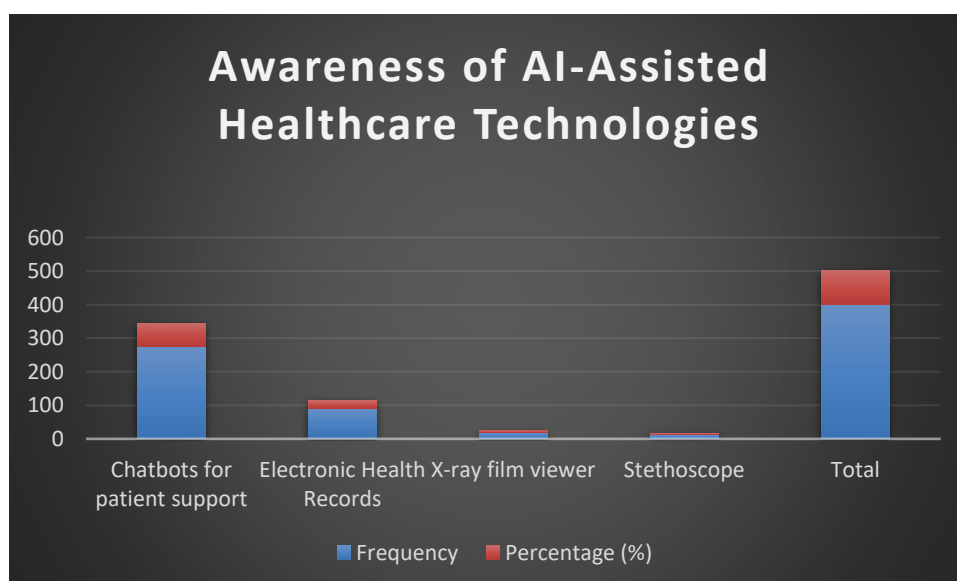


Most respondents (**72.6%**) correctly identified AI as computer systems capable of performing tasks that require human intelligence. However, misconceptions remained, with some participants believing AI referred only to machines performing physical work (9.4%) or robots replacing doctors (8.0%).

Awareness of AI Applications and Technologies

Table 6 Awareness of AI-Assisted Healthcare Technologies

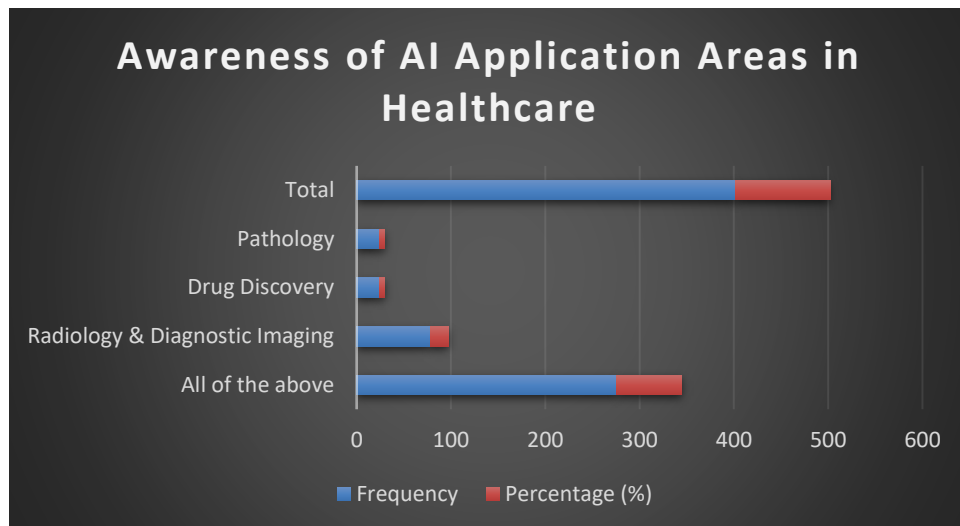
Response Category	Frequency	Percentage (%)
Chatbots for patient support	276	68.7
Electronic Health Records	92	22.9
X-ray film viewer	20	5.0
Stethoscope	14	3.4
Total	402	100



The majority of participants (**68.7%**) recognized chatbots as AI-assisted healthcare technologies, whereas fewer identified Electronic Health Records (22.9%) and other healthcare tools.

Table 7 Awareness of AI Application Areas in Healthcare

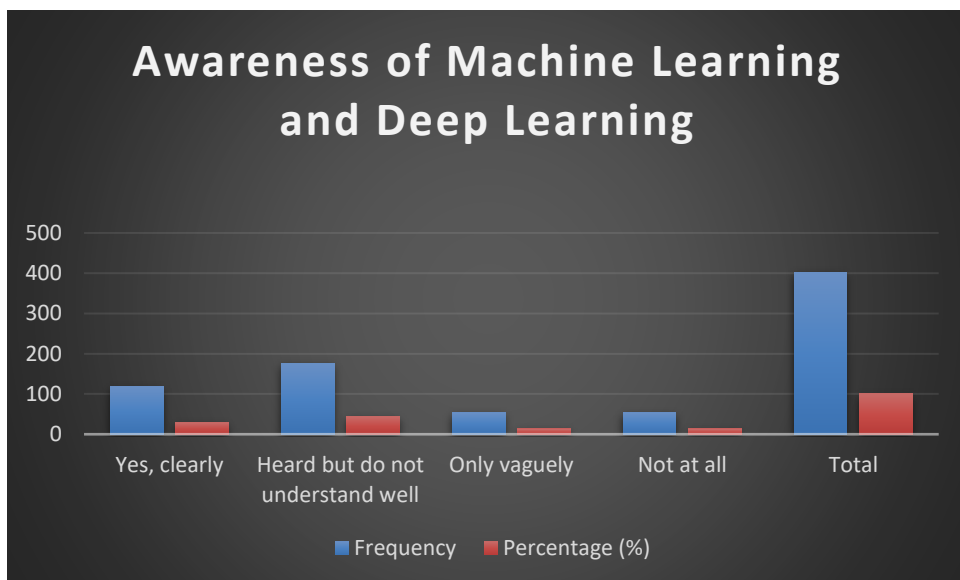
Response Category	Frequency	Percentage (%)
All of the above	276	68.7
Radiology & Diagnostic Imaging	78	19.4
Drug Discovery	24	6.0
Pathology	24	6.0
Total	402	100



A substantial proportion (**68.7%**) correctly recognized that AI can be applied across multiple healthcare domains including radiology, pathology, and drug discovery.

Table 8 Awareness of Machine Learning and Deep Learning

Response Category	Frequency	Percentage (%)
Yes, clearly	118	29.4
Heard but do not understand well	176	43.8
Only vaguely	54	13.4
Not at all	54	13.4
Total	402	100

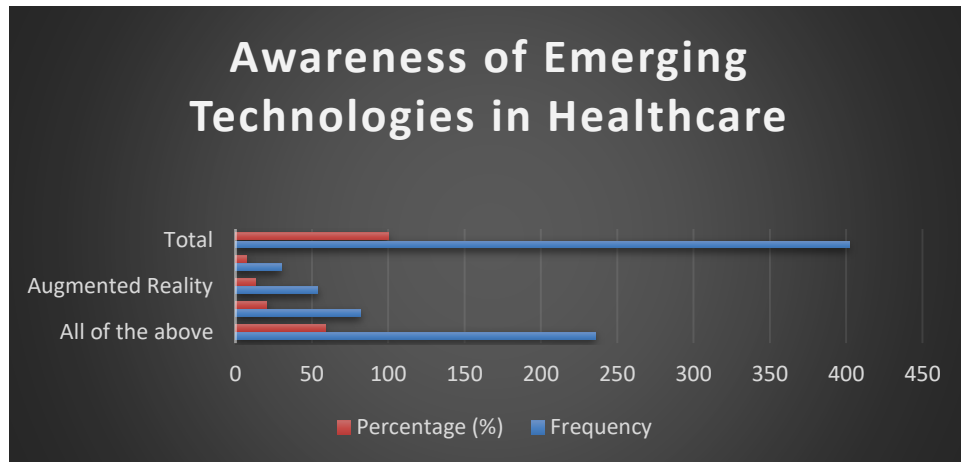


Although 73.2% had heard of machine learning and deep learning, only **29.4%** clearly understood these concepts. This suggests a knowledge gap regarding advanced AI methodologies.

Awareness of Emerging Technologies

Table 9 Awareness of Emerging Technologies in Healthcare

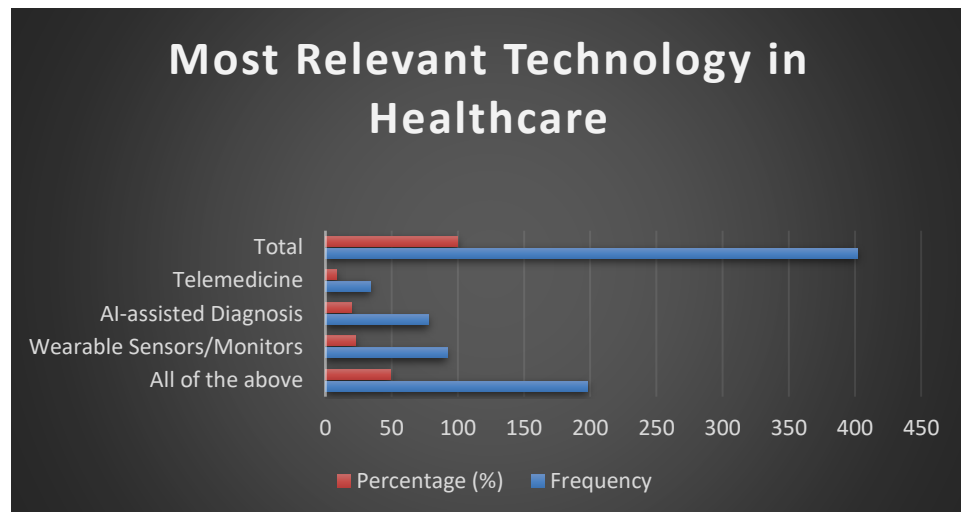
Response Category	Frequency	Percentage (%)
All of the above	236	58.7
3D Printing in Medicine	82	20.4
Augmented Reality	54	13.4
Blockchain	30	7.5
Total	402	100



More than half of the respondents (**58.7%**) recognized multiple emerging technologies in healthcare, indicating a broad awareness of technological innovations beyond AI.

Table 10 Most Relevant Technology in Healthcare

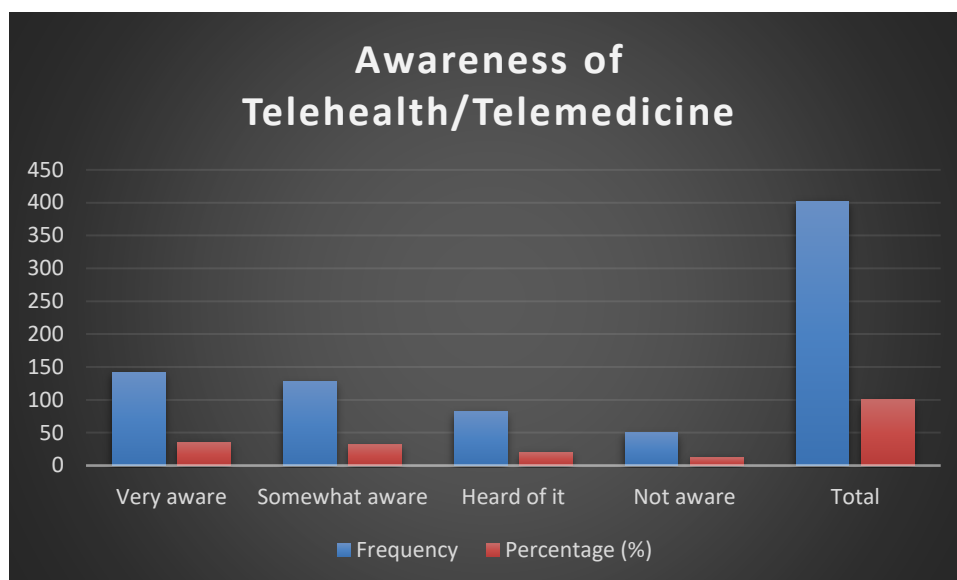
Response Category	Frequency	Percentage (%)
All of the above	198	49.3
Wearable Sensors/Monitors	92	22.9
AI-assisted Diagnosis	78	19.4
Telemedicine	34	8.4
Total	402	100



Nearly half of the participants (49.3%) perceived all listed technologies as equally relevant to healthcare, while wearable sensors and AI-assisted diagnosis were also viewed as important innovations.

Telehealth Awareness and Technology Usage
Table 11 Awareness of Telehealth/Telemedicine

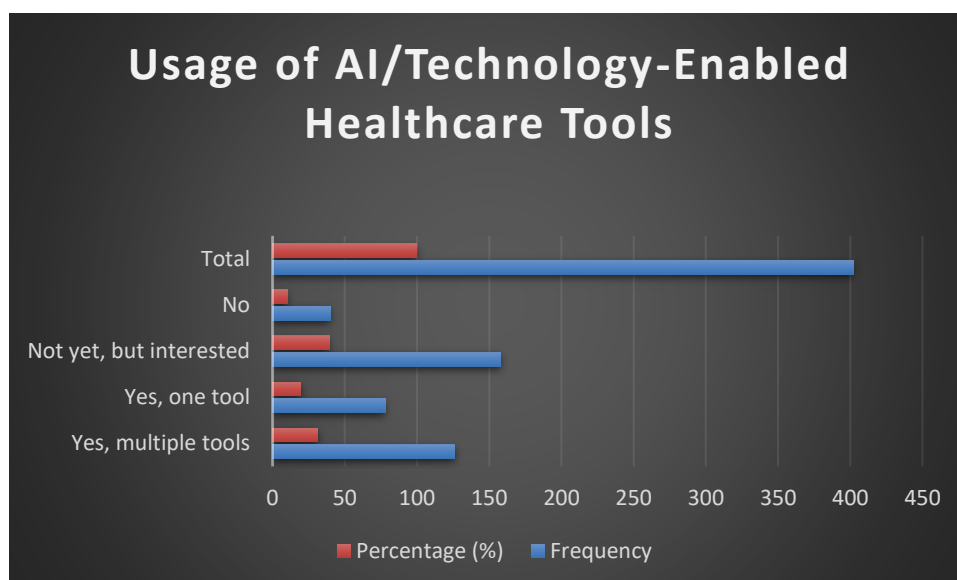
Response Category	Frequency	Percentage (%)
Very aware	142	35.3
Somewhat aware	128	31.8
Heard of it	82	20.4
Not aware	50	12.5
Total	402	100



Approximately two-thirds of respondents demonstrated moderate to high awareness of telehealth services, reflecting increasing exposure to digital healthcare delivery systems.

Table 12 Usage of AI/Technology-Enabled Healthcare Tools

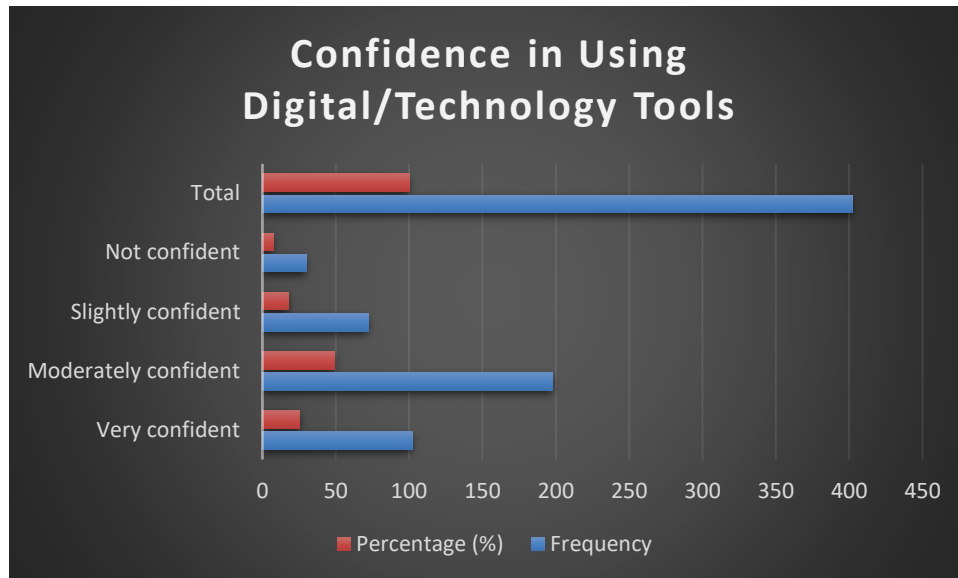
Response Category	Frequency	Percentage (%)
Yes, multiple tools	126	31.3
Yes, one tool	78	19.4
Not yet, but interested	158	39.3
No	40	10.0
Total	402	100



While 50.7% had already used at least one AI-enabled healthcare tool, the largest group (39.3%) had not yet used such technologies but expressed interest in doing so.

Table 13 Confidence in Using Digital/Technology Tools

Response Category	Frequency	Percentage (%)
Very confident	102	25.4
Moderately confident	198	49.3
Slightly confident	72	17.9
Not confident	30	7.4
Total	402	100

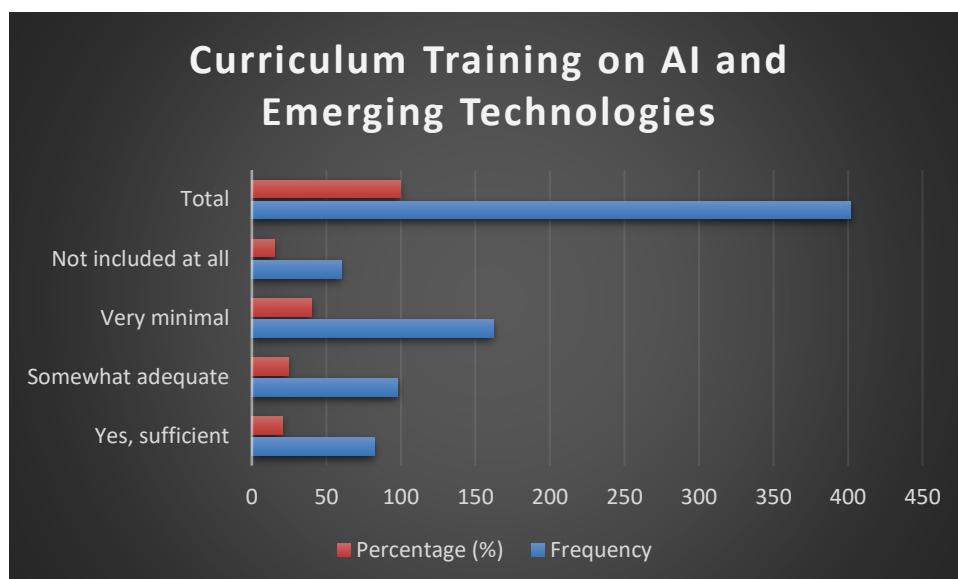


Most participants demonstrated moderate confidence (49.3%) in using digital healthcare technologies, indicating a generally positive attitude toward technology adoption.

Educational Exposure and Preparedness

Table 14 Curriculum Training on AI and Emerging Technologies

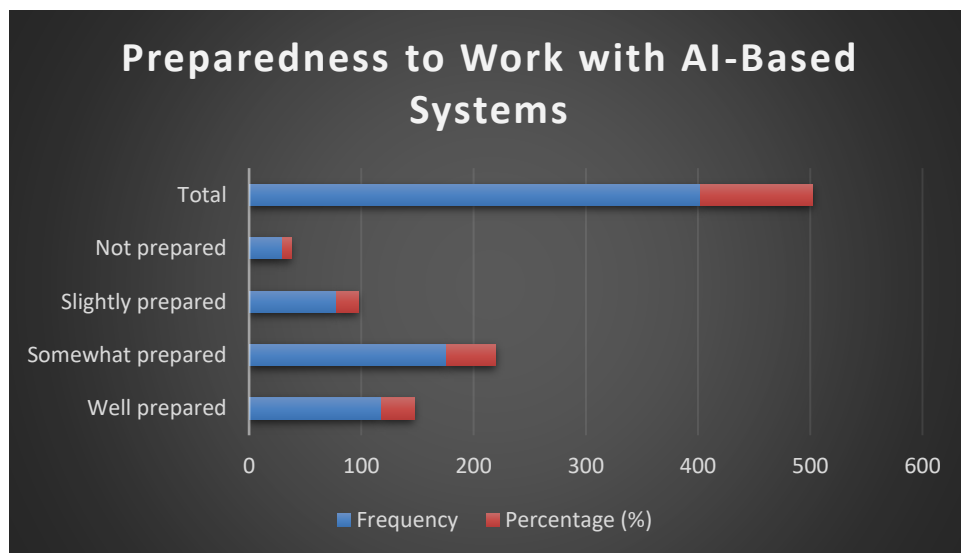
Response Category	Frequency	Percentage (%)
Yes, sufficient	82	20.4
Somewhat adequate	98	24.4
Very minimal	162	40.3
Not included at all	60	14.9
Total	402	100



A significant proportion of respondents (55.2%) reported receiving minimal or no AI-related training in their curriculum, highlighting a major educational gap.

Table 15 Preparedness to Work with AI-Based Systems

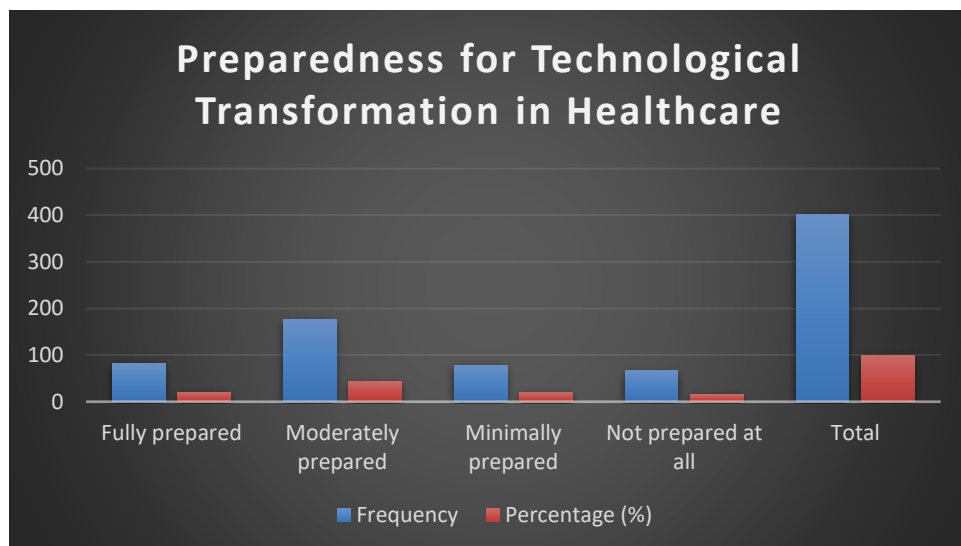
Response Category	Frequency	Percentage (%)
Well prepared	118	29.4
Somewhat prepared	176	43.8
Slightly prepared	78	19.4
Not prepared	30	7.4
Total	402	100



Most participants felt somewhat prepared (43.8%) to work with AI systems, while only 29.4% considered themselves well prepared.

Table 16 Preparedness for Technological Transformation in Healthcare

Response Category	Frequency	Percentage (%)
Fully prepared	82	20.4
Moderately prepared	176	43.8
Minimally prepared	78	19.4
Not prepared at all	66	16.4
Total	402	100

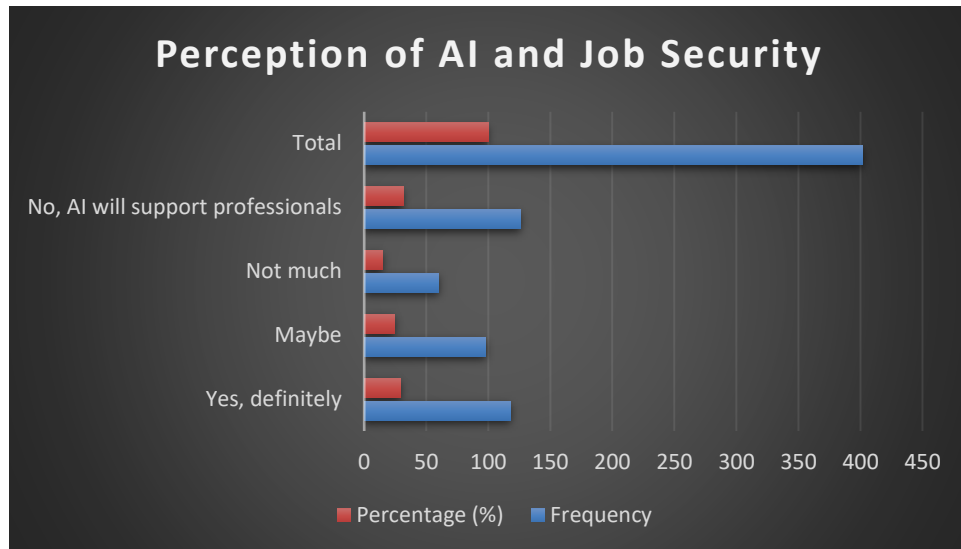


The findings indicate moderate readiness for technological transformation among students, although over one-third reported minimal or no preparedness.

Perceptions and Attitudes Toward AI

Table 17 Perception of AI and Job Security

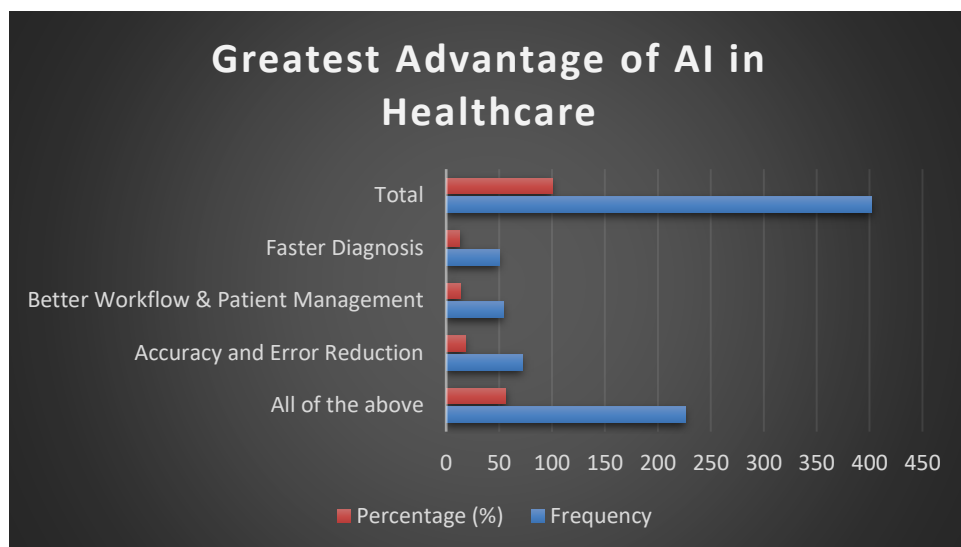
Response Category	Frequency	Percentage (%)
Yes, definitely	118	29.4
Maybe	98	24.4
Not much	60	14.9
No, AI will support professionals	126	31.3
Total	402	100



Participants expressed mixed views regarding job security. However, the largest proportion (31.3%) believed that AI would support healthcare professionals rather than replace them.

Table 18 Greatest Advantage of AI in Healthcare

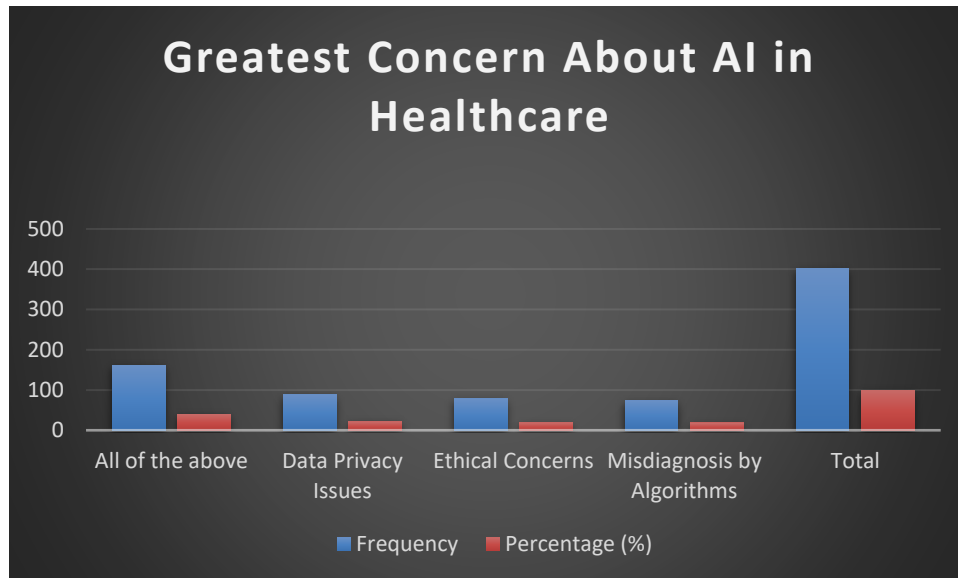
Response Category	Frequency	Percentage (%)
All of the above	226	56.2
Accuracy and Error Reduction	72	17.9
Better Workflow & Patient Management	54	13.4
Faster Diagnosis	50	12.5
Total	402	100



More than half of respondents recognized multiple benefits of AI, particularly improved accuracy, workflow efficiency, and diagnostic speed.

Table 19 Greatest Concern About AI in Healthcare

Response Category	Frequency	Percentage (%)
All of the above	162	40.3
Data Privacy Issues	88	21.9
Ethical Concerns	78	19.4
Misdiagnosis by Algorithms	74	18.4
Total	402	100

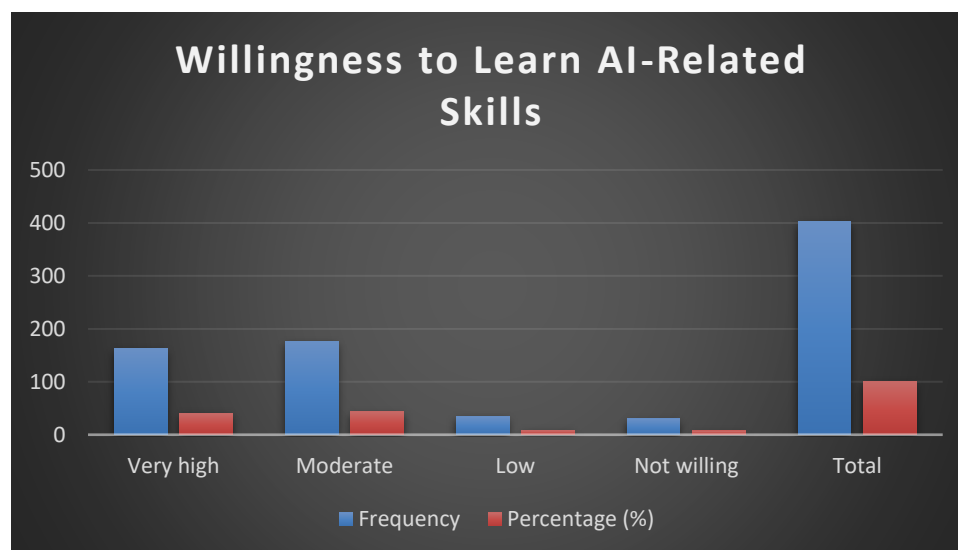


Data privacy, ethical concerns, and algorithmic errors emerged as important concerns among participants regarding AI implementation in healthcare.

Future Learning and Educational Needs

Table 20 Willingness to Learn AI-Related Skills

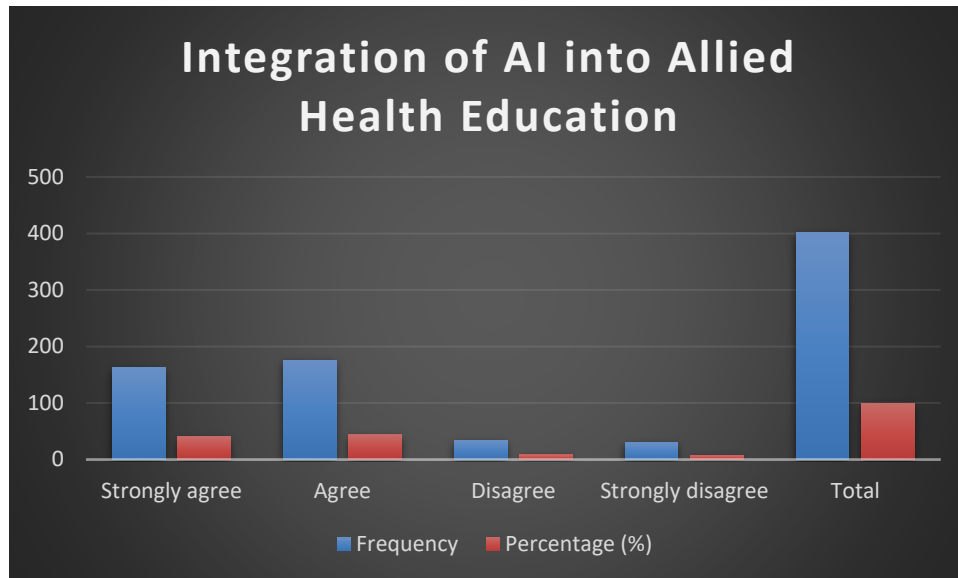
Response Category	Frequency	Percentage (%)
Very high	162	40.3
Moderate	176	43.8
Low	34	8.4
Not willing	30	7.5
Total	402	100



A large majority (**84.1%**) expressed moderate to very high willingness to learn AI-related skills, indicating strong interest in future technological education.

Table 21 Integration of AI into Allied Health Education

Response Category	Frequency	Percentage (%)
Strongly agree	162	40.3
Agree	176	43.8
Disagree	34	8.4
Strongly disagree	30	7.5
Total	402	100

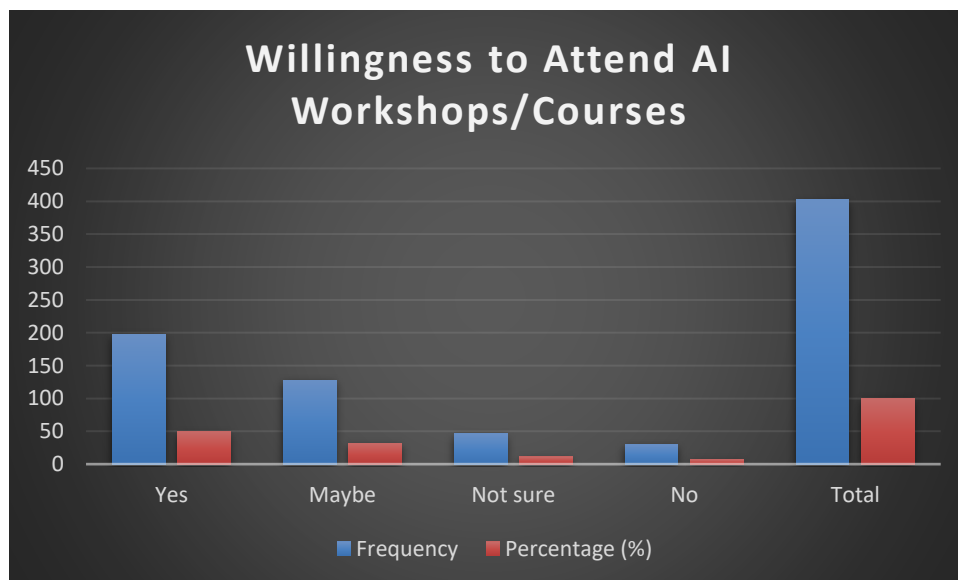


Most respondents (**84.1%**) supported integrating AI and emerging technologies into allied health curricula.

Table 22 Willingness to Attend AI Workshops/Courses

Response Category Frequency Percentage (%)

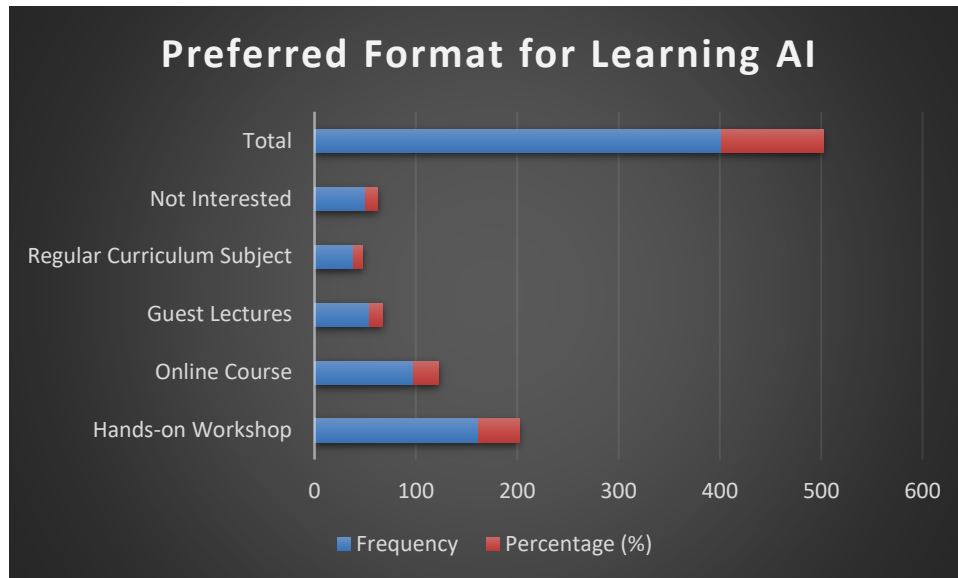
Yes	198	49.3
Maybe	128	31.8
Not sure	46	11.4
No	30	7.5
Total	402	100



Almost half of the participants were willing to attend AI workshops, while another 31.8% expressed possible interest.

Table 23 Preferred Format for Learning AI

Response Category	Frequency	Percentage (%)
Hands-on Workshop	162	40.3
Online Course	98	24.4
Guest Lectures	54	13.4
Regular Curriculum Subject	38	9.5
Not Interested	50	12.4
Total	402	100

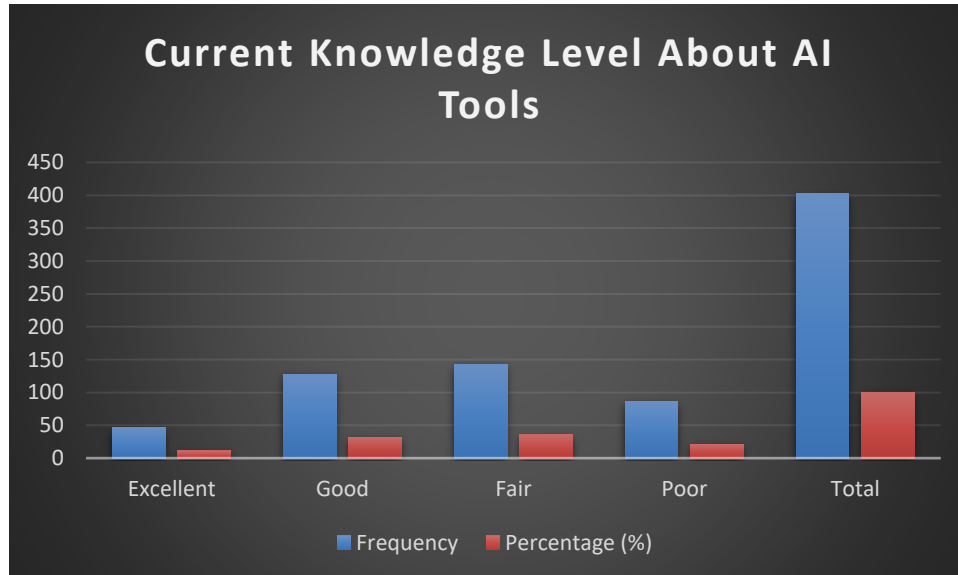


Hands-on workshops were the most preferred learning method (40.3%), suggesting a preference for practical and interactive AI training.

Table 24 Current Knowledge Level About AI Tools

Response Category Frequency Percentage (%)

Excellent	46	11.4
Good	128	31.8
Fair	142	35.3
Poor	86	21.4
Total	402	100

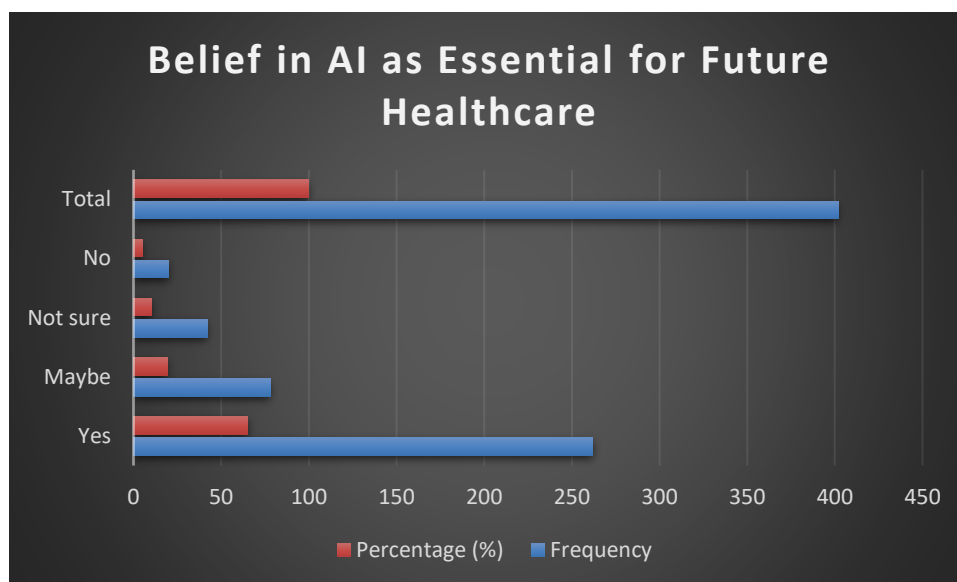


Most participants rated their current AI knowledge as fair (35.3%) or good (31.8%), while only 11.4% considered their knowledge excellent.

Table 25 Belief in AI as Essential for Future Healthcare

Response Category Frequency Percentage (%)

Yes	262	65.2
Maybe	78	19.4
Not sure	42	10.4
No	20	5.0
Total	402	100



The majority of respondents (65.2%) believed that AI will be essential in the future of healthcare, demonstrating a positive outlook toward technological advancement.

Discussion:

The present study assessed awareness and preparedness regarding Artificial Intelligence (AI) and emerging healthcare technologies among allied healthcare students. The findings demonstrated moderate awareness and familiarity with AI among participants, with most students reporting basic knowledge and understanding of AI concepts. Similar findings have been reported in previous studies where healthcare students demonstrated moderate levels of AI awareness but limited detailed knowledge and practical understanding of AI applications (10).

The present study further demonstrated that participants recognized the role of AI in healthcare applications such as diagnosis, decision-making, and patient management. Previous literature has reported that AI technologies have increasingly contributed to improving healthcare efficiency, diagnostic accuracy, and clinical outcomes through predictive and decision-support systems (1). However, despite this awareness, understanding of more advanced concepts such as machine learning and deep learning remained limited among participants, suggesting that exposure to AI-related concepts does not necessarily indicate comprehensive understanding.

Awareness regarding emerging healthcare technologies such as telemedicine, wearable technologies, and digital healthcare tools was also observed among participants. The increasing integration of digital technologies within healthcare systems and educational settings may explain this

finding. Similar findings were reported by Weber et al. (11), who observed that healthcare professionals demonstrated varying attitudes toward AI adoption, with knowledge of AI significantly influencing perceptions and willingness to use AI-enabled technologies. The study further suggested that limited understanding of AI may contribute to fear and skepticism regarding its implementation in healthcare practice.

Jackson et al. (12), who found that medical students expressed a strong demand for structured AI training despite having positive perceptions regarding AI applications in healthcare. The study also highlighted concerns regarding ethical issues and professional responsibilities, emphasizing the need for integrating AI education into healthcare curricula.

The present study also demonstrated a positive attitude toward AI learning, with most participants expressing willingness to acquire AI-related skills and support integration of AI into allied healthcare education. Preference for hands-on workshops identified in this study suggests that practical and experiential learning approaches may enhance understanding and confidence regarding AI technologies. Similar findings have indicated that active learning strategies and practical exposure significantly improve AI literacy among healthcare students.

Conclusion:-

The study demonstrates moderate awareness and familiarity with artificial intelligence and emerging

technologies among allied health students, but limited understanding of advanced AI concepts and inadequate formal curricular exposure. Despite these gaps, students showed positive attitudes toward AI education, with a strong willingness to acquire AI-related skills and support its integration into allied health curricula. These findings highlight the need for structured, practical, and curriculum-based AI education to improve students' preparedness for technology-driven healthcare.

Limitations:

Data were self-reported and collected through an online questionnaire, which may introduce response and selection bias.

Future Recommendations:

Future studies should include larger and more diverse samples across multiple institutions and healthcare disciplines. Longitudinal and interventional studies are recommended to evaluate whether structured, hands-on AI training improves students' knowledge, confidence, and practical readiness. Development and validation of standardized AI-literacy assessment tools for allied health education should also be prioritized.

8. Conflict of Interest: Nil

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