ORIGINAL RESEARCH ARTICLE

Attitude, Readiness, and Predictors of AI Adoption among Undergraduate Medical Students

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DOI: 10.55489/njcm.160920255559

ABSTRACT

Background: Artificial Intelligence (AI) is revolutionizing health care. Aim of study was to assess the attitude and readiness towards AI and their predictors among undergraduate medical students.

Methods: A cross-sectional study was conducted among 362 medical students at a West Bengal institute from November 2024 to April 2025, excluding the 3rd Prof Part II MBBS 2020 batch. Sit et al.'s attitude towards AI and Karaca et al.'s Medical artificial intelligence readiness scale for medical students (MAIRS-MS) tools were used. Multiple linear regression using stepwise method was used to determine the predictors.

Results: Only 19.9% students received teaching/training in AI. Mean score of 'attitude' and 'readiness' towards AI were 35.9±7.3 and 70.0±16.8 respectively. Nearly 43% understood AI limitations (43.7%) and could ethically use AI technology (43.1%). Familiarity with AI terminologies (ß=0.314, p<0.001) and AI training (ß=5.930, p<0.001) positively predicted attitude towards AI. Year of study (2nd prof- ß=4.24, p=0.018; 3rd Prof Part I- ß=8.63, p<0.001), training in AI (ß=7.48, p<0.001) and attitude towards AI (ß=1.37, p<0.001) positively predicted readiness towards AI

Conclusions: Teaching/training medical students in AI favors their attitude towards AI, both of which further impacts readiness towards AI thus promoting integration of AI in medical curricula.

Keywords: Algorithms, Deep Learning, Education Medical, Generative Artificial Intelligence, Supervised Machine learning, Unsupervised Machine learning

ARTICLE INFO

Financial Support: None declared

Conflict of Interest: The authors have declared that no conflict of interests exists.

Received: 11-05-2025, **Accepted**: 31-07-2025, **Published**: 01-09-2025

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How to cite this article: Sarkar M, Sain S, Mukhopadhyay P, Sarkar AP. Attitude, Readiness, and Predictors of AI Adoption among Undergraduate Medical Students. Natl J Community Med 2025;16(9):859-866.
DOI: 10.55489/njcm.160920255559

www.njcmindia.com | pISSN: 0976-3325 | eISSN: 2229-6816 | Published by Medsci Publications

INTRODUCTION

Artificial Intelligence (AI) has rapidly drawn lots of attention among health care practitioners due to its increasing applications in different spheres of health including research. AI is a remarkable scientific breakthrough dating back to 1950 and has changed the modern world and is progressively evolving.[1] AI can be understood broadly as machines ability to imitate human intelligent behavior.[2] It is the ability of the computer to learn from experience and modify its processing based on new data.[2] Many AI applications are being increasingly used nowadays to aid diagnosis in radiology, pathology, neurosurgery, dermatology, pharmacology, and even precision oncology etc.[2–5] In recent days the utility of AI has so much increased in medicine in day-to-day life from diagnosis, decision-making, robotic surgeries to personalized treatments, that medical personnel cannot advance in career without knowing the basics of AI.

Recognizing the role of AI in health care advancement, it is imperative that medical students who are the budding doctors should be aware about the basics of AI and its evolving applications in health. AI has also played significant role in easing learning abilities, addressing time constraints of students and thus alleviating burden on medical students.[6] There is an urgent need for integrating AI in Medical curriculum. Only a few countries have begun to integrate it in their medical curriculum. In this context, it is important to know the attitude and readiness of medical students towards AI.

At the same time there are some limitations and ethical issues of AI applications which should be understood by the medical students. There are ethical concerns regarding data privacy, data security and even lack of human feelings like empathy or sympathy etc. while providing health care using AI. Furthermore, AI is susceptible to algorithmic bias, which means the possibility of producing biased results when trained on biased or skewed data, not representative of real-world scenarios. There are limited researches from India seeking perceptions on AI among medical students, far less are researches investigating medical students' attitude and readiness towards AI.[7–11] Most of these studies lack the factors affecting medical students' attitude and readiness towards AI, so that addressing those factors, AI can be integrated into medical curricula and clinical practice.

With this background, the study was conducted with the objective to assess the attitude and readiness towards AI in medical field among undergraduate medical students of a tertiary care center at Bankura district, West Bengal and to identify the factors influencing them. This research might enhance medical education by identifying AI knowledge gaps, reinforce the need for AI teaching/training, address ethical concerns, and guide policymakers in effectively integrating AI into medical curricula and practice.

METHODOLOGY

An institution based observational study with cross-sectional design was conducted among undergraduate MBBS students of a tertiary care center of Bankura district of West Bengal for a period of 6 months from November 2024 to April 2025. All undergraduate medical students of the institute were the study population. During the data collection period, five undergraduate MBBS batches were running at that time. Students who were available on the day of data collection and provided written informed consent for the study were included in the study while students who were the examinee batch of 3rd Prof Part II MBBS Examinations, 2025 (i.e. 3rd Prof Part II MBBS 2020 batch) were excluded from the study due to examination-related unavailability.

Sample size and sampling technique- From a study in central India, it was found that the average score of Medical artificial intelligence readiness scale for medical students (MAIRS-MS) was 74.61 ± 10.137. [7] Sample size was computed using the formula n= $\frac{z_{\alpha}^2 s^2}{d^2}$, where, Z_{α} = standardized normal deviate =1.96 at 95% confidence level, s = sample standard deviation= 10.137, [7] d= precision/ margin of error= 2% of 74.61= 1.49. A design effect of 2 was applied to account for potential clustering of responses within MBBS batches. With an adjustment for design effect of 2, the sample size came out to be 354.6 ≈355 i.e., minimum 89 students per batch (1st Prof-2024, 2nd Prof-2023, 3rd Prof Part 1-2022, 3rd Prof Part 2-2021). Considering 10% non-response rate, the final sample size required was 394 i.e., 99 students per batch. Finally, 100 students from each of the 4 batches were selected by systematic random sampling. Sampling frame was created based on their roll numbers from attendance register. The total number of students per batch was 200; therefore, the sampling interval was 200/100=2. However, 38 students overall were absent. Final number of students selected from 1st Prof-2024, 2nd Prof-2023, 3rd Prof Part 1-2022 and 3rd Prof Part 2-2021 batches were 92, 91, 90 and 89 respectively. Hence, only 362 students could provide written informed consent and were ultimately included in the final analysis.

Study variables were age, gender, year of study, residence, familiarity with some AI terms, sources of information regarding AI, AI applications used, difficulties faced while using AI, attitude and readiness towards AI in medical field concerned variables.

Study tools were pre-designed pre-tested structured questionnaire, attitude towards AI scale by Sit et al.[12] and Medical AI Readiness Scale for Medical Students (MAIRS-MS) by Karaca et al.[13]

Sit et al. attitude towards AI questionnaire is a valid and reliable tool with 5-point Likert scale, having a total of 11 items for the attitude domain, with options for each item ranging from 'strongly agree' (score 5) to 'strongly disagree' (score 1). The Item

number 3 in the attitude domain of the scale is reversely scored ('strongly agree'- score 1; 'strongly disagree- score 5'). Overall attitude score was calculated by sum of the scores for each item and higher total scores generally indicated a more positive attitude towards AI in medical field.[12]

The MAIRS-MS is a valid and reliable tool with 22 items designed to measure medical students' readiness for AI technologies and applications in medicine. The scale has four factors/ domains: cognition (1-8 items), ability (9-16 items), vision (17-19 items), and ethics (20-22 items). The MAIRS-MS uses a 22 to 110 scale, with each question having a specific scoring range. It has five-point Likert-type rating scale for each item (1-strongly disagree to 5-strongly agree). Higher scores indicated a greater perceived readiness for AI in medicine.[13]

The familiarity with different AI terms (artificial Intelligence, machine learning, supervised learning, unsupervised learning, deep learning, neural networks, algorithms) were given score as never heard=0, heard a few times=1, heard often=2, can understand=3, can explain=4.[8,11] The scores obtained for these 7 terms were summed up to form 'Total familiarity score' which varied from score 0 to 28.

Validity and Reliability of study tool- The 'Familiarity with different AI terminologies' scale was assessed for content validity after obtaining agreements on each item from 6 subject experts from the Department of Community Medicine of the institute. The scale-level content validity index based on the average method (S-CVI/Ave) for familiarity with AI terminologies scale 0.95. Overall study tool was also assessed for content validation from another six subject experts from the same Department of the institute and SCVI/Ave obtained was 0.96. The entire instrument was pilot tested on 40 interns of the same institute to check for any discrepancy, clarity, language, and functionality of all-sub-sections of the questionnaire. It was modified accordingly. Final instrument had three sections, i.e., sociodemographic and AI related variables, attitude towards AI and readiness towards AI. Cronbach's alpha was calculated for each section to assess the internal consistency of the entire questionnaire. Cronbach's alpha obtained was 0.78 for socio-demographic and AI related variables, 0.74 for attitude towards AI and 0.76 for readiness towards AI indicating that the study tool was reliable.

Study technique and data collection procedure- After obtaining approval from the Institutional Ethics Committee, the students were briefed about the study purpose and voluntary nature of participation. They were administered the questionnaire for self-administration after obtaining written informed consent. The data collection took approximately 5-7 minutes. To avoid missing data and ensure completeness of data collection, each proforma was thoroughly checked for any missing data before submission.

Ethical Issues- The study was approved by Institutional Ethics Committee (vide No. BSMC/IEC/4153 dated 22-11-2024). Written informed consent of the respondents was taken. Anonymity and confidentiality were maintained.

Statistical analysis- Data were entered and analyzed using Jamovi software for windows release solid, and version 2.3.28. Qualitative data were expressed in frequency and percentage while quantitative data were additionally expressed in terms of mean, median, standard deviation, range, interquartile range etc. Multiple linear regression was done using stepwise method to identify the predictors of attitude towards AI, readiness towards AI and subdomains (cognition, ability, vision, and ethics) of readiness towards AI. For all statistical purposes, p value less than 0.05 were considered significant.

RESULTS

The mean age of the students was 21.4 ± 1.71 years, median was 21 years and varied from 18 to 26 years. Majority (57.2%) belonged to the age group of 21 years or below. Majority (66.3%) were male. Almost equal representations from all years of MBBS was there with 1st Professional (25.4%), 2nd Professional (25.1%), 3rd Professional Part I (24.9%) and 3rd Professional Part II (24.6%). Majority (56.1%) resided in urban areas.

Table 1: Introductory AI related variables of Study population (n=362)

Variables	Number (%)
Source(s) of information of AI#	
Social media	340 (93.9)
Friends	231 (63.8)
Television	162 (44.8)
Newspaper	143 (39.5)
Journal or Textbooks	142 (39.2)
Family	100 (27.6)
Teaching or training in AI	72 (19.9)
AI application(s) used (n=357*) #	
Meta AI	310 (86.8)
ChatGPT	291 (81.5)
Google assistant	281 (78.7)
Google Gemini	233 (65.3)
Alexa	142 (39.8)
Siri	129 (36.1)
August AI	19 (5.3)
Research Rabbit	15 (4.2)
Difficulties faced while using AI application(s) (n=357*) #	
Paid version	188 (52.7)
Limitation of data	164 (45.9)
Unable to interpret	122 (34.2)
Faulty data	101 (28.3)
Teaching/ training in AI	
Received	72 (19.9)
Not received	290 (80.1)

*n=357 as 5 students have not used AI applications; # Multiple responses present

Social media was the commonest source of information for most (93.9%) of the students. Only 19.9% students had received teaching/ training in AI. Meta AI and ChatGPT were the common AI applications used. 'Paid version' was the most common difficulty faced by students while using AI applications. Table 1 shows the introductory AI related information.

Approximately 38% students had heard often AI and machine learning. 25.7% and 38.1% had never heard of supervised and unsupervised learning respectively. Table 2 shows the familiarity of students with different AI terminologies in an ordinal scale.

Table 3 shows the attitude towards AI among undergraduate MBBS students. 19.1% students strongly agreed and 44.5% students agreed that AI will play an important role in health care. 7.2% and 21.0% of students strongly agreed and agreed respectively that they were less likely to consider a career in Radiology given the advancement of AI. 11.3% and 33.4% students strongly agreed and agreed that some specialties will be replaced by AI during their lifetime. 17.1% and 37.6% students strongly agreed and agreed that all medical students should receive teaching in AI. Almost half of the students (49.2%) strongly agreed or agreed that they had an understanding of the limitations of AI.

On a scale of 22-110, the mean score of overall readiness towards AI using MAIRS-MS scale was 70.0 ± 16.8. Table 4 shows the summary measures of score of familiarity with AI terminologies, attitude towards AI, overall readiness towards AI and its domains i.e. cognition, ability, vision, and ethics.

Table 2: Familiarity towards AI terminologies (n=362)

AI terminologies	Never heard n (%)	Heard a few times n (%)	Heard often n (%)	Can understand n (%)	Can explain n (%)
Artificial Intelligence	4 (1.1)	23 (6.4)	138 (38.1)	116 (32.0)	81 (22.4)
Machine learning	32 (8.8)	84 (23.2)	139 (38.4)	66 (18.2)	41 (11.3)
Supervised learning	93 (25.7)	112 (30.9)	84 (23.2)	51 (14.1)	22 (6.1)
Unsupervised learning	138 (38.1)	87 (24.0)	71 (19.6)	46 (12.7)	20 (5.5)
Deep learning	68 (18.8)	111 (30.7)	94 (26.0)	60 (16.6)	29 (8.0)
Neural network	125 (34.5)	87 (24.0)	83 (22.9)	39 (10.8)	28 (7.7)
Algorithms	30 (8.3)	75 (29.0)	142 (39.2)	68 (18.8)	47 (13.0)

Table 3: Attitude towards AI among Undergraduate Medical Students (n=362)

Attitude towards AI	Strongly agree or agree (%)	Neither agree nor disagree (%)	Disagree or Strongly Disagree (%)
AI will play an important role in healthcare	230 (63.6)	87 (24.0)	45 (12.4)
I am *LESS* likely to consider a career in radiology given the advancement of AI	102 (28.2)	150 (41.4)	110 (30.4)
Some specialties will be replaced by AI during my lifetime	162 (44.8)	88 (24.3)	112 (30.9)
I have an understanding of the basic computational principles of AI	137 (37.9)	105 (29.0)	120 (33.1)
I am comfortable with the nomenclature related to artificial intelligence	143 (39.5)	125 (34.5)	94 (26.0)
I have an understanding of the limitations of AI	178 (49.2)	114 (31.5)	70 (19.3)
Teaching in artificial intelligence will be beneficial for my career	194 (53.6)	95 (26.2)	73 (20.2)
All medical students should receive teaching in artificial intelligence	198 (54.7)	99 (27.3)	65 (18.0)
At the end of my medical degree, I will be confident in using basic healthcare AI tools if required	181 (50.0)	112 (30.9)	69 (19.1)
At the end of my medical degree, I will better understand the methods used to assess healthcare AI algorithm performance.	192 (53.0)	97 (26.8)	73 (20.2)
Overall, At the end of my medical degree, I feel I will possess the knowledge needed to work with AI in routine clinical practice	181 (50.0)	112 (30.9)	69 (19.1)

Table 4: Summary measures of score of familiarity with AI terminologies, attitude towards AI, readiness towards AI along with its domain-wise scores obtained among undergraduate medical students (n=362)

Variables	Mean (SD)	Median (IQR)	Minimum	Maximum
Familiarity score of AI terminologies	12.4 (6.3)	21.0 (3.0)	18	26
Attitude towards AI (Sit score)	35.9 (7.3)	37.0 (9.0)	15	53
Readiness towards AI (Overall MAIRS-MS score)	70.0 (16.8)	70.0 (18.0)	22	110
Cognition	24.1 (6.1)	24.0 (8.0)	8	40
Ability	26.1 (6.7)	26.0 (7.0)	8	40
Vision	9.9 (2.7)	10.0 (3.0)	3	15
Ethics	10.0 (2.9)	10.0 (3.0)	3	15

Table 5: Multiple Linear Regression model showing predictors of Attitude towards AI among undergraduate medical students (n=362)

Predictors	Univariable		Multivariable	
	ß (95% CI)	p value	ß (95% CI)	p value
Intercept			30.844 (29.349-32.340)	<0.001
Age (years)	-0.130 (-0.571-0.310)	0.561		
Gender (Male)	0.848 (-0.739-2.43)	0.294		
Year of study (2nd Prof)	-0.660 (-2.759-1.44)	0.537		
Year of study (3rd prof Part I)	1.565 (-0.540-3.67)	0.144		
Year of study (3rd Prof Part II)	-1.002 (-3.113-1.11)	0.351		
Residence (Urban)	1.67 (0.164-3.17)	0.030		
Familiarity score of AI terminologies	0.351 (0.238-0.464)	<0.001	0.314 (0.207-0.421)	<0.001
Teaching/ Training in AI (Received)	6.42 (4.66-8.18)	<0.001	5.930 (4.236-7.624)	<0.001

Reference category for categorical predictors: Gender-Female; Year of study- 1st Prof; Residence- Rural; Teaching/ training in AI- No teaching/ training in AI

Table 6: Multiple linear regression models showing predictors of readiness towards AI (MAIRS-MS) and all domains of MAIRS-MS (n=362)

Dependent variable	ß (95% CI)	p value	F (df), p value	R^2, adjusted R^2, Cohen's f^2
Cognition				
Intercept	6.7 (4.03-9.35)	<0.001	43.82 (6,355), <0.001	0.43, 0.42, 0.75
Year of study (2nd Prof)	1.27 (-0.13-2.7)	0.07		
Year of study (3rd Prof Part I)	3.61 (2.14-5.09)	<0.001		
Year of study (3rd Prof Part II)	1.12 (-0.29-2.53)	0.12		
Familiarity towards AI terminologies score	0.11 (0.027-0.20)	0.010		
Teaching / Training in AI (Received)	3.00 (1.67-4.34)	<0.001		
Sit's attitude score	0.39 (0.31-0.46)	<0.001		
Ability				
Intercept	4.65 (1.84-7.46	0.001	62.7 (5,356), <0.001	0.47, 0.46, 0.89
Year of study (2nd Prof)	1.03 (-0.43-2.49)	0.165		
Year of study (3rd Prof Part I)	2.11 (0.61-3.6)	0.006		
Year of study (3rd Prof Part II)	0.03 (-1.43-1.50)	0.965		
Teaching / Training in AI (Received)	2.20 (0.78-3.61)	0.002		
Sit's attitude score	0.56 (0.49-0.64)	<0.001		
Vision				
Intercept	1.98 (0.77-3.20)	0.001	39.0 (6, 355), <0.001	0.40, 0.39, 0.67
Gender (Female)	0.77 (0.31-1.24)	0.001		
Year of study (2nd Prof)	0.88 (0.26-1.49)	0.006		
Year of study (3rd Prof Part I)	1.26 (0.63-1.90)	<0.001		
Year of study (3rd Prof Part II)	0.27 (-0.35-0.89)	0.387		
Teaching / Training in AI (Received)	1.03 (0.43-1.63)	<0.001		
Sit's attitude score	0.19 (0.16-0.22)	<0.001		
Ethics				
Intercept	1.58 (0.29-2.88)	0.017	38.1 (6, 355), <0.001	0.39, 0.38, 0.64
Residence (Urban)	0.50 (0.01-0.98)	0.045		
Year of study (2nd Prof)	0.68 (0.007-1.36)	0.048		
Year of study (3rd Prof Part I)	1.10 (0.40-1.79)	0.002		
Year of study (3rd Prof Part II)	0.19 (-0.48-0.86)	0.577		
Teaching / Training in AI (Received)	1.05 (0.40- 1.70)	0.002		
Sit's attitude score	0.21 (0.17-0.24)	<0.001		
Overall MAIRS-MS				
Intercept	15.6 (8.81-22.31)	<0.001	72.7 (5, 356), <0.001	0.51, 0.50, 1.04
Year of study (2nd Prof)	4.24 (0.74-7.74)	0.018		
Year of study (3rd Prof Part I)	8.63 (5.04-12.21)	<0.001		
Year of study (3rd Prof Part II)	1.94 (-1.58-5.45)	0.279		
Teaching / Training in AI (Received)	7.48 (4.09-10.88)	<0.001		
Sit's attitude score	1.37 (1.19-1.56)	<0.001		

Reference category for categorical predictors: Gender-Male; Year of study- 1st Prof; Residence- Rural; Teaching/ training in AI- No teaching/ training in AI

Mean score in the vision domain was 9.9 ± 2.7. Approximately 43% students could explain the limitations (43.7%) and strengths & weakness (43.1%) of AI technology. While 47% students could foresee the opportunities and threats that AI technology could create.

Mean score obtained in the ethics domain was 10.39 ± 2.9. Less than half of total students (45.3%) strongly agreed or agreed that they could use health data in accordance with legal and ethical norms. Similarly, 43.1% students strongly agreed or agreed that they could use AI technologies under ethical principles.

Likewise, 47.3% students either strongly agreed or agreed that they could follow legal regulations regarding the use of AI technologies.

Table 5 shows the predictors of attitude towards AI. Multiple linear regression was run to predict the attitude towards AI through stepwise method. Regression was run initially using 6 predictor variables i.e., age, gender, year of study, residence, familiarity scores of AI terminologies and teaching/ training in AI. Step by step the variables which were not significant were removed from the model till all the predictors were significant. In the final model, the familiarity score of AI terminologies and teaching/ training in AI significantly predicted attitude towards AI, $F(2,359) = 44.8$, $p<0.001$, $R^2 = 0.20$, Cohen's $f^2 = 0.25$.

Table 6 shows predictors of readiness towards AI and all its domains using multiple linear regression through stepwise method. All the assumptions were met. Using the model builder, step by step the variables which were not significant were removed from the model until all the predictors became significant. In the final model of overall MAIRS-MS, age and gender were not significant and therefore removed from the model. It was observed that in the final model the predictors of overall readiness towards AI were year of study i.e., 2nd Professional and 3rd Professional Part I with reference to 1st Professional MBBS, received teaching/ training in AI and attitude towards AI score. The model was statistically significant and predicted 50% of the variability in readiness.

Discussion

A cross-sectional study was conducted among undergraduate medical students with an overall aim to assess the attitude and readiness towards AI and to determine the factors affecting the attitude and readiness towards AI. The current study revealed that the mean age of the students was 21.4 ± 1.71 years. This was like the study done by Dhurandhar et al. where the mean age of students was 21.39 ± 1.77.[7]

Most of the students' source of information about AI was social media (93.9%) in this study. Alshanberi AM et al. also revealed that social media was the most common source of information (57%).[14] Only 19.9% students had received teaching/ training in AI in our study likewise, 20.2% had attended a course on AI in the study done by Tezpal M et al.[15], 14% received training in AI in Alwadani FAS et al.[16] study and only 8.6% received some form of AI training in study done by Alghamdi SA et al.[17] and Jackson P et al.[10] The low percentage of students receiving teaching/ training in AI reflected the potential curriculum gap which needs to be addressed for advancement in medical field. The ongoing undergraduate medical curriculum needs update with regards to inclusion of AI and its application in health care. Among the students (357) who had used AI applications, Meta AI and ChatGPT were the most frequently used AI applications in the present study. Similarly Chat GPT was most common used AI application (60.4%) in a study.[18]

Approximately 38% students had heard often AI and machine learning, 26% had heard often deep learning. 25.7%, 38.1% and 34.5% had never heard of supervised learning, unsupervised learning, and neural network respectively. Similar findings were obtained from another study, where AI was the most heard term among medical doctors, followed by machine learning and deep learning. The understanding of other terms like supervised learning, unsupervised learning, and neural network, were less known to the participants.[11]

On a scale of 11-55, the mean score of attitudes towards AI in this study was 35.9 ± 7.3. In the present study 44.7% students agreed (11.3% strongly agreed and 33.4% agreed) that some specialties will be replaced by AI during their lifetime. Another study revealed, fear among 44.8% students that AI could replace human medical professionals.[6] Fear of employment loss was reported in 64.8% students.[11] These finding suggested that job security is a concern among students that needs to be addressed. Another important finding obtained was that approximately half of the students (49.2%) agreed that they had understandings of the limitations of AI. This was like Sit C et al. study which found that 48.3% students understood AI limitations.[12] Sit C et al. also recommended that limitations of AI must be presented to students so that they do not feel discouraged to pursue some career streams like radiology.[12]

17.1% and 37.6% students strongly agreed and agreed that all medical students should receive teaching in AI. This was slightly lower response compared to other studies.[2,12] This could be explained as the current generation are already overburdened with their curriculum. They have no understanding of the fact that how AI can reduce their mental burden, save time, and aid in increased work efficiency.

On a scale of 22-110, the mean score of overall readiness towards AI was 70.0 ± 16.8. The mean scores of four domains were cognition 24.1 ± 6.1 (out of 40), ability 26.1 ± 6.7 (out of 40), vision 9.9 ± 2.7 (out of 15) and ethics 10.0 ± 2.9 (out of 15). Similar findings were obtained from a study which revealed that average MAIRS-MS score was 74.61 ± 10.137, and the mean values of subscales of MAIRS-MS were cognition, 26.23 ± 4.417, ability 27.62 ± 4.372, vision, 10.37 ± 1.803 and ethics, 10.39 ± 1.789.[7] The total medical AI readiness among medical students was 70.59 ± 19.24 in another study with similar subdomain scores. [1] Nearly same results were also obtained from other study.[19] On the contrary, the mean scores of overall readiness towards AI and subdomains were slightly lower in a study probably due to varied population group involving different courses, streams and multiple institutions in Saudi Arabia and even included post graduates.[3]

From the vision domain of MAIRS-MS, it was reflected that approximately 43% students could explain the limitations, strengths & weaknesses of AI technology. While 47% students could foresee the opportunities and threats of using AI technology. Similar findings were reported from Dhurandhar D et al. study where 47.6% could foresee opportunities and threats pertaining to AI technology.[7]

Under the ethics domain of MAIRS-MS, less than half of total students (45.3%) agreed that they could use health data in accordance with legal and ethical norms. It was also found that 43.1% students could use AI technologies under ethical principles. Likewise, 47.3% students agreed that they could follow legal regulations regarding the use of AI technologies. Similar findings were obtained from Dhurandhar D et al. where it was reported that half of the students could use health data in accordance with legal and ethical norms (50.0%) and follow legal regulations regarding the use of AI technologies (50.2%).[7] These findings reflected the need for ethics-focused AI training and to acquaint students with the strengths, weaknesses, opportunities, and threats of using AI technology, so that they can better handle AI in medical field.

The familiarity score of AI terminologies and teaching/ training in AI significantly predicted attitude towards AI ($p<0.001$). Similar results were obtained from Alwadani FAS et al., participants who received training on AI reported better understanding of AI ($p = 0.03$), developed positive attitude towards teaching in AI ($p = 0.05$) and were more confident in using basic healthcare AI tools ($p = 0.05$).[16] Alghamdi SA et al. also found that students who received AI training had more positive attitude towards AI.[17] Gender did not influence attitude towards AI in our study, as was also found from other study which found no statistically significant difference between attitudes of male and females towards AI.[6]

The predictors of overall readiness towards AI were year of study i.e., 2nd Professional and 3rd Professional Part I, received teaching/ training in AI and attitude towards AI score. Year of study was significant predictor of all domains of readiness towards AI in study done by Almalki M et al.[3], Xuan PY et al.[19] argued that preclinical students had a higher degree of readiness in all domains except cognition as compared to clinical students. Those who had attended AI training before had significantly higher readiness scores across all domains similar to present study.[18,19] In contrast to current study, there was no significant relationship between students' years of study and AI readiness in the study done by Ziapour A et al.[1] This difference could be because of difference in sampling technique as the later used convenient sampling method in contrast to probability sampling method in our study. Though further research is recommended to confirm the findings. In this study age had no role in predicting readiness towards AI among medical students similar to a study where age had no correlation with overall readiness and other sub-domains except negative correlation with ethical domain.[7] The difference in latter study was probably due to declining focus on ethics teaching over time by teachers. No effect of age on readiness towards AI was also reflected from other studies.[1,3,18] But, Xuan et al. found that age was correlated with all domains of readiness except cognition.[19] This could be because of difference in analysis, as in the later, analysis was restricted up to bivariate level. Secondly in their study younger age group was more equated with generation Z, born with digital gadgets and therefore more readiness towards AI. There was no significant difference in scores of readiness towards AI (MAIRS-MS and all subdomains except vision) across gender in this study. Dhurandhar D et al. also found no association of subscale scores and MAIRS-MS scores with gender. [7] The mean AI readiness (71.84 ± 18.27) was higher in females than males (69.62 ± 19.93), but the difference was not significant ($p = 0.106$) in another study.[1] Similar results were obtained from Xuan PY et al.[19] and Almalki M et al.[3] study where gender had no impact on AI readiness. However, gender (females) was a significant predictor of MAIRS-MS in a study apart from other factors like area of residence, English proficiency, computer technology, ethics and data science education and training in AI.[18] Gender differences in readiness towards AI could be attributed to more opportunities and support for women in Science, Technology, Engineering, and Mathematics field in Saudi Arabia.[18]

The study highlighted the need for inculcation of positive attitude towards AI among the medical students and emphasized the need for AI teaching/ training and increasing familiarity with AI among the undergraduate medical students. The study had shown that teaching/ training in AI and a positive attitude towards AI could increase their readiness for AI. Increased readiness for AI not only will enable integration of AI with medical curricula but also can help in learning and using AI technologies faster in medical day to day life. Increased AI readiness can enable earlier and more precise disease detection and therefore timely intervention and better patient outcomes, which otherwise could be missed by humans whenever there are large data, images, records etc. Thus, improved AI readiness could enhance diagnostic accuracy or patient care.

Strengths and Limitations

The strength of the study was that, a very small relative error was considered to compute sample size and multiple linear regression analysis was used to determine the predictors of attitude towards AI as well as overall readiness and all sub-domains of MAIRS-MS. Despite of this study had some limitations like the possibility of inherent bias while using Likert scales (like central tendency bias etc.) could not be ruled out. Second limitations being the generalizability of the study, as this was a single institu-

tion-based study. Therefore, in future multi-institutional studies are recommended for higher external validity.

Conclusion

The study was conducted on undergraduate medical students to assess their attitude, readiness, and predictors for adoption of AI. From this study it could be concluded that familiarity with AI terminologies and AI teaching/ training to medical students may inculcate the development of positive attitude towards AI. This positive attitude towards AI together with teaching/ training in AI can lead to higher readiness to AI among medical students. This can further enable the integration of AI with undergraduate medical curriculum. However, this may be interpreted with caution because of the limitation of cross-sectional design in establishing causality. In future for generating stronger evidence on this aspect, longitudinal or experimental studies are recommended.

Acknowledgement: Authors are grateful to 2nd Prof MBBS students of Bankura Sammilani Medical College, Bankura for helping in data collection. Authors are also thankful to other faculties of Community Medicine for providing valuable feedback.

Authors' Contributions: MS, **SS**, **PM**, and **APS** contributed to the study concept, study design, and manuscript preparation. **MS**, **PM**, and **SS** were involved in defining the intellectual content and conducting the literature search. Data collection was carried out by **MS** and **SS**. All authors participated in data analysis, manuscript editing, and gave final approval of the article.

Availability of Data: The data are available from the corresponding author upon reasonable request.

No use of generative AI tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

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