MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2024.9.519.525

Assessment of Knowledge, Attitude and Practices Regarding Role of Artificial Intelligence in Medicine among Undergraduate Medical Students in a Tertiary Care Teaching Hospital

[1]N. Thamarai Selvi, [2]N. Sundhar Rajan, [3]D.H. Gopalan and [4]K. Sunitha

[1,4]Department of Pathology, Vydehi Institute of Medical Sciences and Research Centre, India
[2]Department of Surgery, Tagore Medical College and Hospital, India
[3]Department of Anatomy, Tagore Medical College and Hospital, India

OPEN ACCESS

Key Words
Artificial intelligence, medicine, KAP

Corresponding Author
K. Sunitha,
Department of Pathology, Vydehi Institute of Medical Sciences and Research Centre, India
2drsunitha@gmail.com

Author Designation
[1]Associate Professor
[2,4]Assistant Professor
[3]Professor

Received: 25 July 2024
Accepted: 26 August 2024
Published: 28 August 2024

Citation: N. Thamarai Selvi, N. Sundhar Rajan, D.H. Gopalan and K. Sunitha, 2024. Assessment of Knowledge, Attitude and Practices Regarding Role of Artificial Intelligence in Medicine among Undergraduate Medical Students in a Tertiary Care Teaching Hospital. Res. J. Med. Sci., 18: 519-525, doi: 10.36478/makrjms.2024.9.519.525

ABSTRACT

In our journey through the 21st century, Artificial Intelligence (AI) has seamlessly integrated into our daily lives, reshaping how we live, work, and interact. Role of AI in medicine has gained popularity recently and is increasing globally. As doctors we need to update ourselves in this ever-evolving and competitive world. However, developing countries like India are still lagging in education, research and implementation of AI in general as well as in healthcare. There is a necessity that AI to be implemented in healthcare system which may be incredibly beneficial for humans and giving value addition to the community. The aim of this study is to assess Knowledge, Attitude and Practices regarding role of Artificial Intelligence in Medicine among undergraduate medical students in a Tertiary Care Teaching Hospital. We conducted a cross-sectional study using an online questionnaire based survey and questions were based on Knowledge, Attitude and Practice of AI in medicine. A sample of 510 medical students were selected based on stratified random sampling. Binominal Logistic regression analysis was done for comparison of variables and $p<0.05$ was considered significant. Out of 510 medical students, 63.3 % were females and 36.7 % were males. Regarding Educational Status, 18.6 % were I MBBS students, 19.2 % were II MBBS students, 24.5% belonged to III MBBS, 16.5 % were from IV MBBS and 21.2 % were CRMI. With binominal logistic regression analysis test, statistically significant values were seen between the following variables. Females have 1.557 times good Knowledge and 0.620 times Positive Attitude compared to Males. Regarding Educational Status, III and IV MBBS students have 1630 and 1.904 times Positive Attitude compared to I MBBS students and II MBBS, III MBBS and IV MBBS students have 2.225, 2.128 and 1.118 times Good Practice compared to I MBBS students. Medical Students in this Institution have considerably Poor knowledge and Poor Practice regarding the role of Artificial Intelligence in Medicine. However, they acknowledge the importance of Artificial Intelligence in Healthcare system and have a Positive Attitude towards AI. Most of the students feel it will be really useful to include AI in Medical Curriculum. It can be suggested that from the study, since AI is an upcoming and flourishing technology in healthcare, it would be very useful to include a Module or Elective Course or Value-Added Course regarding basics of Artificial Intelligence in MBBS Curriculum.

INTRODUCTION

In our journey through the 21st century, Artificial Intelligence (AI) has seamlessly integrated into our daily lives, reshaping how we live, work and interact. Its impact is evident across various aspects of our routines, marking a significant shift in our societal scene. This silent integration into our daily routines is notable, as AI seamlessly operates in the background, often escaping conscious recognition. The widespread adoption of AI reflects its growing importance, emphasizing the need for a balanced exploration of its benefits and potential challenges[1]. Artificial intelligence is a software system that attempts to simulate human intellect by using data sources to make independent decisions or assist humans in making decisions[2].

Artificial intelligence is increasingly prevalent in business and society, and are beginning to be applied to healthcare. These technologies have the potential to transform many aspects of patient care, as well as administrative processes within provider, payer and pharmaceutical organisations. There are already a number of research studies suggesting that AI can perform as well as or better than humans at key healthcare tasks, such as diagnosing disease. Today, algorithms are already outperforming radiologists at spotting malignant tumours and guiding researchers in how to construct cohorts for costly clinical trials. However, for a variety of reasons, we believe that it will be many years before AI replaces humans for broad medical process domains[3].

AI would play an essential part in enhancing medicine in the future and support the future needs of medicine by analysing the enormous amounts and various forms of data that patients and healthcare institutions record at every moment. Within the near future, doctors can be anticipated to encounter patients in very distinctive wellbeing care settings compared with the present time and hence, restorative instruction must advance. Omnipresent and digitalized wellbeing care frameworks permit both doctors and patients to obtain biomedical data easily. In addition, progressed restorative advances will lead doctors to experience a developing number of more inactive patients with incessant conditions and comorbidities due to drawn-out life spans. Exponentially extending restorative information requires doctors to upgrade, not review, what they know and select the ideal data from an excess of alternatives. AI can diminish the burden of doctors within the associated interruption of computerized information and can progress their capacity to analyse. Subsequently, the non-analytical, humanistic viewpoint of medication will be more emphasized since it is troublesome to substitute with innovation. Hence, collaboration between physicians and machines has the greatest potential to improve clinical decision-making and patient health outcomes[4].

The largest application of AI algorithms has been witnessed in the field of Radiology. However, various applications have also been developed in the field of Pathology, Medicine, Dermatology, Ophthalmology, Cardiology, Psychiatry, Oncology, Neurosciences, etc. AI algorithms have been developed in the field of Radiology which help in Imaging, Categorization, Formulation of Hypothesis based on the data fed for the given patient history, type of procedure and Interpretation of results. Various Algorithms have been formulated in Pathology which helps in prognosis and predictive factors of various experimentation and lab testing and also helps in analysis of tissue histology and molecular data[5].

Since AI is so beneficial and helpful, then what is stopping us from making use of it in healthcare. It was observed that developing countries like India and Pakistan are still lagging in education, research and implementation of AI in general as well as in healthcare[5].

The aim of this study is to Assess Knowledge, Attitude and Practices regarding role of Artificial Intelligence in Medicine among undergraduate medical students in a Tertiary Care Teaching Hospital. Additionally, this study will delve deep into the different views about Artificial Intelligence and to know whether students consider AI as a positive addition to this field or is considered a threat for replacing physicians.

MATERIALS AND METHODS

This was a Cross-sectional Study conducted over a period of 4 months from March 2024-June 2024. All MBBS Students from Medical College and Hospital who are willing to take the study and fill the consent form were included in the study and those who did not respond to the link or did not give consent for the study were excluded from the study. Google Forms link was provided to students through WhatsApp and e-Mail. Stratified Random Sampling method was used for sample collection.Based on Reference No.6, minimum sample size was calculated to be around 330. Pre-Validated and Published Questionnaire was available in Open access journal stating that this can be used in any form for research purposes[6].

After getting Institutional Ethics Committee Clearance, Participant Information Sheet and Consent form was provided to students. It has been conveyed to students that participation in the Study was voluntary and have no relation to the students' curricular activities. Respondents was informed on the nature and purpose of the questionnaire and anonymity was guaranteed. Confidentiality was protected on giving access to data only to Study Investigators. Study was conducted using

Google Forms which was circulated among students through Mail and Whats App.

Those who were willing for the study and had filled the consent form. Questionnaire was provided to record their responses. Outcome was measured using 5-point Likert Scale wherein there were 5 choices-Strongly Agree, Agree, Neither Agree or Disagree, Disagree and Strongly Disagree. Knowledge section has 6 questions and for the purpose of Statistical Analysis, Yes=1 and No=0 and Good Knowledge was considered if score >3. The Subscale of Attitude section has 10 questions and for Statistical Analysis, No opinion, Disagree and Strongly Disagree=0 and Agree and Strongly Agree=1 and score >5 was considered as Good Attitude. In Practice Section, there were 7 questions and for Statistical Analysis, Yes=1, No and Never Applied/Don't Know=0 and Score >2 points was considered Good Practice[6]. The data was analysed using SPSS software version 23.0. The frequencies and percentages of different variables were shown using frequency tables. Binomial logistic regression analysis was carried out to predict the outcome measurements of Artificial Intelligence, such as Knowledge, Attitude and Practice from Baseline characteristics of the study population. Adjusted Odds Ratio and their respective 95% confidence intervals were used in the regression. A $p<0.05$ indicated that association was significant.

RESULTS AND DISCUSSIONS

This study was conducted using Google Forms which have been filled by 542 MBBS students, out of which 510 students gave their consent for the study and filled out all the questions and therefore only responses from those 510 students are taken up for this study.

Table 1: Socio-demographic characteristics of the study population (n =510)

Variable	Frequency	Proportion
Age (years) (mean ± SD)		(20.93 ± 1.71)
Gender		
Male	187	(36.7)
Female	323	(63.3)
Education Status:		
1st MBBS	95	(18.6)
2nd MBBS	98	(19.2)
3rd MBBS	125	(24.5)
4th MBBS	84	(16.5)
CRMI	108	(21.2)

Out of these 510 MBBS students who participated in this study, 187 (36.7 %) were males and 323 (63.3 %) were females. The reason for female preponderance is that 2/3rd of the MBBS students were females. Mean age of the study participants was 20.93 and overall ranging from 18 to 22 years of age. Stratified Random Sampling was used in this study and minimum of 50 % students responded in each batch to avoid Bias and uniform responses from just 1 batch. Among the 510 students who responded, 95 (18.6%) were from Phase-I MBBS, 98 students (19.2%) were from Phase-II, 125 (24.5%) were from Phase-III Part-I, 84 (16.5%) from Phase-III Part-II and 108 (21.2%) were from CRMI (Table 1).

Table 2 : Frequencies of Participants' responses to Knowledge Questions

Variable	Frequency	Proportion
Do you know what Artificial Intelligence (AI) is		
Yes	483	(94.7)
No	27	(5.3)
Do you know about Machine learning and Deep Learning		
Yes	184	(36.1)
No	326	(63.9)
Do you know about any Application of AI in Medical Field		
Yes	220	(43.1)
No	290	(56.9)
Have you ever been taught about AI in Medical College		
Yes	102	(20.0)
No	408	(80.0)
Do you Know about any application of AI in Radiology		
Yes	103	(20.2)
No	407	(79.8)
Do you Know about any application of AI in pathology		
Yes	65	(12.7)
No	445	(87.3)

Regarding Knowledge of AI, individuals were questioned about the Basic Concept of Artificial Intelligence (AI) and its subtypes like Machine Learning (ML) and Deep Learning (DL) and its applications. It was observed that out of 510 respondents, 483 (94.7%) had a basic concept about AI. However, only 184 (36.1%) had knowledge about Machine Learning and Deep Learning and 220 (43.1%) know about any application of AI in medicine. 27 (5.3%) individuals had no knowledge about the basic concept of AI, 326 (63.9%) had no knowledge about ML and DL, 290 (56.9%) were unaware of any application of AI in the medical field. Only 103 (20.2%) individuals were aware of any application in AI in the field of Radiology and only 65 (12.7%) students knew about any AI application in Pathology. Few of the applications of AI known to students were in Robotic Surgery, Chat GPT, Diagnostic Radiology, Medisearch, Nanorobots, Capsule Surgery, Davinci Method, Gamma, SORA, HeDal, AI in Cardiac Surgery, pubchem, August AI, Health Watch, Watson, Laparoscopic Surgery, health, Cloud Computing, Neuroscience, Dietary Monitoring, etc. (Table 2).

Regarding the Attitude towards AI in Health Care, 126 (24.7%) individuals strongly agree and 264 (51.8%) agree that AI is essential in the medical field while 85 (16.7%) were Neutral / No opinion regarding this, 28 (5.5 %) disagree and only 7 (1.4%) strongly disagree with this. 107 (21%) students strongly agree and 265 (52%) students agree that AI should be included in MBBS curriculum as well as Specialist training whereas

Table 3: Participants responses in Attitude Section (n = 510)

Item	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
I think AI is essential in Medical Field	126 (24.7)	264 (51.8)	85 (16.7)	28 (5.5)	7 (1.4)
I think AI should be included in MBBS Curriculum as well as Specialist Training	107 (21.0)	265 (52.0)	107(21)	23(4.5)	8(1.6)
I think AI aids Practitioner in early diagnosis and assessment of severity of disease	110 (21.6)	288 (56.5)	90 (17.6)	18 (3.50)	4 (0.8)
I think there is a possibility that AI may replace Physicians in Future	94 (18.4)	162 (31.8)	99 (19.4)	109 (21.4)	46 (9)
I think AI is very essential in field of Radiology	79 (15.5)	281 (55.1)	130 (25.5)	17 (3.3)	3 (0.6)
I think AI is very essential in field of Pathology	72 (14.1)	260 (51)	159 (31.2)	1 (3.1)	3 (0.6)
I think Introduction of AI is essential in current COVID-19 Pandemic	73 (14.3)	251 (49.2)	157 (30.8)	26 (5.1)	3 (0.6)
I think AI would be a burden for the Practitioner	39 (7.6)	138 (27.1)	199 (39)	118 (23.1)	16 (3.1)
I think Budget should be allocated for AI to be used &practised	73 (14.3)	293 (57.5)	121 (23.7)	20 (3.9)	3 (0.6)
I think AI would increase the percentage of errors in diagnosis	50 (9.8)	159 (31.2)	201 (39.4)	85 (16.7)	15 (2.9)

107 (21%) had no opinion, 23 (4.5%) disagree and 8 (1.6%) strongly disagree with this. 110 (21.6%) students strongly agree and 288 (56.5%) agree that AI aids clinical practitioner in early diagnosis and assessment of severity of disease whereas 90 (17.6%) were neutral, 18 (3.5%) disagree and 4 (0.8%) strongly disagree with this. 94 (18.4%) students strongly agree and 162 (31.8%) agree that there is a possibility that AI may replace physicians in future and 99 (19.4%) were neutral, 109 (21.4%) disagree and 46 (9%) strongly disagree with this. 79 (15.5%) strongly agree, 281 (55.1%) agree that AI is very essential in the field of Radiology, 130 (25.5%) were neutral, 17 (3.3%) disagree and 3 (0.6%) strongly disagree with this. 72 (14.1%) strongly agree and 260 (51%) agree that AI is very essential in the field of Pathology and 159 (31.2%) were neutral, 1(3.1%) disagree and 3 (0.6%) strongly disagree with this. 73 (14.3%) strongly agree and 251 (49.2 %) agree that Introduction of AI is essential in current COVID-19 Pandemic and 157 (30.8%) were neutral, 26 (5.1%) disagree and 3 (0.6 %) strongly disagree with this. 39 (7.6%) strongly agree and 138 (27.1%) agree that AI would be a burden for the practitioner and 199 (39%) were neutral, 118 (23.1%) disagree and 16 (3.1%) strongly disagree with this. 73 (14.3%) strongly agree and 293 (57.5%) agree that Budget should be allocated for AI to be used and practiced and 121 (57.5%) were neutral, 20 (3.9%) disagree and 3 (0.6%) strongly disagree with this. 50 (9.8%) strongly agree and 159 (31.2%) agree that AI would increase the percentage of errors in diagnosis and 201 (39.4%) were neutral, 85 (16.7%) disagree and 15 (2.9%) strongly disagree with this (Table No.3)

According to the opinion given by medical students in this study, causes of failure of implementation of AI in Healthcare in descending order were 175 (34.3%) suggested this due to Lack of Awareness followed by 83 (16.2%) due to Lack of Proper training, 80 (15.6%) due to Lack of Technological development, 80 (15.6%) due to Lack of Curriculum, 68 (13.3%) due to Lack of Financial Resources and 24 (5%) due to Lack of Interest (Fig. 1).

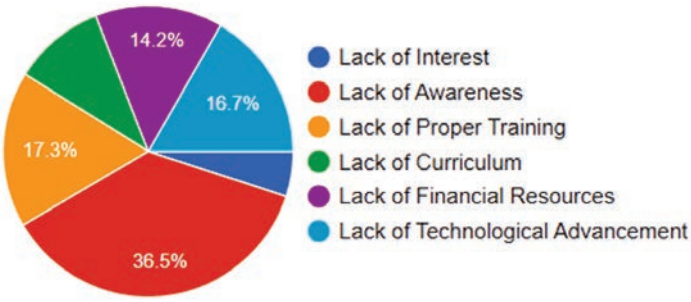

Fig. 1: Reason for reduced Practice of Artificial Intelligence in South India

Table No.4 Frequencies of Participants' responses to Practice Questions

Variable	Frequency	Proportion
Have you ever applied AI technology in any Field		
Yes	61	(12.0)
No	449	(88.0)
Was it easy for you to apply AI		
Yes	171	(33.5)
No	339	(66.5)
Did AI make your task easy		
Yes	279	(54.7)
No	231	(45.3)
Would you like to work on AI in future		
Yes	309	(60.6)
No	63	(12.4)
Don't Know	138	(27.1)

Out of 510 participants, only 61 (12%) medical students had ever practically applied AI and 449 (88%) students have never applied AI in any field. 171 (33.5%) students have agreed that AI made their respective tasks easy and 339 (66.5%) have not applied and therefore mentioned that it was not easy to use AI. 320 (60.4%) students have never used any AI in Radiology whereas out of 190 (37.2%) students who have applied AI in Radiology, 58 (12.1%) have applied for MRI, 62 (12.9 %) have applied for CT, 48 (10 %) have applied for X-rays and 22 (4.6 %) have applied for PET Scan. In relation to question regarding usage of AI in Pathology, 348 (66.1%) have never applied any AI technology in Pathology and among 162 (31.7 %) who have applied AI in Pathology, 56 (11.7%) have applied in Histopathology, 33 (6.9%) have applied in Frozen

Table No.5: Binomial Logistic Regression Analysis on KAP Subscales (low/medium vs high) and its Association with Participants Gender and Educational Status (n= 510)

Variables	Knowledge Good n(%)	Attitude Poor n(%)	Practice Adjusted OR (95% CI) **	p-value	Positive n (%)	Negative n (%)	Adjusted OR (95% CI) **	p-value	Good n(%)	Poor n (%)	Adjusted OR (95% CI) **	p-value
Gender :												
Male	89 (47.6)	98 (52.4)	Ref	-	125(66.8)	62 (33.2)	Ref	-	153(81.8)	34 (18.2)	Ref	-
Female	119(36.8)	204(63.2)	1.557 (1.08 -2.24)	0.018	247(76.5)	76 (23.5)	0.620 (0.41 - 0.92)	0.019	249 (77.1)	74 (22.9)	1.337 (0.85 -2.10)	0.209
Education Status:												
I MBBS	45 (47.4)	50 (52.6)	Ref	-	64 (67.4)	31 (32.6)	Ref	-	81 (85.3)	14 (14.7)	Ref	-
IIMBBS	39 (39.8)	59 (60.2)	1.125	0.677	75 (76.5)	23 (23.5)	1.032	0.916	83 (84.7)	15 (15.3)	2.225	0.026
III MBBS	48 (38.4)	77 (61.6)	(0.65-1.96)				(0.57 -1.86)				(1.19-4.51)	
IVMBBS	28 (33.3)	56 (66.7)	0.826	0.500	99 (79.2)	26 (20.8)	1.630	0.012	93 (74.4)	32 (25.6)	2.128	0.033
CRMI	48 (44.4)	60 (55.6)	(0.47-1.44)				(1.88-3.02)				(1.06-4.25)	
			0.779 (0.46-1.32)	0.350	62 (73.8)	22 (26.2)	1.904 (1.06-3.43)	0.032	67 (79.8)	17 (20.2)	1.118 (1.63-2.01)	0.013
			0.625 (0.35-1.13)	0.119	72 (66.7)	36 (33.3)	1.409 (0.75-2.65)	0.282	78 (72.2)	30 (27.8)	1.516 (0.77-2.99)	0.230

section, 31 (6.5%) in Hematology, 29 (6.1%) in Cytopathology and 13 (2.7%) in Culture and Sensitivity. 279 (54.7%) accepted that AI made their task easy and other 231 (45.3%) students mentioned that AI did not made their task easy. Concerning the future practice of AI, it was interesting to note that 309 (60.6%) students were eager and willing to work with AI in future, 138 (27.1%) students were not sure whether they wanted to work on AI in future and very less number of students 63 (12.4%) expressed their disinterest in working on AI in future (Table 4).

Table 5 demonstrates corelation of Gender and Educational Status with Knowledge, Attitude and Practice of role of AI in medicine and understand if any variable and it's corelation with KAP is statistically significant.

On comparing Gender with Knowledge, it was observed that among females 119 (36.8%) had good knowledge and 89 (47.6%) males had good knowledge. 204 (63.2%) females had poor knowledge and 98 (52.4%) males had poor knowledge. P-value was significant for Females and it shows that Females have 1.557 times good knowledge compared to males. Regarding Education Status, in I MBBS 45 (47.4%) had good knowledge, followed by CRMI with 48 (44.4%) having good knowledge, II MBBS 39 (39.8%) had good knowledge, followed by III MBBS 48 (38.4%) had good knowledge and IV MBBS students had minimal good knowledge with 28 (33.3%) exhibiting good knowledge. However none of the p-value for these variables were statistically significant. So, Knowledge is poor in all years of MBBS Students.

In corelation of gender with Attitude, it was observed that 247(76.5%) females had Positive Attitude and 76 (23.5) females had negative attitude. 125 (66.8 %) males had Positive Attitude and 62 (33.2%) males had negative attitude towards AI. However, p-value for Females is significant and therefore Females had 0.620 times more Positive Attitude than their Male Colleagues. On comparing educational status and Attitude, in I MBBS 64 (67.4%), in II MBBS 75 (76.5%), in III MBBS 99 (79.2%), in IV MBBS 62 (73.8%) and in CRMI, 72 (66.7%) had positive attitude. Negative Attitude is seen in 31 (32.6%) of I MBBS, 23 (23.5%) of II MBBS, 26 (20.8%) in III MBBS, 22 (26.2%) in IV MBBS and 36 (33.3%) in CRMI. However, p value is significant for III and IV MBBS Students and we can conclude that III MBBS and IV MBBS students have 1.630 and 1.904 times more Positive Attitude compared to I MBBS students.

On Comparing Gender with Practice of AI, Good Practice is seen in 153 (81.8%) males and 249 (77.1%) females. Poor Practice is observed in 34 (18.2%) males and 74 (22.9%) females. P-value is not significant for any value and there is no significant practice in both males and females. In Corelation with educational status and Practice, it was observed that Good Practice is noticed in 81 (85.3%) of I MBBS students, 83 (84.7%) of II MBBS students, 93 (74.4%) of III MBBS students, 67 (79.8%) of IV MBBS students and 78 (72.2%) of CRMI. Poor Practice was observed in 14 (14.7%) of I MBBS students, 15 (15.3%) of II MBBS students, 32 (25.6%) of III MBBS students, 17 (20.2%) of IV MBBS students and 30 (27.8%) of CRMI students. P-value is significant for II, III and IV MBBS students and we can conclude that II MBBS, III MBBS and IV MBBS students have 2.225, 2.128 and 1.118 times the good practice compared to I MBBS students.

In recent days, Artificial Intelligence seems to have made revolutionary advances in the field of healthcare[7] since it performs tasks efficiently as well as accurately in a short period of time through running various algorithms which is guided by Human Intelligence[8]. Various applications of AIin medicine include drug development, virtual health assistants, tailored treatment regimens, medical imaging analysis, and predictive analytics. Big data sets are analysed by AI algorithms to increase the precision of diagnoses, maximize treatment results, and improve patient care. AI is currently transforming healthcare delivery, increasing efficiency and enhancing medical research. It can help radiologists detect problems and even enable tailored treatment and telemedicine options[9]. Since we know how much AI can perform and how impactful it is, data on Medical Students' Knowledge, Attitude and Practice (KAP) needs to be studied to understand the current situation as in where we stand right now and decide we need to progress in the

future. This data also shows educational policymakers how important it is to have interdisciplinary collaboration among healthcare stakeholders in order to plan for AI-based training, as well as how important it is for students to have access to AI. Furthermore, the advancement of contemporary scientific and technological ideas will provide a foundation for fostering innovation in the healthcare sector, where students are the driving force behind the profession's future[10]. Hence the primary focus of this study is to determine Knowledge, Attitude and Practice towards role of Artificial Intelligence in Medicine among MBBS students.

A total of 510 medical students of Tertiary Care Centre participated in this study, out of which 36.7% were males and 63.3% were females with male to female ratio of 0.57. Out of 510 participants, 94.7% had a basic knowledge of AI however only 36.1% knew about their subtypes like Machine Learning and Deep Learning. This corresponds to a study a study from Pakistan where 71.3% had basic knowledge of AI, 35.3% knew about its subtypes and 77% weren't aware of the practical application of AI in Medicine[5]. In our study 56.9 % of study participants weren't aware of any practical application of AI in medicine. This shows that medical students in spite of having basic knowledge of role of AI in medicine, doesn't know it's practical implications. 80% of students have responded that they have never been taught about AI in Medical College. 79.8% and 87.3% did not know any application in Radiology and Pathology respectively.

In our study, 76.5% students agreed that AI is essential in Medical Field which is concordant with the Pakistan study where 74.4% students acknowledged the same[5] and with a study in UK where they found that three-fourth of the study population agreed with the same[11]. 73% students think that AI should be included in MBBS Curriculum as well as in Specialist Training which is similar to study done in Syria where 85.3% students agreed with the same[6]. In our study, 78.1% students think that AI aids Practitioner in early diagnosis and assessment of severity of disease which is concordant with the study with Syria where they found that 82.8% participants believe in the same[6]. In our study, it is worrisome to find that 50.2% students think that there is a possibility that AI may replace Physicians in Future which is discordant with the findings with a study in Syria where only 21.5% participants feel the same[6]. We should not think AI as competitor to mankind rather, AI can be collaborative with humans to bring out a better healthcare to the community. So we need not worry whether AI may replace doctors and do their job. In our study, 65.1% students think that AI is very essential in field of Radiology which is similar to the study in Syria where the doctors suggested that 73.2% agreed with the same[6].

In our study, 65.1% students think that AI is very essential in field of Pathology which is concordant with the study by Swed et al, wherein 73.5% participants agreed with the same. In our study 63.5% students think that Introduction of AI is essential in current COVID-19 Pandemic which is very much concordant with the study done by Swed *et al,* where 68.1% participants acknowledged the same[6]. In our study, 65.2% students think that AI would be not be a burden for the Practitioner which is concordant with the study in Syria where 82.2% participants agreed that it will not be a burden for the practitioner[6]. In our study, 71.8% students think that Budget should be allocated for AI to be used and practised which is very much in concordant with the study done by Swed et al, where 67.3% doctors agreed with the same. In our study, 41% students think that AI would increase the percentage of errors in diagnosis which is in concordant with a study done in Syria wherein 30% doctors agreed with the same[6]. In our study, 60.6% students expressed Interest to work on AI in future which is concordant with a study done by Swed *et al,* wherein 78.6% participants were eager to work on AI in future. Even though number of students expressing interest is comparatively less in our study, they will be interested if they are exposed to AI and its dynamics and it would be definitely easy for this generation doctors as most of them are technologically strong.

According to the opinion given by medical students in this study, causes of failure of implementation of AI in Healthcare in descending order were 175 (34.3%) suggested this due to Lack of Awareness followed by 83 (16.2%) due to Lack of Proper training, 80 (15.6%) due to Lack of Technological development, 80 (15.6%) due to Lack of Curriculum, 68 (13.3%) due to Lack of Financial Resources and 24 (5%) due to Lack of Interest. This is almost in concordance with a study done in Pakistan where findings are almost similar[5]. In our study, statistically significant correlation was found in gender wherein it was found that Females have 1.557 times good knowledge compared to males and females have 0.620 times Positive Attitude compared to males. Practice was not found significant in both males and females. In a study conducted by Swed *et al,* it was described that Females have good knowledge and Males have Positive Attitude[6]. In a study conducted by Zaboor Ahmed *et al,* they have concluded that Males have good knowledge in their study and other aspects were found to be statistically insignificant[5]. Reason for Females having good

knowledge and positive attitude towards role of AI in medicine could be due to the Intuitive nature of females to know more about things they are not aware of[6].

In our study in regards to correlation between Educational Status and KAP categories, statistically significant findings were that III MBBS and IV MBBS students have 1.630 and 1.904 times more Positive Attitude towards role of AI in medicine. In regards to Practice and educational status, II MBBS, III MBBS and IV MBBS students have 2.225, 2.128 and 1.118 times Good Practice compared to I MBBS Students. In a study conducted by Swed *et al,* it was concluded that Females and Graduate doctors have good knowledge and there is no significance in various age groups. Males and Undergraduate doctors have good attitude and doctors belonging to age group 41-50 years have good practice and Undergraduate doctors have good practice score compared to Post graduate doctors[6]. In a study conducted by Zaboor Ahmed *et al,* he found that Males have good knowledge, Administrative doctors have Negative Attitude and Doctors with more experience have Good Practices towards AI in medicine[5]. The reason for Undergraduate doctors having Positive Attitude can be due to young people are so smart with advanced technologies they can easily adapt to new advancements and training and eager to learn more[6]. Doctors with more experience have Good Practice in AI because they have been exposed to AI technologies by companies that explore AI in medicine. Many doctors have been training machines to identify various cells in Hematology, Cytology and Histopathology by marking and identifying numerous cells so that the machine learns from it[6].

CONCLUSION

Medical Students in this Institution have considerably Poor knowledge and Poor Practice regarding the role of Artificial Intelligence in Medicine. However, they acknowledge the importance of Artificial Intelligence in Healthcare system and have a Positive Attitude towards AI. 73% students feel it will be really useful to include AI in Medical Curriculum. 50% students think that AI may replace Physicians in Future. We should not think AI as competitor to mankind rather, AI can be collaborative with humans to bring out a better healthcare to the community. It can be suggested that from the study, since AI is an upcoming and flourishing technology in healthcare, it would be very useful to include a Module or Elective Course or Value-Added Course regarding basics of Artificial Intelligence in MBBS Curriculum.

REFERENCES

1. Amisha, M.P., M. Pathania and V.K. Rathaur, 2019. Overview of Artificial Intelligence in Medicine. J. Family Med. Prim. Care, 8: 2328-2331.
2. Hashimoto, D.A., E. Witkowski, L. Gao, O. Meireles and G. Rosman, 2020. Artificial intelligence in anesthesiology: Current techniques, clinical applications, and limitations. Anesthesiology, 132: 379-394.
3. Davenport, T. and R. Kalakota, 2019. The potential for artificial intelligence in healthcare. Future Healthcare J., 6: 94-98.
4. Saad, M.M.A., A. Shehadeh, S. Alanazi, M. Alenezi and A.A. alez et al., 2022. Medical students' knowledge and attitude towards artificial intelligence: An online survey. Open Pub Hea J., 15: 1-8.
5. Ahmed, Z., K.K. Bhinder, A. Tariq, M.J. Tahir and Q. Mehmood et al., 2022. Knowledge, attitude, and practice of artificial intelligence among doctors and medical students in Pakistan: A cross-sectional online survey. Ann. Med. amp Surg., Vol. 76 .10.1016/j.amsu.2022.103493.
6. Swed, S., H. Alibrahim, N.K.H. Elkalagi, M.N. Nasif and M.A. Rais et al., 2022. Knowledge, attitude, and practice of artificial intelligence among doctors and medical students in Syria: A cross-sectional online survey. Front. Artif. Intell., Vol. 5 .10.3389/frai.2022.1011524.
7. Xiang, Y., L. Zhao, Z. Liu, X. Wu and J. Chen et al., 2020. Implementation of artificial intelligence in medicine: Status analysis and development suggestions. Artif. Intell. Med., Vol. 102 .10.1016/j.artmed.2019.101780.
8. Lai, M.C., M. Brian and M.F. Mamzer, 2020. Perceptions of artificial intelligence in healthcare: Findings from a qualitative survey study among actors in france. J. Transl. Med., 18: 1-3.
9. Shorey, S., E. Ang, J. Yap, E.D. Ng, S.T. Lau and C.K. Chui, 2019. A virtual counseling application using artificial intelligence for communication skills training in nursing education: Development study. J. Med. Internet Res., Vol. 21, No. 10 .10.2196/14658.
10. Popenici, S.A.D. and S. Kerr, 2017. Exploring the impact of artificial intelligence on teaching and learning in higher education. Res. Pract. Technol. Enh Lear., Vol. 12, No. 1 .10.1186/s 41039-017-0062-8.
11. Sit, C., R. Srinivasan, A. Amlani, K. Muthuswamy, A. Azam, L. Monzon and D.S. Poon, 2020. Attitudes and perceptions of uk medical students towards artificial intelligence and radiology: A multicentre survey. Insig into Ima, Vol. 11 .10.1186/s 13244-019-0830-7.