

Knowledge and Attitude of Artificial Intelligence among Under-Graduate Students

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ABSTRACT

Background: Artificial Intelligence (AI) in medical science is the use of software and technical knowledge in the collection, understanding, assessment and analysis of data such as a prescription, laboratory reports and results that often require human intelligence. Based on current scenario, it is expected that artificial intelligence will play a key role in the transformation of medical practice. It is, therefore, our responsibility to ensure that our future doctors must have the knowledge and experience to work collaboratively with artificial intelligence. **Aims/Objective:** to analyse the knowledge and attitudes of Under-Graduate students and to carry out educational activities to improve their knowledge. **Method:** A questionnaire consisting of questions about artificial intelligence and its implementation was framed. Every participant included in this study were asked to write their answers of the questions given in questionnaire. After some educational activities, same questionnaire was given to the participants and their response was collected and analysed. We used descriptive analysis to analyse the result with the help of Microsoft Excel 365. **Results:** 201 students from were familiar with the term Artificial Intelligence (AI) whereas 194 students have no idea of this term in medical science. Only 51 students agreed that AI has useful application in medical field that is against our knowledge and research. ²⁰ Only 26 students thought that AI has better diagnostic abilities over human doctors. However, these attitudes changed after our educational activities and most of the students changed their viewed and agreed to the fact that AI do have useful application in medical science and is superior to diagnostic ability of human doctors. The number of students getting grade A & B (Good knowledge on AI) increased from 134 to 342 after our educational activities. **Conclusion:** We noticed student's overall optimistic perspective on role of AI in medical science and their developing enthusiasm in acquiring knowledge on AI and medical informatics after educational activities. As AI-enabled technologies are in trend of integration with medical diagnostics and therapeutics, certain changes in the curriculum of MBBS course are needed to incorporate fundamental knowledge and skills on AI and medical informatics that is likely to be more integrated with healthcare in upcoming future.

Keywords: Knowledge, Attitude, Artificial Intelligence, Medical Students

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Introduction

Artificial Intelligence (AI) in medical science is the use of software and technical knowledge in the collection, understanding, assessment and analysis of data such as a prescription, laboratory reports and results that often require human intelligence. It can decrease time in research activities and generate thousands of information that can lead to further improvements in health care.

Alan Turing (1950) was one of the inventors of modern computers and AI. The "Turing test" was related to the logic that the act of computer on artificial intelligence is the capability to perform human tasks in cognitive-related domain [1]. The era between 1980 and 2000 AD saw an increase in inclination towards artificial intelligence. Wise AI interface such as intricate professional programs, network platforms of Bayesian, human networks based on neural science, and hybrid AI systems were utilized in various clinical scenario of

medical practice. In the year 2016, a significant portion in the investment in research related to artificial intelligence was associated with health care systems in comparison to other domains [2].

Medical artificial intelligence may be divided into two categories: Physical or Virtual [3]. AI of virtual type works on operating systems such as computer-based health recording interfaces to a guide related to neural networking in taking decision regarding plan of treatment. AI of physical type is concerned with robotic machines that assist during surgery, AI based artificial limbs for patients with disabilities, or caring for the patients of old age.

Goal of evidence-based medicine is to provide correlation based on clinical scenario and to provide information by utilizing organizations and trends from present information in the form of research papers, review articles or authentic website. Conventionally, we have been using mathematical techniques to find these trends or correlations. AI acquired technique of diagnosis of any disease with the help of

two broad methods- the flowchart method and the database method.

A flowchart-based method includes rendering a history-taking procedure. For example, a clinician who asks a sequence of queries and therefore comes to the possible diagnosis through combining complexity of the signs presented. It needs the feeding of extensive data on AI-related cloud networks taking into account vast range of signs and patho-physiology experienced in conventional clinical practice. Results of such procedure are restricted since devices cannot detect and collect symptoms that can be seen only by a physician during a patient's visit.

Conversely, the database uses a system of in-depth study or recognition of pattern that involves computer training with monotonous designs in determining whichever specific bunches of signs or definite clinical or radiological pictures indicate. Google artificial brain project launched in 2012 is good example of it. The program has skilled it to identify felines based on millions of videos on YouTube through active development by examining multiple pictures. After three days of study, the project can anticipate a cat's picture with 75 percent precision [4,5].

The application of computer assisted diagnostics (CAD) on testing mammography of breast cancer is renowned. Recent research has shown that this method is not perfect tool for diagnosis according to certain prediction standards, sensitiveness, and peculiarity. Moreover, misdiagnosis may confuse doctors leading to unnecessary operation [6,7]. A 2016 study [8] found that doctors spend 27 percent of their work hours on routine interaction over their subjects and exhausted 49.2 percent of their work hours on computer-based hospital records and paperwork. Other researches have noted where programs based on AI have been capable of surpassing doctors with properly diagnosing doubtful dermatological diseases [9]. Artificial intelligence-based decision-making methods are helpful in circumstances wherever specialists frequently dispute, like diagnosing lung tuberculosis with X-ray images of lung [10].

However, we often find contradictions in the views of health care professionals with respect to the inclusion of AI in the therapeutics. Reasons concerning these conflicts is a scarcity of knowledge and awareness of the term and its origin [11]. There is therefore a need for research in health facilities to analyse the knowledge and attitudes of medical students and to engage in teaching activities to improve their knowledge on AI. These graduating students will be our future doctors. And based on current scenario, it is expected that artificial intelligence will play a key role in the transformation of medical practice. It is, therefore, our responsibility to ensure that our future doctors must have the knowledge and experience to work collaboratively with artificial intelligence.

The goal of this study was to evaluate the knowledge and attitude of undergraduate medical students on AI and effect of educational activities in the medical college on their attitude and knowledge. This assessment was to be done by categorising the students based on their responses to the questionnaire based on attitude on AI and based on scores and grades achieved by them on their knowledge about AI.

Materials & Methods

This was an observational and prospective study which was conducted at Department of Pharmacology of tertiary care hospital of Northern India after approval by Institutional Ethics Committee. After providing and explaining participant information sheet, written consent of each study participant was taken on informed consent form. The duration of study was 3 months from February 2021 to April 2021. The first month was dedicated to analyse the

knowledge and attitude of students, the second month for educational activities and third month to re-analyse their knowledge and attitude after educational activities.

Inclusion Criteria

Participants were M.B.B.S undergraduates

Exclusion Criteria

Nursing staff, Para medical staff, Ph.D scholar, M.D/M.S Postgraduates students were excluded.

Based on aforementioned inclusion and exclusion criteria, 400 students were enrolled and from this selection, 395 students gave written informed consent for participation in this study.

A questionnaire consisting of questions about artificial intelligence and its implementation was framed. Intraclass correlation coefficient (ICC) was utilized to evaluate the reliability of the questionnaire and ICC value was calculated to be 0.89. Every participant included in this study were asked to write their answers of the questions given in questionnaire. Their response was collected and analysed. Lecture about artificial intelligence and discussion led by clinicians, data scientists and administrators were organized in 2nd month of study [12]. After these educational activities, same questionnaire was given to the participants and their response was collected and analysed.

Attitudes on major aspects of artificial intelligence was divided in five choices with one option to choose:

- 1) Strongly Agree
- 2) Agree
- 3) Neutral
- 4) Disagree
- 5) Strongly disagree.

Scores were given to each student on the basis of their knowledge according to their answer to the question in the questionnaire and their personal interview on online platform. On the basis of their score, each student was given grade. Higher score means better knowledge.

- | | | |
|----|----------|-------------|
| 1) | Grade A: | Score 8-10 |
| 2) | Grade B: | Score – 5-7 |
| 3) | Grade C: | Score 3-4 |
| 4) | Grade D: | Score 0-2 |

Statistical Analysis

Descriptive analysis was utilized to analyse the results by using Microsoft Excel 365. The categorical data was expressed in frequency or percentage. The difference in categorical was analysed with the help of chi square test and significance level for tests was set at 95 % (P< 0.05).

Results

395 students have submitted their response to the questionnaire and they were enrolled in the educational activity on artificial intelligence in medical practice. Baseline demographic characteristics of enrolled participants in given in table 1.

Most of students belonged to age group 18-25 years of age. Number of males were higher. Most of the students lived in urban area and were acquainted with skill to use computers. There was greater participation of 1st professional and 2nd professional MBBS students [Table 1].

Table 1: Baseline Demographic Variables (n=395)

S.No	Characteristics	Values
1.	Age (Mean \pm SD)	23.67 \pm 5.83
2.	Sex	
	1) Male (%)	233 (58.99)
	2) Female (%)	162 (41.01)
3.	Residence	
	1) Urban (%)	214 (54.18)
	2) Rural (%)	181 (45.82)
4.	Having skills to use computer	
	1) Yes (%)	311 (78.23)
	2) No (%)	84 (21.27)
5.	Phase of undergraduate students	
	1) 1 st Professional MBBS	99 (25.06)
	2) 2 nd Professional MBBS	102 (25.82)
	3) Final Professional MBBS (Part -1)	96 (24.30)
	4) Final Professional MBBS (Part - 2)	98 (24.81)

Table 2: Comparison of attitude of students on artificial intelligence before and after educational activities (n=395)

Attitude Aspects	Choice	Before Educational Activities	After Educational Activities	P- Value (Chi-Square)
Familiarity with artificial intelligence (AI)	Yes	201	393	<0.00001 (Highly Significant)
	No*	194	2	
Useful application of AI in medical practice	Strongly Agree	14	301	<0.00001 (Highly Significant)
	Agree	37	52	
	Neutral*	194	2	
	Disagree	106	31	
	Strongly Disagree	44	9	
Superiority of diagnostic ability of AI over human clinician	Strongly Agree	5	226	<0.00001 (Highly Significant)
	Agree	21	108	
	Neutral*	194	2	
	Disagree	128	38	
	Strongly Disagree	47	21	
Ability of AI of replacing your job	Strongly Agree	3	21	<0.00001 (Highly Significant)
	Agree	7	37	
	Neutral*	194	2	
	Disagree	137	38	
	Strongly Disagree	54	297	
Chances of you to use AI in making clinical decision in future	Strongly Agree	39	103	<0.00001 (Highly Significant)
	Agree	111	201	
	Neutral*	194	2	
	Disagree	39	55	
	Strongly Disagree	12	34	

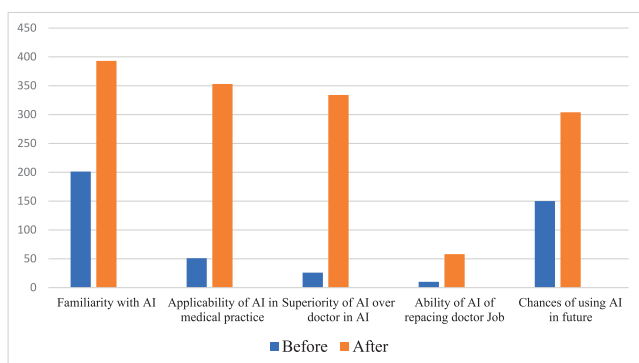


Figure 1: Comparison of number of students giving positive response on different aspect of attitude on AI before and after educational activities

Most of the students were familiar with the term artificial intelligence and the proportion increased to almost 100% after our educational activities. However, most of them were not having positive attitude of useful application of AI in medical practice and diagnostics but their perspective changed significantly after our educational activities ($p < 0.0001$) [Table 2] [Figure 1].

Table 3: Comparison of knowledge of students on artificial intelligence before and after educational activities (n=395)

Grade	Before Educational Activities	After Educational Activities	P- Value (Chi- Square)
A	31	119	<0.00001 (Significant)
B	103	223	
C	63	42	
D	198	11	

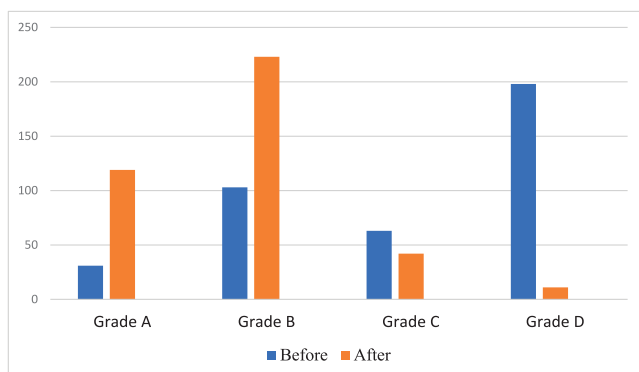


Figure 2: Comparison of knowledge of students on artificial intelligence before and after educational activities

Most of the students were found to be in grade D (poor knowledge on AI, scoring less than 3 out of 10) at baseline. After our educational activities, their knowledge increased significantly and most of them had got grade A and B (good knowledge on AI, scoring e” 5 out of 10) [Table 3] [Figure 2].

Discussion

Undoubtedly, AI and in-depth learning is going to have a profound impact on the prospective of medicine and surgery generally [13,14]. When these kinds of articles first appeared in different scientific conferences, it appeared that doctors were very interested that they might miss their employment in the coming prospective. Therefore, informal instances of medical students sharing anxiety that MBBS education could be an unsatisfactory career option.

Nevertheless, excepting these informal examples, we lack a systematic study among future doctors in their general attitude to AI in medicine and surgery.

Male students generally have more interest and activity regarding computer science like gaming, social networking, hacking etc. [15] 58.99% participants in our study were male. Similarly, students living in urban areas spent more time on computer [16]. And 78.33% students were having skills in activities involving computers. Obviously, these skills and activities do have impact on their attitude regarding artificial intelligence.

201 students from were familiar with the term Artificial Intelligence (AI) whereas 194 students have no idea of this term in medical science. These results should alarm medical colleges of chances of future doctors to lag behind in upcoming era of artificial intelligence in medical practice. However, after our educational activities, nearly all students were aware of role of artificial intelligence in medical science.

Effective disruptive technologies often introduce simplicity [17], however such can not be applied on most existing AI systems. To measure altered or retained clinical practice, clinicians should organize themselves toward influential groups and directly support the design of AI programs. Clinicians should be trained of no less than fundamental concepts of therapeutic computer science, and have an understanding of principles of design of artificial intelligence in order that they could carry out their job instantly in collaboration with engineers, guaranteeing that the whole system fulfil the upcoming requirements of ethical, practical and medical health care systems.

We are already dealing with examples of errors in the medical AI system due to misconceptions. IBM’s Watson was learned expertise in cancer using only theoretical scenarios [18], a practice that can’t be accepted while teaching human physicians. No wonder that is going to produce plenty of faults. Virtuous artificial intelligence system requires groups of specialists from the therapeutic, academic, and computer & medical informatics field. Complicated issues that are already existing in the ethics of medical informatics [19] must be incorporated into artificial intelligence in therapeutics as directing standards. Merely by incorporating aforementioned codes of conduct into artificial intelligence, we may be able to take it from AI to Artificial Enlightenment.

Only 51 students agreed that AI has useful application in medical field that is against our knowledge and research [20]. Only 26 students thought that AI has better diagnostic abilities over human doctors. However, these attitudes changed after our educational activities and most of the students changed their viewed and agreed to the fact that AI do have useful application in medical science and is superior to diagnostic ability of human doctors.

Majority of students didn’t agree to the fact that AI can cause loss of their job in future and also after our educational activities, majority of them didn’t change their perspective on this point. It is not yet clear whether these prospects are valid or not, or whichever components of medical science or surgical science will have initial advantage or disadvantage from the utilization of AI. Admiring outcomes have previously been constructed (example in ophthalmology and dermatology - Google’s paper for diagnosis of retinopathy and Stanford skin cancer diagnosis paper), and in some applications various reports suggests that well-trained algorithms can perform in comparison with humans [21,22]. However, we are still far from fully integrating AI in clinical practice.

There was satisfying outcome of our educational activities on AI on the knowledge of students of this topic. The number of students

getting grade A & B (good knowledge on AI, scoring e” 5 out of 10) increased from 134 to 342 after our educational activities.

One should have sufficient knowledge of fundamental of clinical medicine and surgery (including the basics of medicine or the clue to understand the use of AI in medicine), medical informatics, biometrics, and medical practice based on evidence. Even for an undergraduate student, anyone need not quietly acknowledge AI-associated issues of social communications and online. Undergraduate students must strive to evolve the ability to differentiate accurate details from computer generated data [23] and the ability to produce valid, reliable data for patient and the community. However, curriculum in medical colleges still need to be developed to meet the educational needs adequately.

But it should also be kept in mind that current research has few limitations. It can be difficult to transfer the findings to different nations and different teaching curriculum. Furthermore, since our team have merely examined the attitudes of undergraduate medical students, it can be postulated that postgraduate medical students or consultants don't have same optimistic or pessimistic views of students. A fascinating topic for additional research could be to explore with these various classes of healthcare professionals, to address their concerns.

Conclusion

This survey that explored knowledge and attitude of undergraduate medical students on the role of artificial intelligence and medical informatics in medicine and surgery has found that many students were unknown of this potential branch. This could have profound impact their clinical practice as future doctors. There were also satisfactory results after our educational activities and optimistic changes in student's attitude on artificial intelligence was noted. We noticed student's overall optimistic perspective on role of AI in medical science and their developing enthusiasm in acquiring knowledge on AI and medical informatics after educational activities. As AI-enabled technologies are in trend of integration with medical diagnostics and therapeutics, certain changes in the curriculum of MBBS course are needed to incorporate fundamental knowledge and skills on AI and medical informatics that is likely to be more integrated with healthcare in upcoming future.

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