ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 11 | November - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

AWARENESS OF ARTIFICIAL INTELLIGENCE AND ROBOTIC SURGERY AMONG URBAN ALLOPATHIC MEDICOS

Physiology

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ABSTRACT

This cross-sectional descriptive study was conducted amongst 112 urban allopathic medicos (50 females: 44.64% and 62 males: 55.36%), by administering online questionnaire to determine their awareness regarding artificial intelligence and robotic surgery. A significantly (Z=3.594; p=0.0003) higher proportion of females were post-graduates. A higher proportion of males, without significant gender-wise difference (Z=0.213; p=0.833), had the experience of using Google search for diagnosis of symptoms. Significantly more males (Z=2.155; p=0.030) were aware of Niti Aayog plan to use artificial intelligence in health care; a significantly higher (Z=2.283; p=0.022) proportion of males believed that artificial intelligence can be harnessed to help human staff. However, a significant (Z=2.661; p=0.007) majority of females felt that artificial intelligence and robotic surgery ought to be under human supervision. Many respondents opined that robotic surgery will increase productivity of surgeons, offer better post-operative care with minimal blood loss, quicker wound healing and reduced risk of iatrogenic infections.

KEYWORDS

Allopathic medicos, Artificial Intelligence, Awareness, Robotic surgery

INTRODUCTION

Artificial intelligence (AI) is a branch in computer science that is steered by machine learning (ML) algorithms. [1, 2] AI refers to hardware or software that is capable of carrying out physical tasks and cognitive functions, solving a range of problems, or making decisions without unambiguous human instructions. [3] AI encompasses a broad range of techniques and applications, such as, genetic algorithms, neural networks, ML, and pattern recognition. [4] Since AI is non-human intelligence that is programmed to complete specific tasks, it can overcome some of the computationally intensive and intellectual limitations of humans and can replace human tasks and activities within a wide range of industrial, intellectual, and social applications with resulting impacts on productivity and performance. [5] AI is rapidly gaining popularity within the healthcare sector to help deliver precision health care. [1, 2] Researchers are using AI to develop diagnostic tools and to improve delivery and efficacy of healthcare. New innovations have obtained approvals from regulatory authorities and are being used in routine medical practice. [6, 7] In spite of these developments, the undergraduate and postgraduate medical curricula have not yet included AI as an integral component of medical education. [8]

AI is expected to affect various fields of medicine substantially and has the potential to improve many aspects of healthcare. [9] Though few AI techniques are used in medical practice, many exaggerated Internet-based narratives seem to suggest that AI software programs would be superior to human medical experts in assessing the patient's medical information and automatically offer diagnoses and that AI will soon supplant human medical experts. [10] In a survey conducted on 263 medical students, 83% respondents were of the opinion that AI could potentially detect pathologies in radiological examinations but 56% felt that AI would not be able to establish a definite diagnosis. 86% agreed that AI will improve radiology, while 83% disputed the speculative statements that human radiologists will be replaced. 71% of respondents acquiesced on the need for AI to be included in medical training. [11] The potential utility of AI algorithms has been demonstrated in a range of specialties, including ophthalmology, [12] dermatology [13] and pathology. [14] Perhaps validated AI tools in radiology will emerge rapidly in the near future. [9]

Doctors need to understand AI in the same way that they need to understand any technology that can affect clinical decision-making; [15] and should also be aware of factors which may diminish the performance of algorithms for specific patient groups. [16]

In April 2018, the United States Food and Drug Administration authorized the use of the first AI device to diagnose diabetic retinopathy without a physician's assistance. [17] Though an increasing number of healthcare service companies are investing in the development of AI, researchers [17] suggest that not all individuals are willing to accept the use of medical AI devices. A cautious assessment of users' attitudes and perceptions about AI is needed for successful implementation of AI-based systems. [18] A vital requirement is to understand the determinants of acceptance or refusal of the use of AI-based devices in healthcare delivery because, if patients do not view interacting with a medical AI device as useful, they may insist on interactions with physicians, and consequently, the AI-based devices may remain unused. [19] The purpose of the present study was to determine the awareness regarding AI and robotic surgery amongst allopathic medicos.

MATERIALS AND METHODS

This cross-sectional descriptive online study was conducted in 2020 during the Covid-19 lockdown. A pre-tested and pre-validated questionnaire was administered, using the snowball sampling technique, via Google forms to male and female allopathic medicos, who were based in a metropolitan city in Western India. Informed consent was taken on the Google forms. The data were adapted to Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA) and analyzed using SPSS statistical software Windows Version 25.0 (IBM Corporation, Armonk, NY, USA). The percentage of responses and the standard error of difference between two sample proportions were calculated. The statistical significance was determined at $p<0.05$.

RESULTS AND DISCUSSION

A total of 112 allopathic medicos (50 females: 44.64% and 62 males: 55.36%) participated in this study. The gender difference in the age distribution was statistically significant (Z=3.640; p=0.0002). The gender difference in age distribution is depicted in Fig-1.

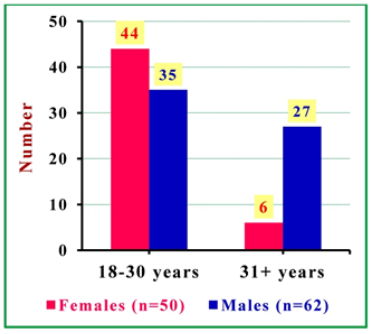

Fig-1: Age Distribution Of Female And Male Respondents

Table-1: General Awareness And Opinions Regarding Ai

Awareness and opinions	Females (n=50)	Males (n=62)	Z value	'p' value
Generally aware of AI and robotics	33 (66.0%)	40 (64.52%)	0.163	0.872
Combination of AI & Human care will benefit	48 (96.0%)	59 (95.16%)	0.213	0.833
Have used Google search for diagnosis of symptoms	41 (82.0%)	47 (75.81%)	0.794	0.429
Aware of Niti Aayog plan to use AI in health care	18 (36.0%)	35 (56.45%)	2.155	0.030 *
Rural areas will benefit if AI is used for health care	41 (82.0%)	48 (77.42%)	0.596	0.548
Can prevent Covid-19 spread to health staff	46 (92.0%)	54 (87.10%)	0.834	0.406
AI can be harnessed to assist human staff	37 (74.0%)	56 (90.32%)	2.283	0.022 *
AI is useful in diagnosis of cancer	38 (76.0%)	42 (67.74%)	0.961	0.337
AI and robotics only under human supervision	32 (64.0%)	24 (38.71%)	2.661	0.007 *

Z = Standard error of difference between two proportions; *Significant

Education-wise, 40 (80.0%) females and 29 (46.77%) males were post-graduates. The gender difference in education was statistically significant (Z=3.594; p=0.0003). 20 (48.78%) out of 41 female participants and 24 (51.06%) out of 47 male participants had the experience of using Google search for diagnosis of symptoms, without significant gender-wise difference (Z=0.213; p=0.833). 4 (9.75%) out of 41 female participants and 12 (25.53%) out of 47 male participants were satisfied with the accuracy of using Google search for diagnosis of symptoms, without significant gender difference (Z=1.914; p=0.056).

Table-2: Awareness Of Benefits Of Robotic Surgery

Parameter	Females (n=50)	Males (n=62)	Z value	'p' value
Will increase productivity of surgeons	42 (84.0%)	57 (91.94%)	1.303	0.193
Better post-operative care	35 (70.0%)	33 (53.23%)	1.807	0.070
Use in surgical implants is feasible	42 (84.0%)	48 (77.42%)	0.871	0.384
Minimal blood loss	28 (56.0%)	36 (58.06%)	0.219	0.825
Better precision	34 (68.0%)	50 (80.65%)	1.536	0.123
Quicker wound healing	34 (68.0%)	27 (43.55%)	2.583	0.009 *
Shorter hospital stay	30 (60.0%)	31 (50.00%)	1.056	0.289
Reduced risk of iatrogenic infections	37 (74.0%)	46 (74.19%)	0.023	0.984
Extramural control of surgical robots feasible	41 (82.0%)	37 (59.68%)	2.554	0.010 *

Z = Standard error of difference between two proportions; *Significant

In the present study, only 4 (8.0%) females and 4 (6.45%) males opined that AI and robotic surgeons may replace human doctors, without significant gender difference (Z=0.316; p=0.748). However, a Canadian study [20] reported that one-sixth of 322 Canadian medical students who were interested in radiology opined that they were less likely to consider radiology as a career because they were more concerned about the displacement, rather than replacement, of radiologists by AI, which could lead to reduced workforce demands.

36 (72.0%) females and 12 (19.35%) males opined that funds were the main constraint in introducing AI in Indian health system; exhibiting highly significant (Z=5.596; p<0.0001) gender difference.

CONCLUSION

In the not so distant future, medical teachers will be assigned the task of ensuring a foundation of artificial intelligence literacy among existing physicians and to train medical students for a future in which artificial intelligence will play a considerable role. Medical students ought to have opportunities to learn about the clinical usage, technical shortcomings, and ethical implications of the gadgets at their disposal. Medical teachers should also attempt to nurture the skills and interests of those medical students who will take up research and drive innovation in this space.

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