Artificial Intelligence, a New Germ Theory in Medicine: From Pakistan's Perspective

Usha Kumari MBBS, MD[1], Fakhar Abbas MBBS, MCPS, MD[2], Shafaq Jawed MBBS, MD[3]

[1] Dow University of Health Sciences, Karachi, Pakistan

[2] Mayo Hospital, Lahore, Pakistan

[3] Research Specialist, Women and Infant Hospital, Rhode Island, USA

Artificial intelligence (AI) has introduced a new dimension in the different fields of science. In the Western world, AI has been adopted enthusiastically in healthcare fields due to its efficiency and precision. In contrast, the healthcare system in Pakistan has not given due attention to this scientific advancement. Lack of awareness, and financial and moral concerns related to AI, undermine the usefulness of AI. There are opportunities and obstacles in every evolutionary step. It is crucial to embrace the brighter side of AI for a better approach to the healthcare of patients in Pakistan.

Keywords: Machine intelligence; Machine learning; Robotics

Artificial intelligence (AI) also known as "robotics" or "machine learning" (ML) is the computer-guided performance of a task with minimal human involvement. It is gaining attention in a variety of sectors, with the goal of enhanced performance, precision, and time effectiveness. In medicine, AI enables early diagnoses of the diseases as well as improves handling of massive workflow, which reduces human errors and medical expenditures. In the far end, AI is linked to enhanced patient care and reduced morbidity and mortality[1]. Despite early promises, AI in medicine has not been enthusiastically adopted. Digitalization is advancing in other fields in Pakistan, but not in medicine, it is a distant priority. In addition, the dilemma of using technology in the decision-making process is one explanation for such attitudes of physicians regarding AI. In contrast, there is no hesitation in accepting biochemical data from an auto-analyzer or magnetic resonance imaging (MRI), which are also based on technology. In addition, because of a lack of adequate understanding, healthcare professionals (HCPs) believe that AI is not a better alternative to human physicians. It requires thoughtfulness, time, and labor, whereas the health care department is not ready to bear the burden required for generating the system.

Despite these concerns, there is convincing evidence that medical AI can reliably offer a helping hand to HCPs. Technology cannot replace human clinicians, but it can supplement conventional medical practice. Scientists have created image reading and machine vision algorithms for rapid assessment[2], improved pathology visualizations[3] and identifying emergencies[4]. Because of the fast pace and the capacity to work round the clock, AI can shorten the time for generating reports for medical investigations. AI operating system is not hampered by human factors such as tiredness, which might decline or impair its validity. AI can expedite the working of medical specialties. AI-based video software can identify diseases that HCPs might otherwise overlook, hence it avoids misdiagnosis and boosts early diagnoses. AI-guided interpretation of electrocardiograms (ECG), single-photon emission computed tomography (SPECT) imaging, cardiac computerized tomography (CT), angiography, and MRI are effective in detecting heart failure early and lowering mortality[5]. Scientists are enrolling AI in predicting the prognosis of cancer, drug designing, and data collection for research and public health.

AI in Pakistan is at the very beginning stage. Literature suggests that 31% of the 51 digital health (DH) studies conducted in the last five years in

Correspondence to:

Kumari U.

Dow University of Health Sciences, Karachi 74200, Pakistan.

Phone: +92-30-82032418

Email: ughansham@yahoo.com

Pakistan were based on AI. The most common targeted domains are general health, immunization, and diagnostic. The lack of skills in technology, cost, and privacy doubts are the major obstacles[6]. Covid-19 pandemic has turned out a blessing in disguise in the field of DH, as it revealed the enormous potential of AI when "work from home" became a new norm.

Some of the DH studies based on AI conducted in Pakistan are mentioned here. AI-based algorithms have been utilized in predicting the trend of the covid-19 curve in different districts of Pakistan[7]. Multidrug-resistant tuberculosis (MDR-TB) is a serious and worrisome issue. A case-control study based on AI, conducted in Swat, Pakistan identified the risk factors associated with MDR-TB[8]. A pilot study found that AI-based software could correctly identify 80% and 86% of digital slides of chronic villi and malarial parasites, respectively[9]. In another study, blasts cells were correctly picked up in known cases of leukemia with satisfactory results[10]. Research found the incidence of restless syndrome in diabetes mellitus using the ML models[11]. In a cohort study conducted on children, the AI model was used to find out that the electroencephalography (EEG) waveform pattern found at age 4 could predict academic achievement at a later stage[12]. The data generated by such studies can be helpful for public health sectors, local governments, as well as the World Health Organization (WHO).

In brief, AI may be used effectively in a variety of areas in the medical sector. Uncertainty over how AI will affect the future of medicine goes hand in hand with fears about how AI will change what it means to be human. Challenges, down the way, include approval from the Food and Drug Administration (FDA), ethical concern, and public perceptions and acceptance of AI. The path to integrating AI is still quite long, but the potential advantages of AI cannot be overlooked. Pakistan falls under a lower-middle-income country. It has a heavy burden of different diseases with limited availability of healthcare, especially in its periphery. AI can serve to fast-track the HCPs shortage problem. The goal of the present letter is to forecast how AI would improve and supplement the "medical intelligence" of future medical practitioners in Pakistan. AI can provide considerable healthcare advantages provided moral principles are upheld and a productive, open-source, and user-friendly technology is developed.

References

1. Choudhury A, Asan O. Role of artificial intelligence in patient safety outcomes: Systematic literature review. JMIR Med Inform 2020;8:e18599.
2. Teare P, Fishman M, Benzaquen O, Toledano E, Elnekave E. Malignancy detection on mammography using dual deep convolutional neural networks and genetically discovered false color input enhancement. J Digit Imaging 2017;30:499-505.
3. Li R, Zhang W, Suk HI, Wang L, Li J, Shen D, et al. Deep learning based imaging data completion for improved brain disease diagnosis. Med Image Comput Comput Assist Interv 2014;17:305-12.
4. Prevedello LM, Erdal BS, Ryu JL, Little KJ, Demirer M, Qian S, et al. Automated critical test findings identification and online notification system using artificial intelligence in imaging. Radiology 2017;285:923-31.
5. Noonan AS, Velasco-Mondragon HE, Wagner FA. Improving the health of African Americans in the USA: an overdue opportunity for social justice. Public Health Rev 2016;37:12.
6. Kazi AM, Qazi SA, Ahsan N, Khawaja S, Sameen F, Saqib M, et al. Current challenges of digital health interventions in pakistan: Mixed methods analysis. J Med Internet Res 2020;22:e21691.
7. Ahmad I, Muhammad Asad S. Predictions of coronavirus COVID-19 distinct cases in Pakistan through an artificial neural network. Epidemiol Infect 2020;148:e222.
8. Ali MH, Khan DM, Jamal K, Ahmad Z, Manzoor S, Khan Z. Prediction of multidrug-resistant tuberculosis using machine learning algorithms in SWAT, Pakistan. J Healthc Eng 2021;2021:2567080.
9. Zehra T, Shaikh A, Shams M. Dawn of artificial intelligence - Enable digital Pathology in Pakistan: A paradigm shift. J Pak Med Assoc 2021;71:2683-4.
10. Zehra T, Shabbir A. Adoption of digital pathology in developing countries: From benefits to challenges. J Coll Physicians Surg Pak 2021;31:1120-2.
11. Iftikhar S, Shahid S, Hassan MU, Ghias M. Assessment and prediction of restless leg syndrome (RLS) in patients with diabetes mellitus type II through artificial intelligence (AI). Pak J Pharm Sci 2020;33:2399-403.
12. Rasheed MA, Chand P, Ahmed S, Sharif H, Hoodbhoy Z, Siddiqui A, et al. Use of artificial intelligence on Electroencephalogram (EEG) waveforms to predict failure in early school grades in children from a rural cohort in Pakistan. PLoS One 2021;16:e0246236. Correction in: PLoS One 2021;16:e0247744.