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INTEGRATION OF ARTIFICIAL INTELLIGENCE INTO INDIAN HEALTHCARE SYSTEM

Faizanur Rahman[*]
Zubair Ahmed[#]

Abstract

Artificial Intelligence (AI) is a rapidly growing area of interest in India. AI refers to a machine's ability to think, perceive, learn, solve problems, and make decisions. Most AI systems rely on large historical datasets to forecast future trends and outcomes at a rate that humans cannot match. AI is also significantly reshaping the Indian healthcare market. As a result, AI-enabled healthcare services such as automated analysis of medical tests, predictive healthcare diagnosis, automation of healthcare diagnosis using monitoring equipment, and wearable sensor-based medical devices are expected to revolutionize the country's medical treatment processes. AI could be highly beneficial in areas with scarce human resources, such as rural and remote areas. For example, in India, AI technology has been beneficial in screening, monitoring, and treating COVID-19 cases. However, India's road to AI-driven healthcare adoption is fraught with difficulties. There are no standardized guidelines for designing AI applications in healthcare systems in India. There is no regulatory body dedicated exclusively to AI.

Furthermore, most AI companies that provide services are startups yet to gain the healthcare industry's trust. This paper aims to sketch a picture of the current state of AI in the Indian healthcare sector. It investigates the potential and impact of AI in healthcare and the challenges associated with policy-making in the healthcare industry.

Keywords**:** Artificial Intelligence, COVID-19, Healthcare, Pandemic, Startup

1. Introduction

Artificial Intelligence (AI) underpins various concepts, including computing, software development, and data transmission. Machine learning, deep learning, natural language generation, speech recognition, robotics, and biometric identification are all examples of AI-enabled technologies. AI is used in various industries, including healthcare, manufacturing, business, and automotive.[1]

AI is defined as machine intelligence rather than human or other living species' intelligence. AI and related technologies are becoming more common in business and society and are starting to show up in healthcare. AI aims to mimic human cognitive functions. It's causing a paradigm shift in healthcare, thanks to the growing availability of healthcare data and the rapid

[*]**Assistant Professor, Faculty of Law, Jamia Millia Islamia, New Delhi**
[#]**Assistant Professor, Department of Law, Alia University, Kolkata (W.B.)**

[1] Ma Si, New partnership to leverage AI technology in medical fields, April 20, 2071, available at: http://www.chinadaily.com.cn/business/tech/2017-04/20/content_29013915.htm. (last visited 20.02.2022)

advancement of analytics techniques. It can potentially increase care delivery productivity and efficiency, allowing healthcare systems to provide more and better care to more people.[2]
AI in the healthcare sector is emerging as a set of technologies that allow machines to sense, comprehend, act, and learn to perform administrative and clinical healthcare functions and be used in research and training. AI can help healthcare providers have a better experience, spend more time on direct patient care, and reduce burnout. Artificial intelligence makes patients', doctors', and hospital administrators' lives easier by automating tasks that humans usually do, but in a fraction of the time and at a fraction of the cost. This paper aims to assess the current state of AI in the Indian healthcare sector.

2. Forms of AI used in Healthcare

There is a wide range of applications for artificial intelligence in the healthcare industry across different sectors. Using artificial intelligence in healthcare can be divided into the following broad categories to understand the types of AI better; those other solutions are being developed around:[3]

(i) Descriptive AI is the most widely used type of AI in healthcare today and has the most significant short-term potential. It quantifies previous events and uses this information to gain additional insights, such as detecting trends and minor changes that would otherwise go undetected by medical professionals. Such technology, for example, can spot patterns in fracture detection and skin lesions. Furthermore, these technologies have been shown to detect subtle wrist fractures better than humans.

(ii) Predictive AI may be able to perform the functions of a clinician, potentially replacing human labor. Primary care clinicians are in short supply in many parts of India.[4] The scarcity of clinicians and the capacity of healthcare programs are limiting factors. This is where AI can help. Artelus[5] wants to use artificial intelligence to help with primary screening in understaffed rural areas. Wysa,[6] for example, can track and predict mental health issues. High-touch technology (where each patient receives individual attention) is another option. Unfortunately, there is no way to communicate unintended nonverbal cues like judgment, and there is no sense of the usual hierarchy in clinician-patient relationships. As a result, virtual humans are more likely, to be honest with patients, and patients are more likely to follow their coaching and care plans.[7]

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[2] A. Ericson, Health AI Mythbusters: Separating Fact from Fiction, October 31, 2017, available at: https://www.accenture.com/us-en/blogs/blogs-health-ai-mythbusters-separating-factfiction. (last visited 20.02.2022)
[3] P. Perry, How Artificial Intelligence Will Revolutionize Healthcare, available at: http://bigthink.com/philip-perry/how-artificial-intelligence-will-revolutionize-healthcare (last visited 20.02.2022)
[4] Mathur, V., Billionfit: Technology redesigning healthcare [White paper], September, 2017, available at: http://www.grantthornton.in/ globalassets/1.-member-firms/india/assets/pdfs/billionfit-technology--redesigning-healthcare.pdf. (last visited 22.02.2022)
[5] Artificial Learning Systems., available at: http://artelus.com/products.php. (last visited 24.02.2022)
[6] Wysa - AI coach for behavioural health., available at: https://www.wysa.io/ (last visited 20.02.2022)
[7] F. Dare, Can High Tech Be High Touch in Healthcare? May 3, 2017, available at: https://www.accenture.com/us-en/blogs/blogs-high-tech-high-touch-healthcare. (last visited 22.02.2022)

(iii) Prescriptive AI advances the goal of predictive AI by detecting trends that humans may not predict and suggesting treatment options based on nuances in the diagnosis. Prescriptive AI is the most compelling and contentious use case due to its decision-making ability. Prescriptive AI could be used as a cognitive agent that mimics the brain to relieve the human cognitive load. For example, one of the most knowledge-intensive industries is healthcare. In collaboration with physicians, nurses, and researchers, AI-powered smart agents can search, find, present, and apply the most current clinical knowledge, significantly improving clinician efficiency and capacity and the quality of care.[8]

3. State of AI in the Healthcare Market in India

According to reports, AI could add USD 957 billion to the Indian economy by 2035, or 15% of the current gross value added, and AI investment in the Indian healthcare industry appears to rise.[9] AI integration in healthcare is being promoted by stakeholders such as FICCI and the Prime Minister's Office in India as a critical technology for improving healthcare efficiency, quality, cost, and reach. In India, assistive AI has the most growth potential, whereas technologies that can replace doctors have the lowest chances of succeeding due to a conflict of interest among the medical establishment, among other reasons.

According to a review of AI and health solutions, reports, and news items in India, the goal of most AI-based healthcare initiatives in India has been to extend medical services to traditionally underserved populations in India, such as rural areas lacking the necessary infrastructure or primary physicians, and economically weaker sections of society unable to afford certain medical facilities. As a result, AI in India appears to address economic disparity issues rather than widening existing gaps, as some have predicted. A review of AI and healthcare companies in India also reveals that foreign companies are developing and testing new solutions.

Emerging markets, such as India, are also experiencing a skills shortage. AI-enabled tools may be able to assist less-skilled people in making difficult decisions. For example, consulting highly skilled doctors can be saved for cases where the AI tool determines a low confidence level in a decision, allowing the expert to focus on the most critical cases. Mental health assistant apps like Wysa, a chatbot that allows certain cases to be escalated to a human assistant depending on need, are examples of these. AI also addresses issues of accessibility and affordability in these markets by assisting underserved demographics in obtaining low-cost healthcare. India is also an important testing ground for new artificial intelligence solutions due to its abundance of data.[10]

[8] F. Dare, Can High Tech Be High Touch in Healthcare? May 3, 2017, available at: https://www.accenture.com/us-en/blogs/blogs-high-tech-high-touch-healthcare. (last visited 20.02.2022)

[9] Accelerating India's Economic Growth with Artificial Intelligence, Accenture (2017), available at: https://www.accenture.com/t20171220T030619Z__w__/in-en/_acnmedia/PDF-68/ Accenture-ReWire-For-Growth-POV-19-12-Final.pdf (last visited 20.02.2022).

[10] https://cis-india.org/internet-governance/ai-and-healthcare-report(last visited 24.02.2022)

Artificial intelligence applications in healthcare are expected to be worth INR 431.97 billion by 2021. The doctor-patient ratio in India is expected to reach Rs. 6.9:1000 by 2023, up from Rs. 4.8:1000 in 2017. The ability of AI applications to improve doctors' efficiency will aid in addressing issues such as uneven doctor-patient ratios, providing high-quality healthcare to rural populations, and training doctors and nurses to perform complex medical procedures.[11]

AI adoption is significantly reshaping the Indian healthcare market. As a result, medical treatment processes in the country are expected to be revolutionized by AI-enabled healthcare services such as automated analysis of medical tests, predictive healthcare diagnosis, automation of healthcare diagnosis with the help of monitoring equipment, and wearable sensor-based medical devices.[12]

4. Legal and Regulatory Framework for AI Solutions in Healthcare in India

Various policies influence the development and application of artificial intelligence in healthcare in India. This includes rules governing the use of health data, digital medical device certification, digital medical device standards, and patient/relationship frameworks. In addition, the Indian government has taken several policy initiatives to promote AI and health-related solutions development. The following summarizes pertinent Indian law, policy, and standards:

(i) Information Technology Act, 2000 & Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011

Applying these new technologies necessitates a continuous data exchange between the patient and the service provider. Therefore, under the Data Protection Rules (Rules), the patient's personal information, such as medical history and physiological conditions, is considered Sensitive Personal Data or Information (SPDI), and specific provisions apply when a corporate body collects, stores, transfers, or processes such information.

The Rules make it clear that consent is required. As a result, a doctor or institution must obtain written consent before using a patient's data. If any data is being collected, the patient must be informed of the purpose of the collection and any transfers of such information to third parties and the identity of the data collection agency. In addition, the corporate body transferring the SPDI must ensure that the SPDI receiver follows proper security procedures. A privacy policy must also be published on the website of the corporate body. In order to keep the SPDI secure, the Rules also require the implementation of reasonable security practices and procedures, of which ISO 27001 is an accepted standard.

[11] AI in Healthcare: 4 Examples in Health Informatics, available at: https://healthinformatics.uic.edu/blog/ai-in-healthcare-4-examples-in-health-informatics (last visited 24.02.2022)

[12] Artificial Intelligence (AI), available at: https://www.businesswire.com/news/home/20190726005157/en/Artificial-Intelligence-AI-in-Healthcare-Market-in-India-is-Expected-to-Grow-at-a-Rate-of-40-by-2021-Impacting-the-Doctor-Patient-Ratio-During-the-Forecast-Period-2018-2023---ResearchAndMarkets.com (last visited 24.02.2022)

The Rules also call for the appointment of a 'Grievance Officer,' whose contact information must be made public on the website, and users can opt out or modify their SPDI if necessary.

The Supreme Court, in *K.S Puttaswamy & Anr.* v. *Union of India & Ors*.,[13] emphasized the need for a comprehensive data protection framework, prompting the Ministry of Electronics and Information Technology to appoint a committee of experts chaired by Justice B.N. Srikrishna to identify data protection issues, make recommendations to address them, and draft legislation introduced in Parliament.[14]

(ii) The Indian Medical Council Act, 1956 (MCI Act) and The Indian Medical Council (Professional conduct, Etiquette, and Ethics) Regulations, 2002 (MCI Code)

The MCI Code establishes professional and ethical standards for doctors' patient interactions, including patient confidentiality and prognosis disclosure. The Code also states that medical records should be computerized to be retrieved quickly. The Medical Council of India is the apex body that regulates medical practice in India. However, the NITI Aayog's proposed National Medical Commission Bill, 2016, aims to replace the current Medical Council of India with a 'National Medical Commission. The National Medical Commission Bill would alter the regulatory framework governing medical practitioners if passed.

(iii) Electronic Health Records Standards, 2016

The 2016 EHR Standards [15] attempt to regulate data ownership and privacy standards surrounding the storage of patient health data. This includes information from medical facilities and medical devices, and self-care systems. The government has recognized the need for data standardization and has established standards for data capture, storage, retrieval, exchange, and analytics, including images, clinical codes, and data. These include ISO and other national standards to be used for EHRs.

(iv) Open Data Policy

The National Data Sharing and Accessibility Policy (NDSAP) was developed by the Ministry of Science and Technology and implemented as an Open Data Platform by the Ministry of Electronics and Information Technology.[16] The NDSAP is intended to facilitate sharing non-sensitive data created with public funds and is available in either digital or analog format.[17] Access to this data is open, registered, or restricted depending on the level of authorization required.

[13] (2017) 10 SCC 1; AIR 2017 SC 4161.
[14] Office Memorandum for the Constitution of a Committee of Experts to deliberate on a data protection framework for India, July 31, 2017, available at: http://meity.gov.in/writereaddata/files/meity_on_constitution_of_expert_committee_31072017.pdf (last visited 20.02.2022)
[15] The Electronic Health Record (EHR) Standards for India (2016).
[16] Open Government Data (OGD) Platform India, available at: https://data.gov.in/(last visited 20.02.2022)
[17] National Data Sharing and Accessibility Policy (NDSAP) 2010, available at: https://data.gov.in/sites/default/files/NDSAP.pdf. (last visited 20.02.2022)

The Health Management Information System (HMIS) is where most of the healthcare indicators on the Open Data Portal come from, but studies have questioned its accuracy.[18] Although the website's data is from the public sector, nearly 70% of healthcare is provided by private companies. This casts doubt on the data's representativeness. In addition, start-ups without access to large datasets face the problem of not having enough data for prototyping.[19] Because open data is a critical enabler for AI, India should open up more data and incentivize private healthcare providers to provide anonymized data.

(v) Medical Devices Rules, 2017

The Medical Device Rules, 2017 were written to distinguish between medical devices and pharmaceuticals for regulatory purposes. The Rules define what constitutes a medical device, and their application is limited to those devices that fall within their purview. In addition, the Rules include a risk-based classification system that divides medical devices into Low (Class A), Low Moderate (Class B), Moderate-High (Class C), and High (Class D) (Class D). Manufacturers must classify products based on their risk by the framework established by the Drug Controller General of India.

Class A medical devices do not require a prior audit by a third party or official inspection in order to obtain a license to manufacture them; Class B medical devices do require a prior audit by a third party but do not require official inspection, and Class C or Class D medical devices do require prior official inspection. In addition, devices are expected to conform to either the standard laid down specifically for the device by the central government or the Bureau of Indian Standards or to standards laid down by the International Organization for Standardisation or the International Electro-Technical Commission, among others, in the absence of which they must conform to standards laid down by the International Organisation for Standardisation or the International Electro-Technical Commission, among others. These provisions clarify product standards for medical devices.

Other provisions include certainty of timelines for application decisions and when an audit or inspection can be expected, granting perpetual licenses (valid until canceled), making the licensing process more accessible, and mandatory recalls in the event of knowledge of a health risk.

There are no separate provisions in the Rules for the sale of medical devices. However, they address a practical issue faced by Indian distributors, namely stock transfers, which are simply stock transfers and not sales. The hospital is billed per user, and the remainder of the stock is returned to the distributor. A distributor usually does not keep track of stock transfers. As a

[18] Pandey, Arvind & Roy, Nandini & Bhawsar, Rahul & Mishra, Ram., Health Information System in India: Issues of Data Availability and Quality, available at: https://www.researchgate.net/publication/232084914_Health_Information_System_in_India_Issues_of_Data_Availability_and_Quality_1 (last visited 24.02.2022)

[19] S. Mohandas, AI and Healthcare in India: Looking Forward, Centre for Internet and Society, December 16, 2017, available at: https://cis-india.org/internet-governance/blog/aiand-healthcare-in-india-looking-forward. (last visited 21.02.2022)

result, the Rules permit the supply of implantable medical devices in exchange for a delivery note (challan).

The Rules create a new regulatory framework for medical device clinical trials. The licensing authority has set a 90-day deadline for deciding on a clinical trial application. In addition, for approval of medical devices other than investigational medical devices, the Rules have introduced the concepts of 'Pilot Study, which is an exploratory study, and 'Pivotal Study,' which is a confirmatory study as substantial equivalence.

(vi) ISO 13485:2016

ISO 13485 is an international standard that defines quality management systems for manufacturers, suppliers, contract service providers, and distributors of medical devices and equipment. Its main objective is to regulate medical devices by establishing uniform quality management system requirements, which serve as the foundation for regulatory compliance in domestic and international markets.[20]

An organization must demonstrate its ability to consistently provide medical devices and related services that meet customer and regulatory requirements to meet this standard. Unless otherwise specified, an organization may be a part of one or more product lifecycle stages, and the standard applies to such organizations regardless of their size or type. The standard can also be used by suppliers or third parties who provide quality management services to the organization.

This standard is being incorporated through IS 15579:2005, India's attempt to move towards ISO 13485:2016, as the country continues developing a medical device framework. IS 15579:2005 and ISO 13485:2016 are identical, except for a national foreword and minor editorial changes, according to the Bureau of Indian Standards. IS 15579:2005 may be mandatory, unlike its international counterpart.[21]

5. Role of Artificial Intelligence in Tackling COVID-19

Big data and artificial intelligence are being used to accelerate efforts to combat the COVID-19 pandemic. In addition, various AI offshoots have been used to combat disease outbreaks. Therefore, AI has the potential to be extremely useful in the fight against COVID-19. AI is used to identify disease clusters successfully, track cases, predict future outbreaks, assess mortality risk, diagnose COVID-19, manage the disease through resource allocation, facilitate training, maintain records, and study disease trends. The following are a few AI applications that are attracting much attention and providing hope in the fight against COVID-19:[22]

[20] ISO 13485:2016, available at: http://www.isoindia.org/iso_ISO_13485.php (last visited 22.02.2022)
[21] R. Paddock, Medical Device Regulatory Profile for India, January, 2010, available at: https://www.trade.gov/td/health/indiaregs.pdf (last visited 22.02.2022)
[22] Arora, Neelam et. al., 'The role of artificial intelligence in tackling COVID-19', 15(11) *Future Virology* (2021), available at: https://www.futuremedicine.com/doi/10.2217/fvl-2020-0130 (last visited 20.02.2022)

(i) AI in Prediction & Tracking

By extracting information from social media platforms, phone calls, and news sites, AI can forecast the spread of viruses, develop early warning systems, provide helpful information about vulnerable areas and predict morbidity and mortality. For example, based on available data, Bluedot identified a cluster of pneumonia cases and used machine learning to predict the outbreak and geographic location of the COVID-19 outbreak. COVID-19 data is collected and made available on HealthMap to help effectively track the virus's spread. The importance of using multitudinal and multimodal data to identify and forecast COVID-19 outbreaks has recently been highlighted.[23]

(ii) AI in Contact Tracing

In COVID-19, AI can supplement mobile health applications in which smart devices such as watches, phones, cameras, and wearable devices are used for diagnosis, contact tracing, and efficient monitoring. In telemedicine, applications like AI4COVID-19, which rely on audio recording samples of 2 s cough, can be used.[24]

(iii) AI in Monitoring of COVID-19 Cases

In clinical settings, AI techniques monitor patients and predict treatment outcomes. AI may provide critical resource allocation and decision-making information by prioritizing the need for ventilators and respiratory supports in the Intensive Care Unit based on data derived from vital statistics and clinical parameters.[25] AI can also predict recovery or mortality in COVID-19 and provide daily updates, storage and trend analysis, and treatment tracking.

(iv) AI in Early Diagnosis

COVID-19 cases were detected and quantified using chest x-ray and CT scan images using AI. COVID-19 detection neural network (COVNet) is a deep learning model that uses visual 2D and 3D features extracted from a volumetric chest CT scan to distinguish between COVID-19 and community-acquired pneumonia.[26] This could help reduce the number of RT-PCR tests in resource-constrained settings.

(v) AI in Assisting Medical Practitioners & Healthcare Staff

AI-based triage systems can help medical staff and healthcare workers reduce their workload by automating processes such as providing training to practitioners, determining the mode of treatment and care by analyzing clinical data using pattern recognition approaches, digitizing patient reports, and providing solutions that reduce their contact with patients. AI can classify patients into mild, moderate, and severe categories based on the severity of their symptoms, genetic disposition, and clinical reports so that different approaches can be taken to treat them as effectively as possible. In asymptomatic cases or patients with mild symptoms, AI in

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[23] Santosh KC., 'AI-driven tools for coronavirus outbreak: need of active learning and cross-population train/test models on multitudinal/multimodal data', 44(5) **J. Med. Syst.** 1-5 (2020).

[24] Imran A, Posokhova I, Qureshi HN *et al.*, 'AI4COVID-19: AI enabled preliminary diagnosis for COVID-19 from cough samples via an app', 100378 **Inform. Med. Unlocked** 1-31 (2020).

[25] Rahmatizadeh S, Valizadeh-Haghi S, Dabbagh A., 'The role of artificial intelligence in management of critical COVID-19 patients,' 5(1) **J. Cell. Mol. Anes.**16-22 (2020).

[26] Li L, Qin L, Xu Z *et al.*, 'Artificial intelligence distinguishes COVID-19 from community acquired pneumonia on chest CT', 200905 **Radiology** 1-16 (2020).

telemedicine can also eliminate the need for frequent and unnecessary hospital visits by remotely monitoring cases and recording patient data. AI-based medical chatbots can also be used for consultations, reducing physical crowding in hospitals, spreading infection, and preventing critical care services from becoming clogged. In hospital settings, service robots and anthropomorphic robots with AI cores can provide essential services and perform routine tasks such as cleaning, disinfecting, and monitoring.[27]

(vi) AI in Preventing the Spread of Misinformation

The flood of information has turned this pandemic into an infodemic. Using information from social media platforms such as Twitter, Facebook, and others to better understand COVID-19 knowledge, awareness, and practices can help develop a strategy for collecting and disseminating timely and accurate information to help mitigate COVID-19's impact. Machine learning techniques can also be used to detect trends and conduct sentiment analysis, as well as to provide information about the source of false information and suppress rumors and misinformation. Artificial intelligence (AI) techniques can also clearly depict recovery rates, healthcare accessibility and availability, and gap detection. AI can provide the most up-to-date information on emerging evidence in diagnosis, treatment, symptom spectrum, and therapeutic outcomes in this highly dynamic situation, assisting clinicians in real-world scenarios and the general public in overcoming fear and panic.[28]

6. Challenges to AI in Healthcare in India

There are several obstacles to AI implementation and adoption in Indian healthcare. Among them are:

(i) India currently lacks regulatory authority in the field of AI in healthcare. The Indian Medical Council (/National Medical Commission), India's Drug Controller General, or a new entity created specifically for this purpose are possibilities. A viable alternative would be to empower the MCI to oversee medical aspects and a regulator under the Data Protection Bill to oversee data issues. In the case of medical devices, there is also a regulatory gap, which the recent Indian Medical Devices Rules, 2017, attempted to fill.

(ii) Acceptability of results, which include direct results obtained using AI technologies and opinions provided by medical practitioners who are influenced/aided by AI technologies, is one of the most significant challenges in India's adoption of AI in healthcare. When presenting their products to doctors and hospitals, start-ups in the field are frequently asked to show proof of a clinical trial, even though clinical trials are costly, time-consuming, and ineffective certification forms for medical devices and digital health platforms. Clinical trials are also problematic for startups because there is no precise regulation to follow. They believe that, while clinical trials are required for drugs, in the case of AI, the process often results in the technology being obsolete by the time it is approved. On the other hand, medical

[27] Yang GZ, Nelson BJ, Murphy RR *et al.*, 'Combating COVID-19 - the role of robotics in managing public health and infectious diseases', 5(40) **Sci. Robot.** 5589 (2020).
[28] Samuel J, Ali GG, Rahman M, Esawi E, Samuel Y., 'Covid-19 public sentiment insights and machine learning for tweets classification', 11(6) **Information** 314 (2020).

professionals are less trusting of startups that a national or international authority has not approved. Therefore, these startups propose a possible and partial solution allowing doctors to collaborate on clinical trials.[29]

(iii) Policymakers in India are ignoring India's efforts to develop and improve the national infrastructure required for AI to take off. The infrastructure for cloud computing, for example, is primarily concentrated in servers outside India. Many Indian start-ups have incorporated themselves outside of India because of more accessible access to infrastructure and technology due to delays in investing in native infrastructure.[30]

(iv) In AI-based healthcare solutions, the issue of information asymmetry between the doctors who use the system and the coders who built it is expected. As a result, some users may be wary of using the software. Furthermore, how AI technologies are viewed directly impacts their efficacy in treatment. As a result, more research is required, particularly in developing countries such as India, where technology penetration and understanding differ significantly from those in developed countries.[31]

(v) Investment in health-related AI in India appears to be limited, with research underfunded and explored, particularly by the government.

7. Conclusion

AI technology helps resolve health issues in India, but it is limited by the lack of readily available medical information and the inability of human attributes to handle some aspects. Although AI applications are designed to replace human interference, they cannot justify and convey information. A few procedures performed by medical institutions' clients resulted in misrepresentation or fraudulent activity. Artificial intelligence is used to detect digital assaults and cyber-attacks and protect medical computer systems.

AI systems have argued that machines making better clinical decisions will not replace human physicians. The AI application will help patients with training, medical research, diagnosis, medical treatments, and decision-making in wellness care. AI systems will advance to the point where they will perform a broader range of tasks without human input or control. While stimulating and driving innovation in the sector, AI is developed and used transparent and public-interest manner.[32]

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[29] S. Mohandas, 'AI and Healthcare in India: Looking Forward, Centre for Internet and Society, December 16, 2017, available at: https://cis-india.org/internet-governance/blog/aiand-healthcare-in-india-looking-forward. (last visited 24.02.2022)

[30] S. Vempati. India and the Artificial Intelligence Revolution, available at: http://carnegieendowment.org/files/CP283_Vempati_final.pdf (last visited 24.02.2022)

[31] S. Mohandas, 'AI and Healthcare in India: Looking Forward, Centre for Internet and Society, December 16, 2017, available at: https://cis-india.org/internet-governance/blog/aiand-healthcare-in-india-looking-forward. (last visited 24.02.2022)

[32] Vijai C. and Worakamol Wisetsri, 'Rise of Artificial Intelligence in Healthcare Startups in India', 14 (1) *Advances in Management* 48-52 (2021)