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RESEARCH ARTICLE

SCOPE OF ARTIFICIAL INTELLIGENCE IN SPECTRUM OF AYURVEDA

Dr. Prerna Saini[1] and Dr. Deepti Parashar[2]

1. P.G. Scholar, Department of Rog Nidan Avum Vikriti Vigyan, Institute for Ayurved Studies and Research, Shri Krishna AYUSH University, Kurukshetra, Haryana-136118.
2. Professor & HOD, Department of Rog Nidan Avum Vikriti Vigyan, Institute for Ayurved Studies and Research, Shri Krishna AYUSH University, Kurukshetra, Haryana-136118.

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Manuscript Info

Abstract

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Ayurveda, the science of life is utilized for maintenance of health since ancient times. The main objective is to prolong lifespan of humans and also to maintain and promote their positive health. This traditional medical system with established history of many centuries is becoming one of the most popular sciences with safety and efficacy. With increase demand of Ayurvedic medicine and acceptance of Ayurveda in the global world, there is requirement of modernization and use of advance techniques in Ayurveda. There is a disconnect between cutting- edge technical developments and the development of methods to be incorporated into Ayurveda. Ayurveda is currently not exposed in terms of various concepts and ideologies. To decrease the lacunae in the current availability, the agglomeration of Ayurvedic sciences with modern technology is essential. Now a day's newly progressed branch known as Artificial Intelligence (AI) can be used to meet increasing demands of Ayurveda medicines and to tackle challenges faced during drug manufacturing. AI can be used to combine engineering principles into the drug development. This can be achieved through applicability of AI in the various sectors of Ayurveda.

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Introduction:-

Upgrading yourself is the only way of staying ahead. To upgrade is to make improvement in something or exchange it for better version. There may be up gradation of skills, knowledge or system. Ayurveda – The science of life is one of the most approved and admired existing health systems in the world with fundamental principles and theory-based practices. Central to Ayurvedic diagnosis is the assessment of individual constitution (prakriti), imbalances (vikriti), and disease manifestations (roga) through a combination of clinical examination, patient history, and diagnostic techniques such as pulse diagnosis (nadi pariksha) and tongue examination (jihva pariksha). However, the subjective nature of these methods and the complexity of Ayurvedic diagnosis pose challenges for standardization and accuracy. Ayurveda has ability to treat many chronic diseases such as Cancer, Diabetes, Arthritis and Asthma. So for upgrading this ancient and precious system of medicine there must be full- fledged inclusion of technology that allows computers and machines to function in an intelligent manner. This computer or machine based intelligence is called as Artificial Intelligence. It is the simulation of human intelligence processes by machines, especially computer systems.

Corresponding Author:- Dr. Prerna Saini
Address:- P.G. Scholar, Department of Rog Nidan Avum Vikriti Vigyan, Institute for Ayurved Studies and Research, Shri Krishna AYUSH University, Kurukshetra, Haryana-136118.

Digital transformation and technologies in health care such as virtual care, remote monitoring, Artificial Intelligence (AI), big data analytics, block chain, smart wearables, platforms, tools enabling data exchange and storage, remote data capture, and the exchange of data and sharing of relevant information across the health ecosystem have enhanced the health outcomes by improving medical diagnosis, data-based treatment decisions, digital therapeutics, clinical trials, self-management of care, and person-centered care as well as creating more evidence-based knowledge, skills, and competence for professionals to support health care.[1] In the current phase of globalization, the world is not turning up on India; Ayurveda, our soft power, is not being accepted worldwide. To match the frequency of globalization, Ayurveda has to be integrated with artificial intelligence.[2]

What Is Artificial Intelligence?
The Council on AI of the Organization for Economic Cooperation and Development (OECD) defines an AI system as "A machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments."[3]

AI is any software technology with at least one of the following capabilities: perception – including audio, visual, textual, and tactile (e.g., face recognition), decision-making (e.g., medical diagnosis systems), prediction (e.g., weather forecast), automatic knowledge extraction and pattern recognition from data (e.g., the discovery of fake news circles in social media), interactive communication (e.g., social robots or chatbots), and logical reasoning (e.g., theory development from premises).[4]

Importance Of AI In Ayurveda
AI integration is accelerating in the mainstream medical industry, and attempts are now being made to include AI in traditional medicines .

The Trisutra (three fundamental databases) of Ayurveda for AI can be human data, Ayurveda therapeutics data, and disease data.

Human Data
The first dataset on humans includes Dosha Prakriti (Somatic constitution) and its characteristics, Sapta Dhatu (major structural components of the body), 13 types of Agni(digestive/metabolic factors), 13 Srotas(structural or functional body channels), 3 Mala(Body waste products), and Oja (the essence of all seven Dhatu).

Prakriti is one of the unique concepts described in Ayurveda. It is determined by each Dosha or a combination of two or all the three.[14] Prakriti analysis aids in determining which Dosha or Doshas predominate in a person. Because disease is caused by a Dosha imbalance, a deeper understanding of Prakriti aids in the establishment of an effective treatment regimen for a certain individual. This function can be improved by creating a clinical decision support system that uses Prakriti as a primary tool to get greater acceptability.

Various government and non- government entities are actively participating in setting trends in Ayurveda digitization. Collection, organization and dissemination of information with economy and efficiency dampened on the skills and expertise of the portal / program manager. There are many computer-based Ayurveda practices designed to assist Ayurvedic doctors to detect, communicate and interpret data for accurate diagnosis and treatment.[15] Various programs like Aushadhakosh, Dosha assessment, Prakriti assessment, RASEX, RUDRA, etc., are in the market making digital Ayurveda supportive systems. In the net not only e-Journals, e-books and indexing units (DHARA, AYUSH Research portal, TKDL) but also many dot com and bloggers (Technoayurveda, Ayurhelp, Ayurvedic cure, Chakrapani, etc.) are helping the system.

Ayurveda Therapeutics Data
The second set of Ayurveda therapeutics includes medicinal plants with their Rasa (taste), Guna (property/ quality/ attribute), Virya (Potency), Vipaka (bio-transformed rasa), and procedures like Panchakarma (five internal bio-cleansing therapies) as well as Pathyapathya (compatible diet & regimen).

For drug discovery aspect-
Data from sources such as research articles, patents, clinical trials, patient records, and
Samhitas could be fed into an AI platform, which will provide both practical usage and medications that are already known and

described in classical writings. This creates a cloud-
based representation of over one billion known and
disrupted interactions between biological elements like genes, symptoms, illness problems, tissues, species, and prospective medications. To generate knowledge graphs, this may be queried similarly to a search engine.

So, whenever this engine is asked to provide information about a disease, it can give various options, other alternate drugs (potent drugs) to treat the same disease. This way when we develop and assess them in clinical trials, it will all come down to
sophisticated pattern recognition. The epoch-
making discovery of monoamines in Rauwolfia serpentina opened up the floodgates to new vision through Ayurvedic pharmacology.[13]

Disease Data
Lastly are the disease symptoms. These three datasets, or Trisutra for AI in Ayurveda, could be brought together to diagnose, predict, and prevent disease through drugs, diet, Dinacharya (daily regimen), and Ritucharya (seasonal regimens) concepts taking care of chronobiology.

The extensive usage of plant-based TM suggests that medicinal plant extracts, when combined with modern technologies and concepts, could serve as potential reservoirs for innovative drug development. The use of robotics in the sector of patient monitoring and diagnostics, robust networking facilities in a rural area and providing consultation services, the use of DNA fingerprinting methods to assess the Prakriti, and use of wearable gadgets coupled with AI technologies to get real-time health-related data, all can be used for the early detection of diseases, offering health-care services, and to predict the outbreak of epidemics. There is also a need for experienced researchers and scholars, equipped with knowledge of modern technologies, different data collection methods, and documentation processes. Technology adoption in the field of Ayurveda are taking place in various form-

Knowledge
1. Tele conference
2. e-CME
3. e- lecturing
4. RDBMS

Problem Solution
1. Instrumentation for Ayurvedic diagnosis
2. Nadi (dosha-pulse) analyser
3. Remote (robotic) surgery

Research
1. Drug pathway analysis
2. Absorption /target/ action of medicine
3. Namburi spot test
4. Disease based objective parametric evaluation

There are several distinct areas for increasing the efficiency and improving the utility of AI, which include search and optimization capacity, natural language processing, Machine Learning (ML) and probabilistic reasoning, neural networks, and planning and decision-making; of which ML, natural language processing, and neural networks are increasingly being used to evaluate enormous amounts of data.[5] With the advent of AI systems, clinical studies can be altered and conducted dynamically with the usage of supercomputing AI systems, algorithms, and high-throughput techniques, enabling in-depth analyses of the studies, reducing the fluctuation in results, minimizing errors, and enhancing the output of clinical trials. AI integration can also aid in the selection of the study participants based on the patient's eligibility, and suitability, efficient sorting of medical records, and identification of illness phenotype with optimal patient monitoring to ensure timely identification of predictive signs of any drug-induced toxicities.[6]

There is a vivid range of applications in the market for Dosha evaluation, Prakriti assessment, etc. for assisting Ayurveda physicians in appropriate evaluation of clinical information to make accurate diagnosis and treatment,

with an ample amount of journals, e-books, and indexing units such as Digital Helpline for Ayurveda Research Articles (DHARA), AYUSH Research portal, Traditional Knowledge Digital Library (TKDL), Random Uninterrupted Documentation for Retrospective Analysis (RUDRA) Program, AyuSoft, Prakriti Vichaya, and Triskandha Kosha to strengthen the position of Ayurveda in the digital era of AI.[7]

Robotics is an important part of AI where in an artificial agent works in the real-world environment and deals with surrounding It is a man-made machine that mimics the human thinking process; simply put, it is a machine with human intelligence. AI has a number of advantages, including the reduction of error, increased power, and increased labor efficiency and helps in solving new problems, Improved interface as well as better handling of information.[8] To improve the scientific accountability of Ayurvedic medications, the Indian Ayurvedic Pharmacopoeia must be updated. Several herbal medications are not included in the Indian Ayurvedic Pharmacopoeia but are often used as ingredients in final formulations. The need of the hour is to create an updated or extra Ayurvedic pharmacopoeia that includes data on therapeutic plants that are not listed in the Indian Ayurvedic Pharmacopoeia.[9] Optimizing AI to deal effectively with the challenges faced by the Ayurveda Pharma industry, such as large- scale availability of drugs, quality assurance, and standardization, which makes them palatable, dosage fixing for multiple formulations, increased shelf life, uniform supply of medicine safety and efficacy, can be affected.[10]

AI is being actively applied in complementary and alternative medicine, so it is necessary to elaborate and utilize the database of traditional medicinal pharmacology to be used in ethnopharmacology. This work can help drug investment in the field of network pharmacology. To help the practitioners prescribe medicines, AI and ethnopharmacology in traditional medicines are required to be integrated.[11]

Conclusion:-
The World Health Organization's (WHO's) "Global Strategy on digital health 2020–2025" has emphasized the use of AI to strengthen health systems with its varied range of applications, specifically focusing on the needs of consumers, health professionals, health- care providers, and industry towards empowering the patients and achieving the vision of health for all. In the scenario of globalisation, the challenge is to to develop Ayurveda to compete in the international market. Before implementation of Artificial intelligence in Ayurveda, standardisation of Ayurvedic diagnostic, procedural and therapeutic aspects should be done. The technology should not only be used to maximize the potential of Ayurveda but also to respect and preserve physicians' integrity and ability, as the core principles of Ayurveda give utmost importance to Bhishaka (physician) in the ethical principle for treatment protocol.[3]

The development of artificial intelligence (AI) in the medical field has been growing rapidly. As AI models have been introduced in complementary and alternative medicine (CAM), a systematized review must be performed to understand its current status.

Opportunities for interdisciplinary research that joins AI and Ayurveda knowledge base can have breakthrough outcomes in terms of the prediction & prevention of diseases and in delivering personalized therapy. Owing to the potential of AI in the health sector, it could play a crucial role in bridging gaps in health-care delivery and services, particularly in low- and middle-income nations. The use of AI-based tools promises a significant role in extending health-care services to neglected groups, improving public health surveillance, and assisting health-care providers in better responding and providing complex care. This allows health-care providers to focus on addressing the challenges and complexities of the health-care system. AI, as an enabler for long-term health security and universal health coverage, needs to be integrated into the larger digital health ecosystem, guided by a robust strategy, and should be more people-centered, efficient, sustainable, and inclusive in nature.

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