

## THE IMPACT OF INTEGRATING ARTIFICIAL INTELLIGENCE IN AYURVEDA: A NEW ERA OF TRADITIONAL MEDICINE

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### ABSTRACT

Ayurveda, an ancient system of medicine, emphasizes holistic and personalized approaches to health. With the rise of Artificial Intelligence (AI), there is growing interest in how these technologies could revolutionize Ayurvedic practice. The demand and acceptance of Ayurveda at the global level is increasing and there is a need of evidence based Ayurveda for further globalization. An attempt has been made through this article to explore the current and future applications of AI in Ayurveda, highlighting its basis engineering, potential benefits and limitations for the field. The current and upcoming impacts of AI on Ayurveda, could shape the future of this ancient medical practice. By understanding both the opportunities and challenges, future research and implementation strategies in Ayurveda will become easier with AI.

**KEYWORDS:** Ayurveda, Artificial Intelligence, Industry 4.0, Integration, Globalization.

### INTRODUCTION

We are in the era of 'Industry 4.0' which joins the technologies like Artificial Intelligence, Gene editing and Robotics to the physical and biological world. This revolution has also affected the healthcare system. The World Health Organization (WHO) has set the 'Global Strategy on digital health 2020-2025', which emphasizes the use of AI to promote healthy lives and wellbeing. It integrates financial, organizational, human and technological resources.

With the present global trend, there is a need to adopt the digital integration of Ayurveda with AI without compromising its basics but with advance vision. Acharya Sushruta states "*Ekam shastram adhiyano n vidyat shastra nischayam*" we need exposure to different fields of knowledge. Ayurveda, the oldest holistic health systems, emphasizes balance and harmony in the body, mind, and spirit. Traditionally, Ayurveda relies on extensive knowledge of individual constitution (Prakriti), disease etiology (Vikriti), and therapeutic measures. The integration of AI offers a transformative approach to enhance diagnostic accuracy, treatment personalization, and research efficiency in Ayurveda. As AI technologies evolve, their application in Ayurveda could significantly impact clinical practices, patient outcomes, and the future of Ayurvedic research. Without compromising the need of physician, AI can become the best assistant for the Ayurveda practitioner.

## AIM AND OBJECTIVES

- To explore the impact of AI in the field of ayurveda.
- To identify the challenges and ethical considerations involved in integrating AI with Ayurveda.

## MATERIALS AND METHODS

Information is collected from the classical Ayurveda texts , samhitas and their commentaries. Also from different research articles related to the topic in various journals and available on internet.

## DISCUSSION

### What is AI

Artificial Intelligence (AI) refers to the field of computer science dedicated to creating systems capable of performing tasks that would typically require human intelligence. These tasks include learning from data, recognizing patterns, making decisions, and understanding natural language. AI encompasses various technologies and approaches, including machine learning, neural networks, natural language processing, and robotics.

Artificial intelligence is a field of science concerned with building computers and machines that can reason, learn, and act in such a way that would normally require human intelligence or that involves data whose scale exceeds what humans can analyze.

## The Role of AI in Ayurveda

### 1. Enhancing Diagnostic Accuracy

AI can play a crucial role in improving diagnostic accuracy within Ayurveda. Traditional Ayurvedic diagnostics often involve subjective assessments by practitioners, such as Nadi Pariksha and observation of physical symptoms. AI-driven tools can analyze patient's data, including medical history, symptoms, and lifestyle factors, to assist in diagnosing various conditions with higher precision.

#### Key Applications

- Machine Learning Algorithms: AI algorithms can be trained to recognize patterns in large datasets, aiding in the identification of disease patterns and improving diagnostic consistency.
- Natural Language Processing (NLP): NLP can be utilized to analyze patient records and historical texts, extracting relevant information for accurate diagnosis and treatment recommendations.

#### Currently available Tools and software for Nadi parikshan

- AyurPulse by AyurTech
- NadiPro by Aayu Technologies
- PulseAI by ZenMed
- VedicPulse by HealthAI
- NadiSense by Prakruti Labs etc.

### 2. Personalizing Treatment Plans

Personalized treatment is a cornerstone of Ayurveda, emphasizing individualized care based on unique constitutions and imbalances. AI can enhance this aspect by providing treatment plans through data-driven insights.

#### Key Applications

- Predictive Analytics: AI systems can analyze patient data to predict treatment outcomes, enabling practitioners to customize individual responses.
- Decision Support Systems: AI can assist practitioners in selecting appropriate herbal remedies, dietary adjustments, and lifestyle changes based on comprehensive patient profiles and historical treatment data

**AI based tools available for Prakriti parikshan and treatment plan**

- Prakriti AI by Aayu Technologies.
- AyurPrakriti by ZenMed
- DoshaAI by Prakruti Labs
- Prakriti Analytics by AyurWell
- HealthifyMe for personalised diet and exercise plans.
- AyurBalance by ZenMed for lifestyle adjustment
- YogaAI by YogaTech suggests customised Yoga routine and poses.

**3. Advancing Ayurvedic Research**

AI has the potential to revolutionize Ayurvedic research by analyzing vast amounts of data and uncovering new insights into herbal efficacy, treatment protocols, and disease mechanisms.

**Key Applications**

- Data Mining: AI can mine research databases and clinical records to identify trends, correlations, and novel therapeutic applications for Ayurvedic herbs and treatments.
- Simulation Models: Advanced AI models can simulate the effects of various treatments and predict their impact on different patient profiles, accelerating the research and development process.

**Examples**

- HerbalDB: An AI-enhanced database that provides detailed information on herbal compounds and their traditional uses in Ayurveda.
- PubChem: A comprehensive chemical database that, when combined with AI tools, can facilitate the identification and analysis of Ayurvedic herbs.
- Bioconductor: An open-source project providing tools for the analysis and comprehension of high-throughput genomics data, applicable to Ayurvedic research.
- Text Mining and Analysis Tools: Software like Lexalytics or RapidMiner can analyze textual data from research papers to identify potential Ayurvedic drug candidates and their effects.
- TensorFlow: Provides tools for building custom models for classifying and analyzing Ayurvedic texts
- Scikit-learn: A machine learning library in Python that can be used for text classification

tasks in Ayurvedic literature.

- Lexalytics: Provides text analysis and sentiment analysis tools to extract key insights from Ayurvedic literature.
- RapidMiner: Offers text mining capabilities to analyze research papers and traditional texts for valuable information.

#### **4. Integrating AI with Traditional Practices**

Integrating AI with traditional Ayurvedic practices presents both opportunities and challenges. The fusion of AI technology with traditional knowledge can enhance practice efficiency and broaden the accessibility of Ayurvedic treatments.

##### **Key Applications**

- Smart Diagnostics: AI tools can complement traditional diagnostic methods, providing a comprehensive assessment that combines both modern and traditional approaches.
- Telemedicine: AI-powered telemedicine platforms can facilitate remote consultations, making Ayurvedic care more accessible to a global audience and addressing barriers related to geographic location.

##### **Examples**

- AyurvedaAI by AyurTech Solutions diagnostic software
- AyurPulse by HealthAI diagnoses dosha imbalance
- VedicCare Telehealth by VedicAI
- AyurTelemed by ZenMed

#### **Challenges and Considerations**

##### **1. Data Privacy and Security**

The integration of AI in Ayurveda involves handling sensitive patient data. Ensuring data privacy and security is paramount to prevent unauthorized access and misuse of personal health information.

##### **2. Ethical Concerns**

Ethical considerations arise regarding the use of AI in medical decision-making. Ensuring that AI systems make decisions transparently and without bias is crucial for maintaining patient trust and ensuring fair treatment.

### **3. Preservation of Traditional Knowledge**

While AI offers significant advancements, it is essential to preserve and respect traditional Ayurvedic knowledge. Balancing AI innovation with the preservation of traditional practices is key to maintaining the integrity of Ayurveda.

### **4. Training and Adaptation**

Practitioners and researchers must be trained to effectively use AI tools and integrate them into their practice. Adaptation to new technologies and workflows can be challenging and requires ongoing education and support.

### **5. Availability of Ayurvedic data**

One key issue is the availability and standardization of Ayurvedic data. While Ayurveda is rich in knowledge, it lacks the structured data required for AI algorithms to function effectively.

## **Impacts and Benefits**

### **1. Bridging Ancient Wisdom with Modern Technology**

AI can bridge the gap between the wisdom of Ayurveda and modern technology by providing tools for data-driven decision-making. For example, machine learning can be used to identify patterns in historical data from Ayurvedic case studies, offering insights that can be applied to future treatments. Additionally, AI can make Ayurvedic knowledge more accessible through apps and digital platforms, offering real-time consultations and tailored advice to patients globally.

### **2. Evidence based research**

AI provides more objectivity which is the major concern in the research of Ayurveda as the concepts tends to be subjective mostly. it also provides accuracy and can perform comprehensive analysis of various attributes.

### **3. Upskilling and Reskilling**

As AI is has been entered in each and every field there is a need to be ready to adopt and upgrade this new knowledge and skills for better future of healthy mankind.

### **4. Integration and globalization**

Another benefit is the integration of AI-based recommendations with traditional Ayurvedic methods.

## CONCLUSION

The integration of AI in Ayurveda holds immense potential to enhance diagnostic accuracy, personalized treatment plans, advance research, and broaden access to Ayurvedic care. As AI technologies continue to evolve, it is grabbing each and every field of mankind at global level, so as in Ayurveda. It is the need of an hour, for the Ayurveda practitioner and students not to be carefree and at least be aware and stay updated regarding AI.

Its impact on Ayurveda will depend on addressing challenges related to data privacy, ethical considerations, and the preservation of traditional knowledge. By embracing these opportunities and overcoming challenges, the future of Ayurveda can be enriched with AI-driven innovations. It will help achieving the 4P's of medicine that it should be predictive, preventive, personalized and participative.

The potential benefits of AI in Ayurveda are significant. As AI application in Ayurveda will likely transform the field, making Ayurvedic care more precise, accessible, and effective.

AI can only supplement, not replace, the intuition and expertise of experienced practitioners who have spent years studying this intricate science. AI will never replace the role of practitioner and healthcare providers as this field requires the human element to reach to the patients mind and soul for treatment and cure but can become a good assistant.

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