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Impact of AI in Ayurveda Practise

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Abstract
Ayurveda is a holistic system of medicine that emphasizes individualized healthcare, maintenance of health, prevention of disease, and restoration of physiological balance. Learning and practising Ayurveda require multidimensional human intelligence, including knowledge acquisition, comprehension, memory, analytical reasoning, critical thinking, clinical judgement, and effective communication. With the rapid advancement of Artificial Intelligence (AI), healthcare is undergoing significant technological transformation. AI, a branch of computer science, involves the development of systems capable of performing tasks that traditionally require human intelligence [1]. Its applications in healthcare include diagnostic assistance, predictive analytic, clinical decision support, personalized care, medical documentation, and research [2].

The integration of AI with Ayurveda offers opportunities to enhance clinical practice, education, research, and healthcare delivery while preserving the fundamental principles of Ayurvedic medicine. AI may assist practitioners in areas such as disease identification, analysis of clinical data, personalized treatment planning, documentation, and development of evidence-based healthcare approaches. However, its application in Ayurveda also presents challenges related to data quality, standardization, ethical considerations, privacy, interpret-ability, validation, and the preservation of traditional knowledge. Therefore, AI should be considered a supportive tool rather than a replacement for human intelligence and clinical expertise. This article explores the potential impact, applications, challenges, and future prospects of AI in Ayurveda practice and examines how AI can complement human intelligence while retaining the principles and wisdom of Ayurveda.

Keywords: Artificial Intelligence, AI in Healthcare, Personalized Medicine, Clinical Decision Support, Digital Health.

Introduction

Ayurveda, one of the traditional systems of medicine, is founded on a holistic and individualized approach to health, disease prevention, diagnosis, and management. The practice of Ayurveda involves systematic observation of the patient, assessment of signs and symptoms, understanding of disease patterns, consideration of individual constitution, and formulation of appropriate therapeutic strategies. The classical principles of Ayurveda therefore emphasize careful examination, reasoning, and individualized decision-making in clinical practice.

Human intelligence plays a fundamental role in the learning and practice of medicine. Intelligence involves the ability to acquire information, interpret and analyze it, recognize patterns, reason from available evidence, and make appropriate decisions. Interestingly, certain functional aspects of artificial intelligence (AI) follow a somewhat analogous sequence. AI systems are designed to process information, identify patterns, generate inferences, and support decision-making based on predefined algorithms and available data [3]. AI is broadly defined as the capability of computational systems to perform tasks that conventionally require human intelligence, such as learning, reasoning, pattern recognition, and problem-solving.

Certain conceptual parallels can therefore be observed between the systematic approach of Ayurveda and the functioning of AI. For example, *Pratyaksha Pramana* [4] involves knowledge obtained through direct perception and observation, which can be conceptually compared with data acquisition through sensors, imaging, and other digital inputs. *Yukti Pramana* [5], which emphasizes rational analysis and inference based on multiple factors, may be conceptually related to computational reasoning and decision-support processes. Similarly, the Ayurveda principle of individualized

assessment of the patient and disease can find relevance in AI-based approaches that analyze multiple patient-specific parameters to assist in personalized healthcare.

However, Ayurveda and AI originate from fundamentally different knowledge frameworks, and these parallels should not be interpreted as equivalence between classical Ayurvedic concepts and modern computational methods. Rather, Ayurvedic principles may provide a conceptual foundation for developing AI-assisted applications, while contemporary computational technologies can provide tools for organizing, analyzing, and applying Ayurvedic knowledge in a structured manner. The rapid development of AI has created opportunities in several areas of healthcare, including medical education, clinical decision support, diagnostic assistance, medical data analysis, personalized care, research, and drug discovery. In Ayurveda, AI has the potential to assist in areas such as *Roga Nidana* [6], interpretation of clinical findings, *Prakriti* assessment, identification of disease patterns, analysis of classical literature, personalized treatment planning, pharmacological research, and development of digital knowledge resources. Such applications may improve accessibility, consistency, efficiency, and data-driven analysis in Ayurveda when appropriately validated.

At the same time, the integration of AI into Ayurveda presents important challenges. Ayurvedic concepts are often contextual, qualitative, individualized, and dependent on clinical reasoning, while AI systems require appropriately structured, standardized, and reliable datasets. Therefore, classical Ayurvedic knowledge may require digitization, standardization, appropriate coding, contextual adaptation, and scientific validation before it can be effectively incorporated into computational frameworks. Such adaptation should be undertaken without compromising the fundamental principles and holistic philosophy of Ayurveda.

Thus, AI should be viewed as a supportive technological tool rather than a replacement for Ayurvedic physicians and their clinical judgment. A balanced integration of classical Ayurvedic wisdom with modern computational technologies may open new possibilities for education, research, diagnosis, and clinical practice. In this context, understanding the potential impact, applications, opportunities, limitations, and ethical considerations of AI in Ayurveda practice becomes essential.

Materials and Methods

Relevant classical Ayurvedic texts, contemporary textbooks, research articles, review articles, and published literature related to Artificial Intelligence (AI), Ayurveda, healthcare technology, diagnosis, clinical decision-making, education, and research were considered as the source materials for this review. A narrative literature review was conducted to explore the role and impact of Artificial Intelligence in Ayurveda practice**.**

Review of Literature

Impact of Artificial Intelligence in Ayurveda Practice

1. Introduction

Artificial Intelligence (AI) has emerged as an important technological development in healthcare, with applications in diagnosis, prediction, personalized medicine, clinical decision support, drug discovery, health monitoring, and knowledge management. AI refers broadly to computational systems capable of performing tasks such as pattern recognition, prediction, classification, language processing, and data-driven decision support. Its growing application in traditional medicine has created new opportunities to document, analyse, standardize, and evaluate traditional healthcare practices. The World Health Organization (WHO) has recognized the growing relevance of AI in traditional medicine and has highlighted its potential to support evidence-informed decision-making, knowledge management, healthcare delivery, and research.

Ayurveda is particularly relevant to AI because it is based on individualized and holistic principles. Ayurvedic practice considers multiple dimensions of the individual, including *Prakriti*, *Dosha, Vikriti, Agni, Bala, Satmya, Ahara, Vihara*, and *Samprapti*. The large number of variables involved in Ayurvedic diagnosis and treatment creates both an opportunity and a challenge for computational analysis. AI and machine learning may help analyse complex relationships among these variables, but their outputs require careful validation and should support-not replace-the judgement of qualified Ayurvedic physicians.

2. Artificial Intelligence and the Modernization of Ayurvedic Practice [7]

The integration of AI into Ayurveda represents an emerging area of interdisciplinary research involving Ayurvedic medicine, computer science, biomedical engineering, genomics, data science, and digital health. AI technologies can process large quantities of structured and unstructured information and identify relationships that may be difficult to analyse manually.

The WHO's 2025 technical brief on AI in traditional medicine describes applications ranging from knowledge management and evidence generation to decision support and health-system applications, while also emphasizing governance, ethics, intellectual property, and responsible implementation.

In Ayurveda, potential applications include:

- *Prakriti* assessment
- *Dosha* and *Vikriti* analysis
- *Nadi Pariksha*
- Disease diagnosis and risk prediction
- Personalized treatment planning
- Analysis of medicinal plants and formulations
- Ayurgenomics
- Clinical decision support
- Digital health and remote monitoring
- Analysis of classical Ayurvedic literature
- Education and research

However, the available evidence is still developing. Much of the current literature consists of narrative reviews, proof-of-concept studies, computational models, sensor research, and early-stage applications rather than large prospective clinical trials.

3. AI in *Prakriti* Assessment

3.1 Importance of *Prakriti* in Ayurveda

Prakriti refers to an individual's constitutional characteristics and is a fundamental principle of personalized healthcare in Ayurveda. Assessment of *Prakriti* traditionally involves observation, clinical examination, questioning, and evaluation of physical, physiological, psychological, and behavioural characteristics.

Traditional *Prakriti* assessment may vary between practitioners because some characteristics require subjective interpretation. Therefore, researchers have investigated whether machine learning and digital technologies can improve the objectivity and reproducibility of *Prakriti* assessment.

A landmark study by Tiwari *et al*. (2017) used machine-learning approaches to analyse phenotypic characteristics associated with the three extreme *Prakriti* types. The study involved 147 healthy individuals and demonstrated that computational analysis could identify patterns corresponding to *Vata*, *Pitta*, and *Kapha* constitutional groups. The researchers also tested the approach using an independent North Indian population, suggesting that machine learning could contribute to more systematic *Prakriti* classification.

More recently, a 2026 review of AI and digital technologies in *Prakriti* assessment concluded that AI, machine learning, physiological sensors, image analysis, and computational methods could potentially improve objectivity, scalability, and reproducibility. The review also emphasized that data quality, interoperability, explainability, and Ayurvedic domain validation remain major challenges.

Impact on Ayurvedic Practice

AI-assisted Prakriti assessment may:

- Reduce observer-dependent variation.
- Improve standardization of assessment tools.
- Support large-scale screening.
- Assist in personalized diet and lifestyle recommendations.
- Facilitate research into constitution-based disease susceptibility.
- Strengthen the connection between Ayurveda and personalized medicine.
- Nevertheless, AI classification should not be considered a substitute for comprehensive Ayurvedic clinical examination.

4. AI and *Nadi Pariksha*

4.1 Digitalization of Nadi Examination

Nadi Pariksha is an important diagnostic method in Ayurveda. Traditionally, practitioners assess the pulse manually to obtain information related to the physiological and pathological state and Ayurvedic principles such as *Vata*, *Pitta*, and *Kapha*.

The interpretation of *Nadi* depends substantially on practitioner expertise. Consequently, researchers have explored sensors, signal-processing techniques, machine learning, and digital devices to capture and analyse pulse characteristics objectively.

A comprehensive 2024 review examined technological developments in sensor-based *Nadi Pariksha*. The review analyzed research involving pulse acquisition devices, prepossessing, feature extraction, feature selection, classification, and disease-related applications. It concluded that sensor-based systems may improve the reliability and speed of pulse analysis but that significant challenges remain in standardization and translation from experimental research to routine clinical practice.

4.2 Machine Learning in Nadi Analysis

Machine-learning models can analyse characteristics of pulse waveform that may not be easily interpreted through manual observation alone. AI systems can potentially classify patterns using features such as:

- Pulse amplitude
- Frequency
- Rhythm
- Waveform morphology
- Pressure variations
- Temporal characteristics

Recent computational studies have reported high classification performance in experimental datasets; however, high accuracy within a data-set does not automatically establish clinical validity. Independent external validation and comparison with standardized Ayurvedic expert assessment are necessary before such tools can be routinely adopted.

Impact on Practice

AI-assisted *Nadi Pariksha* could potentially:

- Support practitioner training.
- Digitally record pulse findings.
- Improve reproducibility.
- Facilitate longitudinal monitoring.
- Create research databases.
- Support clinical decision-making.

However, sensor-based *Nadi* analysis remains an emerging field requiring stronger clinical validation.

5. AI in Ayurvedic Diagnosis and Clinical Decision Support

Accurate diagnosis is essential for effective treatment. In Ayurveda, diagnosis involves comprehensive evaluation rather than dependence on a single parameter. Ayurvedic assessment may include Darshana (inspection), Sparshana (palpation), Prashna (questioning), Ashtavidha Pariksha, Dashavidha Pariksha, Dosha assessment, Dushya, Agni, Bala, Kala, and Prakriti.

AI can potentially integrate multiple forms of information simultaneously. For example, machine-learning systems can combine:

- Patient symptoms
- Medical history
- Lifestyle information
- Dietary habits
- Physical findings
- Laboratory data
- Medical images
- Physiological measurements
- Ayurvedic assessment parameters

This type of multi-modal analysis may support clinical decision-making and pattern recognition.

6. AI and Personalized Treatment in Ayurveda

Personalized healthcare is one of the strongest areas of conceptual overlap between Ayurveda and AI.

Modern AI systems can analyse multiple patient variables and generate individualized predictions or recommendations. Ayurveda has long emphasized individualized care based on constitutional and clinical differences among patients.

Important Ayurvedic variables that could potentially be incorporated into AI models include:

- *Prakriti*
- *Vikriti*
- *Dosha* predominance
- *Agni*
- *Bala*
- *Satmya*
- *Ahara*
- *Vihara*
- Age
- Season
- Place
- Disease stage

AI can potentially analyse the relationships among these variables and support personalized recommendations.

Potential Applications

AI may assist with:

- Personalized dietary recommendations.
- Lifestyle planning.
- Selection of preventive measures.
- Monitoring treatment response.
- Identification of risk patterns.
- Follow-up and long-term patient management.

A major potential benefit is the ability of AI to analyse large and complex datasets while retaining individual-level information. This may help strengthen evidence-based personalized Ayurveda, provided that models are developed using high-quality and clinically meaningful data.

7. AI and Ayurgenomics

7.1 Concept of Ayurgenomics

Ayurgenomics is an interdisciplinary field that attempts to explore relationships between Ayurvedic constitutional concepts, particularly *Prakriti*, and modern biological and genomic information.

Research in Ayurgenomics seeks to understand whether constitutional differences described in Ayurveda may be associated with measurable biological, genetic, metabolic, or other molecular characteristics.

A 2026 scoping review of clinical Ayurgenomics studies identified 16 clinical studies incorporating both *Prakriti* assessment and genetic analysis. The review reported that most studies were cross-sectional and emphasized the need for larger samples, standardized *Prakriti* assessment, longitudinal validation, replication, and clinical outcome studies.

7.2 Role of AI in Ayurgenomics

AI is particularly useful for analyzing complex biological data. Machine-learning algorithms can identify relationships among:

- Genomic information
- Phenotypic characteristics
- *Prakriti*
- Metabolic markers
- Microbiome data
- Disease risk
- Treatment response
- The combination of Ayurvedic phenotype and computational analysis may contribute to predictive and personalized healthcare.

Impact

AI-based Ayurgenomics may eventually contribute to:

- Early disease-risk identification.
- Personalized preventive strategies.
- Individualized healthcare planning.
- Identification of biomarkers.
- Better understanding of *Prakriti*.

However, current evidence should be interpreted cautiously because Ayurgenomics research is still developing and many studies require replication and larger populations.

8. AI in Ayurvedic Herbal Medicine and Drug Discovery

Ayurveda has a vast pharmacopoeia of medicinal plants and formulations. However, the scientific investigation of complex herbal preparations is challenging because plants contain multiple bio-active compounds and may act through multiple biological pathways.

AI and machine learning can support medicinal plant research at several stages.

8.1 Potential Applications

AI can assist in:

- Identification of medicinal plants.
- Classification of plant species.
- Analysis of phytochemical data.
- Prediction of biological activity.
- Virtual screening.
- Prediction of herb–drug interactions.
- Toxicity prediction.
- Network pharmacology.
- Drug repurposing.
- Optimization of extraction processes.

A recent review of AI in medicinal-plant drug discovery described applications ranging from plant identification and metabolite analysis to ADMET prediction, virtual screening, network pharmacology, and generative AI. At the same time, it emphasized that AI-driven botanical drug discovery remains largely exploratory and requires curated datasets and experimental validation.

Impact on Ayurveda

For Ayurvedic medicine, AI may accelerate the scientific investigation of:

- Single herbs
- Poly-herbal formulations
- Phytoconstituents
- Safety profiles
- Mechanisms of action
- Potential therapeutic targets
- AI should therefore be considered a tool for prioritizing and analyzing research questions rather than proof of clinical effectiveness by itself.

9. AI in Analysis of Classical Ayurvedic Literature

Ayurveda contains extensive knowledge distributed across classical Sanskrit texts (various Samhitas) and later commentaries. Accessing, translating, organizing, and analyzing this information can be challenging because of:

- Sanskrit language complexity.
- Multiple interpretations.
- Large volumes of text.
- Different editions and commentaries.
- Unstructured information.

Artificial Intelligence, particularly Natural Language Processing (NLP), offers new possibilities for digitizing and analyzing Ayurvedic literature.

AI-based text analysis could help:

- Digitize manuscripts.
- Search classical literature efficiently.
- Organize concepts and terminology.
- Compare references across texts.
- Develop structured knowledge databases.
- Support education and research.

Limitations

AI-generated interpretations of Sanskrit and Ayurvedic concepts must be carefully reviewed by subject experts because literal translation may not preserve the intended philosophical or clinical meaning. Hallucinations and

inaccurate outputs from general-purpose language models also present important risks.

10. AI in Ayurvedic Education

AI can potentially improve Ayurvedic education through adaptive and interactive learning.

Potential applications include:

- Intelligent tutoring systems.
- Personalized learning pathways.
- Automated quizzes.
- Case-based learning.
- Virtual patients.
- Literature search assistance.
- Digital visualization.
- Translation support.
- Simulation-based education.

AI can analyse student performance and identify areas requiring additional learning. It may also help students access and navigate large volumes of classical and contemporary literature.

However, AI-generated educational content must be verified by qualified teachers and subject experts.

11. AI, Telemedicine and Patient Monitoring

Digital health technologies, wearable sensors, and AI systems have created new opportunities for continuous health monitoring.

AI may analyse information related to:

- Heart rate
- Sleep
- Physical activity
- Diet
- Stress-related indicators
- Blood pressure
- Other physiological parameters

These applications may support preventive healthcare, which is highly relevant to Ayurveda.

Ayurvedic healthcare emphasizes maintenance of health through:

- *Dinacharya*
- *Ritucharya*
- *Ahara*
- *Vihara*
- Exercise
- Sleep
- Mental well-being

AI-enabled digital health systems could potentially support individuals in monitoring health-related behaviours and maintaining preventive lifestyle practices.

Impact

AI-assisted monitoring may help:

- Improve patient follow-up.
- Encourage healthy behaviour.
- Maintain longitudinal health records.
- Identify potential changes over time.
- Support preventive care.

Nevertheless, consumer health applications should not make unsupported diagnostic claims.

12. AI in Disease Prediction and Preventive Healthcare

- One of the important potential applications of AI is predictive analysis.
- Machine-learning algorithms can identify patterns associated with future health risks when trained on appropriate datasets. Ayurveda also emphasizes prevention and early intervention.

AI may eventually assist Ayurvedic practice by analysing:

- Constitutional characteristics.
- Family history.
- Lifestyle factors.
- Environmental exposure.
- Physiological data.
- Genomic information.
- Disease history.
- This may support a transition toward more predictive and preventive models of healthcare.

However, prediction models must be externally validated and tested for fairness, bias, clinical usefulness, and real-world outcomes before implementation.

13. Benefits of AI in Ayurveda Practice

The literature suggests several potential benefits.

13.1 Improved Standardization: AI may reduce variation in the assessment of measurable parameters and support the development of standardized tools.

13.2 Personalized Healthcare: AI can analyse multiple patient variables simultaneously and may support individualized recommendations.

13.3 Better Data Management: Digital systems can organize patient records and research information more efficiently.

13.4 Support for Research: Machine learning can identify patterns within large datasets and generate research hypotheses.

13.5 Preservation of Knowledge: NLP and digital technologies can support the preservation and organization of classical Ayurvedic literature.

13.6 Improved Accessibility: Digital systems may expand access to educational and healthcare resources.

13.7 Integration with Modern Science: AI may support research linking Ayurveda with genomics, biomedical data, and digital health.

14. Challenges of Artificial Intelligence in Ayurveda

Despite its potential, AI integration into Ayurveda faces important challenges.

14.1 Lack of Standardized Data: Many Ayurvedic concepts are qualitative and context-dependent. Differences in terminology and clinical assessment methods can make data-set development difficult.

14.2 Limited Clinical Validation: Many AI applications remain at the proof-of-concept stage. Large prospective clinical studies are limited.

14.3 Small Sample Sizes: Machine-learning models trained on small datasets may not perform reliably in different populations.

14.4 Subjectivity of Ayurvedic Parameters: Some clinical assessments depend on practitioner expertise and interpretation.

14.5 Interpret-ability: Complex AI models may produce predictions without clearly explaining how conclusions were reached.

14.6 Data Privacy: Health data must be collected and managed responsibly.

14.7 Ethical Concerns

Important concerns include:

- Algorithmic bias
- Inaccurate recommendations
- Over dependence on technology

- Informed consent
- Accountability
- Misuse of traditional knowledge

15. Limitations of Current Research

A critical review of the current literature shows that enthusiasm about AI in Ayurveda should be balanced with scientific caution.

The major limitations are:

- Limited large-scale clinical studies.
- Lack of universally accepted datasets.
- Variation in Prakriti assessment methods.
- Limited external validation of AI models.
- Over reliance on accuracy reported from individual datasets.
- Difficulty translating complex Ayurvedic concepts into computational variables.
- Limited evidence regarding clinical outcomes.
- Lack of regulatory standards specifically designed for AI in Ayurvedic practice.
- The WHO and recent academic reviews emphasize that AI in traditional medicine requires responsible governance, evidence generation, validation, and appropriate stakeholder involvement.

16. Future Scope

The future of AI in Ayurveda may involve the development of integrated systems combining:

1. **AI+Prakriti:** For standardized constitutional assessment.
2. **AI+Nadi Pariksha:** For sensor-based and computational pulse analysis.
3. **AI+Ayurgenomics:** For personalized and predictive healthcare.
4. **AI+Herbal Medicine:** For drug discovery and safety assessment.
5. **AI+NLP:** For analysis of classical Ayurvedic literature.
6. **AI+Wearable Technology:** For health and lifestyle monitoring.
7. AI+Clinical Decision Support

Discussion

The present review highlights the growing potential of Artificial Intelligence (AI) to influence and support Ayurvedic practice. AI has already demonstrated important applications in modern healthcare, including disease diagnosis, medical imaging, risk prediction, personalized medicine, drug discovery, patient monitoring, and clinical decision support. These technological developments provide significant opportunities for Ayurveda, particularly because Ayurvedic practice is based on individualized assessment and considers multiple factors while understanding health and disease. One of the most important areas identified in the literature is the application of AI in *Prakriti* assessment. *Prakriti* is a fundamental concept in Ayurveda and forms the basis for individualized healthcare. Traditional assessment of *Prakriti* involves the evaluation of several physical, physiological, psychological, and behavioural characteristics. As this assessment may vary depending on the experience and interpretation of the practitioner, AI and machine-learning approaches have the potential to improve objectivity and standardization. Computational models can analyse multiple characteristics simultaneously and identify patterns associated with different *Prakriti* types. This may contribute to the development of more systematic and reproducible methods of constitutional assessment.

Another important application is AI-assisted *Nadi Pariksha*. Traditional pulse examination requires considerable clinical expertise and depends largely on the practitioner's ability to interpret subtle pulse characteristics. The development of sensors, digital pulse acquisition systems, and machine-learning algorithms may help record and analyse pulse signals more objectively. Such technologies could assist in practitioner training, digital documentation, research, and longitudinal patient monitoring. However, the literature indicates that sensor-based *Nadi Pariksha* is still in an early stage of development, and further standardization and clinical validation are required before its routine use in Ayurvedic practice.

The review also demonstrates the potential of AI in Ayurvedic diagnosis and clinical decision support. Ayurvedic diagnosis is multidimensional and involves the assessment of *Dosha, Dushya, Prakriti, Vikriti, Agni, Bala, Ahara, Vihara,* and other clinical factors. AI systems may be useful in organizing and analyzing this complex information. Machine-learning models can potentially identify patterns, support risk assessment, and provide decision-support recommendations. However, the complexity and individualized nature of Ayurvedic principles make it difficult to directly convert all traditional concepts into computational variables. Therefore, AI systems should be developed with active involvement of qualified Ayurvedic practitioners.

Personalized healthcare represents one of the strongest areas of integration between AI and Ayurveda. Modern AI can analyse large quantities of individual health data and generate personalized predictions or recommendations. Similarly, Ayurveda emphasizes individualized treatment based on the constitution and condition of the patient. AI may therefore support personalized dietary recommendations, lifestyle modification, preventive healthcare, and treatment monitoring. The integration of *Prakriti* assessment with modern clinical and biological data may contribute to the development of more precise and patient-centred healthcare models.

The emerging field of Ayurgenomics also presents an important area for future research. Ayurgenomics attempts to explore possible relationships between Ayurvedic constitutional principles and modern genetic or molecular characteristics. AI can analyse large and complex datasets involving genomic, phenotypic, metabolic, and clinical information. Such integration may contribute to a better understanding of individual differences in disease susceptibility and treatment response. However, current Ayurgenomics research is limited by small sample sizes, differences in *Prakriti* assessment methods, and the need for replication in larger and more diverse populations.

AI also has significant potential in Ayurvedic herbal medicine and drug discovery. The large number of medicinal plants and complex poly-herbal formulations used in Ayurveda presents a challenge for conventional research methods. AI can assist in analyzing phytochemical information, predicting biological activity, identifying potential therapeutic targets, and studying herb–drug interactions. These technologies may accelerate the scientific investigation of Ayurvedic medicines and help generate hypotheses for laboratory and clinical research. Nevertheless, computational predictions must be confirmed through experimental studies and clinical trials.

The use of Natural Language Processing (NLP) and other AI technologies for analyzing classical Ayurvedic literature is another promising development. Ayurvedic knowledge is distributed across numerous Sanskrit texts, commentaries,

manuscripts, and modern publications. AI-based tools can potentially support digitization, translation, information extraction, semantic analysis, and knowledge organization. This may improve access to traditional knowledge and facilitate research. However, the interpretation of Sanskrit and Ayurvedic terminology requires expert supervision because many concepts have contextual meanings that may not be accurately captured through automated translation alone.

AI can further contribute to Ayurvedic education and digital healthcare. Intelligent learning systems, virtual case studies, automated assessments, and personalized educational platforms may improve learning opportunities for students and practitioners. Similarly, wearable devices and AI-based health applications can support the monitoring of sleep, physical activity, heart rate, dietary habits, and other lifestyle factors. These applications are particularly relevant to Ayurveda because of its emphasis on preventive healthcare and healthy lifestyle practices.

Despite these opportunities, the review identifies several important challenges. The major limitation is the lack of standardized and high-quality Ayurvedic datasets. Ayurvedic diagnosis often depends on qualitative observations and individualized interpretation. Variations in terminology, assessment procedures, and clinical practices may affect the reliability of data used for AI development. Therefore, standardization of data collection and development of validated assessment tools are essential.

Another major concern is the limited clinical validation of many AI-based Ayurvedic applications. High accuracy reported in small or controlled datasets does not necessarily indicate that a model will perform effectively in real clinical practice. AI systems should therefore be evaluated using large and diverse populations and should undergo external validation. Clinical usefulness, safety, and patient outcomes should be considered in addition to technical accuracy.

Ethical issues are also important. AI systems dealing with patient information must ensure privacy, confidentiality, informed consent, and responsible data management. There is also a need to protect traditional Ayurvedic knowledge and ensure that its digital use does not lead to inappropriate commercial exploitation or misuse. Transparent and explainable AI models are particularly important in healthcare because practitioners need to understand and evaluate the basis of AI-generated recommendations.

Overall, the literature suggests that AI has the potential to strengthen Ayurveda by improving data analysis, standardization, research, documentation, personalized healthcare, and clinical decision support. However, AI should not replace the clinical judgement, experience, and holistic understanding of Ayurvedic practitioners. The most appropriate approach is the development of human-centred and practitioner-supervised AI systems that combine technological capabilities with traditional medical knowledge.

Conclusion

Artificial Intelligence has emerged as a promising technology with the potential to significantly influence the future development and practice of Ayurveda. The present review demonstrates that AI can contribute to various areas, including *Prakriti* assessment, *Nadi Pariksha*, diagnosis, clinical decision support, personalized healthcare, Ayurgenomics, herbal medicine research, drug discovery, education, literature analysis, and preventive healthcare.

The individualized and holistic principles of Ayurveda make it particularly suitable for the application of advanced computational methods. AI and machine-learning technologies can analyse large volumes of complex data and identify patterns that may support Ayurvedic practitioners in understanding individual differences, disease patterns, and treatment responses. AI may also improve the documentation and standardization of Ayurvedic knowledge and facilitate its integration with modern scientific research.

Among the most promising applications are AI-assisted *Prakriti* assessment, sensor-based *Nadi Pariksha*, personalized healthcare systems, Ayurgenomics, and computational analysis of medicinal plants and classical texts. These technologies may help reduce subjectivity, improve data management, support research, and develop more systematic approaches to personalized healthcare.

However, the integration of AI into Ayurveda also presents significant challenges. The lack of standardized datasets, variations in clinical assessment, limited large-scale validation studies, ethical concerns, data privacy issues, and difficulties in computationally representing complex Ayurvedic concepts must be addressed. AI models developed for Ayurvedic applications should therefore undergo rigorous scientific validation and should be designed with the participation of qualified Ayurvedic practitioners, researchers, data scientists, and healthcare professionals.

It can be concluded that Artificial Intelligence should be considered a supportive and complementary tool rather than a replacement for Ayurvedic physicians. The successful integration of AI into Ayurveda will depend on maintaining the fundamental principles and holistic philosophy of Ayurveda while using modern technology to improve research, analysis, documentation, and healthcare delivery.

Future research should focus on the development of standardized Ayurvedic datasets, large multi centre clinical studies, validated *Prakriti* assessment tools, explainable AI models, and ethical guidelines for the responsible use of AI. Interdisciplinary collaboration between Ayurveda and technology experts will be essential for developing reliable and clinically useful applications despite these opportunities, several challenges need to be addressed. One of the major challenges is the standardization and digitization of Ayurvedic knowledge. Classical Ayurvedic descriptions are frequently qualitative and context-dependent, whereas AI systems generally require structured and consistently coded data. Differences in terminology, diagnostic interpretation, clinical documentation and physician assessment may affect the quality of datasets. Therefore, systematic development of standardized Ayurvedic datasets and validated digital frameworks is essential.

Another concern is the quality and reliability of AI-generated information. AI systems may produce incorrect or misleading outputs when trained on incomplete, biased or poor-quality data. In Ayurveda, inappropriate interpretation of classical concepts could lead to distortion of traditional knowledge. Therefore, validation by subject experts, transparent methodologies and continuous evaluation are necessary before implementing AI systems in clinical practice.

The ethical dimension is equally important. Patient confidentiality, informed consent, data security, algorithmic bias and accountability for AI-assisted decisions must be considered. The physician should retain responsibility for clinical decisions, while AI should function as an assistive technology. The human–AI relationship in Ayurveda should therefore be based on physician oversight rather than technological replacement.

Overall, the impact of AI on Ayurveda is likely to depend not simply on the availability of advanced technology but on how appropriately Ayurvedic principles are translated into digital and computational frameworks. Standardization should not mean oversimplification of Ayurveda; rather, it should facilitate accurate representation of its concepts while preserving their clinical context and holistic nature.

Thus, AI offers significant opportunities to modernize selected aspects of Ayurveda practice, particularly in diagnosis, clinical decision support, personalized care, education, research, documentation and drug discovery. At the same time, its integration requires rigorous scientific validation, interdisciplinary collaboration and respect for the fundamental principles of Ayurveda. The future of AI in Ayurveda should therefore be envisioned as a collaborative model in which computational intelligence enhances, but does not replace, human clinical intelligence and Ayurvedic wisdom.

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