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Review Article

Telemedicine ond Artificial Intelligence In *Ayurveda*: A Retrospective Narrative Review of Evolution, Opportunities, Challengesand Future Perspectives

Dr. Vidhya Arora

Assistant Professor, Kayachikitsa, Gangasheel Ayurvedic Medical College and Hospital, Bareilly, Uttar Pradesh, India

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ABSTRACT:

Background: *Ayurveda*, a traditional system of holistic medicine, is gaining increasing recognition worldwide. The rapid growth of digital technologies such as telemedicine and artificial intelligence (AI) has transformed healthcare delivery. Their integration into *Ayurveda* offers tremendous opportunities but also presents several challenges.

Objective: To explore the opportunities and challenges in integrating telemedicine and AI with *Ayurveda,* while emphasizing the need for standardized research frameworks and ethical practices.

Methods: A structured narrative literature review was undertaken. Literature published between 2010 and 2026 was searched in PubMed/MEDLINE, Google Scholar, and relevant official AYUSH and WHO portals, using combinations of terms related to *Ayurveda*, telemedicine, artificial intelligence, digital health, *Prakriti*, diagnosis, ethics, regulation, and pharmacovigilance. Peer-reviewed articles, systematic reviews, guidelines, and relevant official reports were considered. Titles/abstracts were screened for relevance, followed by full-text assessment. The final evidence base was synthesized narratively because of heterogeneity in study designs and outcomes.

Results: Major opportunities include accessibility of *Ayurveda* in rural areas, AI-assisted diagnosis of *Prakriti* and *Vikriti*, digitization of classical texts, pharmacovigilance, and cost-effective delivery models. Challenges involve unstructured data, lack of regulatory frameworks, ethical issues, adoption resistance, and insufficient clinical validation.

Conclusion: Telemedicine and AI can expand the reach and scientific acceptance of *Ayurveda*, but careful attention to standardization, evidence generation, ethical frameworks, and practitioner training is essential. AI must be seen as an augmentation, not a replacement, of *Ayurvedic* practice.

Keywords: Artificial Intelligence, *Ayurveda,* Challenges, Digital Health, Opportunities, *Prakriti*, Telemedicine

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INTRODUCTION:

Ayurveda is one of the world's oldest systems of medicine, emphasizing prevention and individualized treatment [1]. With the increasing burden of non-communicable diseases and the need for cost-effective healthcare, *Ayurveda* has drawn global attention [2]. Parallelly, digital health technologies, particularly telemedicine and AI, are revolutionizing modern healthcare delivery [3].

Telemedicine allows remote consultation and monitoring, bridging the gap for patients in rural and underserved areas [4]. The Ministry of AYUSH, Government of India, released official telemedicine practice guidelines for AYUSH practitioners in 2020, providing a legal and professional framework [5].

Artificial intelligence (AI), including machine learning, natural language processing (NLP), and image recognition, is increasingly applied in diagnosis, prognosis, and personalized medicine [6]. In *Ayurveda*, AI has shown promise in *Prakri*ti classification, pulse analysis, tongue diagnosis, and textual mining of classical *Samhitas* [7,8].

Despite these promising trends, integration of AI and telemedicine into *Ayurveda* faces significant challenges such as data heterogeneity, lack of standardization, ethical issues, and practitioner acceptance [9,10]. This paper explores these opportunities and challenges in detail.

AIM AND OBJECTIVES

Aim

To critically review the current applications, opportunities, challenges, and future prospects of telemedicine and artificial intelligence in *Ayurveda*, with particular emphasis on clinical practice, accessibility, research, ethics, regulation, and digital transformation.

Objectives

1. To review the current and emerging applications of telemedicine in *Ayurvedic* healthcare, including remote consultation, monitoring, accessibility, and continuity of care.
2. To examine the applications of artificial intelligence in *Ayurveda*, including *Prakriti* classification, diagnostic support, knowledge mining, education, and pharmacovigilance.
3. To identify the major challenges associated with digital transformation in *Ayurveda*, including data standardization, privacy, ethics, regulation, technological barriers, practitioner acceptance, and clinical validation.
4. To summarize current research and policy developments and identify priorities for future research, responsible implementation, and evidence generation.

METHODOLOGY

For each included source, information was extracted on publication year, study/document type, digital technology or AI application, *Ayurvedic* domain, principal findings, reported opportunities, limitations, ethical or regulatory considerations, and implications for clinical practice or future research. Findings were grouped thematically into opportunities, diagnostic and research applications, accessibility and cost-effectiveness, data and standardization challenges, ethical and privacy concerns, regulation, technological barriers, practitioner acceptance, and clinical evidence gaps.

Data extraction and narrative synthesis

Records identified through database and supplementary searches were first screened by title and abstract for relevance. Potentially eligible records were then assessed at the full-text level against the predefined eligibility criteria. Duplicate records were removed before final inclusion. The final set of publications and authoritative documents was used for qualitative narrative synthesis. Because the included literature covered heterogeneous study designs, technologies, outcomes, and policy documents, quantitative meta-analysis was not considered appropriate.

Study selection process

Studies and documents were considered eligible when they addressed at least one of the following: (1) telemedicine or telehealth applications relevant to *Ayurveda*/AYUSH; (2) AI or machine-learning applications relevant to *Ayurvedic* diagnosis, assessment, treatment support, education, research, or pharmacovigilance; (3) digitalization of *Ayurvedic* knowledge or clinical records; or (4) ethical, regulatory, privacy, implementation, or governance issues relevant to digital *Ayurveda*. Peer-reviewed original studies, reviews, systematic reviews, methodological papers, and authoritative guidelines or reports were considered. Publications were excluded when they were unrelated to *Ayurveda*/AYUSH or digital health/AI, duplicated another record, lacked sufficient relevance to the review question, or were opinion material without substantive supporting information.

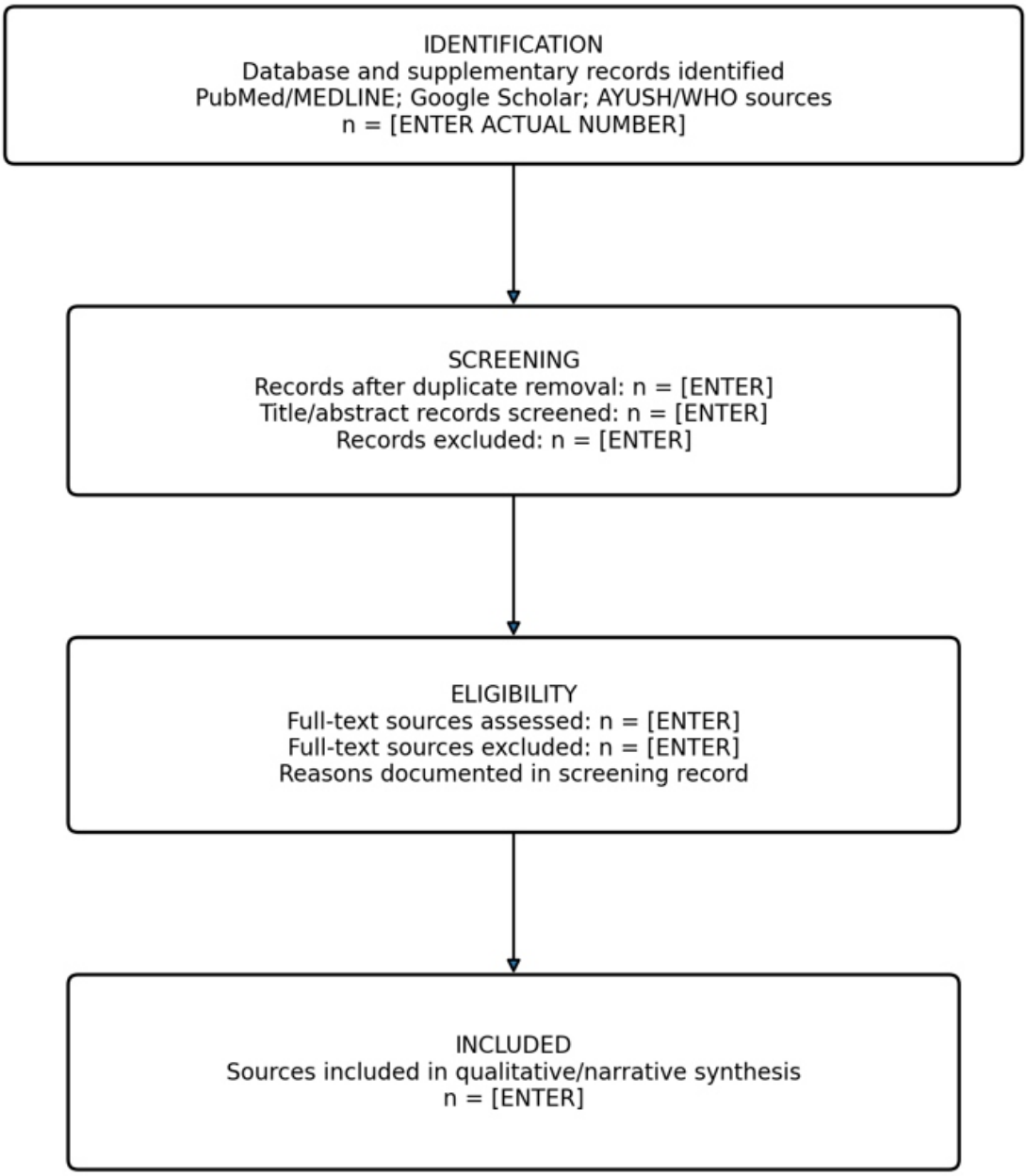
Eligibility criteria

A literature search was planned for publications from January 2010 to December 2026. PubMed/MEDLINE and Google Scholar were searched using combinations of controlled vocabulary and free-text terms. The principal concepts were: ("*Ayurveda*" OR *"Ayurvedic* medicine" OR "traditional medicine") AND ("telemedicine" OR "telehealth" OR "digital health" OR "remote consultation") AND ("artificial intelligence" OR "machine learning" OR "natural language processing" OR "computer vision" OR "clinical decision support"). Additional searches combined *Ayurveda* with specific applications such as *Prakriti* classification, pulse diagnosis, tongue diagnosis, pharmacovigilance, electronic health records, ethics, privacy, regulation, and healthcare delivery. Official documents were additionally searched on the websites of the Ministry of AYUSH, Government of India, the World Health Organization (WHO), and other relevant governmental health agencies. Reference lists of key articles and reviews were also examined to identify additional relevant publications.

Search strategy

This article was conducted as a structured narrative literature review. The review was designed to identify and synthesize published evidence and authoritative guidance concerning the use of telemedicine and artificial intelligence (AI) in *Ayurveda*. The reporting of the identification, screening, eligibility, and inclusion process was organized in a PRISMA-style flow diagram to improve transparency and reproducibility.

Study design and reporting approach



IMPORTANT: Replace all bracketed values with the actual search and screening counts. Do not report reconstructed or estimated numbers.

Figure 1. PRISMA-Style flow diagram of the literature identification and selection process.

OPPORTUNITIES

1. Accessibility and Outreach

Telemedicine provides *Ayurvedic* services to remote areas, reducing geographical barriers [11]. Studies in Kerala reported that telemedicine improved consultation rates among patients who otherwise lacked access to *Ayurvedic* physicians [12].

2. Continuous Monitoring and Preventive Health

Wearable devices and IT platforms allow monitoring of physiological parameters such as heart rate, blood pressure, and sleep quality. AI algorithms can correlate these metrics with *Ayurvedic doshic* imbalances, allowing preventive interventions [13,14].

3. Diagnostic Support

AI-based image recognition tools are being used for tongue and nail diagnosis in *Ayurveda* [15]. Machine learning models demonstrated >90% accuracy in classifying *Prakriti* types using questionnaire and biometric data [16]. Similarly, pulse waveform analysis with AI has shown promising results in predicting *doshic* states [17].

4. Research and Knowledge Mining

NLP tools can digitize and analyse *Ayurvedic Samhitas,* extracting relationships between herbs, diseases, and treatment modalities [18]. AI can also support drug discovery by identifying phytoconstituents with potential therapeutic action [19].

5. Pharmacovigilance and Herb–Drug Interaction Monitoring

With the increasing use of *Ayurvedic* formulations alongside allopathic drugs, AI can detect patterns of herb–drug interactions and adverse events [20].

6. Education and Training

Virtual learning platforms and AI-based simulations help students and practitioners in diagnostic reasoning and treatment planning [21].

7. Cost-Effectiveness

Telemedicine reduces travel expenses and clinical overheads. Studies show significant savings in time and cost when *Ayurvedic* consultations were offered remotely [22].

CHALLENGES

1. Data Standardization

Ayurvedic data is largely textual and subjective. Lack of structured electronic health records (EHRs) in *Ayurveda* limits machine learning applications [23].

2. Ethical and Privacy Concerns

Patient confidentiality, data misuse, and algorithmic bias remain key issues [24]. Transparent and explainable AI is essential to build trust among practitioners and patients [25].

3. Regulatory Uncertainty

Although AYUSH has telemedicine guidelines [5], clear regulations for AI applications in *Ayurveda* are still absent [26]. Legal liability in AI-assisted diagnosis is unresolved.

4. Technological Barriers

Poor internet connectivity, lack of interoperable platforms, and low accuracy of low-cost wearable devices hinder integration [27].

5. Acceptance Among Practitioners

Some *Ayurvedic* physicians fear that digitization may compromise the holistic, personalized essence of *Ayurveda* [28]. Training and sensitization are necessary.

6. Lack of Clinical Evidence

Most AI studies in *Ayurveda* remain at the pilot stage, with small sample sizes and limited external validation [29]. Randomized controlled trials are urgently needed [30].

Future research should focus on development of standardized *Ayurvedic* electronic health records; interoperable *Ayurvedic* terminology and ontologies; multicentric and representative

datasets; external validation of AI models; prospective clinical studies; explainable AI; privacy-preserving data governance; pharmacovigilance; cost-effectiveness; and training of Ayurvedic physicians and students in digital health and AI literacy [23–26,33,36–43].

UPDATED RESEARCH PRIORITIES

The role of AI should therefore remain assistive. It should support the physician by organizing information, identifying patterns and retrieving relevant evidence, while diagnosis, treatment selection and responsibility for patient care remain with the qualified practitioner [24–26,34,36–43].

Emerging applications in 2025–2026 include AI-assisted clinical decision support, natural-language processing of classical Ayurvedic literature, multimodal clinical assessment, pharmacovigilance, remote monitoring and real-world evidence generation. Generative AI may additionally support literature retrieval, educational content and clinical documentation; however, generated information must be verified because large language models may produce plausible but unsupported clinical statements [37,42].

These developments indicate a transition from small experimental AI applications toward a more structured digital-health ecosystem. For Ayurveda, future systems may combine structured clinical information such as *Prakriti, Vikriti,* Agni, *Koshtha*, *Ahara-Vihara, Roga-Rogi Pariksha*, laboratory findings, images and longitudinal treatment outcomes. However, such systems require carefully designed Ayurvedic datasets and validation by qualified *Ayurvedic* experts [36–44].

RECENT DEVELOPMENTS IN 2025–2026

In July 2026, IndiaAI and the Ministry of AYUSH entered into a collaboration aimed at accelerating AI innovation in traditional healthcare. The initiative provides an opportunity to strengthen digital resources, AI research and responsible technology development for the AYUSH ecosystem [44].

During 2026, India strengthened its broader health-AI governance environment through the Strategy for Artificial Intelligence in Healthcare for India (SAHI) and the Benchmarking Open Data Platform for Health AI (BODH). These initiatives emphasize responsible, safe, evidence-based and inclusive use of AI, with attention to validation, governance, benchmarking and data stewardship [42,43].

In India, digital transformation of AYUSH has continued through initiatives associated with Ayush Grid and the wider national digital-health ecosystem. These initiatives provide opportunities for electronic documentation, research data generation, digital education, teleconsultation and improved continuity of care [40,41].

A further development was the WHO–International Telecommunication Union technical brief, "Mapping the application of artificial intelligence in traditional medicine," published in 2025. It documents the emerging use of AI in traditional medicine and highlights the importance of evidence-informed development, governance, data quality and responsible implementation [37].

In 2025, the World Health Assembly adopted the WHO Global Traditional Medicine Strategy

2025–2034. The strategy emphasizes strengthening the evidence base, ensuring safety and appropriate regulation, integrating traditional medicine into health systems where appropriate, and promoting innovation and cross-sectoral collaboration [36]. This provides an important international framework for the future digital transformation of *Ayurveda*.

The period 2025–2026 has brought important developments in the global policy and research environment surrounding traditional medicine and artificial intelligence. These developments are relevant to *Ayurveda* because they emphasize evidence generation, safety, regulation, digital innovation, responsible artificial intelligence, and integration with health systems [36–44].

DISCUSSION

The convergence of Ayurveda with telemedicine and AI has the potential to strengthen preventive and personalized healthcare models [31]. However, integration requires multidisciplinary collaboration between Ayurvedic experts, data scientists, and policy makers [32].

Robust research designs, standardized terminology (such as Ayurvedic ontology development), and large-scale validation are essential [33]. Ethical considerations such as patient consent, transparency, and fairness must be central [34].

Globally, WHO has recognized the role of digital health in strengthening traditional medicine [35]. India, as the birthplace of Ayurveda, is uniquely positioned to lead research and policy innovations in this domain.

CONCLUSION

Telemedicine and AI can democratize access to *Ayurvedic* healthcare, improve diagnostic precision, and accelerate research. However, data standardization, regulation, ethical practices, and clinical validation are critical challenges that must be addressed. The future of Ayurveda lies in integrating digital innovations as complementary tools while preserving the traditional essence of physician–patient interaction.

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Corresponding author: ***vidhyaarora2014@gmail.com***

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