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Navigating the future: Challenges facing ayurvedic practitioners in the next quadrans centennial

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Abstract

Background:
As India advances toward its *Viksit Bharat 2047* mission, Ayurveda—a holistic and ancient system of medicine—faces the dual challenge of preserving traditional knowledge while adapting to a modern healthcare ecosystem. With rising numbers of graduates, integration of digital technologies, and shifting policy landscapes, the discipline must evolve to maintain relevance and efficacy.**Methods:** A pragmatic mixed-methods design was employed. First, a scoping literature review (2000–2024) was conducted across databases including PubMed, Scopus, AYUSH Research Portal, and Web of Science. Second, a qualitative thematic analysis was performed using NVivo 14.0, synthesizing expert interviews, symposia proceedings, and regulatory reports. Third, a technology horizon scanning approach involving Delphi technique and trend extrapolation was used to forecast the impact of emerging technologies like AI, Ayurgenomics,and telemedicine on Ayurvedic practice. **Results**: Key challenges identified included oversaturation of BAMS graduates, lack of professional confidence, leadership gaps, regulatory fragmentation, weak research documentation, and environmental threats to medicinal plant sources. Proposed solutions encompass strengthening clinical career pathways, integrating AI and interdisciplinary studies, promoting evidence-based practice, upgrading educational standards,and ensuring ecological sustainability. **Conclusion**: Strategic modernization, policy support, and transdisciplinary integration can transform Ayurveda into a globally

Keywords: Ayurveda; Viksit Bharat 2047; Integrative medicine; Ayurgenomics; Health policy; Artificial intelligence; Sustainable healthcare; Traditional medicine modernization

1. Introduction

The next 25 years will be pivotal for Ayurvedic practice as India progresses towards its *Viksit Bharat 2047* vision—a national developmental mission aiming to transform the country into a developed nation by its 100th year of independence. Ayurveda, one of the world's oldest and most comprehensive systems of medicine, has significantly contributed to holistic health, preventive care, and lifestyle management. Its unique emphasis on personalized medicine, seasonal regimens (*ṛtucharya*), and disease prevention aligns well with modern goals of sustainable and integrative healthcare. However, the discipline is currently at a crossroads. Key challenges include the preservation of ancient texts and traditional knowledge, integration with evidence-based modern medical practices, the need for rigorous scientific validation, inadequate regulatory mechanisms, and limited global standardization. Moreover, public trust and acceptance in urban and global contexts demand enhanced documentation, digitalization, and quality control of Ayurvedic products and protocols. Addressing these challenges requires collaborative policy frameworks, interdisciplinary research, educational reforms, and technological innovation. By embracing modernization while preserving its core philosophy, Ayurveda can emerge as a global leader in integrative and sustainable healthcare, playing a crucial role in India's health sector goals by 2047.[1]

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Aims and Objectives

- To explore the challenges facing future generations of Ayurvedic practitioners.
- To propose strategies for overcoming obstacles and adapting to the evolving healthcare environment.

2. Methodology

To comprehensively evaluate the evolving challenges and future directions of Ayurvedic practice in the context of India's *Viksit Bharat 2047* mission, a pragmatic, mixed-methods design was adopted. This approach triangulates data from literature, field narratives, and future forecasting techniques, ensuring both depth and breadth in analysis. The mixed-methods framework comprised three principal components: (1) a scoping literature review, (2) qualitative thematic analysis, and (3) technology foresight and horizon scanning. Each component was carefully structured to align with the study's objective of critically assessing Ayurveda's trajectory over the next 25 years within a transdisciplinary and translational paradigm.

2.1. Scoping Literature Review

The literature review adhered to the Arksey and O'Malley methodological framework for scoping reviews, allowing the identification, selection, and synthesis of relevant literature across diverse domains of Ayurvedic scholarship. Four major databases—PubMed, Scopus, AYUSH Research Portal, and Web of Science—were systematically searched using Boolean logic with key search terms: "Ayurveda and global health", "Ayurvedic education reform", "integrative medicine", "Ayurvedic pharmacoepidemiology", and "digital health in traditional medicine". The temporal span was limited to literature published between 2000 and 2024, thereby capturing recent trends while ensuring historical continuity.[2]

Inclusion criteria focused on peer-reviewed articles, meta-analyses, policy briefs, and expert commentaries related to the clinical, educational, policy, technological, and pharmacological dimensions of Ayurveda. Exclusion criteria included opinion pieces without empirical backing and duplicated studies across platforms. In total, 156 articles were shortlisted after initial screening, with 84 studies qualifying for full-text analysis. Grey literature sources, such as Ministry of AYUSH white papers, National Commission for Indian System of Medicine (NCISM) reports, WHO Traditional Medicine Strategy documents, and National Digital Health Blueprint (NDHB) materials, were integrated to capture institutional and policy-level perspectives.[3]

2.2. Qualitative Thematic Analysis

To better understand the experiential realities of Ayurvedic practitioners and institutional stakeholders, a qualitative component was incorporated through thematic synthesis. Primary data were extracted from expert interviews (n=22) conducted with experienced Ayurvedic clinicians, educators, and regulators. Additionally, data sources included proceedings of international Ayurveda symposia (2017–2024), position statements from statutory bodies like the Central Council of Indian Medicine (CCIM, now subsumed under NCISM), and narrative accounts from Ayurveda-focused academic journals.

NVivo 14.0 (QSR International) was utilized for data management and coding. Open and axial coding methods were applied to identify recurring patterns and latent themes. Emergent themes included: (i) epistemological tension between traditional and evidence-based paradigms, (ii) challenges in clinical trial adaptation for Ayurveda's multi-component interventions, (iii) regulatory uncertainty in cross-disciplinary credentialing and scope of practice, and (iv) medico-legal ambiguities in integrative settings. Coding reliability was ensured through inter-rater checks among two independent qualitative researchers. The qualitative data offered rich, contextualized insights into the systemic and on-ground barriers to Ayurvedic integration in modern health ecosystems.[4]

2.3. Technology Horizon Scanning and Foresight Methodology

To project the likely impact of emerging technologies on Ayurvedic practice by 2047, a technology foresight exercise was employed. This included both Delphi technique-based expert consultation and trend extrapolation. A panel of 18 experts from the fields of digital therapeutics, artificial intelligence (AI), bioinformatics, ethnopharmacology, and global health policy participated in two iterative Delphi rounds. Consensus was sought on the technological disruptors most likely to influence Ayurveda, including AI-assisted diagnostics, telemedicine platforms, digital twins for personalized interventions, and omics-integrated frameworks such as Ayurgenomics.

Trend extrapolation used data from healthcare innovation hubs, patent databases, and pilot projects under the Digital Health Mission. Key trends identified were: (i) integration of AI with Prakriti-based diagnostics, (ii) use of blockchain in Ayurvedic drug traceability, (iii) telemedicine-enabled Panchakarma consultations, and (iv) real-time biosurveillance integrated with traditional diagnostic models.

Ethical considerations—such as data privacy, traditional knowledge appropriation, and algorithmic bias—were analyzed through a socio-ethical lens. The foresight component emphasized the need for anticipatory regulation, interoperable health systems, and practitioner training to engage meaningfully with digital health innovations.[5]

3. Methodological Rigor and Triangulation

The triangulated approach provided a multi-layered understanding of the Ayurvedic landscape, ensuring methodological rigor. The convergence of empirical, experiential, and predictive data allowed the study to maintain both descriptive validity and predictive plausibility, crucial for long-term policy recommendations. This transdisciplinary framework not only enriches understanding of the current state but also equips stakeholders with actionable foresight to navigate future transitions.[6]

4. Discussion

Modernizing Ayurveda while retaining its foundational principles poses a complex challenge. As India moves towards the *Viksit Bharat 2047* vision, the Ayurvedic community must engage in self-reflection, systemic reform, and cross-disciplinary collaboration. The growing disconnect between traditional Ayurvedic wisdom and emerging scientific technologies calls for pragmatic integration that safeguards epistemological integrity while enabling contemporary relevance.[6] One of the foremost challenges confronting the Ayurvedic sector is the rising number of graduates and the corresponding limited career opportunities. With an estimated 150,000 BAMS graduates expected over the next 25 years, there is a clear mismatch between educational output and employment avenues. Many young practitioners encounter significant hurdles in securing stable roles within clinical practice, research institutions, or academic settings. This oversaturation not only affects professional growth but also dilutes the quality of Ayurvedic services offered to the public. Compounding this issue is the low confidence among young graduates, who frequently struggle to establish independent clinical practices. The dominant presence of allopathic medicine, combined with the lack of robust mentorship structures, often diminishes their self-efficacy. Without institutional and peer-level support, these graduates may either abandon their discipline or resort to unregulated practice, compromising both professional identity and patient safety.[7]

The sector also suffers from gaps in leadership, where senior practitioners often hesitate to take up mentoring or administrative roles. This lack of visible leadership has led to a strategic vacuum in vision, governance, and resource mobilization. The absence of role models discourages innovation and suppresses initiatives for reform. Furthermore, the Ayurvedic community remains fragmented, both ideologically and institutionally. This lack of unity undermines efforts to advocate for policy reforms, secure research funding, and achieve professional standardization.

Another contentious issue is the integration of Ayurveda into the MBBS curriculum. While interdisciplinary exposure is beneficial, the current implementation—especially through mandatory AYUSH internships for modern medicine students—raises concerns regarding the dilution of Ayurvedic principles. There is a potential risk that Ayurveda may be viewed through a reductionist lens, stripping it of its holistic, individualized approach and undermining its epistemic autonomy.The academic landscape of Ayurveda also suffers from inadequate scientific documentation and lack of representation in high-impact indexed journals. This deficiency hampers its visibility in the global scientific community and inhibits cross-system recognition. A concerted effort is needed to enhance the quality, rigor, and indexing of Ayurvedic research, aligning it with international standards without compromising its unique methodological foundations.[8] [9]

Simultaneously, the rise of artificial intelligence (AI) and other healthcare technologies introduces both opportunities and disruptions. While AI can significantly enhance diagnostic precision, personalized care, and telemedicine outreach, Ayurveda must carefully negotiate this transition. The integration of AI must not obscure the qualitative, contextual nature of Ayurvedic diagnosis—such as *prakriti* assessment and *nidāna* based management—but should instead be used as a complementary tool to enhance clinical efficacy.Environmental sustainability is another pressing concern. Climate change and biodiversity loss threaten the availability of critical medicinal plant species, many of which are integral to Ayurvedic pharmacopeia. Additionally, the adulteration and unethical harvesting of herbs compromise the safety and efficacy of Ayurvedic treatments. Hence, robust frameworks for conservation, ethical sourcing, and

cultivation of medicinal plants are urgently required.To address these multi-dimensional challenges, a series of targeted reforms are proposed. Firstly, practitioner-focused strengthening of Ayurveda is vital. BAMS graduates should be encouraged to remain within the Ayurvedic domain through the creation of diversified tracks such as Ayurveda nursing, pharmacy, and public health. Super-specialization courses in areas like *Marma Chikitsa*, *Pañcakarma*, Ayurvedic oncology, and geriatrics can improve clinical depth and career viability.[10 11 12]

Furthermore, educational institutions must enhance curricular standards, integrating traditional pedagogy with modern learning tools and contemporary healthcare trends. This should be coupled with efforts to ensure job security, fair compensation, and continuous professional development for Ayurvedic professionals. The introduction of interdisciplinary modules, including bioethics, digital health, and research methods, will ensure that graduates are equipped to navigate an increasingly integrative and technologically driven healthcare landscape.

A paradigm shift towards evidence-based practice is imperative. Classical techniques like *Agnikarma*, *Viddhakarma*, and *Basti Chikitsa* must undergo rigorous clinical trials and pharmacological evaluations to gain wider acceptance and credibility. Collaborative research with modern institutions, aided by government support, can drive innovation and standardization.

Lastly, ecological sustainability and plant preservation must be prioritized. The establishment of Ayurvedic botanical gardens, seed banks, and community-based cultivation programs can ensure a continuous and ethical supply of raw materials, thereby safeguarding both environmental and therapeutic integrity.

In conclusion, the modernization of Ayurveda requires a balanced approach—one that honors tradition while embracing innovation. Through visionary leadership, evidence generation, educational reform, and ecological stewardship, Ayurveda can be positioned as a globally respected, integrative healthcare system, ready to meet the aspirations of *Viksit Bharat 2047*.[13]

5. Conclusion

The future of Ayurveda is fraught with challenges but also ripe with opportunities. Through strategic planning, collaboration among practitioners, researchers, and policymakers, and a commitment to preserving the core principles of Ayurveda, this ancient medical system can continue to thrive. The integration of modern technology, coupled with a robust educational and research framework, will ensure Ayurveda's relevance in global healthcare for years to come.

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