

# Global Evolution of Ayurveda: A Comprehensive Analysis of Policy Reforms, Research Developments, Educational Expansion, and Digital Transformation

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## ABSTRACT

**Background:** One of the oldest known medical systems in the world that has undergone great transformation throughout the world over the past one decade is Ayurveda. These changes are in policy frameworks, research productivity, education frameworks and digitization of health. **Objective:** This review presents a detailed discussion of the international history of Ayurveda, including policy measures, research, educational growth, and digital health systems. **Methods:** The literature search was done in PubMed, Scopus, Web of Science, and Google Scholar and official Web sites of WHO and Ministry of AYUSH (publications published between January 2010 and February 2026). There were also official reports and policy documents that were retrieved. Initially, 187 articles were identified, and 41 of these articles have been used in this narrative review according to their relevancy and quality and timeliness. **Results:** The Ministry of AYUSH was created (2014), WHO Global Traditional Medicine Strategy 202534 was adopted, and the WHO Traditional Medicine Global Library (December 2025) was launched with more than 1.6 million resources. Publications with Scopus-indexes per year grew by an average of about 150 in 2010 to more than 1,200 in 2024; the share of randomized controlled trials also grew by 23 percent (2020-2024) compared to 8 percent (2010-2014). The number of colleges expanded to 560 by 2025, with reforms of competency established by the National Commission for Indian System of Medicine, starting in 2000 with 135 colleges. Online sources like the Traditional Knowledge Digital Library and knowledge tools powered by AI have increased access to the traditional knowledge. **Conclusion:** Ayurveda has experienced a long-standing policy support, higher rates of research production, growth of education, and digital innovation, which manifest in the global evolution of Ayurveda. Standardization, harmonization of regulations and protection of traditional knowledge should be continued to be done to bring Ayurveda more fully into world health systems.

**Keywords:** Ayurveda, Traditional medicine, Integrative medicine, Global health policy, Digital health, Evidence-based medicine.

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## 1. INTRODUCTION

Ayurveda or the science of life is one of the oldest medical systems whose textual basis can be traced back to more than three millennia years [1]. It has

long been used on Indian subcontinent, but its use was limited due to limited standardization and research funding and there was limited scientific data available to satisfy the evidence standards of

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today [2]. In the past ten years the discipline has undergone rapid global expansion, with government policy, heightened international interest in integrative medicine, scientific evidence, technological advances in knowledge preservation and dissemination, all fostering Ayurveda Healthcare [3]. Historical reviews have shown the understanding of lifestyle changes as determinants of health has deep Ayurvedic and other traditional systems roots [40].

This evolution has been spearheaded by the continued interaction of the traditional medicine systems with the World Health Organization (WHO). The 2025-2034 WHO Global Traditional Medicine Strategy and Gujarat Declaration of the 2023 WHO Traditional Medicine Global Summit have put traditional medicine on the global health agenda [4,5]. These developments were predetermined by earlier frameworks, including the WHO Traditional Medicine Strategy 2014-2023 [22].

This review examines the international Ayurveda history in four areas: policy measures and institutional progress, research advances and scientific validation, academic growth and resource building, and digital health assimilation and knowledge platforms. It also deals with the current issues and also provides the way forward towards more global integration.

## 2. METHODS

The extensive literature search included PubMed, Scopus, Web of Science, Google Scholar, and the official websites of the WHO and the Ministry of AYUSH. Search terms were Ayurveda, traditional medicine, global health, integrative medicine, policy reforms, and WHO Traditional Medicine Strategy, digital health and Boolean operator combinations. The search was based on publications dating back to January 2010 to February 2026. Further articles were found by hand screening of reference lists and citation tracking. Only publications in English language were considered including their full text.

The respective official websites were accessed to identify official reports, policy documents, and strategic frameworks. One hundred and eighty-seven articles were identified initially and forty-one of them are listed in this narrative review due to relevance, quality, and recency. The search approach adheres to the conventional methods of synthesizing evidence in traditional medicine studies.

## 3. RESULTS

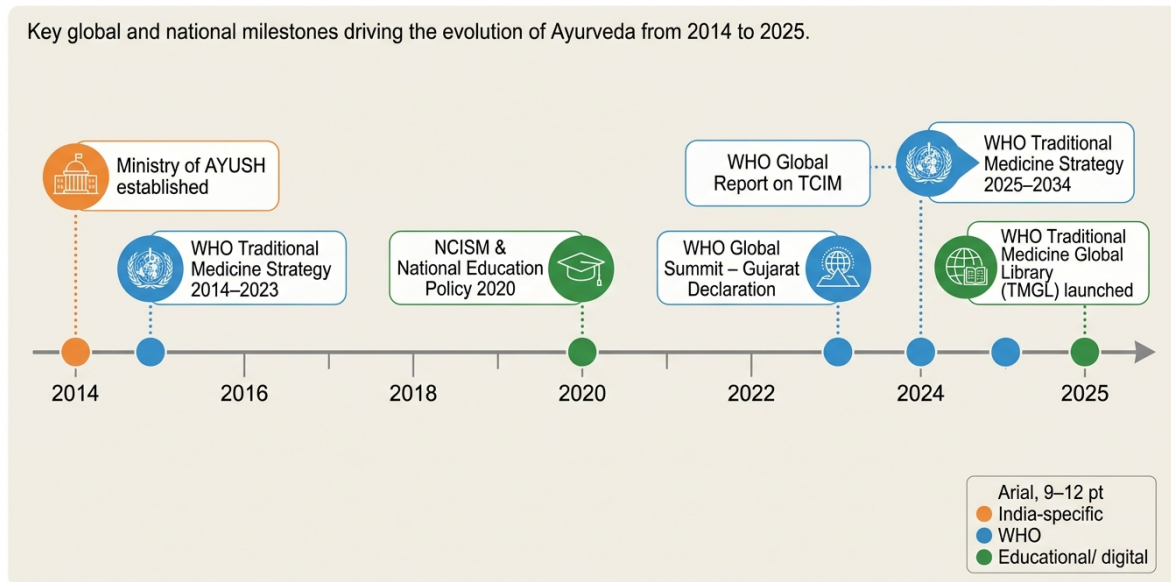
### 3.1 Policy and Governance Reform

WHO has demonstrated increasing institutional engagement with traditional medicine. The WHO Global Traditional Medicine Strategy 2025-2034 presents the strategic goals of evidence-based practice of the Traditional, Complementary, and Integrative Medicine (TCIM) world-wide [4]. The major priorities are to encourage the high-quality research, embrace technological advances, develop regulatory processes, and incorporate TCIM to health systems.

The WHO Global Report on TCIM 2024 indicates that 90 countries have national policies, laws, or regulations for TCIM. Member states reported that an estimated 60–90% of their populations utilize TCIM for healthcare needs [2]. In May 2025, WHO launched TCIM Dashboards that offer profiles at both global and country levels [6]. Figure 1 shows the timeline of gradual globalisation of Ayurveda as policy reforms, WHO strategies, restructuring of education via digital knowledge platforms under the AYUSH Ministry.

In India, the Department of AYUSH was upgraded in November 2014 to an independent Ministry of AYUSH, which will receive a budgetary allocation of about ₹3,500 crore in 2024-25, up from a budgetary allocation of circa 1,200 crore in 2014-15 [7]. To date, the Central Council for Research in Ayurvedic Sciences (CCRAS) has 30 research centres in India. It has been involved in the Ayurvedic Pharmacopoeia of India and the Ayurvedic Formulary of India [8].

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**Figure 1: Timeline of key global and national milestones of AYUSH ministry from 2014 to 2025 contributing the evolution of Ayurveda.**

### 3.2 Research Productivity and Evidence Growth

Bibliometric studies reveal that there has been an increase in the number of Ayurveda journals indexed on Scopus and PubMed within the last 15 years. The quantity of publication output grew annually, rising to more than 1,200 in 2024, compared to about 150 in 2010. The percentage of randomized controlled trials increased to 23% in 2020-24 and compared to 8% in 2010-14, and systematic reviews and meta-analyses also increased [9].

Moreover, funding of research has become diverse, with international agencies, such as the National Institutes of Health (USA) and National Center of Complementary and Integrative Health (USA) providing the funding in the context of complementary and integrative medicine; Ayurveda related studies have been funded [9]. A qualitative systematic review studying Traditional medicine use in OECD countries concluded that patients usually sought Ayurveda treatments because of fears about the side effects of standard treatments, and a perceived preference of its holistic treatment [10]. The individualized medicine using Ayurvedic principles like Prakriti is also under investigation [28,32].

### 3.3 Education and Workforce Expansion

In the year 2000, Ayurveda education had 135 colleges with a total of about 4,900 seats in the form of BAMS (Bachelor of Ayurvedic Medicine and

Surgery), but by the year 2025, the education had increased to 560 colleges with a total of about 31,000 of BAMS (Bachelor of Ayurvedic Programs have since been expanded to include BAMS, 18 specialty MD, PhD, fellowships and certificate courses.

In India, according to the list that is present on the NCISM site,<sup>10</sup> in the country, a total of 450 UG Ayurveda colleges exist, of which 62 are government, 21 government-aided and 367 are private colleges. The total available UG seat stands at 31 790, of which 4699 government, 1386 government-aided and 25 705 private college seats as of 25 June 2022. In addition, total seats of the Ayurveda courses are 4600 in 140 educational institutions with 1724 seats in 40 government colleges, 297 in 15 government-aided colleges and 2579 in 85 privately owned colleges as of 25 June 2022.

In 2020, the National Commission for Indian System of Medicine (NCISM) was set up, which introduced competency-based curricula and outcome-based learning objectives, which align with the National Education Policy 2020 [13]. National Teachers Eligibility Test (NTET) were introduced to harmonize competency and the quality of teaching [14,15]. The major educational reforms and quality assurance mechanisms implemented under NCISM are summarized in Table 1.

**Table 1: NCISM Educational Reforms and Quality Assurance Mechanisms**

Reform / Mechanism	Description	Target

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Competency-based dynamic curriculum (BAMS)	Structured into modules, units, credits; defined program outcomes, course outcomes, competencies	Undergraduate students
Outcome-based dynamic curriculum (MD)	Weightage based on market trends, applicability, future directions	Postgraduate students
National Exit Test (NEXT)	Uniform competency assessment for healthcare service	Graduating students
National Teachers' Eligibility Test (NTET)	National faculty standards to improve teaching quality	Faculty members
Ranking of Ayurveda institutes	Collaboration with Quality Council of India for institutional assessment	All Ayurveda colleges
Rating mechanism for textbooks	Quality standards for newer textbooks	Publishers, authors

### 3.4 Digital Knowledge Ecosystem

Launched in December 2025, the WHO Traditional Medicine Global Library (TMGL) contains more than 1.6 million resources, such as evidence maps, journals, policies, and multimedia collections, and has a search tool based on AI [16].

Traditional Knowledge Digital Library (TKDL) is an alliance between CSIR and the Ministry of AYUSH that ensures bio-piracy is avoided by issuing digitized ancient books to patent office all over the world [17]. CCRAS has created an online

platform like Ayush Sanjivani mobile application to gather information on COVID-19 and Ayurveda Manuscript Advanced Repository [8]. These programs promote the conservation and the spread of traditional knowledge and help solve the issue of intellectual property [29,35]. Collectively, developments in policy support, scientific research, education, digital knowledge systems, and healthcare delivery constitute a comprehensive framework for the global integration of Ayurvedic sector, as presented in Figure 2.

## Framework for Global Integration of Ayurveda

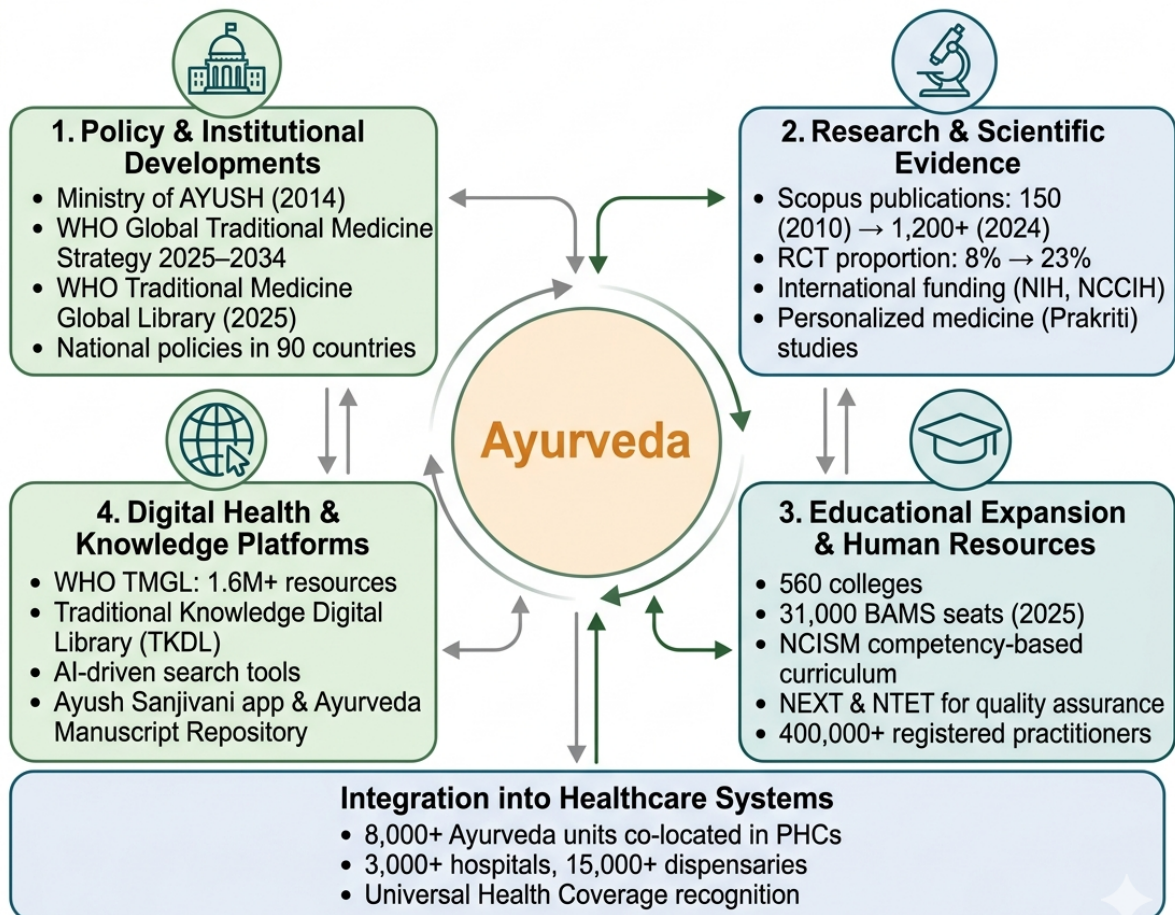


Figure 2 : Conceptual framework illustrating key domains driving the global integration of Ayurveda, including policy reform, evidence generation, education, digitalization, and healthcare delivery

### 3.5 Healthcare Integration and Global Adoption

The use of Ayurvedic Healthcare in primary health has been incorporated in the National Health Mission in India. More than 8,000 Ayurveda units are co-located in the primary health centres and district hospitals. The country has more than 3,000 Ayurveda hospitals and 15,000 Ayurveda dispensaries and more than 400,000 registered practitioners [7,18]. Traditional medicine has a role to play in Universal Health Coverage, which is accepted in international accords [19,20]. This integration has also been facilitated by regional structures of WHO South-East Asia [27,39].

## 4. DISCUSSION

Ayurveda appears to be transitioning from a traditionally localized healing system to an evidence-informed global health discipline. It has undergone a period of steady policy endorsement, growth in research, educational expansion and

technological advancement in the digital realm over the past decade. The establishment of the Ministry of AYUSH, the WHO Global Traditional Medicine Strategy 2025-2034 and the WHO TMGL are major steps in institutionalizing Ayurveda into the global health systems [4,7,16]. This multidimensional growth is further reflected in the increasing research output, expansion of academic infrastructure, enhanced governmental investment, and emergence of digital knowledge platforms, as illustrated in Figure 3.

There has been an increase in research productivity, with a rising proportion of randomized controlled trials and systematic reviews in an attempt to harmonize Ayurveda with the contemporary scientific standards [9]. Curricular reforms have been a part of educational growth to focus on competency-based training [13]. The reasons to consider wider integration are the patient demand in the OECD countries where preference for holistic care and concern about conventional treatments are

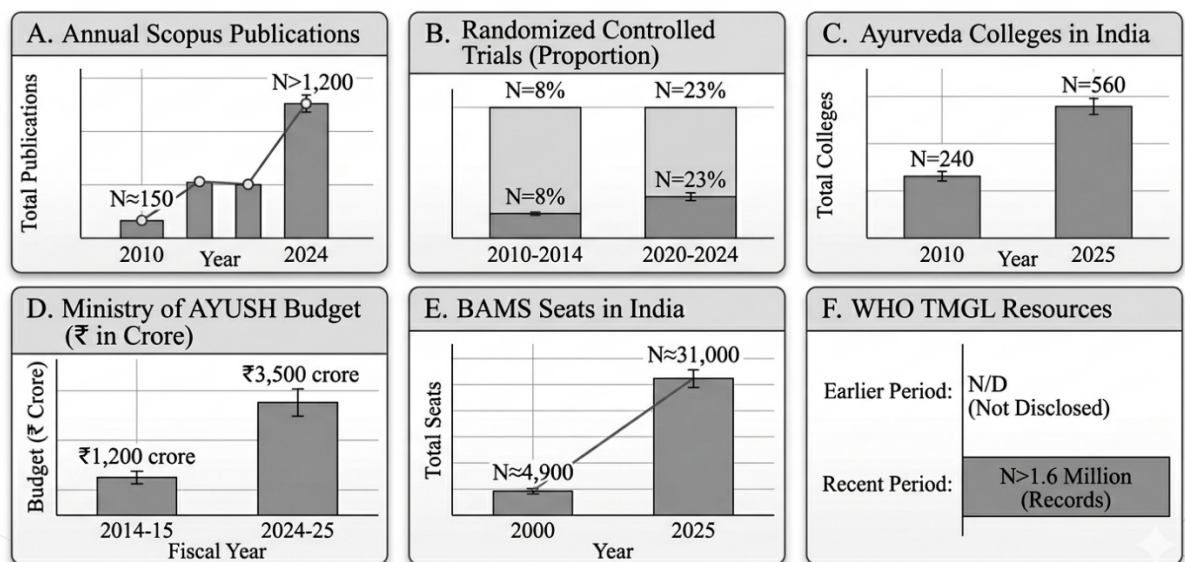
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driving utilization [10]. In addition, the growing global burden of chronic non-communicable diseases, lifestyle-related disorders, and increasing demand for preventive healthcare have created favorable conditions for renewed interest in Ayurvedic principles of diet, lifestyle regulation, and individualized care. The broader international movement toward integrative medicine has also facilitated the acceptance of traditional systems alongside conventional healthcare.

However, challenges continue to persist. The WHO member states are often plagued by a lack of adequate research data of international standards, inadequate safety monitoring, and regulatory harmonization [2]. The Ayurveda globalization is also characterized by issues around policy goals and market relations and traditional knowledge anti-biopiracy, which is dealt with by policies like TKDL [17,21]. While commercialization has expanded the global visibility of Ayurveda, rapid market growth

without adequate scientific validation, quality assurance, or ethical oversight may undermine credibility and public trust. Responsible evidence-based commercialization therefore remains essential. Ensuring product quality and strengthening pharmacovigilance remain essential priorities [33,34,38].

Some of the authors have pointed out the necessity to validate and incorporate Ayurveda in mainstream health care based on evidence [25,26,31,35,41]. The attempts to reconcile the discipline with the modern scientific approach are in continuous development [24,30,32,36]. The importance of lifestyle medicine that Ayurveda has long stressed upon is receiving public health discourse [26,37]. At the geopolitical level, Ayurveda also represents an important component of India's health diplomacy and cultural soft power, with international collaborations, academic exchanges, wellness tourism, and policy engagement contributing to its global visibility.



**Figure 3 : Longitudinal Indicators of Ayurveda Growth over globe**

### Challenges to Globalization of Ayurveda

Despite substantial progress in policy recognition, research expansion, and institutional development, several challenges continue to limit the broader globalization of Ayurveda. One of the major barriers is the considerable variation in regulatory frameworks across countries, resulting in inconsistent classification of Ayurvedic products as medicines, supplements, or traditional remedies. This lack of harmonization creates obstacles for international licensing, market access, and clinical integration. Standardization also remains a

persistent concern, particularly with respect to raw material authentication, manufacturing practices, dosage uniformity, and reproducibility of classical formulations.

Quality assurance of herbal products is another critical issue. Variability in plant sources, contamination, adulteration, and differences in processing methods can affect safety, efficacy, and consumer confidence. In addition, concerns regarding the presence of heavy metals in certain herbo-mineral preparations have attracted international scrutiny, underscoring the need for

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robust pharmacovigilance systems, transparent labeling, and evidence-based safety evaluation.

From a scientific perspective, although research output has increased, there remains a need for large, multicentric, methodologically rigorous randomized controlled trials and real-world effectiveness studies to strengthen the global evidence base of Ayurveda. Furthermore, many Ayurvedic concepts are rooted in individualized and holistic paradigms, which may not always align easily with conventional biomedical research models. Finally, a scientific communication gap persists, wherein available evidence is often underrepresented in high-impact international literature or insufficiently translated for global academic and clinical audiences. Addressing these challenges through coordinated regulatory, scientific, and educational strategies will be essential for the sustainable global integration of Ayurveda.

Looking ahead, Ayurveda may play an increasingly meaningful role in global health systems, particularly in preventive care, chronic disease management, rehabilitation, and patient-centered integrative medicine. Future progress will depend on multicentric clinical trials, stronger scientific communication, digital interoperability, and internationally harmonized regulatory standards.

## Strengths and limitations

This review is an overview of multi-domain of Ayurveda development across the globe, based on the data found in authoritative sources. The limitations are the non-English publications that are not included and the narrative format of the review which might not reflect all the developments in the region.

## Future directions

Among the priorities identified by WHO are strengthening clinical trial capacity, harmonizing regulatory standards, promoting international educational exchange, and utilizing digital health tools for wider knowledge dissemination [4]. Future progress will depend on multicentric trials, digital interoperability, and internationally harmonized regulatory standards. Continued advancement in these areas will be essential for the deeper integration of Ayurveda healthcare into international health systems.

## 5. CONCLUSION

Over the past decade, Ayurveda has evolved from a predominantly regional traditional system into an increasingly globalized and institutionally recognized healthcare discipline. This progress has

been supported by policy initiatives such as the establishment of the Ministry of AYUSH, WHO traditional medicine strategies, expansion of scientific research, educational reforms, and digital knowledge platforms.

Growing international interest in preventive, personalized, and holistic healthcare has created new opportunities for Ayurveda within integrative medicine and universal health coverage frameworks. Its emphasis on lifestyle modification, individualized care, and long-term wellness remains highly relevant to contemporary global health priorities. However, wider integration will require continued efforts toward regulatory harmonization, quality assurance of products, pharmacovigilance, and generation of robust clinical evidence through high-quality multicentric studies. Strengthening scientific communication and international collaboration will also be essential.

With balanced modernization rooted in classical principles and supported by contemporary evidence, Ayurveda has significant potential to contribute meaningfully to future global healthcare systems.

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## CONFLICT OF INTEREST

None

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