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Globalization of Ayurveda pharmaceuticals: Emerging trends

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Abstract

This article reviews contemporary initiatives to build Ayurveda as a global holistic health care system. India is a forerunner in this medical system. Growing desire for natural and organic products with minimal side effects, more consumer awareness, and a surge in demand for nature-derived cosmetics and day care products, are expanding its attractiveness as a medical tourist destination around the world. Furthermore, with a growth in demand for natural products, FMCG products with natural components are grabbing consumer's attention. Despite a drop in economic activity in 2020 owing to the pandemic, the ayurvedic industry is expected to reach \$20.6 billion in 2021 and \$23.3 billion in 2022, as per trade analysts. The current Covid scenario has prepared the way for Ayurveda to be eminent on the global healthcare map. In terms of global share, India has risen faster in the AYUSH market, accounting for approximately 2.8% of the market. Government investments and policies, Global market outreach, Evidence-based Study, Increased R&D expenditure, Innovations and startups, and Marketing to Millennials and Gen Z are the key factors to strongly with-hold the presence of this sector in the pharmaceutical world. Through its unique holistic healthcare approach, AYUSH along with Yoga holds the potential to make India a global healthcare leader. The AYUSH healthcare system will be increasingly important in the future decade, both domestically and globally.

Keywords: Ayurveda; AYUSH; Market; Health Care

1. Introduction

The holistic approach of Ayurveda includes health promotion, illness prevention, early diagnosis, and personalised treatment. Traditional systems such as Ayurveda appear to share many parallels with the modern concept of predictive, preventative, and personalised medicine (PPPM)¹ The majority of individuals now use alternative medicine for their main healthcare requirements, such as herbal medications, phytonutrients, ayurvedic products, and nutraceuticals. The use of traditional herbal remedies has progressively expanded during the last few decades. Because of their presumed safety, most traditional herbal remedies are preferred above conventional medicines²

There is a need to instill modern scientific information and procedures for a better understanding of Ayurvedic pharmacology and its global acceptability. Because of the availability of several active phytoconstituents, determining the pharmacokinetics and pharmacodynamics of Ayurvedic single- and multidrug-based medicines is a significant difficulty. These difficulties may be addressed using a multidisciplinary approach that includes fundamental sciences like Chemistry, Molecular Biology, Pharmacoepidemiology Biotechnology, Ethnopharmacology, Ayurvedic Drug Discovery, Reverse Pharmacology, and others.³

Although Ayurvedic medicine is very efficient, the proper mechanism of action, pharmacology, pharmacokinetics, and pharmacovigilance of many major Ayurvedic pharmaceuticals are still unknown. Furthermore, due to a lack of proof, a thorough understanding of Ayurvedic core beliefs is not scientifically acceptable. In the present day, when the Western

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medical system has nearly achieved the pinnacle due to verified research and improved procedures, there is an urgent need to validate core concepts as well as medications utilized in the ayurvedic system of medicine using advanced research methodology. As a result, developments in current research techniques are critical for the growth of Ayurveda.

2. Material and methods

2.1. Government Investments and Policies

By providing its population with high-quality healthcare and medical facilities, the Ayurveda, Yoga, Unani, Siddha, and Homoeopathy (AYUSH) schools of medicine might play a significant part in realizing the ideal of "New India". The Ministry of AYUSH is now undergoing several reforms in administration, research methods, practice styles, and education.⁴ AIIA, New Delhi, under the Ministry, signed a MoU with Amity University on October 7, 2020. The MoU aims to advance Ayurvedic sciences research in the fields of quality, standardization of Ayurvedic medications, pharmaceuticals, pharmacodynamics, and pharmacokinetics which will also result in collaborative initiatives and publications.⁵

2.1.1. AYUSH grid

To receive all information technology (IT) initiatives specifically intended for AYUSH development and facilitation across India, the Ministry of AYUSH established AYUSH GRID. The AYUSH Hospital Management Information System is a complete IT platform that can be used to efficiently manage all aspects of patient care and healthcare delivery in AYUSH institutions.

2.1.2. Ayushman Bharat Digital Mission (ABDM)

On September 27, 2021, the Ayushman Bharat Digital Mission (ABDM) was established to establish a seamless online platform "through the provision of a wide range of data, information, and infrastructure services, duly leveraging open, interoperable, standard-based digital systems" and safeguarding the security, confidentiality, and privacy of patient-specific health-related data.⁶

2.1.3. Global Centre for Traditional Medicine (GCTM)

The WHO and the Government of India agreed to create the WHO Global Centre for Traditional Medicine (GCTM) in Gujarat, India, in March 2022. The Centre exemplifies a holistic health approach that combines traditional medicine with current science and technology. In addition to supporting innovation and technology-aided advancements, the GCTM would establish norms, guidelines, and standards for the use of traditional medications. It also works to assure long-term sustainability, equity, affordability, and access to traditional medicines.

2.1.4. MOUs

- A Memorandum of Understanding (MoU) was signed between the Ministry of Ayush, Government of India, and the Department of Science and Technology (DST), Ministry of Science and Technology & Earth Sciences today. The Memorandum of Understanding (MoU) aims to pinpoint potential research areas, fostering collaboration, convergence, and synergy. Its goal is to facilitate evidence-based scientific interventions in the Ayush sector and subsequently integrate these findings into the public healthcare system.⁷
- On the 7th Ayurveda Day which is being celebrated today, a Memorandum of Understanding (MoU) was signed between the Ministry of Ayush and the Ministry of Tribal Affairs to collaborate in the Ayush sector.⁸
- With the aim of promoting and recognising AYUSH in the international practice of medicine, the Ministry of AYUSH has signed 25 Country-to-Country MoUs for Cooperation in the field of Traditional Medicine and Homoeopathy. Also, 23 MOUs for collaborative research in AYUSH systems of medicine and 13 MOUs for the establishment of AYUSH academic chairs have been inked.⁹
- The Ministry of AYUSH has struck an agreement with the Ministry of Railways to construct AYUSH wings at five Railway Zonal Hospitals. An MoU has been struck with the Ministry of Defence for the integration of Ayurveda within the Ministry of Defence/Directorate General of Armed Forces Medical Services (DGAFMS).¹⁰

Along with this, Every year, Ayurveda Day, Unani Day, and Siddha Day are observed across the country in recognition of the mythical and historical significance of Indian systems of medicine. International Yoga Day is observed in 190 countries, and Ayurveda Day is observed in over 35 nations. Since 2015, the Ministry has hosted an International Yoga Conference. The Ministry of AYUSH also organizes AROGYA fairs at the state and national levels, as well as multimedia campaigns, the development and distribution of publicity material, including audiovisual material, and so on. The NITI Aayog has formed an Advisory Committee on the Formulation of Integrative Health Policy to propose a framework of

comprehensive integrative health policy to achieve inclusive, affordable, evidence-based healthcare; and a roadmap for disease prevention and health promotion in national programmes based on modern and traditional integrative approaches.

The Ministry of AYUSH, through its Fellowship Scheme, provides financial assistance to qualified foreign nationals pursuing UG, PG, and Ph.D. programmes at India's best AYUSH institutes. The Fellowship Scheme strives to gain international recognition and appreciation for our traditional medical systems. Incentives are extended to AYUSH drug manufacturers, entrepreneurs, AYUSH institutions, AYUSH drug and hospitals, etc., encouraging their participation in international exhibitions, conferences, workshops, seminars, road shows, trade fairs, etc. This is aimed at heightening awareness about the AYUSH systems of medicine among the attending public.¹¹ Many nations have recognised AYUSH medical systems as a result of the Ministry's ongoing efforts. Nepal, Bangladesh, Pakistan, Sri Lanka, UAE, Colombia, Malaysia, Switzerland, South Africa, Cuba, Tanzania, Romania, Hungary, Latvia, Serbia, and Slovenia are five European Union (EU) nations that recognise Ayurvedic therapy. Bangladesh recognises the Unani system, while Sri Lanka recognises the Siddha system.¹²

2.2. Evidence-Based Study

The term "Evidence-based clinical practice" (EBCP) refers to "the integration of best available research evidence with clinical expertise and patient values," which, when used by practitioners, eventually improves patient outcomes. Clinical practice guidelines (CPGs) are observable proof of a culture supporting evidence-based practice. While creating road maps for the healthcare system, EBCP also helps decision-makers apply best practices in healthcare.¹³ The field of medicine is in a transformation right now. We are getting new research that will aid us in making wiser decisions. Integrative medicine is a significant advancement because it blends the greatest aspects of conventional natural health systems like Ayurveda with the best of contemporary medicine. Integrative medicine makes it easier to reconcile Ayurveda's old practices with current scientific knowledge¹⁴.

The most fundamental medical treatments, medications, and immunizations are out of reach for more than 80% of individuals in underdeveloped nations. Although there is less evidence to support their safety and efficacy, complementary and alternative practices are common among more affluent people in both developed and developing nations. Evidence-based Ayurveda research is becoming more accepted both domestically and internationally.¹⁵⁻¹⁸

The term "reverse pharmacology" refers to the process of validating a traditional medical system by going from ordinary clinical practice to a laboratory test.¹⁹ The development of novel drug candidates or formulations using existing knowledge in conventional medicines utilizing reliable preclinical and clinical studies is an intriguing and significant scientific technique.²⁰ Additionally, the use of the reverse pharmacology technique can lower the failure rates of therapeutic applications of herbs or their classical formulations. This method offers the chance to look for novel synergistic pairings, enhancements in bioavailability, and creative approaches that can have a substantial impact on medication development. For eg: A combination of Piperine has been shown in several prior studies to increase the bioavailability of synthetic medications including propranolol, theophylline and rifampicin.²¹

2.2.1. Initiative of AIIA

As a well-established branch of medicine, ayurveda is adapting to the modern world by offering high-quality services through targeted strategies. To develop evidence-based practices, AIIA, a tertiary care facility, is taking the initiative. It has specialized outpatient departments (OPDs) that are mostly concerned with evidence-based practices. Another activity is the publication of case studies to show the clinical use of Ayurveda. Numerous initiatives have been started in collaboration with a range of national and international Memorandum of Understanding (MoU) partners. Collaboration of The Ministry of AYUSH, the Government of India and the London School of Hygiene and Tropical Medicine, to produce the necessary scientific proof, is one such example.²²

Also, numerous publications have been published in the AYUSH system of medicine to enhance evidence-based practice. On the AYUSH research portal, an evidence-based database of AYUSH systems at a worldwide level, 33,325 publications are now available. Out of them, 8346 published papers are about drug research, 13,384 are about preclinical research, 6056 are about clinical research and 5540 are about basic research. There are 237 AYUSH research and development publications linked to COVID-19 that are accessible on the AYUSH research portal.²³

2.3. Innovations & Startups

The Ayush market is presently valued at USD 10 billion and is expected to grow by 50% over the next five years. At a time when there is significant worldwide interest in 'alternative' medical practices, the Ayush industry has enormous potential for exponential expansion.²⁵ With a total of 3,647.5 crore instead of the prior budget projection of 3,050, the Ministry of AYUSH (MoAYUSH) has got a nominal increase of 19.6% in the 2022–23 Union Budget. Compared to the Ministry's prior increase of 2.6%, this is significantly larger.

Ayurveda, Yoga, Naturopathy, Unani, Siddha, and homeopathy are among the Indian systems of medicine that the MoAYUSH is charged with advancing via teaching and research. The Ministry's central sector projects have received 185.44 crore, down from 306.98 in the previous period. The majority of the budget cuts were made to support hospitals financially, encourage medical travel and advance "international cooperation". The amount allotted to the Institute for Teaching and Research in Ayurveda, which was established to promote Ayurveda and also provides degree programmes, has nearly doubled to 150.13 crores. The Central Councils for Research in Ayurvedic Sciences (CCRAS) and for Research in Homoeopathy (CCRH), which fall under the Ministry, are examples of autonomous entities that have earned insignificant raises.²⁴

2.3.1. Ayush Start-up Challenge

The Ministry of AYUSH with AIIA & Startup India is actively trying to support people and early-stage start-ups working on breakthroughs in the alternative medicine and Ayurveda sectors. A key step towards achieving this aim is the "Ayush Start-up Challenge." Ayush Food Innovations, Ayush Bio-instrumentation (hardware solutions), and Ayush IT Solutions (software solutions) are the three entry categories for participating start-ups.²⁵

2.3.2. Global Ayush Investment and Innovation Summit

The Government of India made a notable attempt with the Global Ayush Investment and Innovation Summit, 2022, to draw attention to Ayurveda and pave the path for a sustainable future. Many well-known businesses and new ones set up their booths at the exhibition at GAIIS 2022. One such student-run ayurvedic startup, Green Forest Wellness, founded by Neelkanth Mardia, has received a financial offer from a private corporation for Rs 2.50 crore.

The Ayush industry received over 9,000 crore rupees in letters of intention (LoIs) in just three days. The investments span several industries, including agribusiness, FMCG, medical value travel (MVT), pharmaceuticals, technology and diagnostics, and farmers. More than 70 (MoUs) were signed at the summit between nations, major scientific institutions, farmer's organizations, and businesses. More than 30 FMCG firms, including Amul, Dabur, Kama Ayurveda, Accord, Ayur VAID, Natural Remedies, Ambro Pharma, and Patanjali, participated in the first GAIIS. The creation of about 5.5 lakh employment is to be estimated. Also, the government will create a network of AYUSH Parks for the promotion, research and manufacturing of AYUSH products across the country.²⁶

2.3.3. AIIA- iCAINE

The Incubation Centre for Innovation and Entrepreneurship (AIIA- iCAINE) at All India Institute of Ayurveda (AIIA), was inaugurated in Vigyan Bhavan, New Delhi on 29th Oct 2021. It is first of its kind organization at AIIA for nurturing entrepreneurship and Fostering Ayurveda Knowledge-based start-ups. It administers a business incubator that provides 'Concept to Market' support for Ayurveda Knowledge-based entrepreneurship and facilitates the conversion of research activity into entrepreneurial ventures. It aims to gather like-minded Technocrats, Entrepreneurs and Start-up enthusiasts through events, workshops, expert sessions, sensitization programs, community engagement and other unique efforts revolving around Innovation and Entrepreneurship.

2.3.4. NAM

Indian Government is implementing a Centrally Sponsored Scheme of the National AYUSH Mission (NAM) through States/UTs for the development and promotion of the AYUSH system of medicine. AIIA has received acknowledgment as a Host Institute (HI) under the Ministry of Micro, Small & Medium Enterprises (MSME), Government of India. This designation offers opportunities for innovators to develop and cultivate their novel ideas, aiming for the production of innovative products that can be introduced into the market for commercialization.

2.3.5. AYUR-UDYAMAHA

A sensitization event and workshop "AYUR-UDYAMAHA - Start-up in Ayush Sector-Scope and Opportunities" was organized on 29th and 30th October 2021 in collaboration with Invest India to sensitize the stakeholders about the

start-up ecosystem. The program involved 2 major events: A national seminar on "Start-ups in Ayush Sector- Scope and Opportunities" and Food Expo.²⁷

2.3.6. Network Pharmacology

The paradigm in biology research has changed from "one target, one drug" to "network-target multiple component-therapeutics," and as a result, a new scientific field called "Network Pharmacology" has emerged that focuses on targeting various steps in a physiological regulatory network. Based on pharmacology, network biology, systems biology, bioinformatics, computational science, and other relevant scientific fields, network pharmacology is an interdisciplinary field of study. Network pharmacology works by identifying individual metabolites, mapping protein-protein interaction networks (target identification), screening individual constituents against drug molecules in databases, and mapping the synergy between the metabolites, the multicomponent network, and their associated pathways.²⁸⁻³⁰

In addition to Network Pharmacology, researchers discovered that bioinformatics is crucial for identifying possible biomarkers and presenting treatment choices. Network pharmacology combined with bioinformatics is a cutting-edge method for researching component discovery, target prediction, and treatment alternatives.³¹⁻³²

The use of network pharmacology and bioinformatics might be beneficial in verifying traditional medical techniques in a variety of ways, including: 1. Knowledge of the action's mechanism 2. Reverse pharmacology and reverse innovation of recognized leads from Ayurveda/Traditional Medicine to generate proof and safety. Network-based drug discovery is viewed as a potential strategy for efficient drug development, given the quick advancements in bioinformatics, systems biology, and poly-pharmacology.

Building upon the aforementioned details, the Central Council for Research in Ayurvedic Sciences (CCRAS), as outlined in the Memorandum of Agreement (MOA), has assumed a proactive role in a collaborative project. This project, titled "Mechanistic investigation on the efficacy and mode of action of Ashwagandha and Yogaraj Guggulu using a hybrid proteomics cheminformatics network medicine approach for the treatment of osteoarthritis," is being conducted in partnership with the Indian Institute of Technology (IIT), Guwahati. These efforts may result in a better knowledge of Ayurvedic pharmacology and pharmaceuticals as computational and systems biology will offer fresh perspectives on the discovery of many targets and hence boost the worldwide adoption of Ayurveda and Ayush systems.³³

2.3.7. SMART

NCISM and CCRAS regulating medical education and conducting scientific research respectively, have launched 'SMART' (Scope for Mainstreaming Ayurveda Research in Teaching Professionals). It seeks to increase scientific research in key healthcare research areas through Ayurveda institutions and hospitals. This initiative is crafted to explore, nurture, and promote innovative research concepts within the realms of osteoarthritis, iron deficiency anaemia, chronic bronchitis, dyslipidemia, rheumatoid arthritis, obesity, diabetes mellitus, psoriasis, generalized anxiety disorder, and non-alcoholic fatty liver disease (NAFLD). It makes an effort to inspire instructors to take on initiatives in certain fields of medical study and build a sizable database.³⁴



Figure 1 Various Initiatives taken by AYUSH

2.4. Social Marketing to Millennials & Gen Z

In today's world of technology, social media has evolved into a digital marketplace where businesses may present their marketing campaigns, such as commercials, to reach a larger number of customers. According to Nations (2017), social media is an electronic platform that allows people to communicate with one another through sharing and consuming information, whether it be through Twitter, Facebook, YouTube, WhatsApp or another platform. Technological advancement has altered the way companies communicate with their consumers through Social Media; as a result, businesses must be aware of the strengths of social media and learn how to utilize social media in a way that is compatible with their business strategies.³⁵

The number of active internet users in the country has amounted to 624 million (Keelery, 2021)³⁶, and the internet penetration rate stood around 45% in 2021 (Statista, 2021b)³⁷ with the introduction of the Digital India movement by the Indian government and with an ever-increasing internet penetration over the years.

With 85.80% of users in India, YouTube is the most popular social media network, followed by 75%, 74%, and 70% of users on Facebook, WhatsApp and Instagram respectively. Facebook is the most popular, preferred and dominating social media network among commercial companies and the general public in India. It also competes with Instagram, whose users are primarily millennials and teenagers (The Global Statistics, 2021).³⁸ India is the second-largest telecom market with 1.2 billion telecom subscribers and the third-largest Internet market with roughly 500 million users (Statista, 2021a)³⁹

Social media marketing is a means of marketing a company's products and services online using a variety of approaches and strategies. With 3.6 billion individuals on social media, over 40% of consumers utilize these sites to learn more about new companies (Statista, 2021c)⁴⁰ Through this, social media marketing allows businesses to interact with both existing and new consumers. Companies benefit from these sites since they have a tremendous effect on changing customer behaviour. The marketing staff of various firms try to design material for better engagement that one may resonate with using comprehensive geographical and personal information. Social media marketing is better segmented than traditional marketing channels and seeks to target different people accordingly (Marketing Essentials, 2021).⁴¹

According to a Deloitte analysis, buyers persuaded by social media spend four times more than their typical purchases; the impact can be so strong that 29% of consumers are likely to buy on the same day (FitzGerald, 2019).⁴²

Schemes for Ministry of Ayush ⁴³

- Central Sector Scheme for “Ayurswasthya”
- Central Sector Scheme for “Ayurgyan”
- Central Sector Scheme for promotion of Information Education, and Communication (IEC) in AYUSH
- Central Sector Scheme for promotion of International Co-operation (IC) in AYUSH
- Evolving Pharmacopeial Standards for ASU and H Drug, etc
- Central Sector Scheme of Yoga Training for Police personnel
- Central Sector Scheme of Champion Services Sector Scheme for Medicinal Value Travel
- AOGUSY Scheme
- Central Sector Scheme on Conservation, Development and Sustainable Management of Medicinal Plants
- Ayush Centre of Excellence (ACE) Programme

Table 1 Development in Ayurveda Sector

Development in Ayurveda Sector (As on 24 Jan 2022)⁴⁴		
Ayush Infrastructure (Facilities)	Hospitals	2983
	Dispensaries	18740
Practitioners	Registered Practitioner(IQ & NIQ)	364640
	Institutional Qualified Registered Practitioner	305765
Ayush Drug Industry	Manufacturing Units	6998
Colleges	UG	412
	PG	143

Infrastructural Projects	NIA, Panchkula	Rs. 111.84 Cr.
	AIIA, Goa	Rs. 255.83 Cr.
	AIIA, Ph-II Sarita Vihar Delhi	Rs. 200.56 Cr.
	NEIAH Ph- II, Shillong	Rs. 52.89 Cr.

3. Conclusion

Both contemporary medicine and Ayurveda come with their own set of advantages and disadvantages. Consequently, there is an urgent need for integrated research and treatment approaches that harness the strengths of both systems for the betterment of public health. The future of medical research and practice should transition from being solely evidence-based to embracing evidence-informed holistic healthcare. Incorporating Ayurvedic principles into national health planning across various domains such as clinical practices, healthcare delivery, research, education, industry and culture would yield significant benefits in this regard.

The term "globalization," originally rooted in economics, has evolved to encompass the worldwide exchange of technology and knowledge. Globalization signifies the process of international integration stemming from the sharing of global perspectives, commodities, ideas and cultural elements. It entails the interconnection and integration of individuals, businesses and governments from various countries. Ayurvedic texts contain numerous references to seminars and symposia held worldwide, underscoring the presence of globalization even in ancient times.

Ayurveda, often referred to as the "Science of Life," has been overlooked for many years due to inadequate documentation and research. However, in recent times, it has gained substantial recognition in many nations globally owing to its holistic approach, emphasis on a healthy diet and minimal side effects. People are increasingly drawn to Ayurveda as they become acquainted with its advantages. Given the influence of globalization, it is imperative to standardize Ayurvedic medications in alignment with global norms. The cultivation of medicinal plants should be subject to regulation and monitoring and research efforts should be more meticulous and comprehensive. All of these measures will undoubtedly contribute to the standardization of Ayurveda.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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