



NEW TECHNOLOGY FOR AYURVEDA FORMULATION

Name: Harshali jagdish Ahire .

Department: Pharmaceutics (Pharmacy).

Organization : Shree Balaji Shikshan Prasarak Mandal College Of B. Pharmacy, Ambajogai .

Co Author : Gitanjali .c. chavan.

Dr. Santosh Tarke.

Vishal Sakhare.

ABSTRACT :

Herbal Ayurvedic medications have the potential to be an affordable and effective way to meet the modern healthcare needs of the Indian and international communities. In order to fulfill the increasing demand for the medications, it is vital to scale up manufacturing. One way to do this is by developing and utilizing new relevant technology in conjunction with Ayurvedic herbal formulations. Improving the dosage forms also requires an understanding of the basic Ayurvedic concepts underlying formulation and processing. Information on medicine preparation techniques was gathered from English translations of major Ayurvedic texts as part of a systematic examination of the literature. It is possible to enhance dose forms and scale up while adhering to traditional Ayurvedic principles by utilizing new technology or utilizing already-existing ones. The scientific heritage of harmonious living that is associated with Ayurveda may be traced back to ancient information found in the Rigveda and Atharveda. Many medications have been created and used, starting with Ayurveda and continuing through to present times under the motto "Tradition To Trend."

KEYWORDS : Ayurveda formulation , herbal drug , health , new technology , panchakarma , dosage forms .

INTRODUCTION :

The study of life known as Ayurveda addresses the mental, emotional, and spiritual well-being of each individual as well as those of animals, birds, and plants. Ayurveda is sometimes understood as the science of medicine in a limited sense¹. Ayurveda is one of the oldest the holistic treatment systems in the world. The origins of Ayurvedic wisdom may be traced back over 5000 years to India, earning it the moniker "Mother of All Healing"². The Ashwin twins received the Ayurvedic knowledge from Lord Bramha, which was subsequently transmitted to Daksha Prajapati and Indra. The sage Bharadvaja offered to ascend to heaven in order to acquire ayurvedic knowledge. Its purpose is not to combat illness, but to advance good health³. According to Ayurveda, being simply free from obvious illnesses and having a strong body are not indicators of health. To be deemed healthy, an individual must possess the discernment of their soul, senses, and mind in addition to the balance of their dosas and dhatus. As a result, Ayurveda treats both the prevention and treatment of diseases, as well as the signs and symptoms of both happy and unhappy lives, as well as medications, diets, drinks, and other regimens that are beneficial or detrimental to health⁴. The Ayurvedic formulary is extensive, varied, and in a very good position. As was previously noted, the pharmacopeia of Ayurveda is a rich tradition of herbal practices that describe the medicinal applications of over 600 plants in seventy books that contain eight thousand medicine combination formulations⁵. Ayurvedic medicine literature categorizes medications, food ingredients, and drink constituents into multiple groups. Ayurvedic practitioners likely produced the remedies in their homes up until the 19th century. However, Arya Vaidya Sala of Kottakkal led the way in the 20th century in attempting to industrialize Ayurveda⁶. The use of new technology in Ayurvedic formulation may enable production to increase while requiring fewer raw ingredients.

1587 plants are used by Ayurveda in the formulation of numerous well-researched herbal remedies that treat a wide range of illnesses. The primary idea behind Ayurveda is that it customizes the healing experience for each individual⁷.

WHAT IS AYURVEDA:

The Sanskrit word for "ayurveda" implies "the science or knowledge of life." If we split the word into its two components, ayur signifies life and veda denotes knowledge science. Ayurveda has a long history, dating back to the 2nd century was founded on the ancient Hindu philosophical principles known as Vaisheshika and the school of logic known as Nyaya.. Ayurveda is a traditional medical system indigenous to the Indian subcontinent. Its five elements are earth, fire, water, air, and ether. These five distinct constituents are grouped by Ayurveda into three types of energy and functional principles⁹. The Sanskrit terms for these operational principles are pitta, kapha, and vata. Vata is made up of air and space. Pitta manifests as the fire and water that make up the body's metabolic system. The energy that gives the body its structure is called kapha¹⁰. A licensed Ayurvedic physician should ideally provide guidance when practicing Ayurveda, as it requires extreme dedication. Ayurveda is a medical approach that looks at a person's emotional state, spiritual viewpoint, and bodily makeup. Ayurveda acknowledges that external organisms such as bacteria and viruses can contribute to the development of diseases; nonetheless, these are seen as "secondary causes," with the underlying reason being a disruption in the balance between dosas and dhatus¹¹. Even the most virulent foreign organisms will not be able to thrive or reproduce to the point of

causing disease if these dosas and dhatus are in their proper state of equilibrium. Ayurvedic treatments not only treat the underlying cause of the illness but also strengthen the body's defenses against pathogenic microbes. Before beginning to function, the ingredients in these treatments become homologous to the tissues and stop behaving as alien substances¹². As a result, they have multiple positive effects rather than negative (toxic) ones since they make the body resistant to a variety of different types of organisms. Its origins can be found in antiquated vedic literature, and it addresses the body, mind, and spirit as well as every aspect of our lives¹³.

PANCHAKARMA:

Ayurvedic detoxification techniques include vamana (emesis), virechana (purgation), nasya (nasal installation of herbal oils or powders), basti (herbal enema), and raktamokshana (bloodletting). These techniques are together referred to as panchakarma. To remove toxins from the body, clear the channels, and restore equilibrium, these procedures are frequently combined with complementary therapies¹⁴. One of the most significant Ayurvedic treatments is panchakarma; when performed properly, it improves the efficacy and responsiveness of future therapies. Every procedure is carried out in three stages: the primary procedure, the post-cleansing phase, which includes changing one's food and way of living. Panchakarma can also be utilized for restorative and preventative purposes¹⁵.

Priliminary Treatment :

Snehana:

One of the most significant therapies for getting the body ready for specialist panchakarma treatment is snehana. It entails applying ghee, herbs, and therapeutic oils both topically and internally to the body for a period of three to seven days. Snehana is very important because it helps the body release its doshas and amam, or poisons, during the panchakarma stage¹⁶.

Swedana :

Swedana helps in detoxification in detoxification and reestablishing the balance between Vata, Pitta , and Kapha in our body .The sweat glands are one of the sources that eliminate toxins from the body. Their benefit makes swedana a critical preparatory procedure of the panchakarma treatment¹⁷.

Primary Purification Treatment :

Vamana:

Vamana is a regulated, pharmaceutically induced vomiting procedure. Its goal is to get rid of too much Kapha Dosha in the body, which can lead to a number of conditions like diabetes, arthritic joints, acne, asthma, and persistent colds.The ideal times to practice are one day after Snehana and Swedana, after a restful night's sleep after meal has been digested, or after daybreak. These times coincide with the full moon, when the water element is highest¹⁸.

Virechana:

One of the five Panchkarma cleansing techniques is Virechana karma. Virechana therapy typically starts early in the morning. Ayurvedic doctors use medications based on the conditions to induce Virechana. Purgatives are the recommended treatment for pitta and liver diseases because they remove excess Pitta from the liver, gall bladder, and small intestine¹⁹.

Basti:

The anal channel is used to give medicated oil or medicated decoction in basti. The basti therapy helps the body rid itself of extra Vata dosha. According to Ayurvedic texts, basti has a more comprehensive therapeutic effect on practically all bodily tissues and has effects that are restorative, curative, preventive, and health-promoting. Anuvasan and Ashtpana basti are the two categories into which basti has been divided²⁰.

Nasya:

Nasya therapy involves administering herbal liquids, powders, or oils by nasal instillation. It mostly treats disorders of the throat, nose, and ears. It is also known to enhance hearing, smell, and eyesight. It is also known to stop hair loss, graying hair, stiff necks, headaches, and lockjaws. Nasya is taken prior to eating²¹.

Raktamokshana:

This therapy for blood cleansing is quite effective. Raktamokshana is the process of expelling poisonous blood from different parts of the body. This tainted blood is released, leading to a variety of physical and skin ailments²².

NEW TECHNOLOGY FOR AYURVEDA FORMULATIONS:**Ayushman Bharat Health Account :**

This innovative initiative aims to create a digital health record of the human population that is safer and more efficient. It is safe and permits users to view and exchange health information with participating healthcare providers only after receiving consent²³. In addition, the addition of Ayurvedic concepts such as prakriti can aid in the genetic classification of the population into multiple subgroups based on phenotypic characteristics like appearance, treatment, and habits. This process can also aid in the comprehension of therapeutic outcomes that are grounded in Ayurvedic principles²⁴.

Bioinformatics :

Bioinformatics is a field that aims to extract useful information from biological data by combining computer science, biology, and data analysis. Bioinformatics is crucial to Ayurvedic formulation since it helps analyze enormous databases containing clinical data, phytochemical profiles, and genomic information on Ayurvedic plants and formulations. Researchers can determine the active ingredients in Ayurveda, comprehend their molecular targets, and forecast possible therapeutic benefits by combining bioinformatics with the practice²⁵.

Telemedicine :

India's digital health policy places a strong emphasis on the use of telemedicine services, particularly in grassroots health and wellness centers where a mid-level healthcare provider can connect the patient to the doctor via technology platforms to provide timely and optimal care. The policy advocates for the use of digital tools like telemedicine to improve the efficiency and outcomes of the health care system. This data could be utilized to follow, monitor, or modify a patient's behavior. The Central Council of Indian Medicines published telemedicine practice guidelines for practitioners of Ayurveda, Siddha, and Unani in April 2020. By avoiding social interaction, the practice of

telemedicine helps stop the spread of infectious diseases, lowering the danger to physicians and patients alike²⁶.

Nanotechnology :

The manipulation and application of materials at the nanoscale level are the focus of nanotechnology. Nanotechnology presents innovative opportunities for medicine delivery methods in Ayurvedic formulation. Ayurvedic herbal extracts or active substances can be encapsulated in nanoparticles to prevent deterioration and enhance the body's ability to absorb and utilise them²⁷. Moreover, regulated release of the active ingredients into the nanoparticles can be engineered to provide long-lasting therapeutic benefits. Furthermore, tailored delivery of Ayurvedic medications to particular organs or tissues is made possible by nanotechnology-based methods, which maximizes the benefits of these treatments while reducing their negative effects²⁸.

High Throughput Screening :

Plants are successfully screened using high throughput screening to find novel lead chemicals in herbs. The other new technologies are the neural network for fresh lead identification from the natural product, docking investigations, and virtual screening filtering experiments utilizing pharmacophore models²⁹. A more compact form of the sophisticated high throughput screening method is being employed today: DNA, protein, and cell chip based high throughput screening. By spotting adulteration, PCR-based techniques are becoming more and more important in monitoring the safety of herbal medications. Even a novel technique for creating anticancer drugs is high throughput screening based on fluorescence resonance energy transfer³⁰.

Geo Tagging :

With geotagging, users are able to tag a plant's location and share images. Technology for geotagging plants will also be beneficial for medicinal plant conservation. In addition to latitude and longitude coordinates, these data may additionally contain bearing, altitude, distance, accuracy information, location names, and even a time stamp³¹.

All India Institute Of Ayurveda :

In order to create consumer-friendly medical devices and treatment plans rooted in tradition, assess the effectiveness of Ayurvedic inventions methodically, and produce data that can serve as a benchmark for future research, AIIA partnered with the Indian Institute of Technology, Delhi. Under the government of India's ministry of micro, small, and medium enterprises, AIIA has been acknowledged as a host institute that will give innovators opportunities to develop and nurture their new, innovative ideas for the production of new, innovative products that can be sent into the market for commercialization³².

Artificial Intelligence :

Artificial intelligence is the process of stimulating human intelligence and decision-making through computer models and algorithms. Artificial intelligence (AI) methods like data mining and machine learning have the potential to completely transform research and development in Ayurvedic formulation. AI is capable of extracting insightful patterns from vast amounts of data, including hospital records, research papers, and traditional Ayurvedic literature. This helps with formulation optimization, therapeutic outcome prediction, and identification of possible linkages³³.

BENEFITS OF NEW TECHNOLOGY:

Enhanced Standardization And Quality Control :

The enhanced uniformity and quality control of Ayurvedic medications is one of the major benefits of incorporating new technologies into Ayurvedic formulation. The compositions and potencies of Ayurvedic formulations varied from batch to batch as a result of the traditional preparation methods' frequent lack of uniformity. Utilizing contemporary analytical methods like mass spectrometry, spectroscopy, and chromatography makes it feasible to pinpoint and measure the active ingredients found in Ayurvedic formulations and botanicals.

This makes it possible for producers to set uniform production procedures and quality assurance standards, guaranteeing the reliability and security of Ayurvedic medications³⁴.

During COVID -19 Treatment :

The employment of technology in conventional practice has evolved into the new normal during COVID-19. Consultation and telecommunication have grown in importance as communication methods. Various audio-visual platforms are also crucial in these situations and offer effective means of keeping an eye on people's daily stress levels and general health while they are alone³⁵. All things considered, these technologies can significantly contribute to the emerging field of telemedicine, whether it is for disease prevention or public health monitoring, paramedic staff, or symptomatic and asymptomatic COVID positive patients during a pandemic. Other technologies, such as the internet, drones, and robots with Bluetooth assistance, can be extremely important in reducing the impact of the COVID-19 pandemic in some situations³⁶.

Increased Efficacy And Therapeutic Potential :

Opportunities exist to improve the therapeutic potential and effectiveness of Ayurvedic medicines thanks to new technologies. For example, bioinformatics allows researchers to examine big datasets and spot possible synergistic relationships between various components. Ayurvedic medications may now be delivered precisely thanks to nanotechnology, which also increases their bioavailability and guarantees that they reach their designated site of action³⁷.

Improved Safety :

Adding new technology to Ayurveda can help enhance the safety profiles of Ayurvedic medications. Safety is an important consideration in the development of any medication. The quality and safety of Ayurvedic medicines can be guaranteed by identifying and quantifying any possible impurities or harmful compounds present in raw materials using sophisticated analytical techniques. Artificial intelligence and other technologies can help anticipate potentially harmful decisions regarding Ayurvedic medications³⁸.

FUTURE PERSPECTIVE AND OPPORTUNITIES:

Personalized Medicine In Ayurveda :

Using customized medical techniques into Ayurvedic formulation is one of the most promising directions for the future. Ayurveda acknowledges that every person is different and that their needs should be catered to in their treatment plans. This tailored approach can maximize the therapeutic effects of Ayurvedic formulations by making them more focused and potent³⁹.

Integration Of Traditional And Modern Knowledge :

The successful fusion of conventional knowledge with cutting-edge scientific understanding will determine the direction of Ayurvedic formulation in the future. Evidence-based research can complement and improve the rich tradition of knowledge and practices found in Ayurveda. Partnerships between contemporary scientific discoveries and traditional Ayurvedic practitioners⁴⁰.

Collaboration And Interdisciplinary Research :

Innovation and cooperative methods can be promoted by bringing together specialists from a variety of disciplines, including pharmacology, chemistry, biotechnology, nanotechnology, and data science. This partnership may result in the creation of cutting-edge methods, compounds, and distribution strategies that improve the effectiveness, security, and uniformity of Ayurvedic treatments. The difficulties and constraints encountered in Ayurvedic formulation can also be addressed by interdisciplinary research, creating new opportunities for investigation and learning⁴¹.

CONCLUSION:

The future of Ayurveda formulation holds great promise with the integration of personalized medicine approaches, the integration of traditional and modern knowledge, and collaboration among different disciplines. These advancements can lead to the development of highly effective, safe and standardized Ayurvedic formulations. By embracing new technologies and research methodologies, Ayurveda can adapt to the changing healthcare landscape and continue to provide holistic healthcare solutions for individuals worldwide.

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