

1. INTRODUCTION

The *Trisutra* (*Hetu-Cause, Lakshana-Symptom, and Aushadha-Medicine*), which are associated with *Tridosha* (*vat, pitta, kapha*- phlegm or potential), are the foundation of the traditional Indian medical system known as *Ayurveda*. [1-4] Each person has a unique ratio of *Tridoshas* (primary life force) at birth that are both genetically predetermined and affected by the environment during fetal development. They collectively establish a person's '*prakriti*,' or fundamental makeup. [5] The cause and mechanism of a *dosha's* disruption are thought to affect how an illness develops and progresses, along with its subtypes. Health is defined as the balanced state of *doshas*, digestive fire (*agni*), tissues (*dhatu*s), and excretory functions (*malas*), along with a harmonious state of the soul (*atma*), senses (*indriye*), and mind (*mana*). The primary goal of therapeutic practice is to preserve and maintain this equilibrium. [6-10]

PM encompasses genomics, pharmacogenomics, targeted therapies, and ethical considerations, aiming to tailor healthcare based on individual genetic and molecular profiles or it can also be defined as the safest and most effective delivery of drugs to an individual. [11-13] Over the past few decades, there has been an increasing accent on medicine's optimization and developing personalized medicines to deliver better patient care. [14] It is a medical concept/model, with all decision and practices being transcribed to the individual patient by use of genetic information that proposed customization of health care. Examples of PM include using targeted therapies to treat cancer

cells. [15, 16] The ultimate goal of PM is to target molecular measurements by validation and ultimately the patient population is in need of ameliorate diagnostic precision. [17] It eliminates the trial and error approach precisely from our conventional clinical practices, bringing out a much-optimized view in the era of medical treatment. [18]

The PM has suggested that significant changes in medicines/therapy from a model of "one size fits all" to an approach that customize the predictions, diagnosis, and treatment with perfection for an individual patient. [19-21] PM should have been understood as a "rhetorical entity" employed by academics and clinics in regulations, patient advocacy, and clinical practices not only to define a future state but bring it into being. Clinicians have also been using the term personalized medicine for patient-centered care in which they comprehend and respond to patient perspectives and practice the 'art' of clinical judgment. [14]

The sole purpose of establishing *Ayurgenomics* was to use cutting-edge modern techniques to comprehend the fundamentals of *Ayurveda*, opening the way for an evidence-based approach and, consequently, increased acceptance on a global scale. [22, 23] *Ayurgenomics* establishes a unique connection between modern and traditional medicine by comprehensively explaining fundamental principles and integrating *Ayurveda's* effective preventive strategies into present-day healthcare. The objective of PM is to change the focus on the system that concentrates on the root cause of diseases which helps to achieve the wellness of patients. [24] It has a close relationship with other

cutting-edge fields like preventative changes in lifestyle and the use of functional medicine. *Ayurveda* was aware of the potential effects of diet and other lifestyle factors on human health even before epigenetics and related fields of research like nutrigenetics. They demonstrated that modern medicine is just beginning to understand that preparation is essential for good health.[25] Appropriate exercise, sleep, nutrition, and stress management are necessary for an effective PM system. *Ayurveda* also describes the dosage and duration of the medication, which is prescribed to the patients according to their *bala, satva, agni, roga bala*, and other factors. By describing ancient principles in terms of modern science, *ayurgenomics* contributes to the validity of *Ayurveda* and other conventional medical systems.[22-26]

PM genetics provides a more effective optimal paradigm of care since it fosters a dynamic viewpoint for an individual's benefit by embracing newer tests and technology that have been shown to be useful tools. In terms of genetics, PM is related with a variety of risks. The importance of the clinicians/patients and other components of individualized care may be reduced.[11] Considering genomic risk profile, pharmaco-genomics tests and genome-centered diagnostics are now established to give optimized assistance to all patients. Two cautions remain, like any promising technology, new genomic tests need to be assessed for their effectiveness.[11] Moreover, if health support is absent, the benefits of genomic tools will be considered. The benefits are derived from research that would serve the needs of PM in a larger context of health and disease prevention

2. METHODOLOGY

Table 1: Search Strategy Used for Identifying Relevant Literature

Timeframe Covered: 1983 to January 25, 2025

Database/Source	Search Terms Used	Filters Applied	Notes
Scopus	Precision medicine or Personalized Medicine AND ("Ayurveda", OR "Ayurvedic medications", OR "Drugs", OR "Mechanism of action")	Language: English	Full-text free articles only.
PubMed	Precision medicine or Personalized Medicine AND ("Ayurveda", OR "Ayurvedic medications", OR "Drugs", OR "Mechanism of action")	Language: English	Full-text free articles only
EMBASE	Precision medicine or Personalized Medicine AND ("Ayurveda", OR "Ayurvedic medications", OR "Drugs", OR "Mechanism of action")	Language: English	-
Web of Science	Precision medicine or Personalized Medicine AND ("Ayurveda", OR "Ayurvedic medications", OR "Drugs", OR "Mechanism of action")	Language: English	-
ScienceDirect	Precision medicine or Personalized Medicine AND ("Ayurveda", OR "Ayurvedic medications", OR "Drugs", OR "Mechanism of action")	Language: English	Full-text free articles only
Google Scholar	Precision medicine or Personalized Medicine AND ("Ayurveda", OR	Language:	First 450 results

	“Ayurvedic medications”, OR “Drugs”, OR “Mechanism of action”)	English	screened manually
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HISTORY

PM concept was first introduced by Hippocrates more than 2400 years ago. Hippocrates emphasized the importance of understanding "what person the disease has rather than what disease the person has".[27] The major goals of the Indian system of medicine (*Ayurveda*) are the preservation of health and the eradication of disease. *Ayurveda* focuses primarily on the host rather than the disease in order to prevent and treat the disease. It is extremely individualized for the patient because of the emphasis placed on understanding how disease manifests and progresses in relation to host influences including their environmental factors, lifestyle choices, and food intake.[5, 28] A lack of the metabolic enzyme G6PD (Glucose-6-phosphate dehydrogenase) was found to be the hereditary cause of "favism," the selective toxicity of fava beans, in 1956 [29-32]. Renato Dulbecco came to the conclusion that human genome sequencing was essential for advancing cancer research in 1985.[33, 34] The Human Genome Project (HGP) was started in 1990, and its final form was released in 2003 [35, 36]. Herceptin (anti-EGFR mAb for EGFR+ breast cancers) and Hercept Test (to detect such tumors) were approved by the FDA in 1998, making them the first "official" CMDxs ever created. By the 20th century, clinicians had created a sort of individualized method of patient care.[37] A new scientific field called pharmacogenomics, which focuses on a thorough understanding of medication response, emerged as a

result of the high variability in drug responses that had been noticed earlier in 1950. Pharmacogenomics involves the interdisciplinary study of pharmacology, genetics, biochemistry, molecular medicine, and other fields.[16, 38]

ASSESSMENT OF PRAKRITI

The *Prakriti* assessment approach necessitates significant consideration because it is a vital part of evidence-based decision-making in *Ayurveda*. [5, 28, 39, 40] In Ayurvedic study and practice, traditional methods for *Prakriti* assessment are commonly employed; however, their limitations have raised questions about their reliability and clinical utility. An individual's *prakriti* (innate nature) is determined at the birth time, which cannot be altered during a lifetime. As per *Ayurvedic* literature, the *prakriti* are classified as: mental and physical nature. In *Ayurveda*, *Manas Prakriti* refers to the psychological constitution or mental makeup of an individual, shaped by the dominance of the three *gunas*—*Sattva*, *Rajas*, and *Tamas*. Just as physical *Prakriti* (based on *Vata*, *Pitta*, and *Kapha*) helps determine physiological tendencies, *Manas Prakriti* provides insights into an individual's emotional and cognitive responses, behaviour, stress handling, and mental well-being. In the context of PM, understanding *Manas Prakriti* aligns with the modern emphasis on holistic, individualized care. PM incorporates genetic, environmental, and lifestyle factors to tailor treatment. Similarly, assessing *Manas Prakriti* allows practitioners

to personalize therapeutic strategies such as diet, lifestyle modifications, herbal formulations, and counselling based on an individual's mental disposition.[28, 40, 41]

There are 7 types of *Sharirika Prakriti* (physical nature) described by scholars of *Ayurvedic* science i.e. “*Vata Prakriti, Pitta Prakriti, Kapha Prakriti, Vata Pitta Prakriti, Pitta Kapha Prakriti, Kapha Vata Prakriti and Vata Pitta Kapha (Tridosha) Prakriti*”. There are distinctive characteristics for each *Prakriti*. The concept of *Prakriti*—an individual's unique constitution is a fundamental principle that sets *Ayurveda* apart from other systems of medicine, enabling a personalized approach to health and treatment. Depending on their *Prakriti*, each person has a varied choice of treatment and medication.

Additionally, *Ayurveda* recommends conducive foods and foods that need to according to *Prakriti*. [42] The accurate assessment of *Prakriti* is often complicated by recent or a typical alteration in internal organ function, which may obscure the true clinical picture. Furthermore, environmental influences such as climate, diet, and lifestyle must also be taken into consideration. These variables introduce complexity and make the precise determination of *Prakriti* a nuanced and challenging process.[43] For determining *Prakriti*, traditional *Ayurvedic* techniques like pulse detection and standard questionnaires, such as *AyuSoft* for adults' *Prakriti*[44] and PRS-IPA (Polygenic Risk Score – Ingenuity Pathway Analysis) for children's *Prakriti*[45], are used to determine the individual's *Prakriti*. *Ayurveda* emphasizes a personalized approach to health through

its three core pillars: *Ahara* (food), *Vihara* (lifestyle), and *Aushadhi* (medicine). These components form the foundation of *Prakriti*-based medicine, which tailors interventions based on an individual's unique physical and psychological constitution. In today's rapidly evolving global healthcare landscape—where precision and personalized medicine are gaining prominence—*Ayurveda*'s time-tested principles offer valuable insights. The integration of *Prakriti*-based approaches with modern scientific tools, such as genomics, polygenic risk scores, and bioinformatics platforms like Ingenuity Pathway Analysis (IPA), opens up new possibilities for more effective, individualized care. This convergence of traditional knowledge and modern science marks a promising direction for the future of holistic and integrative healthcare.[46-49]

The Predictive medicine is a branch of medicine that aims to identify patients at risk of developing a disease, thereby enabling either prevention or early treatment of that disease. The concept of *Prakriti* in *Ayurveda* highlights the inherent variability among individuals in terms of susceptibility to diseases and response to therapies. This classification, rooted in the unique psycho-physiological constitution of a person, plays a critical role in personalized health assessment [9]. In contrast, modern medicine defines human physiology and health primarily through a reductionist lens, using concepts such as gene expression, the genome, and epigenetics. While this approach has led to significant advancements, it often overlooks the integrative and holistic perspective offered by *Ayurveda*, which incorporates the dynamic interplay of *Prakriti* and

doshas [5, 28, 39-45, 48-50]. Despite their continued and widespread use across diverse global regions, traditional medical systems like *Ayurveda* remain significantly underrepresented in mainstream scientific research. A prevailing bias against traditional and folk healing practices has contributed to the undervaluation of many of *Ayurveda's* preventive, promotive, and rehabilitative strategies. This skepticism has limited the integration of such systems into modern healthcare frameworks. However, in an era increasingly focused on personalized, preventive, and integrative medicine, there is a critical need for rigorous scientific exploration of these time-tested approaches. Unlocking their full potential through evidence-based validation could significantly enrich contemporary healthcare with safe, holistic, and individualized therapeutic options[5, 28, 39-45, 48-50].

KEY BENEFITS OF KNOWING PRAKRITI

1. Individualized Health Planning will be done.
2. Early Risk Identification.
3. Tailored Treatment Strategies.
4. Optimal Nutrition and Routine can be suggested.
5. Understand Mental and Emotional Condition.
6. Enhanced the Treatment Response.
7. Preventive and Promotive Care will be plan.
8. Assists Seasonal and Environmental Adaptability [5, 28, 39-45, 48-50].

KEY ELEMENTS

PM is frequently created using specific genes and biomarkers that aid in predicting, deciding, diagnosing, and preventing sick conditions by developing an inherent capability for the simultaneous evaluation of

many genes (genomics) [29, 38, 51]. However, the definition of "personalized" places all of the emphasis on the human genome, which focuses on preventing disease rather than treating it once it has gotten worse. Spare attention to genetic risk may also unintentionally minimize other health predictors, such as the importance of a patient's values and fitness care preferences. Clinical reality is more accurately reflected by viewing PM as an all-encompassing endeavor to customize healthcare to the individual, spanning numerous dimensions[11, 14].

ADVANTAGES OF PM

1. Earlier disease intervention with specificity and concreteness which provides better disease analysis and hence proper prevention of disease[21, 29].
2. The efficiency of care will increase with PM as a practitioner can provide a customized treatment for each patient, improving their health care[21, 29].
3. Preventive care will improve through genetic screening as the study of specific genes responsible for causing disease with the help of biomarkers results in greater preventive care for an individual[21, 29].
4. PM improved the patient stratification level by limiting the cost of treatment as it is based on targeted treatment[21, 29].
5. PM facilitates to identification of the various causes of particular diseases and helps to develop the treatment of individual patients. The study of the genetic sections of a population can predict the disease and then its early prevention can be done[21, 29].

6. The probability of negative side effects would be reduced to a large extent which works for the betterment of the patient's overall health[21, 29].

DISADVANTAGES OF PM:

1. Infrastructure requirement: PM has flexible potential in healthcare sectors, however, for that, it requires monolithic infrastructure and more time to implement it perfectly[21, 29].
2. Implementation cost and lack of expertise people are the major concern in PM[21, 29].
3. A key barrier to integrating personalized medicine into standard clinical care is a lack of technologies, knowledge, and research gaps[21, 29].
4. PM implementation has required plenty of genomic information collected from a substantial number of human beings while representing each segmentation which needs various types of ethical and legal clearance[21, 29].

FUTURE PERSPECTIVES OF PM

The human genome project is a great foundation for PM. It has the ability to customize the remedies according to particularized patients via the amalgamation of genetics and molecular profiles. Ginsburg and McCarthy state that the PM intersects with the course of a patient's disease at six major points that are known as predisposition, prognosis, screening, diagnosis, pharmacogenomics, and monitoring[52-55]. Additionally, PM can be utilized as an excellent screening tool to help us find the protein marker that is responsible for the diseases, giving us early access to treatment with lower death and morbidity rates. As drug developers may now employ toxicogenomic

biomarkers to evaluate and intensify the selection of the right compounds which helps us to improve patient selection for clinical trials to lower the frequency of unintended trial failure the developments in PM will also boost efficiency and pharmaceutical development.

3. CONCLUSION

PM though a relatively recent advancement in modern healthcare, shares deep philosophical alignment with the ancient science of *Ayurveda*. At the heart of both systems lies the principle of individualized care. *Ayurveda* emphasizes maintaining the balance of *Doshas*, *Dhatus*, and *Malas* a state collectively known as *Samyavastha*. PM similarly aims to tailor treatment strategies based on a person's unique biological and genetic makeup. Unlike the reductionist approach of modern medicine, which often focuses narrowly on genomic data, *Ayurveda* offers a holistic perspective through the concept of *Prakriti*, which incorporates genetic, environmental, psychological, and lifestyle factors. *Prakriti* not only determines a person's physiological and psychological tendencies but also helps predict susceptibility to diseases, guiding preventive and therapeutic strategies accordingly.

The emerging field of *Ayurgenomics* bridges these two systems, offering new insights into the genetic basis of *Prakriti* and how it influences health outcomes. Although this research is still in its early stages, it opens exciting possibilities for integrating traditional knowledge with scientific validation, thereby enhancing the efficacy and acceptance of personalized care globally. PM has demonstrated significant benefits such as early disease detection, improved drug safety,

enhanced treatment efficacy, and cost-effectiveness in the long run. However, its implementation faces challenges, including the need for advanced infrastructure, high initial investment, and ethical considerations regarding genomic data. Even so, when aligned with the preventive, promotive, and curative wisdom of *Ayurveda*, PM can evolve into a truly comprehensive healthcare model.

In conclusion, the fusion of *Ayurveda's* *Prakriti*-based philosophy with the advancements of PM holds immense promise for the future of global healthcare. This integrative approach not only deepens our understanding of individual health and disease but also paves the way for a more personalized, predictive, preventive, and participatory medical system capable of addressing the diverse needs of humanity in a more sustainable and holistic manner.

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