



“Understanding Genetics and Hereditary Disorders Through the Lens of Ayurveda: A Review Ayurgenomics”

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ABSTRACT:-

Genetics, the science of heredity, deals with the transmission of traits from one generation to the next. Although modern genetic research has significantly advanced in recent decades, ancient Ayurvedic literature already reflects deep insights into hereditary mechanisms. India continues to face a considerable burden of genetic disorders, with thousands of newborns affected annually by conditions such as congenital anomalies, G6PD deficiency, Down syndrome, β -thalassemia, sickle cell disease, and various amino acid metabolism disorders.

Ayurveda's classical texts exhibit a sophisticated understanding of inheritance through concepts such as *Beeja* (seed), *Beejabhaga* (its component), and *Beejabhagavayava* (its sub-component), which closely align with modern notions of genes, alleles, and genetic material. The role of *Tridosha*, *Prakriti*, and *Panchamahabhuta* in embryological development and organogenesis is emphasized throughout Ayurvedic thought. Diseases like *Madhumeha* (diabetes), *Arsha* (hemorrhoids), and *Kustha* (skin disorders) are linked to impurities or defects in *Shukra* (sperm) and *Shonita* (ovum), as well as imbalances in the intrauterine environment.

Disorders classified as *Sahaja* (congenital) and *Kulaja* (familial/hereditary) are attributed to *Beejadosh*a (genetic defects) and are often considered difficult to treat (*Asadhya*). *Charaka* explains that abnormalities in the child arise from structural or functional defects in the *Beeja*, *Beejabhaga*, or *Beejabhagavayava* of either parent, with variations based on the child's sex. As a preventive measure, Ayurveda recommends *Shodhana* (purification therapies) and *Rasayana* (rejuvenative treatments) to enhance reproductive health and reduce the risk of genetic abnormalities in the offspring.

Keywords:-

Genetics, Heredity, *Beeja*, *Beejabhaga*, *Beejabhagavayava*, Congenital Disorders, *Shodhana*, *Rasayana*

Introduction:-

Genetics is the branch of science that explores heredity—the biological processes by which traits are passed from parents to their offspring. It is estimated that approximately 65% of individuals experience some form of health issue linked to congenital genetic mutations. Currently, over 6,000 genetic disorders have been identified, out of which more than 600 are considered treatable. Statistics indicate that about 1 in 50 individuals are affected by single-gene disorders, while chromosomal disorders occur in approximately 1 in 263 people.

In the context of modern lifestyle changes and growing environmental hazards, the prevalence of genetic disorders—including congenital deformities such as lameness and blindness—has been increasing. Interestingly, ancient Ayurvedic texts by *Acharya Sushruta* and *Acharya Charaka* contain foundational insights that align with many genetic principles. In *Sharira Sthana*, they elaborated on concepts such as *Prakriti*, *Matruja-Pitruja Shadbhavas*, and *Beejabhaga Avayava*, which closely correspond to hereditary factors discussed in modern genetics.

The ancient seers recognized that abnormalities in a child—such as blindness or physical disabilities—stem not from defects in the parents themselves but from impairments in the *Shukra* (sperm) and *Shonita* (ovum), i.e., the reproductive cells. These Ayurvedic principles, when revisited in light of modern genetics and supported by emerging technologies, hold promising potential in the prevention and management of various genetic disorders.

Aims and Objectives:-

- To explore and analyze the descriptions of genetic and hereditary disorders found in classical Ayurvedic texts.
- To interpret ancient concepts such as *Beejabhaga*, *Prakriti*, and *Matruja-Pitruja Shadbhavas* in the context of modern genetic science.
- To evaluate the relevance of Ayurvedic approaches in the prevention and possible management of genetic disorders.

Materials and Methods:-

This review is based on a detailed study of classical Ayurvedic references primarily from *Sharira Sthana* of both *Charaka Samhita* and *Sushruta Samhita*. The key concepts examined include *Beejabhaga*, *Beejabhagavayava*, *Matruja Shadbhavas*, and *Prakriti*, which offer parallels to modern genetic understanding. Comparative analysis with contemporary genetic literature was conducted to establish correlations and interpret the applicability of these traditional concepts in modern medical frameworks.

Concept of Prakriti:-

The Ayurvedic concept of *Prakriti* refers to the innate constitutional makeup of an individual, determined at the moment of conception by the union of *Shukra* (spermatozoon) and *Shonita* (ovum), under the influence of *Beeja* (germinal material) and *Kshetra* (uterine environment). *Prakriti* functions as a foundational determinant of physiological, psychological, and pathological attributes in an individual, serving as a basis for personalized diagnosis and therapeutic interventions in Ayurveda.

Contemporary scientific inquiry increasingly supports the genetic underpinnings of phenotypic variability, echoing the Ayurvedic doctrine of *Prakriti*. The categorization of individuals based on the predominance of *Doshas-Vata*, *Pitta*, and *Kapha*—provides a parallel to the modern genomic framework of human individuality and variation. These constitutional types are determined by permutations and combinations of *Dosha* attributes, which exhibit a striking resemblance to hereditary patterns regulated by genotypic expressions.

Ayurveda asserts that *Prakriti* is not only phenotypic but also genomic in origin, influenced by multiple determinants including parental genetic makeup, maternal diet and lifestyle, intrauterine environment, and cosmic and seasonal factors at the time of conception. This is comparable to modern epigenetics, where gene expression is modulated by both inherited and environmental stimuli.

Specifically, the *Prakriti* of a fetus is shaped by the following multifactorial components [5]:

1. **Sukra-Shonita Prakriti:** Genetic constitution contributed by paternal and maternal gametes.
2. **Kala-Garbhashaya Prakriti:** Temporal and uterine conditions during conception.
3. **Matru Ahar-Vihar Prakriti:** Maternal dietary practices and behavioral regimen.
4. **Mahabhuta Vikara Prakriti:** Influence of the five fundamental elements constituting the embryo.

Collectively, these elements determine the individual's constitution, predisposition to diseases, and therapeutic receptivity. Therefore, *Prakriti* can be perceived as a comprehensive physiological phenotype with a genetic and epigenetic basis, akin to a stable constitutional genotype.

Fertilization and Sex Determination:-

Ayurveda conceptualizes the genesis of life through the coordinated interaction of *Shukra* and *Shonita*, equating to the sperm and ovum in contemporary biological terminology. Fertilization represents the confluence of parental genetic material, setting the stage for zygotic development. *Charaka Samhita* delineates a precise mechanism for sex determination wherein the predominance of *Shonita* results in a female progeny, whereas the dominance of *Shukra* yields a male child.

Modern molecular biology substantiates this notion through the chromosomal mechanism of sex determination, governed by the inheritance of X and Y chromosomes from the gametes [6]. An ovum invariably contributes an X chromosome, whereas the sperm may contribute either an X or Y chromosome, thus determining the sex of the zygote.

Ayurvedic scholars, particularly Acharya Sushruta, also emphasized the role of maternal factors—such as diet, psychological state, behavioral patterns, and uterine conditions—during conception and gestation. These factors are recognized today as contributors to epigenetic modifications and fetal programming. Sushruta's *Kshetra*, *Ambu*, *Beeja*, and *Rtu* concepts mirror the preconceptional and gestational factors now known to influence gene expression, morphogenesis, and long-term health outcomes.

Inheritance Pattern – The Doctrine of Shadbhavas:-

The Ayurvedic framework of heredity is encapsulated in the theory of *Shadbhavas*—six progenitorial determinants that contribute to the formation of the embryo and its subsequent development. These are: *Matruja* (maternal contribution), *Pitruja* (paternal contribution), *Atmaja* (consciousness or soul), *Satmyaja* (adaptability), *Rasaja* (nutrition-derived), and *Sattvaja* (mental and emotional traits) [7][8][9].

In particular, *Matruja* and *Pitruja Bhavas* are directly implicated in the organogenetic process. Organs such as the skin (*Twak*), blood (*Rakta*), muscles (*Mamsa*), adipose tissue (*Meda*), marrow (*Majja*), and visceral organs (e.g., liver, spleen, kidneys) are said to be derived from the maternal *Bhavas*. In contrast, the skeletal system (*Asthi*), hair (*Kesha*), nails (*Nakha*), teeth (*Danta*), and reproductive structures are considered paternal derivations.

This dual contribution of hereditary material resonates with the Mendelian principle of biparental inheritance and aligns with the modern understanding of diploid genome formation, where each parent contributes half of the chromosomes. Mutations or defects in either maternal or paternal components

may result in congenital malformations or *Adibala Pravritta* (hereditary) disorders. Therefore, the integrity of *Shadbhavas* is contingent on the health and vitality of both parents at the time of conception.

Concept of Beeja, Beejabhaga, Beejabhagavayava and Their Pathological Manifestations:-

Ayurveda articulates a layered concept of hereditary units, represented by *Beeja* (germ cell), *Beejabhaga* (chromosomal components), and *Beejabhagavayava* (genes or subunits of chromosomes). *Acharya Charaka* introduced these terms to explain how specific traits and disorders are transmitted from parent to offspring [10].

- **Beeja:** Analogous to gametes (sperm and ovum), these are the primary carriers of hereditary material.
- **Beejabhaga:** These subcomponents of *Beeja* correlate with chromosomes, which house the genetic instructions necessary for cellular and tissue development [11].
- **Beejabhagavayava:** These finer subunits represent the genes—the ultimate molecular units of heredity responsible for phenotypic traits.

According to *Acharya Chakrapani*, any deviation or structural abnormality in these components leads to congenital anomalies. *Charaka* emphasized that the phenotypic expression of a disorder correlates with the specific segment of the *Beeja* that is defective [12]. This perspective aligns with the gene-centric view of disease in modern genetics, where mutations in specific loci cause targeted developmental disorders.

Genetic Diseases Described in Ayurvedic Literature

Ayurveda, through its comprehensive exploration of *Sharira*, provides early insights into the origin and progression of diseases with hereditary etiologies. Several classical texts have categorized specific disorders as congenital or hereditary (*Sahaja* or *Adibala Pravritta*), which correspond to modern concepts of genetic and chromosomal diseases.

1. **Prameha (Including Diabetes Mellitus):** In *Charaka Samhita*, *Prameha* is discussed not only as a metabolic disorder but also in its congenital and hereditary forms. *Charaka* attributes the causation of *Sahaja Prameha* to *Beejadoshha*, a defect in the reproductive elements, indicating a genetic predisposition. Furthermore, obesity (*Sthoulya*), a contributing factor to diabetes, is also attributed to inherited constitutional defects [13].
2. **Sahaja Prameha – Inherited Diabetes Mellitus:** *Acharya Sushruta* distinguishes between *Sahaja* (hereditary/congenital) and *Aupasargika* (infectious) types of *Prameha*. He emphasizes that *Sahaja Prameha* is incurable, originating from vitiated *Shukra* and *Shonita*, indicating structural or functional abnormalities in parental germinal elements that correspond to genetic mutations and chromosomal aberrations [14].
3. **Arsha (Piles) – Hereditary Anal Disorders:** *Charaka* classifies *Arsha* (piles) into hereditary and acquired types. The hereditary type emerges from the vitiation of *Beeja*—particularly the segment responsible for the anal region's development. The defect may arise due to substandard parental diet, lifestyle, or unethical behavior, reflecting an ancient understanding of epigenetic influence on germ cells [15].
4. **Kushtha (Chronic Skin Disorders including Leprosy and Psoriasis):** *Shukragata Kushtha*, as described in *Madhava Nidana*, is identified as a hereditary condition, implicating a genetic basis for certain cutaneous disorders transmitted through parental lineage [16]. This affirms the ancient understanding that specific pathological traits, when present in the reproductive elements, can persist and manifest in successive generations.
Kushtha encompasses a broad category of dermatological conditions in Ayurveda, many of which are considered chronic and intractable. *Charaka* and *Sushruta* both classify certain types of *Kushtha* under *Sahaja Vyadhi*, meaning congenital or hereditary diseases, arising from the vitiation of parental *Beeja*.

According to Ayurvedic doctrine, improper diet, behavior, or psychological imbalance in the parents during preconceptional and antenatal phases can lead to *Beejadoshha*, affecting skin tissue (*Twacha*) development in the fetus. *Sushruta* describes *Kushtha* not merely as a superficial skin disorder, but as a systemic manifestation involving *Tridoshic* imbalance, *Rasa Dhatu* (plasma), and *Rakta Dhatu* (blood), with a strong constitutional component. In modern biomedical terms, many chronic dermatological conditions like psoriasis, ichthyosis, and atopic dermatitis have documented genetic components, linked to mutations in specific genes related to immune regulation, skin barrier function, and inflammation. The Ayurvedic concept of *Kushtha* as *Sahaja* or inherited hence resonates with this modern understanding.

Charaka Samhita elaborates on this concept, suggesting that abnormalities in *Beeja* (gametes), *Beejabhaga* (chromosomes), and *Beejabhagavayava* (genes) contribute to congenital deformities and developmental disorders in offspring. These components serve as foundational units of inheritance in Ayurveda, analogous to the modern biological hierarchy of hereditary material. The extent and nature of the *Vikriti* (abnormality) vary based on whether the maternal or paternal contribution is compromised.

- If the *Beejabhagavayava* (gene-level structure) in the mother is defective, it results in *Putipraja*—a female child with distorted reproductive potential or malformation.
- A similar defect in the paternal *Beejabhagavayava* leads to *Putipraj*—a male child with impaired or defective constitution [17].

Severe vitiation of the *Beejabhaga* responsible for the development of the *Garbhashaya* (uterus) results in infertility:

- If the defect is maternal, the condition is termed *Vandhya* (infertile woman).
- If paternal, the resultant male is known as *Vandhya Purusha* [17].

Further anomalies due to disruption in the *Beejabhagavayava* linked to gender-specific organs result in:

- *Varta*: A female with underdeveloped sexual differentiation, possibly resembling intersex phenotypes, where secondary female characteristics predominate despite an incomplete biological female identity.
- *Tripurika*: A male displaying predominantly masculine traits but lacking complete male sexual differentiation, which may correspond to various forms of disorders of sex development (DSDs) [18].

Ayurvedic Insights into Chromosomes, Genes, and Chromosomal Abnormalities

Ancient Ayurvedic literature appears to contain an intuitive understanding of genetic disorders and chromosomal anomalies, even in the absence of cytological tools. *Charaka* refers to conditions such as *Dwireta*, interpreted by some scholars as hermaphroditism. This can be likened to 46,XX ovotesticular disorder of sex development (true hermaphroditism), wherein both ovarian and testicular tissues coexist in a single individual [19].

Other references include:-

- *Pavanendriya*: Possibly corresponding to **Klinefelter's Syndrome (47,XXY)**, characterized by hypogonadism, infertility, and azoospermia, indicative of chromosomal trisomy involving sex chromosomes.
- *Narashanda* and *Narishanda*: Reflect pseudohermaphroditism or disorders with ambiguous genitalia, perhaps linked to enzyme deficiencies or partial androgen insensitivity syndromes.
- *Shandi Yonivyapad*: The clinical features match **Turner's Syndrome (45,XO)**, involving gonadal dysgenesis and primary amenorrhea, traditionally explained by *Beejadosha* in Ayurvedic parlance [19].

Additional syndromic descriptions such as:

- *Samskaravahi* (anaphrodisia),
- *Vakri* (hypospadias),
- *Irsyabhirati* (voyeuristic tendencies, potentially linked to behavioral neurogenetics),
- *Vatikshanda* (eviration or loss of masculine traits), showcase a sophisticated level of observational correlation to congenital or hereditary traits affecting physiology and behavior.

Management:-

Ayurvedic literature offers a well-defined framework for addressing genetic and congenital disorders through the concepts of *Beejashuddhi* (purification of reproductive elements) and *Beejpushhti* (nourishment and fortification of reproductive tissues). These measures aim to optimize both **preconceptional** and **antenatal** health, ensuring the physical and mental well-being of the couple and the healthy development of the fetus.

Ayurveda underscores that **preventive care must begin prior to conception**, focusing on the purification and strengthening of the male and female reproductive systems. Psychological and emotional stability is equally important, and Ayurvedic counseling based on *Satvavajaya Chikitsa* is recommended to manage stress, maintain doshic balance, and enhance mental clarity during the preconceptional phase.

Modern research supports this Ayurvedic view, highlighting that **adequate nutrition during the reproductive phase significantly lowers the risk of miscarriage, developmental anomalies, and other congenital defects**. Nutritional optimization improves gamete quality and reduces the likelihood of epigenetic disruptions.

During the preparatory phase, the **male partner** is advised to consume *Shali rice cooked with Ghrita and milk*, which are rich in essential fatty acids, carbohydrates, calcium, and micronutrients that promote healthy sperm production. The **female partner** should consume *Tila Taila* (sesame oil) and *Masha* (black gram), which are excellent sources of **folic acid, antioxidants, protein, and fiber**, aiding in the prevention of neural tube defects and enhancing cellular repair mechanisms [20].

Ghee is valued for its *rasayana* (rejuvenating) properties, helping to improve the vitality of bodily tissues, while **milk** provides easily absorbable calcium and complete protein for optimal reproductive and fetal health.

Following conception, *Garbhini Paricharya*—a trimester-wise protocol for pregnant women—is advised to support fetal development, hormonal balance, and maternal immunity throughout pregnancy [21].

In addition to dietary and lifestyle measures, **Panchakarma therapies**—Ayurveda's detoxification system—play a crucial role in enhancing fertility and preventing genetic anomalies. These procedures are tailored to eliminate toxins (ama), balance doshas, and rejuvenate the body systems. Scientific studies now validate that Panchakarma helps regulate **endocrine function**, supports **immunity**, and facilitates **optimal reproductive physiology**.

The Shodhana (cleansing) regimen typically includes:

- **Purvakarma** (preparation): **Snehana** (oleation) and **Swedana** (sudation) to mobilize toxins.
- **Pradhanakarma** (main therapies): **Vamana** (therapeutic emesis), **Virechana** (therapeutic purgation), **Basti** (medicated enema), and **Uttar Basti** (specific to female reproductive health) [22–23].

For conditions like muscular dystrophy, which is considered a result of aggravated *Vata dosha* and *dhatu kshaya* (tissue depletion), therapies like *Snehana*, *Swedana*, *Basti*, and *Lepana* are used to improve muscular strength and slow degeneration. Complementary interventions such as gentle *Yoga*, *Pranayama*, and herbs like *Ashwagandha*, *Guggulu*, *Guduchi*, *Shallaki*, *Punarnava*, and *Triphala* are beneficial in promoting overall vitality and metabolic stability.

Discussion:-

Ayurveda categorizes genetic and congenital disorders under *Sahaja Roga*, *Kulaja Roga*, and *Adibala Pravritta Roga*, highlighting their origin from defects in *Beeja* (reproductive seed), *Beejabhaga* (chromosomal elements), and *Beejabhagavayava* (gene-like structures). *Sahaja Roga* refers to diseases present from birth, *Kulaja Roga* runs in families, and *Adibala Pravritta* arises due to parental reproductive defects.

Ancient texts, including *Charaka Samhita*, reference these concepts in the context of *Stree and Purusha Vyapad*, associating congenital deformities with faulty hereditary components. The concept of *Ashta Nindita Purusha* also parallels modern understanding of genetic disabilities. Notably, *Atulyagotriya Vivaha*—prohibiting marriage within the same *Gotra*—anticipates the genetic principle of avoiding consanguinity to reduce autosomal recessive disorders.

Ayurveda discourages conception at a very young or advanced age due to increased risks of *infertility, miscarriage, or fetal abnormalities*. This aligns with current evidence that younger maternal age is linked to higher rates of conditions like *Down syndrome*.

Modern teratogenic factors such as *maternal diabetes, hypothyroidism, infections, certain drugs, and radiation* are similarly acknowledged in Ayurveda through the concept of *Garbha Vikriti*. During the fourth month, when the fetus becomes *Dauhrida*, unmet maternal emotional or dietary needs are believed to cause congenital anomalies such as *limb deformities, blindness, or cardiac defects*.

Conditions like *Pangu* (paralysis), *Sheershambu* (hydrocephalus), and *Hridroga* (congenital heart defects) are examples of *Garbha-janya Vikaras*, attributed to imbalances in *Shadbhavas* and poor maternal care. To address this, Ayurveda recommends *Garbhini Paricharya*, a structured prenatal regimen emphasizing diet, lifestyle, and behavior to support fetal health.

Ayurveda also discusses *sex determination* (*Pumsavana Karma*) and *multiple births* through *Beeja* variations, indicating early insights into embryology. *Panchakarma therapies* are advocated preconceptually for detoxification and hormonal balance, with growing evidence supporting their role in enhancing reproductive outcomes. Preconception diets rich in *antioxidants, folate, and micronutrients*—like black gram, ghee, and milk—are emphasized for both partners to prevent *neural tube defects* and support gamete health.

Overall, Ayurveda offers a holistic view that aligns with modern genetics by emphasizing *early detection, preventive care, and personalized lifestyle guidance* to mitigate hereditary and congenital disorders.

Discussion:-

The Ayurvedic understanding of hereditary and congenital disorders is deeply rooted in the principles of *Sahaja Roga*, *Kulaja Roga*, and *Adibala Pravritta Roga*, which reflect sophisticated early concepts of genetic inheritance, congenital defects, and familial predispositions. These conditions are believed to arise from vitiation or abnormalities in the reproductive components—specifically the *Beeja* (gametes), *Beejabhaga* (chromosomal equivalents), and *Beejabhagavayava* (submicroscopic genetic determinants, analogous to genes).

Sahaja Roga refers to disorders manifesting from birth, which Ayurveda attributes to constitutional and developmental anomalies occurring during intrauterine life. These include structural deformities and functional deficits that may be mapped to congenital anomalies in modern embryology. *Kulaja Roga*, on the other hand, describes diseases that are inherited through familial lineage, indicating recognition of hereditary transmission, while *Adibala Pravritta Roga* stems from intrinsic defects in the germline material of the parents, drawing a conceptual parallel with inherited monogenic and chromosomal disorders.

The *Trisutra* of *Beeja-Beejabhaga-Beejabhagavayava*, introduced by Acharya *Charaka* and other seers, provides a compelling framework that mirrors the biological hierarchy of cellular heredity. *Beeja* encompasses the entire gamete, while *Beejabhaga* is interpreted as chromosomal content, and *Beejabhagavayava* closely aligns with genes and gene segments, responsible for specific phenotypic traits and organogenesis. Mutations or defects at any of these three levels may result in aberrant development, structural anomalies, or systemic disorders in the progeny.

In the context of reproductive anomalies, Ayurveda also categorizes *Stree Vyapad* and *Purusha Vyapad*—female and male reproductive disorders, respectively—which are linked with defects in reproductive tissues and are often congenital or genetically influenced. Acharya *Charaka*'s enumeration of *Ashta Nindita Purusha*—eight types of physiologically and anatomically compromised individuals—may be interpreted as early recognition of syndromic presentations or congenital disabilities, possibly resulting from chromosomal or genetic mutations.

One of the most profound insights into Ayurvedic genetic hygiene is the doctrine of *Atulyagotriya Vivaha*, which advises against marriage within the same *Gotra*. This practice finds scientific validation in modern medical genetics, which discourages consanguineous marriages due to the heightened risk of homozygosity for recessive alleles, leading to autosomal recessive disorders. This ancient Ayurvedic principle reflects an intuitive understanding of Mendelian inheritance long before the formalization of genetics.

Ayurveda also underscores the importance of the age of conception, suggesting that reproduction during immature physiological stages—such as conception by females under 16 or males under 25—can result in infertility, intrauterine death, or congenital malformations. This aligns with current medical data showing increased risks of chromosomal anomalies, such as trisomy 21 (Down syndrome), when conception occurs outside optimal reproductive age windows. Epidemiological data indicate that a significant proportion (approximately 80%) of Down syndrome cases are associated with maternal age and meiotic nondisjunction.

The Ayurvedic literature also provides a detailed account of teratogenic influences affecting fetal development. Factors such as maternal diet, mental state, environmental exposures, and neglected prenatal desires—especially during the *Dauhrida* stage (fourth month of gestation)—are believed to contribute to *Garbha-janya Vikaras* (intrauterine anomalies). These include deformities like *Pangu* (paralysis), *Sheershabhu* (hydrocephalus), *Hridroga* (congenital heart defects), and other physical abnormalities such as limb malformations, dwarfism, blindness, and kyphosis. These descriptions closely parallel the outcomes of modern teratogenic exposures, including maternal diabetes, hypothyroidism, viral infections, ionizing radiation, and pharmaceutical teratogens during organogenesis.

The causation of these anomalies is attributed to imbalances in the *Shadbhavas*—the six essential contributors to procreation and development: maternal factors, paternal factors, soul or consciousness, food and nutrition, psychological disposition, and the integrity of the uterus and environmental influences. This holistic framework recognizes the complex interplay between genetic, nutritional, psychological, and environmental components in shaping fetal health.

To mitigate these risks, Ayurveda prescribes *Garbhini Paricharya*—a systematic, month-wise regimen for pregnant women encompassing dietary, behavioral, pharmacological, and spiritual guidance to ensure optimal fetal development. These recommendations aim to maintain doshic balance, provide essential nutrients, and support the mental and emotional well-being of the expectant mother.

Additionally, classical Ayurvedic texts explore foundational embryological phenomena such as sex determination through *Pumsavana Karma*—a ritual and medicinal protocol aimed at influencing the biological sex of the fetus. Though unsubstantiated by modern empirical science, these practices reflect an early curiosity about embryonic development. Likewise, the occurrence of multiple births, such as twins and triplets, is discussed in relation to anomalies in the *Beeja* and its subdivisions, paralleling contemporary genetic and embryologic explanations for dizygotic and monozygotic twinning.

From a preventive and therapeutic perspective, Ayurveda emphasizes *Panchakarma* therapies—comprising *Vamana*, *Virechana*, *Basti*, *Nasya*, and *Raktamokshana*—as potent modalities for systemic detoxification, hormonal balance, and reproductive health. These interventions are gaining recognition in current scientific research for their potential roles in modulating inflammatory responses, regulating endocrine function, and even influencing epigenetic expression relevant to gametogenesis and embryogenesis.

Further, preconceptional care, an area extensively addressed in Ayurveda, includes dietary and lifestyle recommendations for both partners. The use of antioxidant-rich foods such as *Tila Taila*, *Masha*, *Shali* rice, ghee, and milk is advocated to enhance gamete quality, reduce oxidative stress, and prevent neural tube defects. Modern nutritional science concurs, recognizing folate, vitamins, and micronutrients in such foods as crucial in prenatal neurodevelopment and chromosomal stability.

Ayurveda's comprehensive approach integrates early disease detection, lifestyle modulation, genetic counseling, and prenatal diagnostics to address hereditary and congenital conditions. It recognizes both intrinsic (genetic) and extrinsic (environmental, nutritional, psychological) contributors to disease and offers individualized regimens for risk reduction, thereby aligning with modern precision medicine.

Conclusion:-

Ayurveda, through its intricate understanding of *Beeja*, *Beejabhaga*, and *Beejabhagavaya*, presents a profound proto-genetic framework that anticipates many principles of modern genetics. Concepts such as *Sahaja Roga*, *Kulaja Roga*, and *Adibala Pravritta Roga* offer a nuanced classification of congenital and hereditary diseases, correlating well with embryological, chromosomal, and gene-based pathologies recognized today. Classical Ayurvedic texts not only identified the role of parental health, age, and genetic constitution in the genesis of such disorders but also emphasized the significance of environmental, nutritional, and psychological influences during pregnancy.

Preventive strategies laid down in Ayurveda, including *Garbhini Paricharya*, *Pumsavana Karma*, and *Panchakarma*, align with contemporary recommendations for preconception care, antenatal nutrition, hormonal regulation, and epigenetic modulation. The ancient injunction against consanguineous marriages (*Atulyagotriya Vivaha*) remarkably parallels modern efforts to avoid genetic disorders through genetic counseling and awareness of autosomal recessive inheritance.

Furthermore, Ayurveda's holistic outlook, integrating somatic, psychological, spiritual, and environmental dimensions, provides a unique lens to view the etiology and prevention of congenital anomalies. While modern science focuses on molecular diagnostics and gene therapy, Ayurveda emphasizes systemic purification, personalized nutrition, and lifestyle correction—offering complementary pathways to reproductive wellness and hereditary disease prevention.

Hence, a comparative study of Ayurvedic and modern perspectives reveals a valuable synergy. Integrating classical Ayurvedic wisdom with contemporary biomedical research could lead to more effective, personalized, and preventive healthcare models for managing hereditary and congenital disorders. Such an integrative approach holds promise for advancing reproductive health, reducing the burden of genetic diseases, and fostering healthier future generations.

REFERENCES:-

1. OMIM Gene Map statistics. www.omim.org. Retrieved, 2020-01-14.
2. Bick, David; Bick, Sarah L.; Dimmock, David P.; Fowler, Tom A.; Caulfield, Mark J.; Scott, Richard H. (March 2021). "An online compendium of treatable genetic disorders". *American Journal of Medical Genetics. Part C, Seminars in Medical Genetics*, 187(1): 48–54."

3. Kumar, Pankaj; Radhakrishnan, Jolly; Chowdhary, Maksud A.; Giampietro, Philip F. (2001-08-01). "Prevalence and Patterns of Presentation of Genetic Disorders in a Pediatric Emergency Department". *Mayo Clinic Proceedings*, 76(8): 777–783. doi:10.4065/76.8.777. ISSN 0025-
4. *Caraka Samhita "Vidyotini"* Hindi Commentary by Pt. Sastri Kasinatha and Chaturvedi Gorakhanatha, edited by Pt. Rajeswara Datta Sastri, Chaukhambha Bharti Academy, Varanasi, Ed. Reprint, 2005; Part I, Sharira Sthana 2/28-29, p.n.846.
5. R.K.Sharma, Bhagwan Dash, *Caraka Samhita (vimanasthana)*, Varanasi, Chowkhamba Sanskrita Series Office, Vol II, Chapter8, Verse 95, 2007.
6. Dr.S.Mitra, *Anatomy*, Academic publishers, Calcutta, 2nd Edition, 1982; vol-2.
7. *Caraka Samhita "Vidyotini"* Hindi Commentary by Pt. Sastri Kasinatha and Chaturvedi Gorakhanatha, edited by Pt. Rajeswara Datta Sastri, Chaukhambha Bharti Academy, Varanasi, Ed. Reprint, 2005; Part I, Sharira Sthana 3/6, p.n.855.
8. *Caraka Samhita "Vidyotini"* Hindi Commentary by Pt. Sastri Kasinatha and Chaturvedi Gorakhanatha, edited by Pt. Rajeswara Datta Sastri, Chaukhambha Bharti Academy, Varanasi, Ed. Reprint, 2005; Part I, Sharira Sthana 3/7, p.n. 855-856.
9. *Caraka Samhita "Vidyotini"* Hindi Commentary by Pt. Sastri Kasinatha and Chaturvedi Gorakhanatha, edited by Pt. Rajeswara Datta Sastri, Chaukhambha Bharti Academy, Varanasi, Ed. Reprint, 2005; Part I, Sharira Sthana 3/3, p.n.851- 852.
10. *Caraka Samhita "Vidyotini"* Hindi Commentary by Pt. Sastri Kasinatha and Chaturvedi Gorakhanatha, edited by Pt. Rajeswara Datta Sastri, Chaukhambha Bharti Academy, Varanasi, Ed. Reprint, 2005; Part I, Sharira Sthana 4/30-31, p.n.877-878.
11. *Caraka Samhita of Agnivesa*, elaborated by Caraka and Drdhabala with the "Ayurved Dipika" Commentary if Cakrapanidatta, Edited by Vaidya Jadavji Trikamji Acharya, Chaukhambha Subharati Prakashan, Varanasi, Ed. Reprint, 2005; p.n.322.
12. *Caraka Samhita "Vidyotini"* Hindi Commentary by Pt. Sastri Kasinatha and Chaturvedi Gorakhanatha, edited by Pt. Rajeswara Datta Sastri, Chaukhambha Bharti Academy, Varanasi, Ed. Reprint, 2005; Part I, Sharira Sthana 3/17, p.n.865.
13. Agnivesha, Charaka, *Charaka Samhita* Revised by Dridhabala, Sutra Sthan, Astaunindaniya Adhyaya 21/5, Edited by Pandit Kashi Nath Pandey and Dr. Gorakhnath Chaturvedi, Prameha Chikitsa 6/47. Part I., Part II., 1st ed. Varanasi: Chaukhamba Bharati Academy, 2001; p. 244, 509.
14. 7. Acharya YT. *Sushrut Samhitas of Sushruta*, Chikitsa Sthana. 8th ed., Ch. 11., Ver. 3. Varanasi: Chaukhambha Orientalia, 2005; p. 75.
15. Agnivesha, Charaka, *Charaka Samhita* Revised by Dridhabala, Sutra Sthan, Astaunindaniya Adhyaya 21/5, Edited by Pandit Kashi Nath Pandey and Dr. Gorakhnath Chaturvedi, Arsha Chikitsa 14/7. Part II., 1st ed. Varanasi: Chaukhamba Bharati Academy, 2001; p. 417.
16. Tripathi B. *Madhav Nidana of Madhukosh*, Kushtha Nidana. Ch. 49., Ver. 25-30. Uttarardh, Varanasi: Chaukhambha Surbhartai Prakashana, 2019; p. 208.
17. *Caraka Samhita of Agnivesa*, elaborated by Caraka and Drdhabala with the "Ayurved Dipika" Commentary if Cakrapanidatta, Edited by Vaidya Jadavji Trikamji Acharya, Chaukhambha Subharati Prakashan, Varanasi, Ed. Reprint 2005, Commentary on Sharira sthana 4/30 shloka, p.n. 322.
18. *Caraka Samhita of Agnivesa*, elaborated by Caraka and Drdhabala with the "Ayurved Dipika" Commentary if Cakrapanidatta, Edited by Vaidya Jadavji Trikamji Acharya, Chaukhambha Subharati Prakashan, Varanasi, Ed. Reprint 2005, Commentary on Sharira sthana 4/31 shloka, p.n.322.
19. R.K.Sharma, Bhagwan Dash, *Caraka Samhita* Varanasi, Chowkhamba Sanskrita Series Office, Vol II, Sharir Sthana, chapter 2, Verse 17, 2007.
20. Tripathi B, editor. *Charaka Samhita of Agnivesh*. Varanasi; India: Chaukhamba Surbharati Prakashan, 2014; p. 504.
21. Dhiman K, Kumar A, Dhiman KS. Shad Garbhakara Bhavas vis-a-vis congenital and genetic disorders. *Ayu*, 2010; 31: 175-84.
22. Usha VN. Preconception Care in Ayurveda. Delhi, India: Chaukhambha Sanskrita, 2007; p. 5-7.
23. Sindhu RP, Sivaramakrishnapillai S. Preconception care in Ayurveda. *Indian Sys Med*, 2019; 7: 90-2.
24. Bellieni C. The best age for pregnancy and undue pressures. *J Family Reprod Health*, 2016; 10: 104-7