Epigenetics: The Hidden Codes of *Shadgarbhakara Bhava*

Dr. Srishti Jidani[1], Dr. Shubham Arun Sapkal[2], Dr. Snehal Deshpande[3]
[1,2]*MD Rachana Sharir CBPACS New Delhi*
[3]*Assistant Professor Department of Kriya Sharir SSGMAM Shegaon*
doi.org/10.64643/IJIRTV12I12-202750-459

***Abstract*—Background: *Shadgarbhakar Bhava*, a concept in *Ayurveda*, emphasizes the significance of parental health and environment during and before pregnancy in shaping the offspring's health outcomes. Recent advancements in epigenetics provide insights into how environmental factors influence gene expression without altering the DNA sequence, potentially elucidating mechanisms underlying *Ayurvedic* principles.**

Objectives: This review aims to explore the concept of *Shadgarbhakar Bhava* in *Ayurveda* through the lens of epigenetics, focusing on understanding how maternal lifestyle, diet, and emotional well-being influence foetal development and long-term health outcomes.

Methods: A comprehensive search of electronic databases (PubMed, Scopus, Web of Science) was conducted using predefined search terms related to *Shadgarbhakar Bhava, Ayurveda,* epigenetics, maternal health, and pregnancy outcomes. Studies published in English and relevant to the topic were included.

Results: The synthesis of literature highlights that *Ayurvedic* practices during pregnancy, including diet, lifestyle modifications, and specific therapies, aim to promote a balanced environment conducive to optimal foetal development. Epigenetic mechanisms such as DNA methylation, histone modifications, and non-coding RNA regulation may offer scientific explanations for the observed benefits of these practices.

Conclusion: Integrating *Ayurvedic* principles with epigenetic insights provides a holistic approach to maternal and foetal health. Future research should focus on validating these traditional practices using modern scientific methodologies to enhance prenatal care strategies.

Index Terms*—*Atmaja*, *Ayurveda*, Epigenetics, pregnancy outcomes, procreative factors, *Shadgarbhakar Bhava

I. INTRODUCTION

Birth defects are the primary factor contributing to the death of infants and can manifest as structural, functional, metabolic, behavioural, or genetic abnormalities[1].

Epigenetics is a fascinating discipline that investigates the complex mechanisms that control gene expression and inherited characteristics, going beyond alterations in the DNA sequence. Epigenetics is a field of research that explores the complex relationship between genes and their environment. The term is derived from the Greek terms "epi," meaning above or on top of, and "genetics," which refers to the study of genes and heredity. Epigenetic modifications differ from variations in the DNA sequence as they entail chemical changes to the DNA or its associated proteins. These modifications have the ability to influence gene activity without making any changes to the underlying genetic code. This emerging discipline not only reveals the intricate coordination of molecular mechanisms within cells but also illuminates how environmental influences, lifestyle choices, and experiences can have a lasting impact on our genetic expression and health outcomes. Epigenetics holds the potential to uncover intricate biological complexities, ranging from development and susceptibility to disease, to evolution and personalized therapy. It has the power to reshape our comprehension of heredity and the profound interaction between genetic factors and environmental influences.

In the 1950s, Conrad Waddington provided a classical description of an epigenetic trait as “An epigenetic trait is a stably heritable phenotype resulting from changes in a chromosome without alterations in the DNA sequence”.[2]

Ayurveda, the traditional Indian medicinal system, has placed significant importance on this matter and has proposed several strategies to reduce the hazards. These measures commence prior to pregnancy. As per Ayurvedic principles, ensuring the parents are well-

prepared is crucial for the birth of a healthy offspring. Pre-conception care encompasses a range of therapies aimed at identifying biological, behavioural, and social hazards that may impact the health of both the mother and the baby. The approach encompasses both preventive measures and management strategies, with a focus on addressing health concerns that necessitate intervention prior to conception or during the early stages of pregnancy to achieve the greatest possible effect. In order to achieve the goal of producing healthy offspring, Ayurveda academics recognized the significance of six procreative elements *(Shadgarbhkarabhavas): Matrija, Pitrija, Aatmaja, Rasaja, Satmyaja, and Sattvaja*. The combination of these reproductive variables is essential for the production of healthy offspring. The holistic health of an individual, including their physical, mental, social, and spiritual well-being, is crucial for producing a healthy child and establishing a healthy family, society, and nation. Additionally, ensuring that the mother receives adequate nourishment during pregnancy and follows a wholesome lifestyle regimen is essential for reaching this goal. Failure to consider any of these aspects can lead to unhealthy and faulty childbirth.

In India, efforts have been made to tackle birth defects and chromosomal abnormalities. However, it is crucial to maintain investment in healthcare infrastructure, research, education, and public health initiatives to minimize the effects of these conditions and enhance the well-being of affected individuals and families.

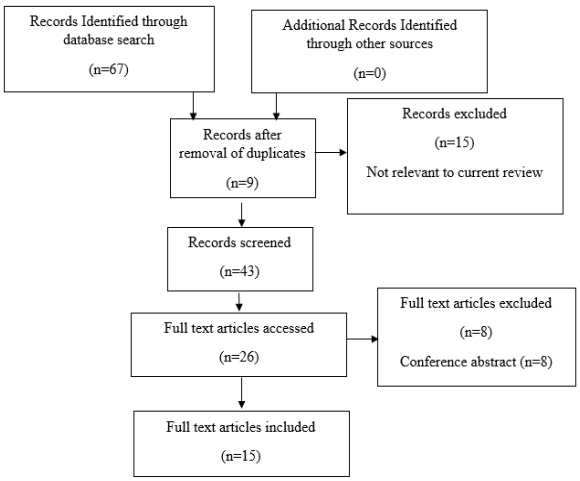
Since the Vedic era, the occurrence of congenitally deformed fetuses has been extensively recorded. *Ayurveda* has documented different genetic illnesses resulting from abnormalities in the *Beeja* (sperm, ovum). The terms *Beeja* (chromosome), *Beejabhaga* (genes), and *Beejabhagavayava* (DNA) were used to explain the morbidity of sperm and ovum.[3]

1.1 Aims & Objectives

1. To delve into the fundamental principles of *Shadgarbhakar Bhava* in *Ayurveda.*
2. The objective of this study is to analyse the effects of *Shadgarbhakar Bhava* on foetal development.
3. To examine the present comprehension of epigenetic mechanisms pertaining to Ayurvedic principles: This purpose entails integrating current literature on epigenetic mechanisms, including DNA methylation, histone modifications, and non-coding RNA control, to elucidate the impact of the maternal environment on foetal programming.
4. To suggest prospective avenues for further research: The objective of this study is to identify any existing gaps in our present understanding and provide potential areas for future research to explore the connection between *Ayurveda* and epigenetics in the context of mother and child health.

1.2 Methodology

A comprehensive search of electronic databases (PubMed, Scopus, Web of Science) was conducted using predefined search terms related to *Shadgarbhakar Bhava, Ayurveda,* epigenetics, maternal health, and pregnancy outcomes. Studies published in English and relevant to the topic were included.



Flow chart 1: Flow diagram of selection process for collection of data

II. RESULTS AND DISCUSSION

Epigenetics refers to the intricate connection between the environment and the way genes are expressed. Epigenetics pertains to the regulation of gene expression at the chromosomal level, namely determining which regions of DNA are accessible for transcription and subsequent protein synthesis. It pertains to alterations in the DNA that occur outside of the genetic code and regulate the activation or deactivation of genes. These alterations do not alter the DNA sequence, but regulate gene expression. Epigenetic modifications are executed by DNA methylation and the interaction between DNA and proteins known as histones. DNA methylation is the

process of adding a methyl group (CH3) to the cytosine nucleotides inside the DNA strand. Parental DNA methylation patterns are heritable and crucial for human ontogeny, facilitating the transformation of a single cell into a sophisticated multicellular organism composed of diverse tissues and organs. Nevertheless, methylation can lead to the improper suppression of genes, including tumour suppressor genes.[4]

Histones are proteins that condense the genome (DNA) into a large nucleoprotein complex called chromatin. The contact between histones and DNA is necessary for the accessibility of DNA during processes like as replication, transcription, repair, and recombination. It serves as a crucial regulatory element for processes that necessitate direct interaction with the DNA. The user's text is enclosed in tags. Histones have a role in controlling gene expression by regulating the way DNA is expressed, which is a key aspect of the epigenetic mechanism[5].

2.1. Researches on factors affecting epigenetic patterns

Research is confirming the role of several factors that alter the epigenetic patterns. Various lifestyle factors, including food, obesity, physical activity, tobacco smoking, alcohol use, environmental contaminants, psychological stress, and working on the night shift, have the potential to alter epigenetic patterns[6, 7]. Reports have indicated the presence of epigenetic dysregulations, such as abnormal methylation, histone modification, and microRNA changes, in several diseases including cancer, neurological disorders, autoimmune conditions, cardiovascular diseases, and others[8]. Scientists have also discovered extensive variations in gene expression related to human immunity and physiology that occur seasonally.[9] Several studies have shown that environmental stress can cause epigenetic changes that are passed down to future generations and can lead to the development of diseases. Studies presents evidence that the health and traits of offspring can be influenced by environmental conditions experienced by paternal ancestors, indicating a mechanism that goes beyond genetic inheritance. Analysis emphasizes reactions that are specific to one sex, suggesting that some characteristics or illnesses may appear differently depending on whether they are inherited from males or females. The study proposes that epigenetic modifications, rather than alterations in DNA sequence, are essential in facilitating these transgenerational effects. Findings highlight the possible effects of environmental exposures on the health of offspring from fathers. This suggests that more research is needed to better understand the causes of diseases and develop measures to prevent them[10].

2.2. Role of diet and medicine

2.2.1.Diet

Epigenetics encompasses the various factors that influence the expression of genes in the phenotype throughout different stages of an individual's lifespan, such as prenatal and postnatal periods, childhood, lifetime social experiences, dietary and nutritional factors, exposure to harmful substances, lifestyle choices, behaviour, stress levels, and environmental conditions[11, 12].

Table no. 1 Genetic disorders due to imbalanced diet

S. No.	DEFICIENCY IN DIET	GENETIC DISORDERS
1	Excess protein phenylalanine	Phenylketonuria
2	Low protein, low caloric diet, low vitamins in diet	Cystic fibrosis
3	Zinc deficiency	Down syndrome
4	Mg	Mitral valve prolapses
5	Iron deficiency	Blue sclera
6	Folic acid deficiency	Spina bifida, cleft palate, Anencephaly
7	Excess copper accumulation	Wilsons disease

It examines how these factors affect gene expression. The phenotypic manifestation varies among individuals based on the specific genes being expressed, influenced by previous exposures, experiences, and impressions. This knowledge is encoded in the genes through epigenetic changes[13]. The phenotype is characterized by its dynamic and ever-changing nature. If the correct rules of life and living are adhered to, these variables will help maintain the expressed phenotype in good health. Failure to adhere to correct principles results in changes in health and the manifestation of sickness[14]. Ayurveda provides a thorough discussion of these principles.

2.2.2.Medications:

S. No.	Medicines	Risk Factor	Example
1	Group A	No foetal risk	Vitamin supplements
2	Group B	Not confirmed yet (risk in animals)	Penicillin, heparin, insulin
3	Group C	Adverse foetal risk	Thalidomide
4	Group D	Can be used only in emergency	Anticonvulsants, antidepressants, benzodiazepines
5	Group E	Proved in no pregnant women (more safety research needed)	Anticancer drugs

Infants have experienced facial and cerebral deformities as a result of high dosages of orally ingested vitamin A, anticancer medications, Accutane (isotretinoin) used for acne treatment, Tegison (etretinate) used for psoriasis treatment, and Dilantin (phenytoin) used as an antiepileptic medication. Pregnant women should minimize their use of drugs, particularly in the first trimester of pregnancy.

2.3. Ayurvedic Perspective

According to *Ayurveda*, matter is comprised of five *Mahabhutas*, which are the fundamental components with the characteristics of space (*Akasha*), air (*Vayu*), fire (*Tejas*), water (*Jala*), and earth (*Prithivi*). These elements combine to create three *Doshas*, namely *Vata, Pitta*, and *Kapha*. The *Doshas* are psychophysiological principles that regulate many parts of the human body. *Vata* is derived from the less dense components that possess the characteristics of space and air. *Pitta* is derived from the combination of the elemental characteristics of fire and water. *Kapha* is derived from the denser components characterized by the attributes of water and earth. *Vata* governs the processes of movement and communication in the body, such as blood circulation, heart contractions, respiration, digestion, and transmission of nerve impulses between cells. *Pitta* governs the processes of digestion, metabolism, and transformation, which encompass energy exchange, hunger, and endocrine activities. *Kapha* governs the organization and unity of the body, encompassing attributes such as physical strength, stability, maintenance of bodily fluids, and body weight. Every person possesses a distinct combination of *Vata, Pitta*, and *Kapha*. This is referred to as their psychophysiological makeup and is associated with the individual's phenotype.

Ayurveda encompasses all stages of life, including the prenatal, postnatal, childhood, and lifetime social experiences. The document provides guidelines for daily and seasonal schedules, encompassing bedtime, wake-up time[15,16,17], meal times, exercise sessions, study periods, meditation sessions, and other activities[18, 19, 20]. Additionally, it provides guidelines for appropriate conduct and strategies for interacting with peers, younger individuals, and older individuals, both in general and in various situations. For instance, the actions and attitudes that should be enhanced encompass love, compassion, and discourse that uplifts individuals. Undesirable behaviours and attitudes to be avoided encompass wrath, violence, as well as the use of harsh or unpleasant speech. Younger individuals should receive advice and assistance, while teachers and seniors should be treated with respect. These habits have an impact on physical health by triggering the release of neuropeptides. Negative emotions elicit the release of neurochemicals that exert strain and inflict harm on the organs, while happy emotions trigger the release of chemicals that promote health[21, 22, 23].

2.4. Prevention of genetic disorders and congenital anomalies

The ultimate objective of conception is to produce offspring of superior quality. Commencing the preparation for improved offspring should be initiated prior to marriage. Ancient literature emphasizes the significance of age in relation to the attributes of a girl, her lifestyle, dietary habits, and different rituals (*Samskaras*) in order to attain a superior offspring.

The superior quality of *Ritu*, *Kshetra, Ambu*, and *Beeja* consistently produces exceptional progeny. These four components must be safeguarded from both external and internal harm[24]. The focus should be on highlighting the exceptional qualities of *Stree* and *Pumbeeja*, rather than just acknowledging their existence.

The principles of *Ritukala* are extensively elucidated in the *Ayurveda* textbooks. The rationale behind all limits in the present scenario is challenging to explain, since they are a reflection of societal conventions from a certain period. However, it is evident that the physical and psychological well-being of women during the preconception stage significantly affects the development of the foetus[25].

The *Charaka Samhita* provides a detailed explanation of *Garbhopaghatakarabhavas*, which refers to the detrimental diet and actions of the mother that might lead to congenital anomalies[26]. Given the foetus's complete reliance on the mother, any detrimental actions taken by pregnant women would also adversely affect the foetus. The repression of urges can have an impact on the psychology of both the mother and the foetus.

The practice of *Masanumasika Garbhiniparicharya*[27] should be adhered to according to the instructions provided by the experts. During the first trimester, it is advisable to have a food that is chilly and sweet, along with milk and *Madhurarasa Dravyas*, in order to prevent dehydration induced by vomiting and provide the necessary nutrition. Similarly, it is important to adhere to a diet and regimen on a monthly basis. Avoid using medications without checking with authorities.

III. CONCLUSION

Ayurveda has long been recognized for its expertise in preventing *Vikrita Garbha*, a concept that was well grasped by ancient thinkers several millennia ago. The sperm and ovum, which contain genetic components that are not visible, are involved in the process of reproduction. Therefore, it is advisable for both the male and female to undergo the *Panchakarma* therapy before making a decision regarding conception. This treatment is aimed at preventing the transfer of congenital problems to their offspring. [28]

According to current knowledge of prenatal care, we can provide the following routines to complement the classical literature mentioned above. Firstly, the woman must undergo a standard physical examination to confirm the good health of her body. This includes ensuring that her immunizations are current, reviewing any prescription medications she is taking to ensure their safety during pregnancy, testing for sexually transmitted diseases, and seeking treatment if she is already infected. An antenatal vitamin supplement indicated before pregnancy. It is recommended to take folic acid supplements for a duration of three months before getting pregnant and continue taking them during the first trimester. Prenatal testing can be conducted to mitigate the likelihood of congenital abnormalities, and it is advisable to seek genetic counselling in instances of elevated risk.

REFERENCES

[1] [1] Moore KL,Persaud TVN. 2009. The developing Human. 8thed. Noida:Imprint Of Elsevier, 458.`

[2] [2] Waddington, C. H. (1953). Genetic assimilation of an acquired character. Evolution, 7(2), 118-126. doi:10.1111/j.1558-5646. 1953.tb00005.x

[3] [3] Sushrut Samhitas of Sushruta edited by Vaidya Yadavaji Trikamaji Acharya. 8th ed., Sharirasthana, Ch. 2., Ver. 33. Varanasi, Choukhambha Orientalia; 2005.p.348

[4] [4] Jones, P. A., & Baylin, S. B. (2007). The epigenomics of cancer. *Cell*, 128(4), 683-692. doi: 10.1016/j.cell.2007.01.029

[5] [5] Luger, K., Mäder, A. W., Richmond, R. K., Sargent, D. F., & Richmond, T. J. (1997). Crystal structure of the nucleosome core particle at 2.8 Å resolution. *Nature*, 389(6648), 251-260. doi:10.1038/38444

[6] [6] Bell, J. T., & Spector, T. D. (2011). A twin approach to unraveling epigenetics. Trends in Genetics, 27(3), 116-125. doi: 10.1016/j.tig.2010.12.005

[7] [7] Breton, C. V., & Marsit, C. J. (2019). Epigenetic effects of air pollution. Exposure and Health, 11(1), 21-34. doi:10.1007/s12403-018-0280-1

[8] [8] Feinberg, A. P., & Tycko, B. (2004). The history of cancer epigenetics. Nature Reviews Cancer, 4(2), 143-153. doi:10.1038/nrc1279

[9] [9] Dopico, X. C., Evangelou, M., Ferreira, R. C., Guo, H., Pekalski, M. L., Smyth, D. J., ... & Wallace, C. (2015). Widespread seasonal gene expression reveals annual differences in human immunity and physiology. *Nature Communications*, 6, 7000. doi:10.1038/ncomms8000

[10] [10] Pembrey, M. E., Bygren, L. O., Kaati, G., Edvinsson, S., Northstone, K., Sjöström, M., ... & Golding, J. (2006). Sex-specific, male-line transgenerational responses in humans. European Journal of Human Genetics, 14(2), 159-166. doi: 10.1038/sj.ejhg.5201538

[11] [11] Feil, R., & Fraga, M. F. (2012). Epigenetics and the environment: Emerging patterns and implications. Nature Reviews Genetics, 13(2), 97-109. doi:10.1038/nrg3142

[12] [12] Jones, M. J., Goodman, S. J., & Kobor, M. S. (2015). DNA methylation and healthy human aging. Aging Cell, 14(6), 924-932. doi:10.1111/acel.12349

[13] [13] Ayurveda: Science of life, genetics, and epigenetics, AYU (An International Quarterly Journal of Research in Ayurveda)37(2):87-91, Apr-Jun 2016.

[14] [14] Waterland, R. A., & Michels, K. B. (2007). Epigenetic epidemiology of the developmental origins hypothesis. Annual Review of Nutrition, 27, 363-388. doi: 10.1146/annurev.nutr.27.061406.093705

[15] [15] Acharya YT, 2009. editor, (2nd ed). Susrutha Samhita of Susrutha, Sutrasthana, Chapter 2/23

[16] [16] Acharya YT, 2011. editor, (2nd ed). Charaka Samhita of Agnivesha, Sutrasthana, Chapter 5/12

[17] [17] Ashtanga Hridaya, Sutrasthana, Chapter 2/8

[18] [18] Acharya YT, 2009. editor, (2nd ed). Susrutha Samhita of Susrutha, Sutrasthana, Chapter 15/14

[19] [19] Acharya YT, 2011. editor, (2nd ed). Charaka Samhita of Agnivesha, Sutrasthana, Chapter 5/15

[20] [20] Ashtanga Hridaya, Sutrasthana, Chapter 2/18

[21] [21] Acharya YT, 2009. editor, (2nd ed). Susrutha Samhita of Susrutha, Sutrasthana, Chapter 17/47

[22] [22] Acharya YT, 2011. editor, (2nd ed). Charaka Samhita of Agnivesha, Sutrasthana, Chapter 7/6

[23] [23] Ashtanga Hridaya, Sutrasthana, Chapter 2/1

[24] [24] Acharya YT, 2009. editor, (2nd ed). Susrutha Samhita of Susrutha, Shareera Sthana; Shareeravichaya: Chapter 2, Verse 33-34. Varanasi: Chowkhamba Sanskrit Series, 348-349.

[25] [25] Acharya YT, 2011. editor, (2nd ed). Charaka Samhita of Agnivesha, Shareera Sthana; Jatisootreeyam:

[26] Chapter 8, Verse 5-6. Varanasi: Chowkhamba Sanskrit Series, 340-341.

[27] [26] Ibid.Chapter 8, Verse 21-22.

[28] [27] Ibid.Chapter 8, Verse 31-32

[29] [28] Acharya YT, 2011. editor, (2nd ed). Charaka Samhita of Agnivesha, Chikitsa Sthana; Yonivyapat: Chapter 30, Verse 125-126.Varanasi: Chowkhamba Sanskrit Series, 639-640