



## Review Article

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### ROLE OF MATURAHARVIHAR PRAKRITI TO MODIFY PRENATAL TRANS-GENERATIONAL PROGRAMMING FOR DEVELOPMENT AND HEALTH: A REVIEW

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#### ABSTRACT

Prakriti, as conceived by Ayurveda, is a pre-determined program influenced by highly active vital forces at the time of conception which is responsible for physical, mental and other characteristics of an individual. Maturaharvihar Prakriti, proposed by Charaka Samhita, is result of one of the plastic prenatal states related with maternal lifestyle and nutrition. A serious consideration given to this phenomenon by Ayurveda, taking in account the potential malleability of programming and its lasting influence on various aspects of life is being increasingly proven scientific in light of mounting evidences gradually accumulated on scientific platforms. The paper discusses the hitherto known important key mechanisms of prenatal life that are responsible for changes in trans-generational transfer of characteristics. These mechanisms are of immense importance due potential of offering infinite therapeutic and preventive opportunities. Evidences of prenatal programming of congenital anomalies, cardiovascular disease, diabetes mellitus, stroke, obesity, mood disorders, behavioral patterns and many other developmental phenomena validates the approach of Ayurveda towards positively programming the prenatal life using an interventional umbrella of lifestyle, diet and medicines. Mammalian animal experiments from agouti mouse to Caenorhabditis elegans as well as meticulous trans-generational characteristics records of humans as Dutch famine gives unequivocal signal towards important underlying signature changes like epigenetic, neuroplastic, hormonal and metabolic modifications. The paper, thus, highlights not only scientific validity of concept of Maturaharvihar Prakriti but also its candid potential of conventional as well pro host therapy.

**Keywords:** Maturaharvihar Prakriti, Trans-generational characteristics, Prenatal programming

#### INTRODUCTION

Prakriti is strength of Ayurveda as it uniquely provides a comprehensive idea about a person as a whole and a rational basis for personal medicine.

Prakriti is known to be largely determined at the time of conception by the predominance of vital forces in Shukra and Shonit<sup>1</sup> and is said to be unchangeable.<sup>1,2</sup>

Does the whole process of formation of Prakriti contain a window that allows an interventional hand for healthy outcome? As the concept of Prakriti and genetics are similar in many aspects, another question may be - Is there any scope and hope for modification in prenatal genetic programming? At this point, the concept of Maturaharvihar Prakriti in Ayurveda and recent advances in epigenetics are important.

#### Concept of Maturaharvihar Prakriti in Ayurveda

##### Use of word Maturaharvihar

Though some of the translators and commentators have preferred the word Aturaharvihar, after analyzing 'Sandhi' in original verse preference for the term- Maturaharvihar has been given. It does not disturb grammar and it justifies the point in description. The term Maturaharvihar is upheld by prominent commentator like Chakrapan<sup>3</sup>.

#### Maturaharvihar Prakriti

Kashyap describes three divisions of diet taken by pregnant mother; Mother fetus and maternal reservoirs for breast feeding. Prakriti is described to have origin from this diet itself<sup>4</sup>. Though maternal and other factors are enlisted at many places, the essence of concept of Maturaharvihar Prakriti (as clearly described by Charaka and Vagbhata) does not just lie in capability of influencing health and development of growing fetus. The concept is important as it influences program of life which governs the life till its end<sup>5</sup>.

#### Application of Maturaharvihar in Ayurveda

All major texts of Ayurveda have cautioned against factors harmful for fetus (Garbhopaghatkar Bhava)<sup>6</sup>. These factors are mainly associated with Vata Dosha aggravating lifestyle and diet. To have desired qualities in an offspring, guidelines are given which are to be followed before conception.<sup>7</sup>

#### Shukra Shonit Prakriti and Maturaharvihar Prakriti

Definitions of Prakriti provided by Charaka and Vagbhata<sup>8</sup> clearly address maternal diet and lifestyle as factors forming Maturaharvihar Prakriti. Definition given by Sushruta enumerates only Shukra and Shonit in verse. But in commentary of Dalhan multifaceted genesis of Prakriti is suggested by putting word 'ityadi' (literally meaning -etc.) in front of word Shukra<sup>9</sup>. Sushruta himself mentions clearly on other places that the formation of embryo is hardly possible with only Shukra and Shonit in absence of other factors<sup>10</sup>. The factors Ritu, Kshetra, Ambu and Beeja described by Shushrut<sup>11</sup> are representatives of

Kal, Garbhashay, Maturaharvihar and Shukra-Shonita respectively. These are the very factors which Charaka describes as Kaal Garbhashay Prakriti, Maturaharvihar Prakriti and Shukra-Shonit Prakriti that should be taken into account while considering Prakriti of an individual.

Though modern science was aware about effects of maternal factors on fetus, it was until very recently that the prenatal factors in form of epigenetics<sup>12</sup> involved in basic life programming are in light.

### **Mechanisms of prenatal programming**

According to modern sciences this period serves as a plastic window period. Following mechanisms operate more effectively due to enormous rate of cell division, metabolism and major blood supply through diffusion during crucial period of prenatal life.<sup>13</sup>

### **Epigenetics**

Exposure to intervention in prenatal life results in biological embedding through changes like DNA mutation. Further trans-generational passage is facilitated through changes in germ line. Processes like methylation, acetylation, phosphorylation of DNA are important for epigenetic changes.<sup>14</sup>

### **Nutrition**

There is sufficient evidence that the prenatal nutritional status, along with genetic and other factors play important role in fetal programming. These changes are also inheritable to next generation.

The studies based on observations of passage of characters in various generations of people who were affected by Dutch famine in Second World War, also provide the evidence about central role of prenatal nutrition in fetal programming.<sup>15</sup>

### **Metabolism**

Metabolic pathways like fatty acid oxidation create superoxide anions, which are reactive oxygen species (ROS). These ROS molecules are capable of creating genetic and epigenetic changes through methylation of DNA.<sup>16</sup> The oxidative stress plays important role in fetal programming.

### **Hormonal**

Maternal hormonal excess or deficiency, both, can affect the programming of fetus in prenatal life. It has been shown experimentally that aberrations of estrogen can result in ovarian dysfunction. Testosterone is responsible for programming of certain neurological and behavioral aspects in prenatal period.<sup>17</sup>

### **Neurological and behavioral**

Neurological and behavioral programming of fetus can be affected through maternal mental stress. The effects of stress are mediated through the master stress hormone CRH (Corticotrophin Releasing Hormone). It initiates the cascade which results in unhealthy outcome for brain and behavior. This produces neurotoxic effects on hippocampal and limbic regions.<sup>18</sup> Stress induces its adverse effects through gluco-corticoids and hypothalamo-pituitary-ovarian axis. It may cause psychiatric diseases latter.

Inflammatory and endocrine key mediators produced due to stress make fetus susceptible to psychopathology.

### **Animal studies**

Experiments in agouti species of mouse have shown that size, color of skin and disease predisposition can be changed in genetically identical sibling due to epigenetic changes<sup>19</sup> due to methyl rich diet of mother mouse.

Such epigenetic changes and trans-generational passage of characters are seen in *Caenorhabditis elegans*<sup>20</sup>, also.

### **Interdependence of mechanisms**

These all mechanisms are interdependent. Change in one mechanism is capable of inducing change in various extents in another mechanism.

### **Therapeutic and preventive potentials of prenatal period**

As a consequence of adverse prenatal programming many diseases can be seen in later life.<sup>21</sup> Some of these diseases are as - Congenital anomalies, Diabetes mellitus, Glucose intolerance, Insulin resistance, Hypertension, Cardiovascular disorders, Obesity, Psychopathologies, Mood disorders, Behavioral disorders, Stroke.

In such conditions appropriate diet and lifestyle can serve as a good pro host therapy. Expression of disease in later life results from interaction of many factors. Still, it can be reasonably stated that healthy lifestyle and diet hold good potential to prevent all these diseases in a good deal. Evidence from animal studies suggests that neonatal dietary intervention, which is a late phase of plasticity, also holds the potential to reverse the adverse metabolic programming.<sup>22</sup>

The study of agents that cause epigenetic changes during prenatal development also opens the various gateways of primary prevention. It may be useful even in many hereditary and sporadic congenital defects.<sup>23</sup>

### **DISCUSSION**

The effects of maternal diet and lifestyle which influence the program of fetal life have an explanation in the activity of Vata Dosha. Vata Dosha is responsible for proper arrangement of basic elements of (fetal or embryonic) body.<sup>24</sup> Here function of wholesome union of all these bodily elements into single thread of life, to make them work as single unit,<sup>25</sup> is also ascribed to Vata Dosha. On the same place Vata Dosha is held responsible for creation of every macro and micro unit for channelization of bodily elements which are under process of maturity. Thus, eventually, the whole process culminates in formation of fetus with its all signature characteristics.

The trans-generational passage of certain signature characteristics inevitably points towards genetics. Here, also, Ayurveda offers astonishing insights. Each and every unit of body is preceded by its respective representative basic program described as Beej bhag. Though the parental bodies may have normal or vitiated body elements, in any case, it is possible to have normal or vitiated Beejbhag. Whatever may be the phenotype of parents, the normal or vitiated body of an offspring has to do only with state of its own Beejbhag.<sup>26</sup>

Vata Dosha has the power to influence the basic life program. Charaka Samhita denotes this by describing the extracorporeal, worldly counterpart of Vata Dosha as being capable of Beej-abhi sanskar which literally means the ability to bring the significant changes in seed.<sup>27</sup>

Thus, Vata Dosha is responsible primarily for whatsoever changes take place inside Beejbhag and renders it normal or vitiated. (Anuptapta and Uptapta) The vital question, that whether we can shape the process of formation of Prakriti has been addressed in detail by Charaka Samhita, as far as prenatal life is concerned. As mentioned earlier, the various factors contributing towards the new life are classified in six groups<sup>28</sup> as Matrij Bhava, Pitrij Bhava, etc. Charaka, possibly for the first time in the history of ancient therapeutics has introduced the idea of 'Design of life by choice' with the newly coined term, 'Yatheshtakaritva'. It goes further with broad classification of forces that promote and operate the basic program of life. First kind of force can be controlled with help of dietary, therapeutic and lifestyle associated interventions the order type force operates of its own and it is beyond control of interventions. It has been emphasized that, the handle of the machine of life programming, to be gripped with the handle of interventions, it is necessary that the factors classified under six heads (Matrij, Pitrij etc.) should be in their most excellent form. Otherwise the process will be handled by the forces beyond our control.<sup>29</sup> This is the basis of intervention with maternal diet and lifestyle to shape the life program of Prakriti. The maternal diet and lifestyle at their best can strengthen the factors that contribute for life. As a preparation for desired characters in an offspring special diet has been advised before conception also. This eventually will result in attaining the goal of 'Design of life by choice' ('Yatheshtakaritva').

Moreover, it has been specifically mentioned that the aberration in maternal diet will result in malformation of certain organs<sup>30</sup>. Vata Dosha is responsible mainly for such vitiations. That is why Vagbhata has mentioned importance of Vata Dosha before description of Prakriti.<sup>31</sup> It reflects the view of Charaka about ability of Vata to affect Beej and / or Beejbhag. Charaka further asserts that changes associated with affected Beejbhag are going to be expressed in post-natal life of a progeny. Thus, the affected germ line may cause disease in successive generations<sup>32</sup> because progeny with a vitiated Beej is going to contribute in Shukra Shonit Prakriti of its next generation.

## CONCLUSION

All the points highlight but a one important fact that Maturaharvihar has a definite role in formation of Prakriti. During prenatal intrauterine life, when there is Prakriti being shaped, it has malleability in certain areas, which can be modified through maternal diet and lifestyle. It also denotes that the genetic configuration can be significantly influenced through maternal diet and lifestyle so as to influence trans-generational passage of certain characters.

The enormous rate of change in every aspect, during prenatal stage, makes the fetus vulnerable in many aspects.

This vulnerability creates need for care in every aspect (diet, lifestyle, mental and emotional condition, etc.)

This prenatal phase serves as a plastic window period, as far as genetic and other modifications responsible for programming of life are concerned.

This phase offers an opportunity, up to certain extent, for therapeutic and preventive interventions for development and health.

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