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# Physio-Anatomical consideration of *Upsneha* & *Upsweda* with special reference to *Garbh Poshan* in Ayurveda – A Review

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## ABSTRACT

The science of *Garbha Vyakaran* has been always a subject of great interest for the persons devoted to it. The matter related to the concept of *Garbha Vyakaran* is systematically described in Ayurvedic literature. Nutrition of embryo mainly concerned with the mechanism involved in both the parts of mother and foetus to meet the requirements for growth and development during intra-uterine life. According to Ayurveda, it is the cessation of menses during pregnancy which affects the mammary glands of the breast and causes lactation for the post-natal feeding of the baby. Apart from the concept of nutritional supply through placenta which is well established in modern science, the relationship in between the changes occurring in the mother and in their body organs, have been tried to explain in the light of present knowledge.

**Key words:** *Garbh Poshan, Upsneha, Upsweda, Placenta, Ayurveda*

## INTRODUCTION

*Garbhavyakarana* (embryology) is the most extensive science that involves growth and development from the cellular stage to full growth (adult), but is usually limited to the prenatal stage of growth and development. This stage is followed by postnatal development in infancy, childhood and

adolescence, as well as early, middle and late puberty. Therefore, the human life cycle can be divided into two periods: prenatal and postnatal. This article mainly dealt with the nutrition of life (embryo) in the uterus, which plays a role in the process of growth and development.

## GARBHA POSHAN

According to Ayurveda, the role of "*Rasadhātu*" is recognized not only in fulfilling the nutritional requirements of the developing foetus, but also in contributing to the maternal health and lactation. There is also adequate literature on the supply of nutrition and gas exchange from the fertilization stage to its birth in the Indian medical system. *Maharshi Charaka* sought to accurately explain all the basics related to nutritional support for growing embryos and foetus. He has rightly characterised the state of foetus to be free from thirst and hunger. It depends on the mother for all activities. It lives upon the

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nourishment by the process of "*Upasneha*" (exudation) and *Upsweda* (conduction of heat). These words explain the process of nourishment by amniotic fluid in early stages till placenta is not formed. The composition of sweat and amniotic fluid is quite similar. Sweat comes on the skin through pores as well as amniotic fluid also comes through filtration from maternal blood as droplets. Amniotic fluid consists of water, glucose, albumin, globulin, sodium, urea, lipids etc. The lipids and glucose present in plasma can be considered as *Upsneha*. While during implantation the proteolytic activities of trophoblast and proteolytic and histolytic activities of chorionic villi provide nourishment to the blastocyst. These can be as *Upsweda*. The umbilical cord is connecting link between placenta and foetus. The heart of the mother floods the placenta with the pulsating vessels. This "*Maturahar Rasa*" (nutritive fluid) promotes strength and complexion of the foetus because it is composed of material having all tastes. *Rasa* (digestive product of food) of the pregnant woman serves three purposes,<sup>[1]</sup> viz,

- Nourishment of her own body
- Lactation
- Growth of the foetus.

Another statement of *Maharshi Kaśyapa* states that the '*Bija*' after entering into the body gets encircled by the "*Rakta*" (blood), if reviewed in context of nutritional supply in embryo, it exactly satisfies the histotrophic nutritional phase. The term '*Bija*' here, is taken in the sense of fertilised egg which when descends down and enters the body (uterine cavity) and finds a site over there for attachment. The modern has recognised the nutritional supply in two phases; histotrophic and haemotrophic, where the latter is maintained by placental circulation, and the histotrophic nutrition is maintained by damaged maternal tissues, containing extravasated blood, and the stagnant blood in the trophoblastic lacunae which meets the nutritional supply of embryo before chorionic development. This is the blood which probably represents the term "*Rakta*" mentioned by *Kaśyapa*.

According to *Vridhha Vagbhata*, *Upasneha* represents the histotrophic nutritional supply, is maintained by the process of osmosis involving the permeability of the concerned cellular wall and is found before the chorionic establishment, while *Upsweda* is the haemotrophic nutritional supply of the modern science where nutritive substances pass from the circulating blood of the mother to that of the foetus.<sup>[2]</sup> Thus the "*Rasa-Dhātu*" (nutritional material) prepared in the mother reaches to the pulsatile placenta from maternal heart through the arterial communication. Then subsequently it reaches to the foetus through the umbilical cord and gets metabolised in the concerned body tissues (*Pakvāśaya*) with his own body metabolic processes (*Kāyāgni*); thus, the nutritional material obtained by the foetus being enriched with excess of essence (*Prasādabhāga*) maintains the growth and development of the foetus.<sup>[3]</sup>

Though *Maharshi Susruta's* approach to foetal circulation has a gross structure, it contains a lot of information. In his view, the umbilical cord is attached to the "*Rasavaha Nādi*" (maternal part of the placenta) of the mother and this carries '*Ahārarasa-Vīrya*' (nutrition) from the mother to the foetus. This (embryo) gets nutrition from the obliquely running *Rasavaha-Dhamanīs* which course through all parts of the body and imparts life to the embryo.<sup>[4]</sup>

P.S. Varrier provides a clear-cut description that is comparable to present views. According to him, the fertilised egg remains living on its own nutritional supply after fertilisation and before the creation of completely established chorion, and later after being implanted into the uterus, it is maintained on maternal blood and fluid and subsequently reaching to its full growth it comes out through uterine passage.

*Vāgbhata* has tried to make understand with an example of field, furrows and the water (*Kedari Kulya Nyaya*), representing the foetus, umbilical cord and the maternal source of nutrition, respectively. This is the channel through which foetus gets nutrition in the

same way as a dry field gets saturated with the water flowing through the furrows.<sup>[5]</sup>

### **Nutritional support for embryo and foetus during intrauterine development**

To stay alive in vivo and in vitro, it is important to maintain nutritional and gaseous exchange from a unicellular organism to a multicellular complexity. For fetal growth and development, the nutritional and gaseous exchange is dealt under the two distinct headings, embryonic nutrition and foetal circulation. The period spent by the developing human egg in the uterus as a free morula and blastocyst, varies considerable among mammals; in man it is two to three days. During this interval, there is further transport to the site where attachment and embedding will occur. While free in the uterine cavity the blastocyst imbibes fluid from the uterine secretion, in which it is immersed and expands to a diameter of about 0.2 mm. This secretion, expelled from the uterine glands, also supplies oxygen and some nutrients to the blastocyst. This situation cannot be continued for a longer period hence the process of implantation into uterine cavity and establishment of the constant nutritional supply to the growing foetus through the placenta is required.

Shortly, before implantation begins, the stretched and thinned zona-pellucida disappears. And the blastocyst now comes into direct contact with the uterine epithelium and makes further growth possible. The human blastocyst probably begins to be attached late in the sixth day after ovulation. Even as the blastocyst is becoming implanted, its trophoblastic wall (the future chorion) starts on a course of specialisation which will pull the invader in intimate relation with the uterine blood. These phase of implantation is not a one sided adjustment, since the maternal tissue, as well, adopt themselves to the new relations and demands. Both sets of co-ordinated changes lead to the production of a specialised organ-the placenta, which is the medium for physiological interchanges between the mother and foetus throughout the remainder of pregnancy. This establishment is located superficially in the compact layer of endometrium but

does not encroach into the spongy layer though it expands greatly as the development proceeds. The trophoblastic wall gets specialised and there appears irregular cavities called trophoblastic lacunae; leads to a beginning of future intervillous space of placenta, Connections are quickly established between the trophoblastic lacunae and uterine blood vessels. Within a week after implantation, there develops prominent sinus like venules beneath the embedded sac. The trophoblast is an invasive tissue which extends progressively into the superficial maternal tissues. This invasion leads to a certain amount of destruction and erosion with the result the trophoblast and endometrium meet. By the end of third week, the erosive process declines and the relationship of the embryo to uterus gets established. The trophoblast has the capacity of ingesting maternal tissues. Blood cells of all kinds and reticular fibres along with the granular and amorphous material are the substances which are presumably utilised for nourishment in the early period of establishment. Early in the fourth week, the essential arrangement by the help of primary, secondary and tertiary villi have been accomplished which make possible the physiological interchanges between the mother and foetus that will characterise the remainder of pregnancy. Blood vessels pass from the embryo through the body stalk to the connective tissue of the chorion, and then extend into the chorionic villi. The passage of the nutritive substances from the circulating blood of the mother to that of the foetus within the vessels of the vili gets established and thus foetal-maternal relationship gets completed with the establishment of a definite placenta.

### **1. Placenta and other changes that occur after the mother is pregnant**

In Indian system of medicine as regards the structural development of the placenta, the description is very obscure. In Ayurveda, the available literatures on the subject appear to be more concerned with functional rather than its structural description. The cessation of menstrual blood, the development of the breast and other changes prevalent in pregnant woman, though interlinked with hormonal secretions in view of the

modern science, have been distinctly described in Ayurveda also.

*Maharshi Suśruta* has said that in those who have conceived, menstrual discharge is absent because even though the '*Artavavaha Srotasas*' are present, these get obstructed by the presence of foetus. Also, because the flow is obstructed below, it goes up and forms the placenta and residual portion of the flow still going up reaches the breasts. Therefore, the pregnant woman has full and protuberant breasts.<sup>[6]</sup>

*Vrddha Vāgbhata* stands with the view that due to pregnancy, the channels carrying the menstrual blood get obstructed and thus it leads to a state of amenorrhoea. Due to being obstructed from below, the menstrual blood gets collected in the uterus and results in the formation of placenta. After delivery the same menstrual blood influences the lactating glands of the breast and comes out in the form of milk during post-puerperal period and gets finally connected with the *Rasa-Dhātu* of the mother, resulting from her diets.<sup>[7]</sup> In modern science, the developing placenta includes

- Chorionic villi,
- A cavernous intervillous space, and
- Decidua basalis with blood vessels that supply the early intervillous space.

By the beginning of the fourth month, the placenta has two components: a foetal portion formed by the chorion frondosum and (ii) a maternal portion formed by the decidual basalis. On the foetal side, the placenta is bordered by the chorionic plate; on its maternal side by the decidual basalis of which the decidual plate is most intimately incorporated into the placenta. The space in between these two plates is the junctional zone consisting mainly the trophoblast and the decidual cells. The intervillous space is primarily of foetal origin but it grows also at the expense of eroded decidual substance. The placenta serves primarily as an organ that permits the interchange of materials carried in the blood streams of the mother and foetus. The functions of the placenta can fall into;

- Nutrition-where the exchange of carbohydrates, proteins, fats, vitamins, water and salts pass in one form or other from the mother's blood to the foetus,
- Respiration- exchange of gases like O<sub>2</sub>, CO<sub>2</sub>, and CO get exchanged by simple diffusion and thus the placenta acts like a lung,
- Excretion-fluid waste products of foetal metabolism escape through the placenta, which exerts a kidney like function,
- The barrier-the placenta is impermeable to particulate matter like bacteria and certain viruses having large molecules. The maternal antibodies like IgG and other gamma globulins against various infectious diseases and the passive immunity against the diphtheria, small-pox, measles and rh factors get transmitted from mother to foetus through placenta, and
- Synthesis-hormones (oestrogen; progesterone and gonadotrophin) are produced in important amounts; certain food stuffs are synthesized and local enzymes are employed.<sup>[8]</sup>

## 2. Extrinsic and Intrinsic factors involved in fetal development

Ayurveda has also recognised the role of '*Prāṇāḥ*'. '*Tridosas*' and '*Mahāguṇas*' which appear to be directly or indirectly interlinked with entire cosmic theory of evolution and in narrow sense it can be correlated with the genetic characteristics of modern science.

*Maharshi Caraka* has emphasised some factors which help in the growth of the foetus in intrauterine life:

- Excellence of the *Gharbotpadak Shadbhava* i.e., *Matrija* (ovum), *Pitrija* (sperm), *rasaj* (wholesome-ness), *Saatmaj* (wholesome-ness), *Satvaj* (mind), *Atmaj* (soul).
- *Pathya Ahaar-Vihaar* (Adoption of proper regimen by the mother) during pregnancy,
- Through '*Upasneha*' (transudation) and '*Upasveda*' (conduction),

- Proper time, and
- Instinctive or natural tendencies.<sup>[9]</sup>

Recognising the importance of '*Prāṇāḥ*', *Bhāvamiśra* has enumerated and specified the role on growth and development of the foetus in respect of its viability. According to him, the '*Agni*' (energy element), '*Soma*' (liquid element), '*Mahi*' (solid element), '*Vāyu*' (gaseous element), '*Nābha*' (the space element), the '*Sattva*', '*Rajas*' and '*Tamas*'; '*Pañcendriyāṇi*' (five sensory organs) and '*Bhūtātma*' (embodied consciousness) have been stated as '*Prāṇāḥ*' and said to contribute the viability in foetus. *Suśruta* has also enumerated the same number of '*Prāṇāḥ*' and linked their role to life principle of the foetus.

## CONCLUSION

From the preceding description, it is clear that a fully grown embryo is not only the outcome of the mere conjugation of sperm and ovum but there are many other factors which contribute a lot in this respect. After fertilisation and implantation, it is the nutritional supply, the role of placenta and inherited genetic factors, which contribute and control the growth of an embryo and foetus according to modern science.

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