Role of preconceptional diet according to Ayurveda: a critical analysis

Sujata K. Shamkuwar∗, M.B.Pillewan†, yogita Shriwas∗, Pratibha Baghel∗

1. Assistant professor, Department of Prasutitantra evum stree roga, faculty of Ayurveda, Government Ayurved College, Jabalpur, India.
2. Professor, Department of Basic Principle, faculty of Ayurveda, R.D.Memorial Ayurved College, Bhopal, India.
3. Professor, Department of kaumarbhriya, faculty of Ayurveda, Ayurved College, Durg, India.
4. Assistant professor, Department of Kriya sharir, faculty of Ayurveda, Government Ayurved College, Jabalpur, India.

*Corresponding author: suju_248@yahoo.co.in

ABSTRACT:
Preconception nutrition is a vital part of preparing pregnancy. Malnutrition can adversely affect the division and replication of cells in the embryo at preimplantation stage in which cells divide and replicate most rapidly. It may cause restricted fetal growth, LBW, missed abortion, congenital anomalies etc. In present era faulty life style, dietetic habit, environmental factors contribute in lowering the fertility rate in male as well as females. Nutritional diet before, during and after pregnancy is very important for healthy progeny. Ayurveda describes specific diet for male and female under the title garbhadhansanskar for healthy baby. Recent studies also show that the nutrition and fertility is linked to both the male and female.

Key words: Ayurveda, garbhadhansanskara, nutrition, fertility.

INTRODUCTION:
Planning for a baby is such a lovely experience for both the mother and father. It is a part of real fulfillment of married life. According to Ayurveda proper preparation is an essential prerequisite for a healthy progeny. Sushrut samhita, one of the Ayurveda’s prime texts describes that a co-ordination of four factors of ritu (proliferative phase including ovulation), kshetra (healthy womb/female reproductive system), ambu (nutritional elements of the body), beeja (healthy sperm and ovum) and proper observance are necessary for the conception and development of a healthy child just as proper season (ritu), good soil (kshetra), water (containing nutrient matter) and vigorous seeds (beeja) together with proper care, helps in germination of strong and undiseased sprouts. A child which is a fruit of such conception is destined to be beautiful of vigorous health, generous, long lived, virtuous, and attached the good of its parents and capable of discharging is parental obligation. Lacuna in above four factors definitely contribute in lowering the fertility or complicated pregnancy, missed abortion, congenital anomalies etc. So to overcome such complication our stalwarts indicates special food for male and female before conception.

Maharshi Sushruta opines that a man should properly lubricate his body with ghrita then partake food composed of boiled shali rice with ghrita and milk and then visit the bed of his wife who has lubricated her body with oil, partake food largely composed of oil and Masha pulse and then meet her husband at night. Maharshi Charaka also mentioned that the man should use ghrita and milk medicated with the drugs of madhura varga (sweet/anabolic drugs) and the woman should consume oil and Masha after the purifying measures and before coitus. Vagbhta II has specified ghritas as phalaghrita and mahakalyanaka ghrita for woman; commentators have explained that the madhura drugs increase shukra and pitalla drugs rakta.

AIM
1. To establish the effect of diet described in classics before conception on fertilization and pregnancy outcomes

OBJECTIVES
1. To ensure a normal pregnancy and delivery of a healthy baby without any obstetric complications.

MATERIAL AND METHODS
Ayurvedic literature regarding garbhodhansanskar, garbhiniparicharya (antenatal care) and its importance before and after conception was searched thoroughly. Similarly its effect on fetal well being was also studied. Other books, research journals and publications related to the topic were also reviewed. Books related to pharmacology of Ayurvedic drugs and related research papers also searched for their mode of action. Other research journals, papers, books related to infertility, conception, pregnancy are also explored to collect the matter.

**DISCUSSION**

Recent studies illustrate that nutrition and lifestyle factors play a critical role in the normal function of the reproductive system. Ayurveda indicates ghrita,milk,shali rice, madhura varga drugs specially for male where as taila(tila taila/sesame oil), Masha (urad daal) in female before conception. The drugs described for male are madhura (sweet), snigdha (unctuous) and sheeta (cold) quality and shukra is also homogeneous with the drugs on the basis of qualitative aspect. Similarly the drugs described for female are hot in potency which is homogeneous with the property of artava i.e. aagneya property.

**Diet for male**

**Ghrita**-The ghrita described in classics is cow ghrita. It is the best in all unctuous substances. Cold in potency and sweet in taste as well as vipaka.It improves memory, intelligence, digestive fire, semen, oja, kapha and meda. Allivates vata, pitta and vishva (toxic condition), useful in painful condition of female genital tract.

The ghrita contain significant level of vitamin A, E, D, B12, high amount of DHA which is the most popular omega 3, omega 6 fatty acid conjugated with linoloic acid and butyric acid, small amount of Vitamin K:

Vitamin A is an essential factor for spermatogenesis. Its deficiency causes replacement of the epithelia of epididymis, prostate and seminal vesicle by stratified squamous keratinizing epithelium and decreased testosterone production. Recent studies have shown that retinoids affect the three types of cell i.e. sertoli, germinal and Leydig cells in fetuses. Approximately 30-80% of infertility cases are caused by oxidative stress and decreased level of seminal total antioxidant capacity .Vitamin E is very good antioxidant, it reduces the sperm DNA damage, improves the number, motility, morphology and sometimes DNA integrity of sperm. It neutralizes free radicals and protects cellular membrane against O2 free radicals .It protects sperm from ROS, also prevents lipid peroxidation and therefore improves functions of other antioxidants. It inhibits production of ROS in infertile man. Nutritional deficiency contributes to male infertility.

Dr Elisabeth Lerchbaurn, from medical university of Graz, has led much research on the effect of vitamin D supplementation in different aspects of male and female fertility. Vitamin D supplementation can improve semen quality, fertility outcomes and testosterone concentrations. Recent studies suggest that Vitamin D supplementation could be beneficial for couples undergoing IVF (European society of endocrinology May 23, 2017). Studies shows that Vitamin D with Vitamin K2 (menaquinone a form of vitamin K) work in tandem relationship to improve metabolic health. K2 boosts testosterone by steroidogenesis. It is also found in gonadal tissue. The diet which boosts their levels finds dramatically higher testosterone level.

Vitamin B12 also has the positive effect on semen quality in primarily increasing sperm count and secondarily enhancing sperm motility and reducing sperm DNA damage. In human there is a strong correlation between sperm motility and sperm membrane DHA concentration. DHA plays a role in the formation of a structure called the acrosome of the head of the sperm. Acrosome is the pointy cap like structure containing enzymes that break through the egg’s outer layer enabling the sperm to fertilize it. Without DHA membrane fusion doesn’t happen. If the vesicle doesn’t fuse, the acrosome doesn’t get made and sperm maturation halts.

**Madhur varga dravyas**- This class consists of the drugs which are madhura (sweet) in taste, snigdha (unctuous), sheeta veerya (cold in potency). The drugs are congenial to the body, improves rasa (body fluid), rudhira (blood), mansa (muscles/flesh), meda (fat), asthi (bones), majja (bone marrow), shukra (semen), ojas, improves life expectancy, soothing the six sense organs, improves strength, immunity, and skin complexion. They balance pitta, toxicity and vayu.

**Shali rice (oryza sativa)**-These type of corn are cold in potency, sweet in taste as well as vipaka (taste conversion after digestion). They improve the body weight, increase sperm production, diuretic, balances all
three doshas\textsuperscript{16}. \textit{Rakta shali} is the best variety of shali rice. It is a good source of vitamins and minerals such as magnesium, selenium, copper, niacin, thiamin, iron, riboflavin, calcium, possesses high fiber and lesser amount of sugar content. These are rich in antioxidants, higher level of proteins with well balanced amino acids and higher contents of fat, vitamin E\textsuperscript{17}. Vitamin E is the best antioxidant for the removal of oxidative stress in the male reproductive system. The use of selenium and Vitamin E has the synergetic effect. The deficiency of these leads to degeneration of germinal epithelium and Leydig cells in seminiferous tubules. They enhance the functions of testes and epididymis by increasing their weight\textsuperscript{18}. Calcium is crucial regulator of many physiologic process in every living cell, including spermatozoa. Ca\textsuperscript{2+} is the trigger of the acrosome reaction in mammalian spermatozoa, it is differentially involved in sperm motility on the stage of sperm maturation. The prostate, seminal vesicles and epididymis are also very rich in calcium\textsuperscript{19}. Magnesium may play a role in sperm motility. It is a marker in seminal vesicle secretions and acts as an intracellular calcium antagonist\textsuperscript{20}. There is evidence that zinc in seminal plasma influences sperm oxygen consumption\textsuperscript{21}, nuclear chromatin decondensation\textsuperscript{22}, and acrosin activity\textsuperscript{23}. Zinc deficiency causes hypogonadism\textsuperscript{24} and it is thought to be important in the stabilization of sperm chromatin\textsuperscript{25}. The ionic form of copper (cu\textsuperscript{+}) is highly toxic for sperm. The only way copper normally enters mammals and other terrestrial vertebrates is via alimentary tract. Copper is an important element for numerous metalloenzymes and metalloproteins that are involved in energy or antioxidant metabolism\textsuperscript{26}.

Iron is essential for many metabolic process including DNA, RNA, and protein synthesis, formation and maintenance of mylin. Physiological level of iron is required for normal spermatozoa production. In general semen contains certain amount of Fe, and Fe content of seminal plasma is important for the preservation of sperm motility and viability after ejaculation, its presence in seminal plasma helps spermatozoa to maintain their functions. Study shows that after correction of iron deficiency anemia there is significant enhancement of sperm parameters coupled with increased serum concentration of testosterone, LH, and FSH\textsuperscript{27}.

Diet for female

\textbf{Taila-} Taila indicates tila taila i.e. sesame oil. Maharshi Charaka opines that of all varieties of oil sesame oil is best for improving strength and imparting oiliness of the body\textsuperscript{28}. He describes the properties of taila that it pacifies vata, and improves strength, hot in potency, cleanses genital organs\textsuperscript{29}. The sesame is \textit{snigdha} (unctuous), \textit{ushna} (hot in potency), \textit{madhura} (sweet) \textit{tikta} (bitter), \textit{kashay} (astringent), \textit{katu} (pungent) in taste. It is good for skin, hairs, improves strength and immunity, aggravates pitta and kapha, vyavayi (undergoes chemical change after it is pervaded all over the body)\textsuperscript{30}.

As per \textit{Bhavaprakasha} black variety of the sesame is best than the white. It is shukrala, and contains more calcium, vitamin K, magnesium, copper, phosphorus, iron, zinc and vitamin B\textsubscript{1}\textsuperscript{31}. It is rich in vitamin E hence acts as a natural antioxidant and prevents cellular damage. It helps to increase endometrial thickness, glandular epithelial growth, development of vascular endothelial growth factor protein expression in the endometrium\textsuperscript{32} and makes a bed to implant the embryo, healthy amniotic sac, hormonal balance, prevents premature rupture of membrane. Vitamin E has been able to decrease miscarriage rate and to increase IL-6 placental levels, while increasing VEGF (vascular endothelial growth factor) placental levels\textsuperscript{33}, able to avoid an inflammatory condition of endometrium which is one of the cause in a low embryo implantation rate and allow viability of embryo\textsuperscript{34}. Vitamin E deficiency during pregnancy may cause miscarriage, preterm birth, pre-eclampsia, and IUGR (intrauterine growth restriction)\textsuperscript{35}. It improves uterine radial artery blood flow, endometrial thickness and may be useful for the patients with a thin endometrium\textsuperscript{36}. Decreased concentration of phosphorus, magnesium, calcium may be a cause of threatened abortion\textsuperscript{37} so the diet rich with these vitamins will definitely improve fertility rate and helps in implantation. Low Vitamin K level leads to higher miscarriage rates and birth defects\textsuperscript{38}, it boosts insulin sensitivity. Supplement of zinc restores the fertility\textsuperscript{39}, its deficiency in pregnant experimental animals limits fetal growth and if severe, causes teratogenic anomalies. Transfer of sufficient zinc to the fetus is dependent on maintenance of normal maternal serum zinc concentrations\textsuperscript{40}. Northern scientists, working with mice discovered that healthy eggs need a tremendous amount of zinc to reach maturity and be ready for fertilization.
Zinc helps the egg exit from a holding pattern to its final critical stage of development.

Masha (urad daal/black gram/vigna mungo)-It is excellent aphrodisiac, pacifies vata, hot in potency, uncutuous, sweet in taste, gura i.e. heavy to digest. It improves strength, bulk of feces and fertility quickly. It contains small amount of isoflavones, excellent source of B-complex vitamins such as B6, thiamin, pantothenic acid, riboflavin and niacin, folates. Folates along with vitamin B-12 is one of the essential factor for DNA synthesis and cell division. Urad beans also incredible sources of minerals like iron, calcium, copper, magnesium, zinc, phosphorus.

Adequate folate diet around conception and during pregnancy may help to prevent neural tube defects (NTD). NTD stands for spina bifida, anencephaly, enencephaly, cephalocoele in the fetus. The cause of these anomalies is failure of spinal cord to properly develop together with their protective shield of skull and spine, around the 4th gestational week. Supplementary intake of folic acid during preconception period and throughout pregnancy has a preventive effect on its recurrence. Inadequate intake of folic acid is also connected with preterm delivery, intrauterine growth restriction, placental abruption and infarction.

CONCLUSION:
Ancient stalwarts of Ayurveda were really much aware about the maternal care and healthy progeny. They describe diet before conception for male and female which is homologous to the properties of shukra and aartava respectively. According to Ayurvedic principle samanena samanasya vidhibhi this diet is helpful to improve semen parameters as well as ovulation and the factors responsible for conception. It is rich with various vitamins and minerals which are essential to improve fertility, ovulation, and proper environment for embryo. Healthy and balanced diet will help to boost fertility levels. At present clinical trials and interventions trials have suggested that dietary supplementation with several nutrients may improve health outcomes for mother and offspring. Some studies have found a number of apparent benefits from taking prenatal vitamins, including reductions in heart, neural tube and other birth defects. The same thing is described by Ayurveda thousand years ago through dietary supplement. However further study is very much necessary to prove this fact.

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