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GARBHOPGHATAKARABHAVAS: ANCIENT TERATOLOGY

[1]Jaiswal Vaibhav
[1]Senior resident,Dept. of kaumarbhritya/Balroga Faculty of Ayurveda, IMS, BHU India.

ABSTRACT

Teratology is the study of abnormal development or congenital malformations, which may be caused by exposure to various chemicals, physical factors and environmental factors. In Ayurveda, the description about the congenital birth defects has been mentioned in many places**.** Ayurveda has also given some quotes on the anomalies or congenital defects precipitating in the fetus and stressed on factors that attached to the defective Shukra (sperm), Shonit (ovum), Aatma (Soul), Kaal (time) and AaharVihar (habitat and dietetic regimen of the mother).Alterations of morphogenesis**,** Alterations of CNS function**,** other functional impairments**,** Death of the conceptus, embryo, or fetus**,** Prenatal-onset growth deficiency**,** Carcinogenesis are teratogenic effect seen in human.These all type of descriptions by ours Acharyas strongly suggests that they have got knowledge about the teratogens.

Key words: environmental factors, congenital defects, fetus.

INTRODUCTION: Congenital birth defects induced by maternal exposure to various exogenous agents during pregnancy are preventable, if these agents are identified and avoided. In Ayurveda there are various precautions described in pregnant lady to avoid any malformation or defect in progeny. According to Ayurveda, a pregnant lady should take precautions and exposure to GarbhopaghatakaraBhavas (factors) should be avoided for any abnormility in fetuses. (Ch.Sa.4/18).

Ancient aspect: In Vedic and other contemporary literature the matter related to the abnormal growth and development in intrauterine life and congenital malformation have limited dealing in comparison to the description present in Ayurvedic literature Atharva Veda, ShatpathaBrahmana, YajnavalkaSmirti, MatsyaPurana and Garbhopanihada has mentioned some quotes regarding this.

Atharva Veda has described about the invisible factors available in the labour room, very close to woman (Pregnant) and which are likely to kill the fetus when it is partially delivered. A type of medicine have been advocated to kill or remove them (A.V. 18/6/19).

According to Garbhopanisada described about the Psychological state of women. Mental stress during pregnancy leading to congenital abnormalities like blindness, deformed body organs like vertebral column and dwarfism etc. in newborn baby. That type of description has a direct concern with true mental stress (Garbhopanisada /3).

The description of vedic literature about the infection, maternal causes, mental stress and other genetic and environmental factors establishing the relationship in between the teratogen and teratogenic changes in the fetus. That could be established with the teratological knowledge of the modern medical science. This information suggests the knowledge of Teratogenic factor during ancient period was well known.

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CharakaSamhita has also mentioned about the birth defects. In the ShariraSthana, about the defects in impairment of the shape, color, sensory as well as motor organs of the offspring. Description of the Dviretas, Pavanendriyatva, samskaravahi suggest that at that time congenital birth defects were also present.According to Charaksamhita the pregnant lady should avoid use of drugs of high potency, Vyavaya (sexual intercourse), and Vyayama (physical exercise) for pregnant lady (Ch.Sh.25/40).

In the SushrutaSamhita mentioned about some works, act causes, which can cause congenital defect in fetus.The pregnant woman should avoid copulation, physical exercise, too much of excessive diet or attinuation (making the body very plumpy or very emaciated respectively), sleeping during day and keeping awake at night; grief, riding on animals/vehicles, fear, sitting on her heels for long periods, indulging in oleation and other therapies, blood letting at unsuitable time and suppression of the urges of the body (of urine, faces, flaws etc).(Su.Sh.3/16). All the above factors vitiate the doshas of the pregnant lady, in turn, the affected doshas can cause injury or trauma to the same parts of the foetus as the same type injury mother has got (Su.Sh.3/17).

Pregnant lady should avoid **Garbhopghatakarabhavas** (the factors which can destroy the fetus) for avoiding any injury to the fetus like all the types of heavy, excessive hot, bitter taste food and violent exercise. She should not were red clothes in order to prevalent the (attacks of) gods, demons and their followers. She should not take intoxicating wines, ride over vehicles, eat meat, should abstain completely from the things which are unfavorable to all the sense organs and many others which (elderly) woman know.(Ch.Sh.4/18)

In Astangsangraha, Vagabhatta has also described about the birth defects. According to him Doshas get vitiated and causes defect in the fetus.When vãta, develops upward movement (which is abnormal) and dries up the channels of rasa in the foetus, the future child will be either a patient of vãtarogaor one born with deficient/poorly developed parts; or it (the foetus) may even remain inside the abdomen for many years.(A.Sa.Sh.2/20).If the pregnant women indulges constantly in foods and activities which cause increase of Vãta, then Vãta getting increased abnormally, travels all over her body and also in the uterus, and produces many diseases of Vãta origin in the child; the child may become inactive, deaf, mute, of nasal speech, stammering, lame, hunch-back, dwarf, of deficient organs (in number) or of extra organs or any other Väta diseases. (A.Sa.Sh.2/34).

MaharsiKashyap has indicated the adverse effect of the smoking of the mother during her prenatal period. In his opinion such activities are likely to produce congenital abnormalities blindness, sickness, discoloration of the new born baby and even Garbhapata or abortion. (Kashyap/chi. 10/20)

These all type of descriptions by ours Acharyas strongly suggests that they have got knowledge about the teratogens and what is the outcome of that. So they have also told about the precautions should

be taken by pregnant women to avoid these untoward effects. In modern science they also described agents such as Physical, chemicals, envoirmental etc that can causes teratological effects.

Modern aspect: The history of teratology goes back a long way.Teratology as a descriptive science starts with written language,a marble sculpture from southern Turkey dating back to 6500 B.C.,depicts conjoined twins and the prehistorian painting of Peruvian pottery, 5000 year old Egyptian paintings and the Chaldean tablets recorded by the Babyloneans 4000 years ago displayed in the British museum in London are some of the earliest pictorial and written records of man's recognition of Congenital malformation. (Wilson,1973;Warkany1977)

The earliest foundation for teratology were laid down by St.Hilaire(1822), followed by Dareste(1877) who is also known as father of experimental teratology.

Alkaptonurea was the first human anomaly to be identified on hereditary basis (Garrod 1902).Until the early 1940's, it was assumed that congenital defects were caused primarily by hereditary factors. With the discovery of Gregg 1941 that German measles affecting a pregnant woman during early pregnancy caused abnormalities in the embryo like congenital cataract, it become evident that congenital malformation in human could also be caused by envoirmental factors.

Thalidomide represents the 1st case of a substance producing minimal toxicity in the adult but considerable toxicity in the fetus (Lenz, 1966).

Along with this new awareness of the in utero vulnerability of the developing mammilian embryo came the development and refinement of*the six principles of teratology* which are still applied today. These principles of teratology were put forth by Jim Wilson in 1959 and in his monograph "*Environment and Birth Defects*." These principles guide the study and understanding of teratogenic agents and their effects on developing organisms:

1. Susceptibility to teratogenesis depends on the genotype of the conceptus and the manner in which this interacts with adverse environmental factors.
2. Susceptibility to teratogenesis varies with the developmental stage at the time of exposure to an adverse influence. There are critical periods of susceptibility to agents and organ systems affected by these agents.
3. Teratogenic agents act in specific ways on developing cells and tissues to initiate sequences of abnormal developmental events.
4. The access of adverse influences to developing tissues depends on the nature of the influence. Several factors affect the ability of a teratogen to contact a developing conceptus, such as the nature of the agent itself, route and degree of maternal exposure, rate of placental transfer and systemic absorption, and composition of the maternal and embryonic/fetal genotypes.
5. There are four manifestations of deviant development (Death, Malformation, Growth Retardation and Functional Defect).
6. Manifestations of deviant development increase in frequency and degree as dosage increases from the "No Observable Adverse Effect Level" (NOAEL) to a dose producing 100% lethality (LD100).

Characterization of teratogenic exposures involves the specific agent, the dose of the agent, the gestational age, and other factors

such as genetic susceptibility. (Friedman et. al.2002).Characterization of teratogenic effects includes general effects such as death of fetus, growth retardation, visible malformation and functional disorder along with specific effects like carcinogenesis and recognizable syndromes, magnitude of risk (absolute, relative) and prenatal diagnosis (invasive and non-invasive techniques). (Friedman et. al.2002)

Any drug or chemical given to the mother will cross the placenta to some extent unless it is destroyed or altered during placental passage or its molecular size or lipid solubility limits transplacental transfer. The onset of this placental transfer starts at the fifth embryonic week to seventh gestational week. For drugs or chemicals with low molecular weight, the transplacental passage to fetus is based on the concentration gradient. (Wilson 1977)

There is no specific constellation of fetal/neonatal signs and symptoms that is pathgnomonic of infection. Each infectious agent, depending on time of exposure and viral host interactions, can result in a diverse range of manifestations. (Friedman et. al.2002)

Teratogenic Exposures: There are many factors, which are responsible for the teratogenic changes. They are teratogenic agents,drugs dosage to embryo or fetus and period of pregnancy.

(a) Agent: Teratogenicity also depends upon the,nature of the chemical, physical or infectious agent, inherent developmental toxicity, and thecapacity to produce other kinds of toxicity in the mother

(b) Dosage to embryo or fetus: Teratogenicity may occur due to single, repeated, or chronic exposure, duration of exposure. Other factor also influences the teratogenicity such as maternal dose, maternal route of exposure, maternal absorption, maternal metabolism and clearance as well as, placental transfer

(c) Period of pregnancy: Exposure of specific teratogen during First, second or third trimester may lead to development of congenital anomalies. In other words, specific congenital anomalies may be result of teratogenic drug exposure between conception and onset of embryogenesis, during Organogenesis and Fetal period

Other factors: areGenetic susceptibility of mother**,** Genetic susceptibility of the fetus**,** Other concurrent exposures**,** Maternal illness or other condition associated with exposure**,** Availability of tests to quantify the magnitude of maternal exposure

Teratogenic effect:

General effects: Alterations of morphogenesis**,** Alterations of CNS function**,** other functional impairments**,** Death of the conceptus, embryo, or fetus**,** Prenatal-onset growth deficiency**,** Carcinogenesis

Specific effects: It includes recognizable syndromeandOther distinctive features

Magnitude of risk: are absolute (death)andrelative

Prenatal diagnosis: Prenatal diagnosis of suspected /expected congenital anomalies can be made by Detailed ultrasound examination, Amniocentesis or other invasive method, availability, reliability and utility

CONCLUSION: These all type of descriptions by ours Acharyas strongly suggests that they have got knowledge about the teratogens and what is the outcome of that. So they have also told about the precautions should be taken by pregnant women to avoid these untoward effects. In modern science they also

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Corresponding Author:Dr.Jaiswal Vaibhav
Senior resident Dept.of kaumarbhritya
Faculty of Ayurveda,IMS,BHU India.
Email id:drvaibhav29@gmail.com

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