

**REVIEW ON NATURAL TERATOGENS****Neelmani Chauhan*, J. E. Rachel Nivedita, S. Sravanthi**

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Corresponding Author*Neelmani Chauhan**Gyana Jyothi College of
Pharmacy, (Uppal Bus
Depot, Hyderabad).**ABSTRACT**

The aim of this study was to present the implications of the use of herbs during pregnancy, pointing out those that should be avoided during this condition because of their abortifacient and/or teratogenic potential. Many poisonous range plants common in the diet of domestic livestock possess teratogenic potential. Some congenital deformities, once thought to be of genetic origin, are now known to be caused by the teratogens of these plants. The period of maternal ingestion required to produce congenital defects varies among plants, from a single dose on one day to prolonged periods of one to two

weeks. Knowledge of the duration of maternal ingestion required for the teratogenic effect to be realized has aided in formulating postulates on the mechanism of action. In some instances, the teratogens have been isolated and structurally characterized, permitting further postulation on the mechanism.

KEYWORDS: Teratogens, pregnancy, natural plants, fetus.**INTRODUCTION**

Excessive and irregular use of drugs during pregnancy can have adverse effects on fetus.^[1-5] Meanwhile, excessive use of medicinal plants can cause toxic effects on the fetus.^[6] There are no definite or specific guidelines for use of most plants or nature-based products in many countries, while such substances can cause adverse effects on either pregnant women or fetuses.^[7]

Besides that, there is scant evidence on the side effects due to use of the medicinal plants and nature-based products during pregnancy.^[8] Birth defects represent one of the dangerous side effects of herbal drugs mainly due to misconception that using such drugs is harmless. Declined quality of life, stigma, adverse effects on social relationships, psychological

diseases and pressure are some of the consequences of birth defects experienced by parents and affected children^[9-13]. In addition, some plants can cause abortion and even endanger maternal health in some cases^[15] such that some mothers may experience certain problems such as psychological trauma, anxiety, emotional problems, declined life satisfaction, and depression after unwanted abortion.^[16-18] Indeed, some users may be unaware of the abortive effects of these plants, and no information on the medicinal plants is usually provided for physicians. Therefore, having inadequate knowledge about this field has caused numerous problems among women who have spent tremendous costs on pregnancy or are planning for pregnancy.^[19,20]

TERATOGENS

A teratogen is defined as any agent that results in structural and functional abnormalities (malformation) in the fetus, or in the child after birth, as a consequence of maternal exposure during pregnancy. They can do direct damage to fetus, causing abnormal development.

Teratogens are the substance that may produce physical or functional defects in human embryo or fetus in a variety of ways, such as duration of exposure, amount of teratogenic substance and the stage of development of embryo or fetus during exposure.

They effect the embryo or fetus in a number of ways, causing physical malformations, problem in behavioral or emotional development of child and decreased intellectual quotient (IQ) in child.

Teratogens are classified into 4 types

- 1) Physical agents
- 2) Metabolic conditions
- 3) Infection
- 4) Drugs and chemical

Causes of teratogenesis

Abnormal development may be caused by errors in genetic programming, from environmental agents/ factors or from unknown causes that interfere with the development.

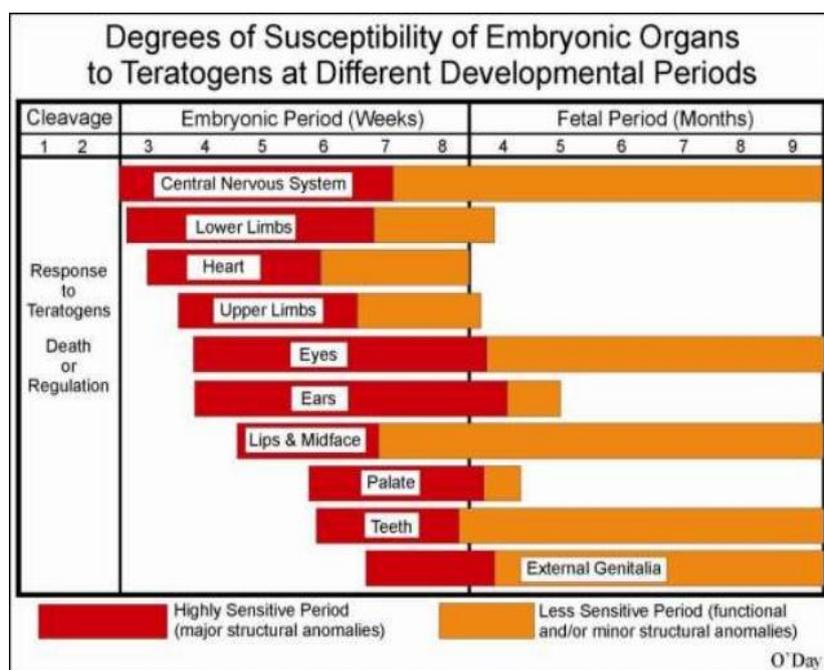
About 7% of all live birth defects are due to prenatal exposure to radiation, environmental factors and drugs and chemicals. Abnormalities caused by genetic events, e.g. mutation in genes, structural changes in chromosomes and aneuploidies, etc are called malformations.

Abnormalities caused by environmental agent are called disruptions. The environmental factor may be biological (eg viruses and parasites) or non biological such as physical factors (temperatures, radiations) and chemical factors (drugs and chemical and nutritional imbalance).

Agents responsible for disruption are called teratogens. Mutagens and carcinogens are the causes of abnormal development but their mode of action differs. Teratogens are the agents that affect embryo at dose level.

There was reportedly 510,000 deaths in 2010 due to congenital defects. Of all the birth defects, teratogens constitute to about 10% and other factors include genetic defects, poor maternal nutrition, infection and environmental toxins.

Some environmental toxins like lead (found in paints), mercury (neurotoxin found in seafood), ionizing radiation, air pollutants, pesticides among others that the mother is exposed to are also potent teratogens.



Plants and phytochemicals with teratogenic side effects

Asparagus racemosus: methanolic extracts can cause gross malformations in fetus, can increase the rate of re-absorption in fetus and may also cause intrauterine growth.

Astragalus – used in herbal medicine and also in traditional Chinese and Persian medicine reported to contain teratogenic substance.

Caffeine –naturally occurring stimulant found in man food, beverages and plants. Some studies have shown in combination with alcohol and smoking may cause miscarriages.

Colchicum autumnale – used as medicine and in cancer treatment

Datura stramonium – used for asthma treatment due to presence of atropine

Indigofera spicata – used as an analgesic and anti-inflammatory drug

Lavandula officinalis: A study investigated the rate of bone anomalies due to antiepileptic drugs and *L. officinalis* comparatively. This study demonstrated that both the essential oils of this plant and phenytoin caused femoral and tibial abnormalities and affected other growth factors negatively, and finally increased the number of abnormal fetuses in mice, but the side effects induced by phenytoin were much more severe than those due to *L. officinalis*.^[21]

Lawsonia inermis: The pulverized dried leaf of *L. inermis* is used as a cosmetic product in Iran. Seven-day administration with 100 mg/kg hydroalcoholic *L. inermis* extract caused parietal bones not to develop and extra ribs to develop in mice fetuses.^[22]

Lupinus – food and health related **Malus domestica** (Apple) seeds and **Prunus cerasus** (Cherry) seeds have cyanogenic glycosides that are fatal to even adults.

Perovskia abrotanoides: *P. abrotanoides* has several uses in Iranian traditional medicine including treatment of parasitic infections. The ethanolic extract of this plant causes certain anomalies such as spina bifida, aglossia gastroschisis, polydactyly, and tarsal extensor as well as skeletal anomalies. However, the induced maternal toxicity was not highly severe in the studied groups.^[23]

Solanum tuberosum (potato), **Solanum melongena** (eggplant), **Lycopersicon esculentum** (tomato): contain solanidanes and spirosolanes that are suspected teratogens that are present in the edible plant parts(see below for references). Apart from that, the green tubers that develop due to exposure to sunlight during their development contain glycoalkaloid solanine that can cause nervous disturbances apart from another toxin, chaconine.^[24]



Potatoes also feature in the list of teratogens; these are home grown and a couple of them have the greenish tinge marking the presence of glycoalkaloid, solanine

Senecio - contains biocides in the form of alkaloids.

Sena (*Senna alexandrina* Mill - Fabaceae): this plant species is part of the formulation of numerous products on the domestic market, both in presentations and, the risk of fetal loss, and may pass *Senna alexandrina* mainly used in treatment of constipation. It is known that constipation problem is very common problem with pregnant women and the use of laxative anthraquinones are very dangerous because the ingredient can induce uterine contraction, increased blood flow to uterus and its risk to fetal loss.

Silymarin: Silymarin is a plant-based compound. One of the main constituents of silymarin, named milk thistle, has many uses in Iranian traditional medicine including treatment of liver diseases. In addition to inducing weight loss, this plant-based compound caused craniofacial, limb, and vertebral column malformations in mice fetus. In addition, silymarin caused growth restriction in the mice and therefore should be cautiously prescribed during pregnancy.^[25]

Sorghum – used as food, fodder and biofuel

Vinca rosea – contains vinblastine and vincristine used for chemotherapy

Veratrum – used in cancer treatment but contains cyclopamine, a teratogen

HESA-A: HESA-A is a combination of aquatic plants consisting of *latisulcatus* (king prawn; family: Penaeidae), *Carum carvi* L. (Apiaceae), *Penaeus* (Melicertus), and *Apium graveolens* L. (Apiaceae). This plant has antitumor and cytotoxic properties. However, Moallem *et al.*, studies demonstrated that HESA-A displayed teratogenic effects at 50, 100, 200, 400, and 800 mg/kg^[26], and 20 and 40 mu/L^[27] in mouse fetus.

CONCLUSION

This was a small sample of medicinal plants that can be potentially toxic to pregnant women, refuting the idea that natural products do not produce any health risk. regarding the safety of

these products during pregnancy, information and reliable data are scarce and often contradictory. In this sense it is critical to conduct studies like the present work, which provides an overview of what we have available in the literature. conduct studies like the present work, which provides an overview of what we have available in the literature.

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