



## ANTI-TERATOGENIC EFFECT OF *Haridra* (*Curcuma longa*)

**Niranjana R N<sup>1</sup>, Nataraj H R<sup>2</sup>, Soniya M P<sup>3</sup>, Dr Akarsha Krishna S<sup>4</sup>**

<sup>2</sup>Associate Professor and Guide, <sup>1,3,4</sup> II Year PG scholar,  
 Department of Agada Tantra.

Sri Dharmasthala Manjunateshwara College of Ayurveda and Hospital, Hassan, Karnataka

### ABSTRACT

Pregnancy is a period of vulnerability, as the developing foetus is highly susceptible to external factors. Teratogens, substances that disrupt fetal development, cause risks during pregnancy. This study explores the impact of teratogenic exposure, encompassing factors such as the type, duration, dosage, and gestational age. Noteworthy teratogens include alcohol, cigarettes, drugs, and certain medications like antiepileptic drugs. Infections (TORCH), environmental toxins, and chronic illnesses like diabetes also contribute to complications. The first eight weeks of pregnancy is vulnerable to teratogenic effects, aligning with organ and system development. This critical period necessitates increased caution. *Haridra* (*Curcuma longa*) commonly known as turmeric, emerges as a potential mitigator. *Haridra* is one of the *Vishaghna dravya* mentioned in Ayurveda texts. Curcumin, a compound in turmeric, exhibits protective properties against teratogenic agents, as evidenced by recent research. Beyond its teratogenic role, turmeric boasts nutritional significance. With 138% of Vitamin B-6, 32% of Niacin, 43% of Vitamin C, and 21% of Vitamin E, it provides a rich array of essential vitamins. Minerals like potassium, iron, manganese, and zinc contribute to its nutritional profile, while the absence of cholesterol aligns with healthy dietary choices. Further analysis reveals turmeric's composition per 100 grams, including 53% dietary fiber, 13.1% moisture, 6.3% protein, 5.1% fat, and 69.4% carbohydrates. Additional components include calcium, phosphorous, carotene, thiamine, and niacin, with a calorific value of 349. Notably, research emphasizes curcumin's pharmacological actions, such as anti-inflammatory, antioxidant, anti-diabetic, antibacterial, hepatoprotective, and anticancer properties. In conclusion, understanding teratogens is crucial for prenatal care. While teratogenic exposure cause risks, especially in early pregnancy, the protective effects of curcumin found in turmeric offer a promising avenue. Integrating turmeric into the diet during pregnancy may not only provide nutritional benefits but also contribute to mitigating teratogenic risks, promoting maternal and fetal health.

**KEY WORDS:** *Tearatogens, Pregnancy risks, Haridra, Protective effects.*

### INTRODUCTION

Teratogenicity refers to capacity of a exogenous agents to cause fetal abnormalities when administered to the mother at stage of pregnancy. Teratogens are environmental agents such as drugs, viruses, lack of nutrients, and physical or chemical elements that upon contact with embryo/fetus can cause congenital anomalies, generating permanent functional or morphological changes in the newborn. The effect of teratogen is related to type of agent, dose and duration and time of exposure. Every year millions of different chemicals are produced and used in the world which contaminate environment and these are exposed to human. These chemicals have ability to penetrate into human tissue and developing fetus, negatively impacting the reproductive health of human<sup>1</sup>.

Birth defects constitute the fifth largest cause of death in the newborn babies in our country. Globally, congenital anomalies affect 2–3% of births. In India, 1–3 out of 100 babies are born with birth defects accounting for 27million babies being born with birth defects each year. The risk of teratogens to a developing fetus is often early in the pregnancy, usually the first trimester and often before implantation. The first half of pregnancy is the most vulnerable<sup>2</sup>. Managing pregnancy complications requires addressing inflammation and oxidative stress. While NSAIDs and glucocorticoids are effective, their adverse effects on the mother and fetus limit their use. The challenge lies in finding safe alternatives for conditions like Preeclampsia, Fetal growth retardation, Gestational DM, and preterm birth.

### A list of some Teratogenic agents causing Birth defects

Natural Teratogens	Poisonous plants, Ionizing radiations
Pharmaceutical Teratogens	Thalidoamide, Tetracycline, Streptomycin, Pencilin, Warfarin, Valproic acid, Diethylstilbestrol, Retinoic acid,
Industrial Teratogens	Lead, Methyl, Mercury, Arsenic, Cadmium
Microbial Teratogens	Treponema pallidum(Syphilis) , Cocksackia virus, Herpes simplex , Rubella, Cytomegalo virus(CMV)
Metabolic conditions in the Mother	Diabetes Mellitus, Hypertension, Auto immune disease (Rh incompatibility), Phenylketonuria, Dietary deficiencies, Malnutrition



## AIMS AND OBJECTIVES

To review the potential of *Haridra*, specifically curcumin, which alleviates teratogenic risks during pregnancy.

## MATERIALS AND METHODS

Collected from Online Journals, Ayurvedic literature, Research articles and journals.

## HARIDRA

*Haridra* (*Curcuma longa*) is a best *Vishaghna dravya* mentioned in *Ayurveda* classics having *Kushthaghna*, *Krimighna*, *Varnya*, *Pramehanashaka* properties.

## Guna Karma

Rasa	Katu, Tikta
Guna	Laghu, Ruksha
Virya	Ushna
Vipaka	Katu
Doshagnatha	Tridoshashamaka

- *Haridra* contains chemical constituents like Curcumene, Curcumenone, curcumin, curdione, cineole, curzerenone, curcumins, sitosterol.
- Curcumin, exhibiting antioxidant, anti-inflammatory, anti-allergic, antiseptic, blood cleansing properties<sup>3</sup>.
- In vitro and in vivo studies showed that curcumin positively modulates the main pathophysiological mechanisms involved in the most common complications related to pregnancy, including gestational DM, preeclampsia, Fetal Growth Retardation and preterm delivery.

## RESULTS AND OBSERVATION

- Curcumin, major component of *Haridra*(*Curcuma longa*), are widely used for culinary and therapeutic purposes. Studies showed that it is non-mutagenic, non-genotoxic, and generally safe in animals and humans.
- Curcumin, a natural compound, shows promise in safeguarding fetal development by countering adverse effects from substances like retinoic acid, polychlorinated biphenyls, lead, alcohol, arsenic, celecoxib, and mercury<sup>4</sup>.
- Oral administration, even at 6g/day for 4–7 weeks, reveals minimal toxicity, though some experience gastrointestinal upsets. While oral bioavailable curcumin formulations appear safe, additional research, especially on nano formulations and human pregnancy, is necessary for a comprehensive understanding of their safety profile<sup>5</sup>.
- Study was conducted to examine the effects of chlorpyrifos, a pesticide, and curcumin, an antioxidant, on the liver of pregnant rats during pregnancy showed chlorpyrifos causes damage by causing free radical formation in the liver during pregnancy and that curcumin, which has an antioxidant characteristic, has a protective effect on this oxidative damage<sup>6</sup>.

## DISCUSSION

- Understanding teratogens is crucial for prenatal care.
- While teratogenic exposure poses risks, curcumin in *Haridra* offers a promising avenue for mitigation.
- Use of *Haridra*(curcumin) in human diet is generally considered safe although more phytochemical studies of this natural product are needed to further evaluate its role in gametes maturation, fertilization and blastocyst development. Due to its multifaced role in regulating different signaling and the encouraging data obtained in animal models and in vitro studies, *Haridra*(curcumin) intake during pregnancy could be beneficial in the pregnancy complications.

## CONCLUSION

- In conclusion, recognizing teratogens is essential for prenatal care. The protective effects of curcumin in *Haridra* possess a promising approach to alleviate teratogenic risks during pregnancy, emphasizing the potential risk reduction.
- Studies highlight curcumin's ability to alleviate inflammation, oxidative stress, and insulin resistance, suggesting a role in improving pregnancy outcomes. It also modulates immune responses in bacterial infections and exhibits potential benefits in gestational diabetes and preeclampsia.
- However, additional research, particularly in human gestation, is necessary to fully validate its effectiveness and safety.

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