

# Study on *Cassia tora* to Combat Dental Fluorosis, Bones Deformations Therapeutic and Medicinal Properties for Making the People Healthy in Jharkhand

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**Abstract:-** The fluorosis is one of the geogenic contaminated drinking water borne diseases caused by the fluoride contamination in ground water. In India, 11.5 million people are at high risk due to fluorosis such as dental fluorosis and skeletal fluorosis across the 132 districts of 21 states. In Jharkhand mainly two districts, Garhwa and Palamu have the fluoride content in drinking water. So many technologies are available to remove the fluoride from the drinking water but not affordable to the poor people due to high cost. In place to this technology food substances should be included in the diet chart to combat the fluorosis so that poor people also access to get solution. We should include the foods rich in calcium or induces the absorption of calcium or directly eliminate the fluoride from our body in poor people diet to combat the fluorosis. In Jharkhand, the most affordable food is the green leafy vegetables called as “*Cassia tora*” or locally called “Chakor Ki Bhanji”. It is abundantly found in the Garhwa & Palamu districts of Jharkhand near the road side and mainly during the rainy seasons. This is the most affordable food to combat the fluorosis in Jharkhand. The use of “chakor ki bhaji” as vegetable is also in practices of the people. It would be the opportunity to minimize the menace of fluorosis in Jharkhand by using the leaves of *Cassia Tora* as vegetables and need to make aware people for use as alternatives of medicines. This leafy vegetable is most affordable food for poor people to minimize the fluorosis and also the farming of this medicinal plant in waste land would increase the income of farmers and also may be the commercial options for farmers as well as agri-entrepreneur.

**Keywords:-** Fluorosis, therapeutic properties like Antioxidant, Hypolipidemic, Hepatoprotective, Hepatoprotective, Antibacterial, Antitumor, Anti-inflammatory, Spasmogenic, Antinociceptive geogenic contamination, *Cassia tora*, Chakor Ki Bhanji, farmer's income.

## I. INTRODUCTION

Fluorine is the one of the most essential elements for the development of the bones and teeth of human beings. It is always found in the form of fluoride in nature with water, soil earth crust and food, but its excess is harmful to the human being and mainly causes skeletal fluorosis and non-skeletal fluorosis and dental caries. In India, 1.15 million are affected with fluorosis across the 12 districts of 21 states [1]. There are lots of fluoride removal technologies available in India but needs high skilled man power for operation and maintenance for these technologies. These technologies are not affordable for poor people due to high cost so some foods substances which are either in calcium rich or may induced absorption of calcium or may directly eliminate fluoride from our body may be included in the diet charts of poor people. The “*cassia tora*” is one of the leafy food vegetables, locally called “Chakor Ki Bhanji” is the most affordable food to combat the fluorosis for poor people. The farming of this rainy plant may be the options for the rural farmers as crops for the double income because this medicinal plant doesn't require more agri- input such as fertilizer and nutrients. This medicinal plant is also a rain-fed weed so does not require extra irrigation other than rain or monsoon. In this way, this weed may be taken as monsoon crops as medicinal or commercial farming for the double income. All parts of this medicinal plant such as leaves, seeds have medicinal properties.

The state of Jharkhand, the northwest locale of Palamu and Garhwa, fluoride in groundwater postures a noteworthy challenge. In 2003, UNICEF and the Birla Founded of Innovation overviewed water sources all through these locale for fluoride and found 833 of 3775 (22%) of water sources in Garhwa over the Indian passable constrain of 1.0 ppm, and 560 of 2864 water sources (20%) in Palamu over the fluoride restrain [2]. Duplicating the percent of water sources influenced by the crude populaces, one finds that the areas of Garhwa and Palamu, at 1.1 and 2.1 million individuals, individually (Census of India, 2005), hold a

combined add up to of 662,000 individuals at hazard for devouring water with risky levels of fluoride to to begin with guess. Compared to the rest of India, families in Palamu and Garhwa are destitute and have a lower level of proficiency (Table 1). A tall level of nourishment inadequate

exists in Palamu (Table 1), and both ranges are well-known hotspots of radical savagery [3].

A fluoride mitigation program that is robust enough to succeed in these areas is likely to succeed elsewhere.

Districts	% Poverty	% Literacy	% Households without two meals/day
Palamu	53.4	56.56	23.45
Garhwa	32.2	58.95	0
Jharkhand	33.15	58.82	0.57

Table 1

The above table uncovers statistic insights for Palamu and Garhwa, the areas beneath ponder, compared to the state normal and the national normal. Destitution headcount proportion is characterized as the percent of family units living underneath the destitution line, balanced for that range and urban/rural economies. Both Palamu and Garhwa are poorer and less taught than the rest of India. The tall rate of nourishment inadequate in Palamu recommends that dietary lacks, particularly moo calcium admissions, in Palamu may increment fluorosis hazard, as in other zones (A. L. Khandare, et.al). Information are from the NSSO 61st circular (2004-2005).

➤ *Fluorosis*

Unimaginably, low levels of fluoride confirmations offer help to expect dental caries. The condition and its affect on people Fluorosis is caused by plan affirmations of fluoride. The dental impacts of fluorosis make much earlier than the skeletal impacts in people revealed to tremendous wholes of fluoride. Clinical dental fluorosis is characterized by recoloring and setting of the teeth. In more extraordinary

cases all the wrap up may be hurt. In any case, fluoride may not be the because it were cause of dental wrap up absconds. Wrap up opacities comparative to dental fluorosis are related with other conditions, such as need of sound food with need of vitamins D and A or a moo protein-energy eat less. Ingestion of fluoride after six a long time of age will not cause dental fluorosis.

Strongly high-level introduction to fluoride is uncommon and more frequently than not due to incidental contamination of drinking-water or due to fires or impacts. Moderate- level unremitting introduction (over 1.5 mg/litre of water - the WHO run the show regard for fluoride in water) is more common [4]. People impacted by fluorosis are routinely revealed to various sources of fluoride, such as in food, water, talk about (due to vaporous mechanical squander), and intemperate utilize of toothpaste. Be that as it may, drinking water is ordinarily the foremost noteworthy source. A person's slim down, common state of wellbeing as well as the body's capacity to arrange of fluoride all influence how the introduction to fluoride shows itself [5].



**Dental Fluorosis**



**Bone deformation**

Fig 1

## II. MEDICINAL PROPERTIES OF CASSIA TORA

Cassia tora is well known plant broadly disseminated in India and other tropical nations. It is an yearly beneath bush and develops in wild no man's land. Distinctive parts of the plant (Clears out, seed, and root) are rumored for their therapeutic esteem. It is well recognized conventional pharmaceutical as purgative and is valuable for treatment of disease, ringworm disease, ophthalmic, skin illnesses and liver disarranges. A few chemical compounds such as Anthraquinone glycosides, Naphthopyrone glycosides, Phenolic compounds, Flavonoids etc. have been separated from this plant. The display survey summarizes the logical data of different angles of Cassia tora plant utilized in conventional framework of medication for Assortmen [6]. of fluorosis suffering people and its become low cost medicine for poor people's those who can not effort high technology for filtering water and also become a boon for farmers through cultivation of this zero budget weed or plant in doubling of income.

Conventional therapeutic plants are practiced around the world for treatment of arthritis particularly in creating nations where assets are scanty. This survey presents the plants profiles possessing all through the world with respect to their conventional utilization by different tribes/ethnic bunches for treatment of joint pain [7]. The plant has been found to display different pharmacological exercises. A few investigate laborers have detailed distinctive organic exercises of C. tora in different in vitro and in vivo test models.

### ➤ Antioxidant Activity:

The methanolic extract of seeds of C. tora (MECT) appears more grounded antioxidant action. It was found that MECT shows more grounded antioxidant action as compared to Alpha-tocopherol. Emodin was illustrated as antioxidant component of MECT 30. The phenolic dynamic component, alatern in and nor-rubrofusarin glucoside disconnected from extract of C. tora moreover appeared a strong free radical rummaging movement [8].

### ➤ Hypolipidemic Activity:

Ethanol extract and its ether solvent and water solvent divisions were assessed for their hypolipidemic action against triton initiated hyperlipidemic profile. Diminished serum and triglyceride level of add up to LDL cholesterol but expanded HDL cholesterol level by distinctive rates was watched. Solvent strands disconnected from the seeds appeared the hypolipidemic level due to their amazing rheological behavior and lipid digestion system. The dissolvable strands improves fecal lipid excretion and appeared critical hypolipidemic impact due to stamped diminishment in serum concentration of add up to cholesterol and triglyceride level [9,10].

### ➤ Hepatoprotective Activity:

The distinctive extricates of seeds of Cassia tora have been considered for cryoprotection against galactosamine harmfulness in essential refined hepatocytes. Methanolic extract of seeds appeared a critical hepatoprotective impact against harmfulness of galactosamine in essential refined rodent hepatocytes. Methanolic extract at a measurement of 400mg/ml orally shown critical defensive impact by bringing down the serum level of transaminases in rats. The % Cytoprotection of diverse confines gotten from the methanol extract of seeds of C. tora were too considered against galactosamine poisonous quality in essential refined hepatocytes. The naphtha-pyrone glycosides were found to have noteworthy hepatoprotective impact against galactosamine harm 21. It has moreover been detailed that Ononitol monohydrate disconnected from the clears out has critical hepatoprotective movement as compared to reference sedate sylimarin. Ononitol monohydrate diminishes the level of serum transaminase subsequently appears its hepatoprotective activity [11].

### ➤ Antibacterial Effect:

The impact of phenolics glycoside, their aglycones and a few other compounds fundamentally related to them on E. coli K12, Pseudomonas aeruginosa Dad 01 and a few strains of Staphylococcus aureus were inspected. Among them, torochryson, torolactone, aloe-emodin, rhein and emodin appeared recognizable antibacterial impact on four strains of methicillin safe Staphylococcus aureus with least inhibitory concentration of 264µg/ml [12,13].

### ➤ Antitumor Activity:

Emodin, an anthraquinone, show in root and bark of C. tora have anti-tumor action. It appears inhibitory impact on angiogenic and mitosis administrative prepare. Since of its quinine like structure, emodin may meddled with electron transport prepare and in changing cellular redox status, which may account for its cytotoxic property [14].

### ➤ Anti-inflammatory Effect:

The Anti-inflammatory impact of methanolic extract of takes off of C. tora was explored against carrageenan, histamine, serotonin and dextran initiated rodent rear paw oedema. It displayed noteworthy anti-inflammatory action against these operators [15].

### ➤ Spasmogenic and Antinociceptive Activity:

The methanolic extract of clears out was assessed in guinea pig ileum, rabbit jejunum and mice intestinal travel for antinociceptive and spasmogenic impact. The extract contracted smooth muscles of guinea pig ileum and rabbit jejunum in a concentration subordinate way which is reversibly blocked by Atropine. The extract expanded intestinal travel in mice. The extract moreover essentially diminished the number of acidic corrosive initiated stomach tightening influences in mice and the impact was comparable to that of Ibuprofen. The extract too essentially decreased the nociceptive reaction of mice to increments drive, which is dosage subordinate. Hence the utilize of C. tora customarily as laxative and in treatment of other sicknesses is reasonable [16].



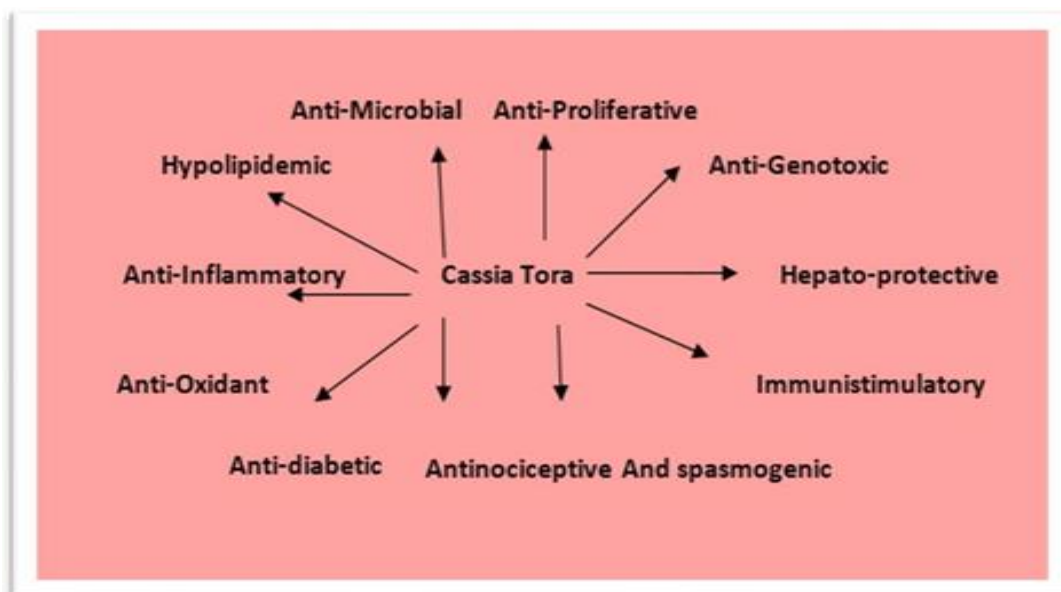


Fig 2

### III. MATERIALS AND METHODOLOGY

The weed “*cassia tora*” is found in road side in all over India in rainy season mainly. In Jharkhand, it is found mainly in Garhwa and Palamu and local people using the leaves of this weed as leafy vegetable as a “**Chakor Ki Bhanji**”. The plan has the following stages:

**Vegetative stages:** -The phase of growth of the plant before the flowering and fruiting is called vegetative stage. In this stage, green leaves are being used as vegetables by the poor people and it is a practice of the common peoples in Jharkhand.

**Flowering stages:** -The growth phase of the plant shows the flowering is called flowering stage.

**Fruiting stage:** -The plant bears long narrow tapered seed pods as a fruit which is being used to treat lots of disease.



Fig 3

➤ Taxonomy of “*Casia tora*”

<b>Kingdom:</b>	<b>Plantae</b>
Division:	Magnaliophyta
Class:	Magnalipsida
Subclass:	Rosidae
Family:	Caesapaniaceae
Sub Family:	Caesalpinioideae
Order:	Fabales
Genus:	Cassia
Species:	Cassia Tora

Table 2

<b>Habitat:</b>	<b>In India it occurs as wasteland rainy season plant.</b>
Botany:	It is an annual fetid herb, 30–90 cm high.
Leaves:	pinnate, up to 10 cm long rachis grooved, conical gland between each of two lowest pairs of leaflets, leaflets in 3 pairs, opposite, obovate, oblong and base oblique.
Flowers:	In pair in axils of leaves, petals five, pale yellow.
Fruit:	Pod, Obliquely separate.
Seed:	30-50 rhombohedral
Flowering time:	rains (in Indian conditions)

Table 3

Other *Cassia* species are also available across the world other than cassia tora which are as follows: *Cassia auriculata*, *Cassia fistula*, *Cassia italic*, *Cassia javanica*, *Cassia siamea*, *Cassia spectabilis*, *Cassia alata*, *Cassia nigricans*, *Cassia nodosa*, *Cassia javanica*, *Cassia sophora*, *Cassia augustifolia*, *Cassia reningera*, and *Cassia australis* etc.

#### IV. AGRONOMICAL PRACTICES

Agronomical practices of the wild crop “Cassia tora” is mainly in tropical regions of India such as satpura regions of Madhya Pradesh and few parts of Uttar Pradesh only. Rest part of India is not aware about the medicinal value of the crop and not found as crop of agronomy. But in Vedic era of India, it was known as “Chakramarda” and was used as Ayurvedic medicine for the treatment of various diseases.

In china, this plant is called as Jue and the matured seeds of sickle unit are utilized for cooling down body because it has actually cooling capacity. Because of this reason typically considered to be an imperative antiquated therapeutic herb in China. Coming to the taste, it tastes severe and salty. It has the control to boost vision and makes a difference in evacuating seriously warm in human liver. It moreover moisturizes digestive tract and ease bowel development and over all bolsters for weight diminishment as well.

##### ❖ Processing:

All parts of weed such as leaves, stem and seeds are processed for value addition and being marketed as medicine or other valuable products. The values of leaves, stem and seeds are as below:

##### ➤ Roots

- The roots are utilized as a pharmaceutical in treating snakebite
- The part of the ground in which this plant is developed and the dried root are connected for curing ringworm in Ayurvedic medication.[17]

##### ➤ Seeds

- Ripened seeds or sickle units could be a profoundly recognized antiquated Chinese therapeutic herb. In Ayurveda the cases are considered to contain extraordinary number of purgatives, anthelmintic, ophthalmic and expectorants.
- These are moreover utilized as aperients and purgatives and connected to control bowel development and give unwinding from obstruction.
- Consuming sickle pods can help to fight skin problems like itch and psoriasis.[17]

##### ➤ Leaves

- The leaves are utilized in new and dried form in Northern Nigeria for treating sicknesses like ulcer, ring worm. It is additionally utilized to treat parasitic skin infections.
- The leaf extricate is found to contain anti-bacterial and anti-viral property for treating Newcastle Disease. It is additionally utilized to treat vaccinia infection.
- Apart from that the clears out of Chakvad contain common pesticide and utilized in natural ranches in India and cassia tora contains chrysophanic acid-9-anthrone which acts as successful fungicide.
- They moreover contain anthraquinones for which they are utilized in powerless decoction in pediatric getting teeth, constipation and fever treatment.[17]

##### ➤ Therapeutic (Healing) Properties

- When utilized in combination with self-heal *Spica Purnellae* and Cape jasmine natural product it can give amazing cure for infections like conjunctivitis and irritation in conjunctiva (it is the mucous layer show within the eyeball that lines the inward surface of eyelids and expands till the forepart of the eyeball).
- It can too be utilized to remedy narrow mindedness to light.
- It is additionally utilized in combination with vetch seed to Semen as *tragalicomplanati* to treat obscured vision which is caused by Yin lack of liver and kidneys.
- For curing hyperlipemia moreover the sickle senna seed decoction is connected. It could be a condition that comes about in overabundance of fat in lipids in blood.
- The new seeds of this trim are found to have chrysophanol, aurantio-obtusin and vitamin A. Separated from that the anthrax-glucoside display in it makes a difference to work out as compelling purgative. When blended with water it appears dermatomyces property and when implanted with liquor it appears the nearness of harmful microorganisms like staphylococcus, bacillus coli, paratyphoid bacillus and bacillus diphtheria.[18]

##### ➤ Yield:

This weed is not practiced as crop in India because it generally found in waste land in rainy season so there is no any accurate estimation of the yield of this crop by any farmers. But one plant gives 4 to 5 branches and each branch bears 15-20 pods with 10 to 15 seeds. In this way each plant gives approximately 100-gram seeds. If we plant this plant in one-acre land with proper spacing, it will require approximately 2000 saplings/plants. So approximated yield is nearly 500kg per ha.

##### ➤ Value Products:

Leaves of the weed are plucked and dried for making the leaves dry powder and being marketed by different companies as medicinal value.



*Cassia Tora* Powder has natural gelling properties. A gelling composition and thickener are based on quality of *Cassia Tora*. *Cassia Tora* is used as a gelling agent that is Cassia Gel. Cassia powder natural gelling properties for using as a gelling agent.

Fig 4

Seeds are also directly being sold out as medicinal values for different disease.



- It is used as a medicine for scabies as well as herpes also as paste along with lime juice for herpes.
- Recommended as decoction for kids at the time of teething.
- Used as a gentle laxative or even as a solution for coughs.

Fig 5

#### ➤ Economics:

The cultivation of this crop will give 100% additional benefit because it does not require any fertilizer, nutrients, irrigation and also not require any plant protection management cost. So, the cultivation of this crop may be zero budget agriculture practices and processing of all parts of plant will give more value and crop may be promoted as medicinal or commercial farming.

## V. CONCLUSIONS

The cultivation of this medicinal plant may be taken up during rainy season as a commercial crop or medicinal plant with zero budget agriculture. This plant may be instrumental like other medicinal plants in doubling farmers income. This is purely additional income as no any cost involve in the cultivation. In addition to above, analysis of *Cassia tora* leaves, stem, roots, seeds reveal that is useful in curing various diseases and disorders like dental fluorosis, bone deformations etc as well as various medicine and therapeutic properties like Antioxidant, Hypolipidemic, Hepatoprotective, Hepatoprotective, Antibacterial, Antitumor, Anti-inflammatory, Spasmogenic, Antinociceptive etc.

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