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# Ethinomedicine Plant Based Product in Caries Management

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**Abstract:** *Background*: Ethnic medicinal practice has come into foucus in recent times due to increased awareness of side effects of the medicine (pharmaceutical drugs). In oral health care also the focus is shifted to herbal products (neem sticks/leaves, mango leaves) for brushing from commercially available tooth paste and brush. In our survey on oral health use of jatropha curcas instead of brushing with tooth brush and paste was observed and the dental caries prevalence was low. *Objective:* The observation from the survey initiated the present study to evaluate antibacterial activity of jatropha curcas leaves against tooth caries organism strepococcus mutans. *Method*: Collection And Identification of Plant Material was done Preparation Of The Jatropha Curcas Extract with leaves and dilution in to 1:3 ratio with ethyl acetate and methanol was done 3 Antibacterial Activity was performed with strain *Streptococcus mutant* by inoculating into 20ml Luria Bertini broth. 100 ml of Muller-Hinton agar was sterilized and poured into sterile petri plates in the laminar chamber and allow to solidify. 100µl of the cultures were spread onto the plates using a spreader. 5 wells were punched on each plate using a 5 mm megabore for four different sample concentrations. 50µl of the dilutions were pipetted into the wells and all the plates were incubated at 37°C overnight. The zone of inhibition was observed and the diameter of the zone was recorded. *Results*: The antibacterial activity of jatropha curcas extracts was observed and it varied with in the types of extract preparation. Methanolic extract preparation has shown better antibacterial effect against streptococcus mutans. *Conclusion*: Jatropha curcasa leaves can be a potential antibacterial agent against cariogenic microorganism streptococcus mutans.

**Keywords:** Ethinomedicine Jatropha Curcas, Streptococcus Mutans, Dental Caries

## 1. Introduction

Ethinomedicine is ethnic practices followed in medicine from ancient time. The various ethnomedicinal practices in the past were ayruveda, homeopathic and other ethnic practices. In ayruveda numerous medicinal plant extracts are being used, these plants extracts are selected for a specific allergic conditions. The knowledge of selection of plants for specific conditions is being passed on from generations.

The World Health Organization estimated that about 80% of people still rely mainly on traditional remedies such as herbs for their medicines. The prevention and treatment of diseases by the use of available and accessible medicinal plants in a particular locality will continue to play important roles in medical health care implementation in the developing countries as plants make up the primary source of new pharmaceuticals and health care products. [4]

In recent times the focus on ethnic medicinal practice has increased due to awareness of side effects of the medicines used in modern practices of pharmaceutical drugs. Natural products are therefore gaining attention as an alternative for antimicrobial agents.

In a oral health survey on soico economic status and brushing habits in the kodugu population the use of jatropha curcas leaves (Figure 1) in lower socio economic status instead of recommended brushing practice (tooth paste and

brush) and the caries prevalence was low.

Review on medicinal plants Jatropha curcas revealed the use of its bark and seeds (Figure 2) in the treatment of various diseases, including bacterial and fungal infections. In the scientific name“Jatropha curcas" the genus name Jatropha derives from the Greek word jatr´os (doctor) ad troph´e (food), which implies medicinal uses. Chemical composition and uses of various parts of jatropha curcas given in table 1 & 2 [1].

All parts of Jatropha (seeds, leaves, bark, etc) have been used in traditional medicine and for veterinary purposes for a long time.

The antibacterial activity of jatropha curcas leaf, latex and seed has studied against E. coil, fungus strain, staphylococcus species. In streptococcus species, streptococcus agalactiae has been reported however the streptococcus mutans has not been tested for the antibacterial effect against jatropha curcas leaves.

Dental caries is one of the globally affecting disease of the oral cavity is still prevalent in today’s era despite knowledge of most advanced sciences and technologies in dental practice. There has been constant effort to focus on interception and correction of this disease entity but today ou r horizon has broadened the approach and goal remains to prevent the disease process rather than to correct it. The use of herbal medicines in oral health care is gaining its importance. [2] The cure for the different illnesses and diseases lies in the chemical compositions isolated from different parts of the plant. Jatropha curcas plant is commonly used for oral hygiene practice in kodagu district.

Thus the present study was aimed to identify the anti bacterial efficacy of jatropha curcas leaves extract against streptoccus mutans, a cariogenic microorganism.

***Figure 1.*** *Jatropha curcas.*

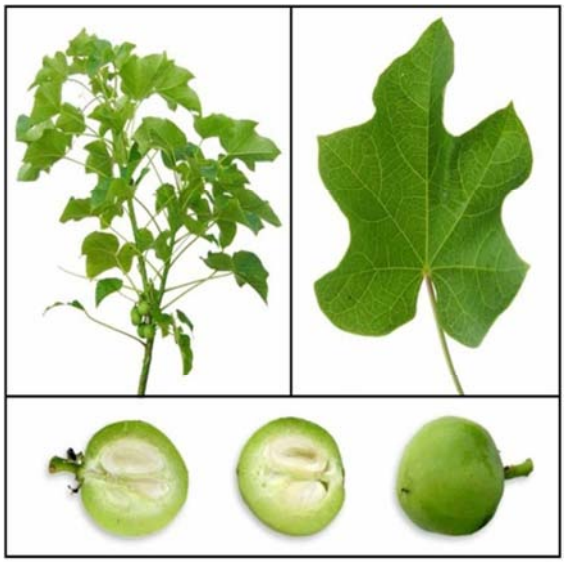

***Figure 2.*** *Leaves & seed.*

***Table 1.*** *Uses of different parts of Jatropha curcas L. in medicines.*

| Plant part used | Uses |
|---|---|
| Seeds | To treat arthritis, gout, jaundice & as contraceptives |
| Bark | As fish poison |
| Latex | To inhibit watermelon mosaic virus |
| Shrub | Hepatoprotective and antiobesity |
| Tender twig/stem | Toothache, gum inflammation, gum bleeding, pyorrhoea |
| Plant sap | Dermatomucosal diseases |
| Plant extract | Allergies, burns, cuts and wounds, inflammation, leprosy, leucoderma, scabies and small pox |
| Water extract of branches | HIV, tumor |
| Plant extract | Wound healing |

***Table 2.*** *Chemical composition of different parts of Jatropha curcas.*

| Various parts | Chemical composition |
|---|---|
| Aerial parts | Organic acids (o and p-coumaric acid, p-OH-benzoic acid, protocatechuic acid, resorsilic acid), saponins and Tannins |
| Stembark | Amyrin, sitosterol and taraxerol |
| Leaves | Cyclic triterpenes stigmasterol, stigmast-5-en-3,7 diol, stigmast-5-en-3,7 diol, cholest-5-en-3,7 diol, campesterol, sitosterol, 7-keto--sitosterol as well as the d-glucoside of sitosterol. Flavonoids apigenin, vitexin, isovitexin. Leaves also contain the dimer of a triterpene alcohol (C63H117O9) and two flavonoidal glycosides |
| Roots | Sitosterol and its d-glucoside, marmesin, propacin, the curculathyranes A and B and the curcusones A–D. diterpenoids jatrophol and jatropholone A and B, the coumarin tomentin, the coumarino-lignan jatrophin as well as taraxerol |
| Latex | Curcacycline A, a cyclic octapeptide Curcain (a protease) |
| Seeds | Curcin, a lectin Phorbolesters Esterases (JEA) and Lipase (JEB) |

# 2. Materials & Methods

### *2.1. Collection and Identification of Plant Material*

Fresh leaves of jatropha curcas were collected from fully grown plant from fields in coorg. The sample was authenticated for its botanical identity by botanist.

### *2.2. Preparation of the Jatropha Curcas Extract*

Fresh leaves of jatropha plant was hand picked and were washed in tap water. Leaves was again wiped with distilled water. It was grounded on traditional grinding stone figure 3 to a paste form without using any medium while grinding. The freshly grounded paste was transferred into two beaker and it was diluted with ethyl acetate and methanol in ratio of 1:3. shaked using shaker, The extract was filtered using a Buchner funnel and Whatman No. 4 filter paper.

### *2.3. Antibacterial Activity*

The test bacterial pathogen strain *Streptococcus mutant* were inoculated into 20ml Luria Bertini broth (Tryptone–10g/l, Sodium chloride–10g/l and Yeast extract–5g/l) and incubated at 37°C and 150 rpm overnight. From the sample stock, 100µg, 200µg, 300µg, 400µg and 50µl control DMSO taken in fresh eppendorfs and made to 50 µl using DMSO (the final 50µl only contained the concentrated stock sample).

100 ml of Muller-Hinton agar was sterilized and poured into sterile petri plates in the laminar chamber and allow to solidify. 100µl of the cultures were spread onto the plates using a spreader. 5 wells were punched on each plate using a 5 mm megabore for four different sample concentrations. 50µl of the dilutions were pipetted into the wells and all the plates were incubated at 37°C overnight. The zone of inhibition was observed and the diameter of the zone was recorded.

***Figure 3.*** *Grinding stone.*

# 3. Results

***Table 3.*** *Shows result of zone diameter in cm formed by streptococcus mutant.*

| ***Streptococcus mutant*** | **Zone diameter (cm)** | | | | |
|---|---|---|---|---|---|
| | **100µg** | **200µg** | **300µg** | **400µg** | **50µl (Control)** |
| Sample 1 | 1.1 | 1.2 | 1.3 | 1.4 | 0.0 |
| Sample 2 | 1.1 | 1.1 | 1.2 | 1.3 | 0.0 |
| Tetracycline | 4.2 | - | - | - | - |

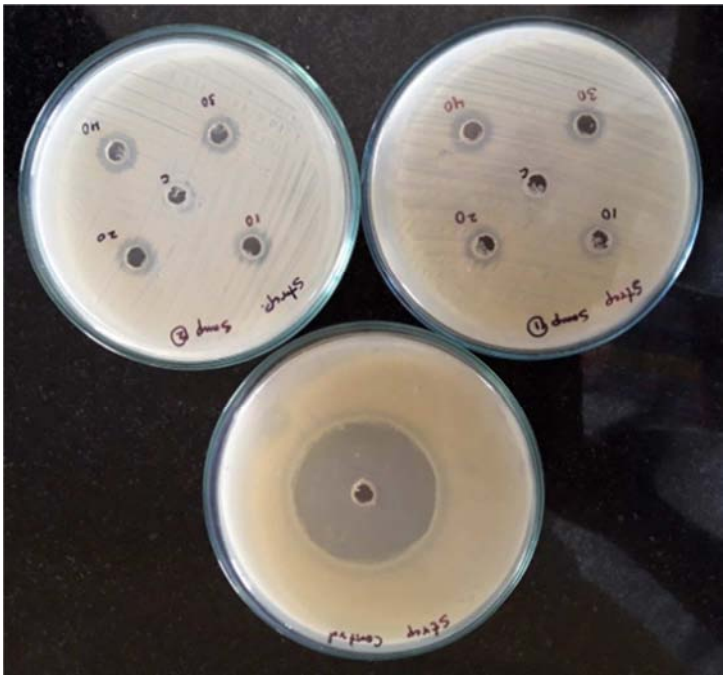

***Figure 4.*** *Muller-Hinton Agar Plates A-Sample 1, B-Sample 2, C-Control.*

Table 3 shows in vitro antibacterial activity of different jatropha curcus leaves extract samples. The results indicate that jatropha curas leaves extract have inhibitory effect on gram positive bacteria. Sample 1 (with methanol dilution) showed maximum inhibition zone 1.4cm with higher concentration (400µg) of leaves extracts against the tested microorganisms, SMutans. Sample 2 (with ethyl acetate dilution) showed maximum inhibition zone 1.3 cm with higher concentration of dilution (400µg) of leaves extract against the tested microorganism, SMutans. figure 4.

# 4. Discussion

The use of traditional medicine and medicinal plants as a normative basis for the maintenance of good health has been widely observed. Herbal products from medicinal plants are preferred because of less testing time, higher safety, efficiency, cultural acceptability and lesser side effects. The chemical compounds present in herbal products are a part of the physiological functions of living organisms, and hence they are believed to have better compatibility with the human body. Medicinal plants like Jatropha curcas have played major role in the treatment of various diseases, including bacterial and fungal infections. [3]

Oyama M. O et al investigated the antibacterial activity of Jatropha curcas leaves in aqueous, methanol and ethanolic extracts. The leaves showed antibacterial activity by inhibiting the growth of Escherichia coli, Staphylococcus aureus, Proteus spp, Klebsiella pneumonia and Pseudomonas aeruginosa. The present study confirms the potential antibacterial effects against streptococcus Mutans, a cariogenic microorganism. [4] Whereas the antibacterial effect of seed extract and antifungal efficacy of leaves of Jatropha curcas has been reported. It was suggested that the secondary metabolites like tannins, alkaloids, sterols, glycosides, saponins, terpenes and flavonoids was responsible for antimicrobial effect. [5]

The antibacterial properties of Jatropha curcas latex against nine different human pathogenic bacteria, namely three different isolates of Staphylococcus aureus, and two methicillin-sensitive strains, Salmonella enterica serovar typhi, Streptococcus agalactiae, Serratia marcescens, Klebsiella pneumoniae, Enterococcus faecalis, Escherichia coli, Listeria monocytogenes and Morganella morgenii. Phyochemical screening of the Jatropha curcas latex has indicated the presence of saponins and tannins which are known to have antibacterial properties. The Jatropha curcas latex has not been researched against cariogenic microorganisms. [6]

Antibacterial activity of Jatropha curcas latex, leaves and their various extracts (methanolic and ethanolic) was tested against Escherichia coli and Staphylococcus aureus was evaluated. The magnitude of antibacterial activity against Escherichia coli and Staphylococcus aureus was found to be significantly higher in latex and its extracts as compared to leaves. [7]

The broad spectrum antimicrobial activity of Jatropha curcas extracts from its bark against S. aureus, P. aeruginosa, E. coli, S. faecalis and other microbes has been reported the management of microbial infections**.** [8]

EL-BAZ. F. K et al. tested different extraction solvents against Jatropha curcas leaves against 6 common foods borne bacteria using disc diffusion assay and concluded that methanolic extract exhibited the highest antibacterial activity against most of the tested strains. The similar findings were observed in the present study that the methanol extract dilution showed maximum inhibhitory zone for SMutams. [9]

Jatropha curcas plants are identified for its antibacterial activity against S. aureus, P. aeruginosa, E. coli, S. faecalis Salmonella enterica serovar typhi, Streptococcus agalactiae, Serratia marcescens, Klebsiella pneumoniae, Enterococcus faecalis using the seed barks leaves with the different extraction methods and dilution.

Medicinal plants have been found useful in the cure of a number of diseases including bacterial diseases owing to a rich source of antimicrobial agents. With the knowledge of curative properties of the medicinal plants against oral microorganisms and their incorporation in clinical practice. we can aim to reduce if not remove this disease entity. Due to a rapid increase in the rate of infections, antibiotic resistance in microorganisms and due to side effects of synthetic antibiotics, medicinal plants are gaining popularity over the drugs Medicinal plants though produce slow recovery but their therapeutic effect is miraculous. [10]

In this study for first time jatropha curcas leaves were tested for its antibacterial effect against streptococcus mutans.

# 5. Conclusion

Jatropha curcas is a versatile plant with several actual and potential uses especially in medicinal uses. A lot of medicinal uses of Jatropha curcas plant parts had been investigated and studied by the researches. This plant typically contains mixtures of different chemical compounds that may act individually, additively or in synergy to improve health. Numerous biologically active substances have been isolated and characterized from all parts of the Jatropha plant. Their mechanisms of action have been studied in associate to a great number of applications of Jatropha curcas in traditional medicines.

Dental caries is the most prevalent chronic infectious disease present universally, characterized by multifactorial etiology. Streptococcus mutans and Streptococcus sobrinus have a central role in the etiology of dental caries because these can adhere to the enamel salivary pellicle and to other plaque bacteria. the jatropha curcas preparation would help in reducing the pathological microoragainsms.

Our study gives a result showing efficacy of the jatropha leaves on tested strain streptococcus mutans. Jatropha curcas potentials benefits can be maximized based on its method of preparation and formulation. In the method of preparation in

this study it was observed methanolic preparation have better antibacterial effect against streptococcus mutans.

The role of Jatropha curcas leaves uses should be taken into consideration as it shows promising potentials in the pharmaceutical field.

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