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Antibacterial Effect of the Latex and the Leaf Extracts of *Jatropha curcas* Linn on *Streptococcus mutans*

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ABSTRACT

This work examined the efficacy of the latex and leaf extracts of *Jatropha curcas* Linn on *Streptococcus mutans*. The hot water extract of the *Jatropha* leaf was prepared at 40°C and the ethanol extract of the leaf was prepared at room temperature. None of the leaf extracts was found to inhibit the growth of *Streptococcus mutans*. However, the latex showed a remarkable inhibition to the growth of *Streptococcus mutans*. The average inhibition zone of the latex against *Streptococcus mutans* was 18mm. The latex was alkaline with pH of 8.1, the ethanol extract of the leaves had pH value of 6.1. The water extract of the leaves was found to be the most acidic with pH of 5.0.

INTRODUCTION

Antimicrobial agents of plant origin have been used successfully in the treatment of infectious diseases. This promising success formed one of the bases of a continuous search for alternative therapeutic agents that could help reduce the challenges being posed by super bugs. Medicinal plants are important for pharmacological research and drug development. Plant constituents have been used directly as therapeutic agents and as starting materials for the synthesis of drugs and pharmacologically active compounds. The clinical, pharmaceutical and economic value of medicinal plants is still growing in various countries (Jayasuriya, 2013). Because of the wide-spread belief that herbal medicines are safer than synthetic drugs, demand of medicinal plants has increased many folds in the national and international markets (Singh & Krishnan Marg, 2011).

Jatropha curcas Linn is known in Nigeria by various local names as butuje, lapapa and ologbo. *Jatropha curcas* Linn is a member of the family Euphorbiaceae. It is a drought resistant small tree or large shrub and it is widely distributed all over the world (Grace, Titilayo, Ezekiel, Faith, Sylvia, & Olalekan, 2009); (Openshaw, 2000). Different parts of the *Jatropha* plant have been tested, however, the latex of *Jatropha curcas* Linn has been found to possess a wound healing effect and has anti-cancerous properties (Shivani, Hitesh, & Bharat, 2012); (Salas, Tello, Zavaleta, Villegas, & Salas, 1994).

Van den Berg, *et al.*, 1995 isolated a novel cyclic octapeptide from the latex of *Jatropha curcas* Linn and named the compound curcacycline A. The compound was found to contain one threonine, one valine, two glycine, and four leucine residues.

Streptococcus mutans has been implicated as one of the etiological agents of the human dental caries (Akpata, 1979); (Alaluusua, 1983). Various conventional chemicals have been used to remove carious lesions from human mouths (Brown, Handler, Horton, Streckfuss, & Dreizen, 1980), however, there is the need to ascertain the potency and toxicity of local herbs in the treatment of infections. In 1924 Clarke isolated certain streptococci from human carious lesions and called them *Streptococcus mutans* because on Gram stain they were more oval than round and thus appeared to be a mutant form of *Streptococcus* (Clarke, 1924).

Taking a leap from the folk use of *Jatropha curcas* Linn as chewing stick in the treatment of dental caries, this research work examined the efficacy of the leaf extracts and latex of *Jatropha curcas* Linn against *Streptococcus mutans*.

MATERIALS AND METHODS

Preparation of Extracts from Leaves

Extracts were prepared from the leaves of *Jatropha curcas* Linn. The leaves were weighed and dried under moving air away from the sun. The dried leaves were then ground into fine powder. The resulting mass was sieved and weighed.

Ethanol Extract

One hundred grams of the powdered leaves was weighed and suspended in 1000 ml of ethanol. The mixture was placed on a shaker over night in order to allow extraction. The extraction was done at room temperature. The resulting suspension was then centrifuged at 2000 revolution per minute for 20 minutes after which the supernatant was carefully decanted and filtered into a sterile conical flask.

Hot Water Extract

One hundred grams of the leaves was weighed and suspended in 1000ml of sterile distilled water. The mixture was placed in water bath for six hours and the temperature was maintained at 40°C. The extract was then centrifuged at 2000 revolutions per minute for 20 minutes. The supernatant was carefully decanted and filtered into a sterile conical flask and stored.

Collection of *Jatropha curcas* Linn Latex

The latex of the plant was tapped by cutting the back of the plant. The back of the plant was cut slightly in a downward manner. A sterile needle and syringe was then used to draw the latex aseptically.

Determination of pH of the Extracts and the Latex

The pH was determined using the pH meter.

Antibacterial Susceptibility Test

The test microorganism was *Streptococcus mutans*. Five Sterile nutrient agar plates were inoculated from the broth culture of the test organism using sterile cotton swabs.

A sterile cork borer (Five millimeter in diameter) was used to make ditches on the plates. The resulting agar plugs were then discarded. Five ditches were made on each plate. Drops of each extract and latex was added into each ditch and a ditch was left empty to serve as a control. All the plates were carefully labeled. The extracts and the latex were allowed to diffuse into the medium before incubation. The plates were then incubated at 37°C for 24 hours. The zones of inhibition were examined and measured after 24 hours of incubation. Average measurement was recorded for the inhibition zone.

RESULTS

As it can be seen on Table 1, the latex was alkaline with pH of 8.1, followed by the ethanol extract of the leaves with pH of 6.1. The water extract of the leaves was found to be most acidic with the pH of 5.0. None of the leaves extract was found to inhibit the growth of the test organism. However, the

latex showed a remarkable inhibition to the growth of *Streptococcus mutans*. This result is as shown in Table 2.

Table 1: pH of the extracts and the Latex of *Jatropha curcas* Linn

Plant Component	pH Value
Ethanol extract of the leaves	6.1
Water extract of the leaves	5.0
Latex	8.1

Table 2: Antibacterial Activities of the Extracts and Latex on *Streptococcus mutans*

Plant Component	Average Zone of Inhibition on the Plates (millimeter)
Ethanol extract	0
Water extract	0
Latex	18

DISCUSSION

During this research work, it was found that the leaf extracts of *Jatropha curcas* Linn have no antibacterial effect against the test organism. However, the latex from the plant was found to inhibit the growth of the test microorganism. It has been confirmed that the latex of *Jatropha curcas* Linn contains secondary metabolites such as tannins, flavonoids and saponins (Levens, Vandan-Berghe, Marten., Vihen, & Lomiveas., 1979).

During the sensitivity test, there was darkening or browning of the region surrounding the ditches containing the latex after 24 hours of incubation. This could be due to the reaction between the agar and the latex.

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