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Effect of *Carica papaya* (Pawpaw) Leaf Extract on Glucosyltransferase (GLT)

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Abstract:

- ***Purpose:***
  To evaluate the effect of *Carica Papaya* leaf extract on glucosyltransferase (GTF).

- ***Method:***
  Fresh leafs of *Carica Papaya* (pawpaw) was collected, dried at room temperature. Extraction was done using maceration method with ethanol as the solvent. The extract was concentrated using water bath. The crude drug stored for analysis. The inhibitory activity of glucosyltransferase was done using GTF assay using spetrophotometric method at wavelength of 530nm. And percentage inhibition was determined.

- ***Results:***
  Result showed a dosage dependent inhibition of GTF following the administration of leaf extract of *carica papaya*. IC_{50} of 0.30mg/ml was determined using the dose-response curve. The extract showed good glucosyltransferase inhibitory activity.

- ***Conclusion:***
  From the result *C.papaya* leaf extract showed good inhibition of glucosyltransferase and the percentage inhibition increases as concentration of the drug increases. As such we can be recommended for people who are suffering from tooth ache and demineralization of the enamel caused by *streptococci mutan* presence.

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I. INTRODUCTION

- *Background to the Study*

Medicinal plants have been touted as viable substitute in a variety of diseases. All over the world, dentists have turned to natural remedies for dental cure due to the negative possessions of certain antibacterial mediators used in dentistry (Kumar, 2021). Caries is one of the most important global oral diseases and it has negative effects on man's daily activities. Plants from the basis of traditional medicine have contributed significantly to the treatment and management of caries which is common among children but also affects adults (Mandela *et al.,* 2019). Medicinal plant is an important element of indigenous medicine systems all over the world. The ethno botany provides a rich resource for natural drug research and development (Farnsworth, 1990).

Previous study revealed that the efficacy of carica papaya ethanol extract was put to test in order to ascertain its effect on the treatment and management of various health challenges. Papaya extract has been used in many areas of treatment in traditional treatment of malarial. As a natural product it has played an important role throughout the world in treating and preventing human disease. Carica papaya linnaeus, (pawpaw), belongs to the family of caricaceae (jaiswal *et al.,* 2010). It is herbaceous succulent plant with self-supporting stems. (Mello *et al.,* 2008). (Bamisaye *et al.,* 2013) reported that it is a large tree like plant with a single stem growing from 5 to 10 meters tall with sparsely arranged leaves confined to be the top of the trunk. The lower trunk is conspicuously scarred where leaves and fruits were borne (Bamisaye *et al.,* 2013). He also reported that all parts contain latex it generally branches only when injured (Mello *et al.,* 2008).

Oral diseases are the main worldwide health complications that affect approximately 3.5 billion people worldwide due to their chronic and progressive nature. Most

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oral diseases can be treated in their early stages and are largely preventable. With the increasing urbanization and changes in lifestyle, mostly in developing countries prevalence of oral diseases continues to increase. The poor access to oral health care facility in the community, having food and beverages high in sugar, and insufficient exposure to fluoride in toothpaste or water supply was the reason behind the increase in oral diseases. The most common oral diseases that include clinical conditions affecting mouth and teeth are periodontal (gum) diseases, dental caries (tooth decay), oral cancers and oral-dental trauma (Mellow *et al*., 2008).

➢ *Aim of the Study*

To evaluate the effect of *carica papaya* leaf extract on glycosyltransferase (GTF).

➢ *Plant Description*

The use of plant parts and their products has been one of the most successful ways for the discovery of new medicines. It has been recorded that plant extracts and their components have shown significant antimicrobial activity on buccal flora, especially on bacteria such as streptococci mutan and glucosyltransferase (*Hope, 2020*).

Carica papaya is a plant popularly known as pawpaw. It belongs to the family caricaceae. It is distributed in the tropics such as Africa, America and Mexico. It belongs to the genus called *carica* and the species known as *carica papaya* (*Rouse, 2010).*

➢ *Taxonomy of the Plant*

- Carica papaya __ common name pawpaw.
- Domain -- eukaryote
- Kingdom-- plantae
- Phylum-- spermatophyta
- Class-- dicotyledonae
- Kingdom-- plantae
- Planta, vegetal, plants.
- Sub kingdom-- viridplantae
- Green plants
- Infra kingdom-- streptophyta _ land plants.
- Super division-- embroyophyta.
- Division-- tracheophyta_ vascular.
- Plants, tracheophytes
- Sub division-- spermatophytina
- Spermatophytes, seed, plants, phanerogames.
- Class-- magnotiopsida
- Super order-- rosanne
- Order-- brassicales
- Family-- caricaceae papayas
- Genus-- carica papaya
- Species-- carica papaya, paw paw.

Fig 1 Picture of Carica papaya Tree and Fruit

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II. MATERIALS AND METHOD

➢ *Plant Collection*

The fresh leaf of *carica papaya* (pawpaw) will be plug in the morning, the *carica papaya* leaf will be taken to a taxonomist to identify the specie of the plant.

➢ *Extraction*

The green leaves of *carica papaya* will be collected from its tree. Leaf will be washed with tap water and dried for 48 hours at room temperature, 25°C than blended. 100g of the powder sample will be macerated in 200ml ethanol for 48 hours and the extract will be filtered and concentrated using water bath. The crude drug will be stored for bioassay.

➢ *Preparation of Drug Concentration*

The crude drug will be diluted. After which, Different concentration will be made using serial dilution to produce concentrations of (0.05, 0.2, 0.4, 0.6 and 0.7) mg/ml.

➢ *Gtf Assay*

The GTF Assay will be used to determine the anticaries activity of the plant extract chlorhexidine will be used as a reference drug and the percentage inhibition will be determined using the formula below.

$$\% \text{ inhibition} = \frac{\text{A control- A sample} \times 100\%}{\text{A control}}$$

III. RESULTS

Table 1 Percentage Inhibition of GIF by C. Papaya Leaf Extract

Conc. (mg/ml)	%inhibition by extract	%inhibition by chlorohexidine	IC_{50} (mg/ml) by obtained from dose response curve
0.05	33.60±0.002	40.00±0.013	
0.2	42.70±0.000	60.00±0.001	Extract = 0.030
0.4	54.60±0.000	72.5±0.00	Chlorohexidine = 0.11
0.6	61.90±0.000	78.40±0.001	
0.7	68.90±0.001	88.70±0.00	

➢ *Value represented in mean ±SD*

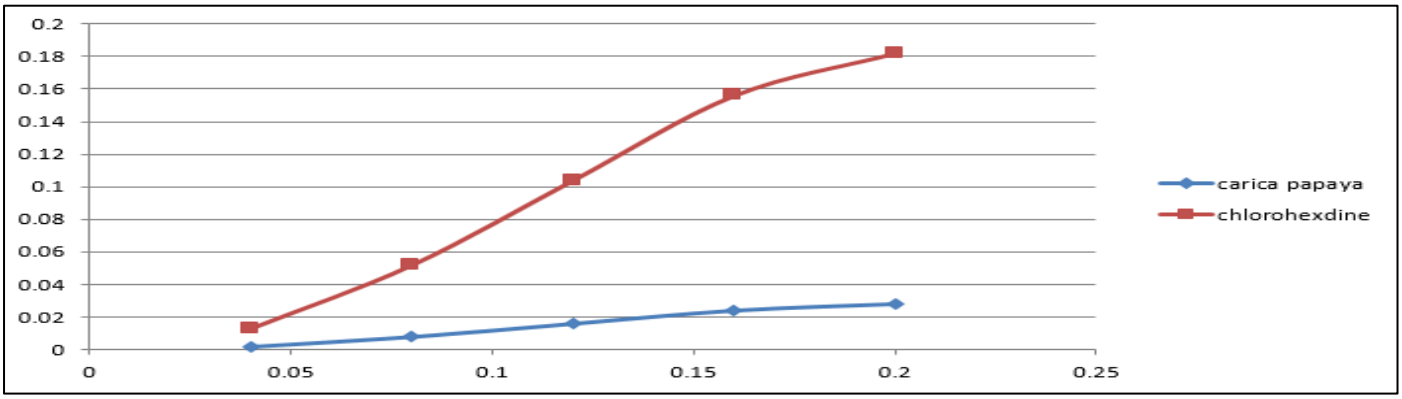

Fig 1 Treatment

➢ Graphical representation of the IC_{50} of the leave Extract Carica Papaya and Chlorohexdine

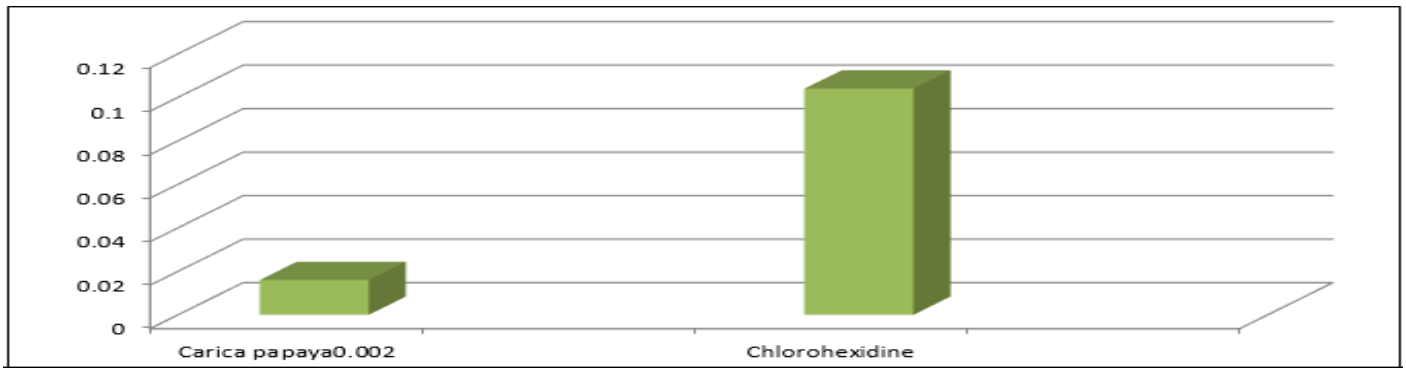

Fig 2 Bar Chart showing average effective dose of the Drugs

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IV. DISCUSSION

The buccal flora has been of great concern because of disorder or oral diseases associated with the oral flora from the results obtained from the laboratory analysis and bioassay conducted. *Carica papaya* is a plant popularly known as pawpaw. It belongs to the family caricaceae. It is distributed in the tropics such as Africa, America and Mexico. It belongs to the genus called *carica* and the species known as *carica papaya*

Table 4.1 revealed that there was a dosage dependent inhibition of GTF following the administration of leaf extract of *Carica Papaya* of different concentration in Mg Ml from 0.05, 0.2, 0.4, 0.6 and 0.7 Mg Ml. the highest percentage inhibition was recorded at 0.7 Mg Ml which gave a percentage inhibition of 68.9% when compared to that of the reference drug at the same concentration gave 88.7%. The IC_{50} of the extract was determined using the dosage - response curve. The IC_{50} for the reference drug gave 0.11Mg\Ml. All these results showed that *C.papaya* extract has anticaries activity.

V. CONCLUSION

The buccal flora has been of great concern because of disorder or oral disease associated with oral flora. From the results obtained from the laboratory analysis and bioassays conducted. Table I review that there was a dosage dependent inhibition of GTF following the administration of leaf extract of *Carica papaya* of different concentration in Mg/ml from 0.05, 0.2, 0.4, 0.6 and 0.7 Mg/ml.

The highest percentage inhibition was recorded at 0.7 Mg/ml which gave a percentage inhibition of 68.9% when compared to that of the reference drug at same concentration gave 88.7%. The IC_{50} of the extract was determined using a dosage response curve. The IC_{50} for the extract gave 0.3Mg/ml why that of the reference drug gave 0.11 Mg/ml. All these results showed that *carica papaya* extract has anticaries activity.

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