

PHYTOCHEMICAL SCREENING OF *CARICA PAPAYA* LEAVES**Abubakar Ahmad Bawuro¹ and Usama Usman²**^{1&2}**Chemistry Department, Federal College of Education Yola.**Corresponding author, wuromed2007@yahoo.com**ABSTRACT**

Powdered leaves of carica papaya were extracted with distilled water and ethanol. The extracts were further subjected to phytochemical tests for the presence of secondary metabolites using standard procedures. Phytochemical screening indicated the presence of alkaloid, flavonoid, saponins, tannin, terpenoid and volatile oil. This indicated that carica papaya leaves has the potential for the production of drugs against organisms causing diseases.

Key words; Phytochemical, Screening, Powdered, Carica papaya**INTRODUCTION**

Infectious diseases are reported to be the world's major human threat and accounting for almost 50,000 deaths every day (Lohedas *et al.*, 2015). The frequency and diversity of life-threatening infections caused by pathogenic microorganisms has increased steadily; becoming an important cause of morbidity and mortality and continues to be a major problem in many developing countries, especially amongst children (Lohedas *et al.*, 2015). The number of emerging multidrug resistant microbial strains is continuously increasing and has become a serious threat to successful treatment of infectious and opportunistic diseases of HIV-AIDS victims (Wagate *et al.*, 2010). Plant derived antimicrobials have received considerable attention in recent years (Sahle and Okbatinase, 2017). It affects not only the economy, but the general well-being of people with more serious impacts in developing countries. Many plants have been used because of their antimicrobial traits such as compounds synthesized in the secondary metabolism. Little is known about the phytochemical and antimicrobial activities of *Carica papaya* leaves extracts on pathogenic microorganisms such as pathogenic *Escherichia coli*, pathogenic *Staphylococcus aureus* and *Candida albicans*, which are known to cause many opportunistic infections among HIV-AIDS infected patients in Lake Victoria region. The Luo community of Nigeria relies heavily on ethno-medicine to manage human ailments and have traditionally used plants to treat diseases of microbial origin (Maima *et al.*, 2014). Infections due to a variety of bacterial etiologic agents, such as pathogenic *Escherichia coli*, *Vibrio cholerae*, *Aeromonas* spp., *Klasiella* spp., *Shigella* spp., *Staphylococcus aureus*, *Pseudomonas* spp. and *Salmonella* spp. are the most common.

In recent years, drug resistance to human pathogenic bacteria has been commonly reported from all over the world (Wagate *et al.*, 2019). According to World Health Organization, WHO (2011), there is lack of scientific evidence to evaluate the safety and efficacy of traditional medicine. Therefore, there is need to screen medicinal plants for better understanding of their properties, safety and efficacy (Doughari *et al.*, 2018) and also to validate their traditional uses and identify the active compounds (Demet *et al.*, 2018). Infectious diseases are very common and have adverse effects to the human beings. The search for newer sources of antibiotics is a global challenge pre-occupying research institutions, pharmaceutical companies and academia, because many infectious agents are becoming resistant to synthetic drugs (Latha and Kannabiran, 2006). Emergence of resistant strains of pathogenic microorganism has also continued to pose a major health concern about the efficacy of several drugs; most importantly antibiotics in current use (Lohedas *et al.*, 2015). This explains the increasing research on various plants, and the upsurge in mass-media advert placement on herbal preparations by countless 'traditional doctors'. Aruljothi *et al.* (2014) defined medicinal plant as a plant in which one or more organs contain substances that can be used for therapeutic purposes or which a precursor for the manufacturing is of drugs useful for disease therapy.

Plants have major advantages mostly for being the most effective and cheaper alternative sources of drugs. The local use of natural products from plants as primary health remedies, due to their pharmacological properties, is quite common in Asia, Latin America, and Africa (Bibitha *et al.*, 2012). It is however noted that medicinal plants are readily available, they have little side effects and there is extensive local knowledge on herbal medicine amongst the communities (Rojas *et al.*, 2006; Doughari *et al.*, 2008).

Pawpaw (*Carica Papaya*) Leaf is commonly known for its food and nutritional values throughout the world. The medicinal properties of pawpaw fruit and other parts of the plant are also well known in traditional systems of medicine. Each part of pawpaw tree possesses economic value when it is grown on a commercial scale (Krishna *et al.*, 2008). Even though the active compounds are normally extracted from all parts of the plant, the concentration of these compounds varies from structure to structure (Aruljothi *et al.*, 2014). However, parts known to contain the highest concentration of the principles are preferred for therapeutic purposes and it can either be the leaves, stem, roots, bulks, corms, rhizomes, woods, flowers, fruits, and the seeds (Kafaru, 2014). Various parts of the pawpaw plant, which include the leaves, fruit, seed, latex, and root, are known to contain bioactive compounds (Anibijuwon and Udeze, 2019). The plant parts are found to possess some properties like analgesic, amoebicide, antibacterial, cardiogenic, cholagogue, digestive, emenagogue, febrifuge, hypotensive, laxative, pectoral and vermifuge (Anibijuwon and Udeze, 2019).

During the last few decades, considerable progress has been achieved regarding the therapeutic properties of pawpaw. Studies from other parts of the world have indicated that *Carica papaya* possesses antimicrobial, antioxidant and anti-inflammatory activities (Aruljothi *et al.*, 2014). The pharmaceutical value and concentration of active ingredients in each plant vary depending on climatic and edaphic factors (Musyimi, 2002). Several factors such as phenological age of plant, percent humidity of the harvested material and the method of extraction have been identified as possible sources of variation for the chemical variation, toxicity and bioactivity of the extracts (Musyimi, 2012). The efficacy of treatment with *Carica papaya* is dependent on the quantity of the different compounds in the preparations. In Indonesia, pawpaw leaves are used as feed for animals after parturition-2 leaves boiled in water fed every 2 days for 1week (Shivananda *et al.*, 2007).

In Nigeria, it is used for treatment of upper respiratory tract ailment and cancer of the uterus. In Ivory Coast, it is used for treating mental instability (Anibijuwon *et al.*, 2019). In Trinidad, it is used for treating scorpion bites and hypertension (Anibijuwon *et al.*, 2019). In Cote d'Ivoire and Samoa, it is used for toothache and in Mexico to treat tuberculosis (Anibijuwon *et al.*, 2009). In This study aimed at investigating the phytochemical screening of *Carica Papaya* leaf extracts on pathogenic *Staphylococcus aureus*, pathogenic *Escherichia coli* and *Candida albicans*.

According to WHO (2011), there is lack of scientific evidence to evaluate the safety and efficacy of traditional medicine. Therefore, there is need to screen medicinal plants for better understanding of their properties, safety and efficacy (Doughari *et al.*, 2018) and also to validate their traditional uses and identify the active compounds (Demet *et al.*, 2018). Infectious diseases are very common and have adverse effects to the human beings. These diseases cause death and lower productivity of people infected and affected. Emergence of resistant strains of pathogenic microorganisms has continued to pose a major health concern about the efficacy of several drugs, most importantly antibiotics in current use. Antibiotic resistance has been observed in *E. coli*, *S. aureus* and *C. albicans* to the synthetic drugs which is becoming a serious public health issue, with high treatment costs. Despite these scientific facts on the antimicrobial potentials of other *Carica papaya* leaf varieties, little information exists showing a comparison on the potencies of extracts from different parts in varied extraction solvents. Before this study little was known about the antimicrobial activity of *Carica papaya* leaf extracts. Hence, this study was initiated to fill gaps of the unknown pertaining to presence of phytochemical compounds occurring in the leaf. However this study sought to determine the phytochemical screening of *Carica Papaya*.

MATERIALS AND METHODS

Apparatus

Soxlet Apparatus, Spatula, Filter paper, Dropper, Water bath, beaker, Test-tube, Test-tube Rack, Sieve, Funnel, Measuring Cylinder, Mortar, Pestle, Sample bottle, and Detergent.

Chemicals and Reagents

Ethanol, Distilled water, Tetraoxosulphate (vi) acid (H_2SO_4), HCl, Ferric chloride ($FeCl_3$), Sodium hydroxide solution, Benefiter's solution, Iodine solution, Concentrated Nitric acid, and 80g powdered leaves.

Sample collection and identification

Fresh leaves of *C. papaya* were collected from a local farm within a rural area in Shagari, Yola South local government area. The leaves were identified by a botanist from Modibbo Adama University Yola.

Sample preparation

Fresh leaves of *carica papaya* leaves were washed with running tap water and then distilled water added to make it sterile free from any kind of contamination. The leaves of *carica papaya* were air dried at constant weight in the chemistry laboratory FCE Yola. With the help of mortar and pestle the leaves were grinded into fine powder and stored in an air tight bottle prior to use for analysis.

Sample Extraction

The method described by Das et al, (2010) was adopted 50g and 50g of fine powder was dissolved in 500ml of ethanol and distilled water respectively. The solutions were allowed to stand for 24hours after which it was filtered. The filtrate was dried using oven. The extracts were then stored in a desiccator for further use.

Phytochemicals Screening

The extract was used for screening the following bioactive compound: terpenoids, flavonoids, alkaloid, volatile oil, tannins, and saponins as described by Ayoola et al, (2008).

Test for Terpenoids

0.2g of the extract was mixed with 1ml of conc. H_2SO_4 and incubated in water bath for 4 minutes, the formation of greyish colour indicates the present of terpenoids.

Test for Tannins

0.2g of the extract was added to 1ml of 2% $FeCl_3$. The formation of blue, green or black, colour indicates the present of tannins.

Test for Alkaloid

1 ml of benedict's solution was mixed with 0.2g of the extract. Sample is then incubated in a water bath for 2-4 minutes. The presence of red, orange, blue or green colour shows the presence of alkaloid.

Test for Saponins:

0.2g of the extract was mixed with 1 to 2ml of distilled water, the formation of 1 cm foam layer indicates the presence of saponins.

Test for Flavonoid:

Few drops of dilute NaOH was added to 0.2g of the extract, the solution neutralized by adding few drops of HCl. The sample discolored indicating the presence of flavonoids.

Test for Volatile oil:

Few drops of concentrated nitric acid were added to 0.2g of the extract, the formation of yellow colour indicates the presence of volatile oil.

RESULTS AND DISCUSSION**Table 1 Extract Yield and Physical Appearance**

EXTRACT	COLOR	Yield(g)	Yield(%)
Aqueous (50g)	Greenish	12.37	24.74
Ethanollic (50g)	Greenish	5.11	10.22

Source: Research Survey 2022.

In Table 1, the yield in grams and in percentage and the physical appearance of the leaves extract were shown. The initial weight of the leaves powder for aqueous extract was 50g which yielded 24.74% greenish solid. And also, 50g of the leaves powder in ethanol yielded 10.22% greenish solid.

Phytochemical Screening**Table 2:** Phytochemical screening of *carica papaya* leaves, aqueous and ethanolic extracts.

Solvent	Alkaloid	Phenol	Terpenoid	Saponin	Tannin	Flavonoid	Volatile oil
ALE	+	+	+	+	+	-	+
ELE	+	+	+	+	+	-	+

Source: Research Survey 2022.

ALE: Aqueous Leaf Extract

ELE: Ethanolic Leaf Extract

+: Present

-: Absent

Table 2 shows the phytochemical screening of both extracts. The results showed that both ALE and ELE contain all the phytochemical substance except Flavonoid which was absent in both extracts.

DISCUSSION

The phytochemical analysis of the leaves showed that the leaves contained alkaloid, saponin, tannin and volatile oil. Flavonoid was absent in both leaves extract. The presence of saponin in the leaf supports the fact that paw-paw leaf has cytotoxic effect, such as permealization of the intestine (Okwu and Okwu, 2004). It also gives the leaf a bitter taste. Alkaloids are the most efficient therapeutically significant plant substance. They are used as basic medicinal agents because of their analgesic and antibacterial properties (Stray, 1998). They show marked psychological effect when administered to animals.

CONCLUSION

This study presents *Carica papaya* as an important and promising natural medicinal plant which could be utilized in several pharmaceutical and medical applications because of its effectiveness, availability and safety. The plant extracts showed both antibacterial and antifungal activities, thus an indication that the plant can be a potential source for production of drugs with a broad spectrum of activity.

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