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### Prospects of Ethnobotanical Uses of Pawpaw (*Carica Papaya*)

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The ethnobotanical uses of pawpaw (*Carica papaya*) in randomly selected five Local Government Areas of Kwara State, Nigeria were investigated using questionnaire. In addition, the aqueous leaves and roots extracts of *Carica papaya* were studied to ascertain the presence of phytochemicals therein. This was done so as to provide the scientific basis for its effectiveness in the use for the treatment of various ailments and diseases in these Local Government Areas.

The study combined the use of questionnaire with laboratory study. Eight hundred and eighty four (884) respondents selected from five Local Government Area of Kwara state, Nigeria participated in the study.

Responses from the public revealed numerous ethnobotanical uses of *Carica papaya* in many different ailments and diseases. The quantitative phytochemical screening of its leaves aqueous extract revealed the presence of tannins (0.001%), flavonoids (0.013%), saponins (0.022%), phenolics (0.011%) steroids (0.004%) and alkaloids (0.019%) while that of the root gave tannins (0.12%), flavonoids (0.014%), saponins (0.026%), phenolics (0.011%), steroids (0.006%) and alkaloids (0.021%). Cardiac glycosides, anthraquinone, phlobatanin and triterpenes were not detected in the leaves and roots aqueous extracts of the plant. Aqueous root extract is richer in detected phytochemical substances compared with aqueous leaves extract in *Carica papaya*. The various phytochemical compounds detected are known to have beneficial uses in industries and medical sciences, and also exhibit physiological activity. Therefore, root extract may be better source for the industrial production/extraction of these phytochemicals, which may serve ethnobotanical uses.

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**Keyword:** Ethnobotanical, *Carica papaya*, Leaves and Root Aqueous Extracts.

#### 1. Introduction

Products of higher plant origin have been known to be effective sources of chemotherapeutic agents without any underlying effects. Plants continue to be a major source of medicines, as they have been throughout human history. The use of medicinal plants all over the world predates the introduction of antibiotics and other modern drugs <sup>[1]</sup>. A medicinal plant is any plant with one or more of its organs containing substances that can be used for therapeutic purposes or which are the precursors for the synthesis of useful drugs <sup>[2]</sup>. They are of great

importance to the health of individuals and communities; the medicinal values of certain plants lie in some chemical substances that produce definite physiological action on the human body. The most important of these bioactive constituents of plants are flavonoids, tannins, alkaloids and foods plants sometimes added to foods <sup>[2]</sup>. These active principles or ingredients occur naturally in such plants. Amongst such medicinal plants is Pawpaw (*Carica papaya*).

Pawpaw (*Carica papaya*) is a plant that belongs to the family of *Caricaceae*. It is herbaceous

succulent plant with self-supporting stems [1]. It is a large tree-like plant with a single stem growing from 5 to 10 meters tall with sparily arranged leaves confined to the top of the trunk. The lower trunk is conspicuously scarred where leaves and fruits were borne. The tree is usually unbranched. Originally derived from the southern part of Mexico, *Carica papaya* is a perennial plant [3].

The *papaya* fruit, as well as all other parts of the plant, contain a milky juice in which an active principle known as papain is present. Aside from its value as a remedy in dyspepsia and many other ailments, it has been utilized for the clarification of beer. The seed is used as intestinal worms expellant when chewed. The root is chewed and the juice swallowed for cough, bronchitis, and other respiratory diseases. The unripe fruit is used as a remedy for ulcer and impotence [4]. The objective of this study is to ascertain the type and quantity of the phytochemical components of *Carica papaya*, which may be responsible for its efficacy as a

medicinal herb. This will provide a scientific basis for its use in the amelioration of various disorders. The study will also suggest the part of the plant (which contain highest amount of these phytochemicals) that can be harness for the industrial production of these bioactives.

**2. Materials**

**2.1 Materials**

**2.1.1 Plant:**

The leaves and roots of *Carica papaya* were harvested from Malete Village, Moro Local Government Area of Kwara State and were air-dried at room temperature in the Biochemistry Laboratory, Kwara State University, Malete.

**2.1.2 Chemicals:**

Stock tannic acid, Gallic acid, etanol and iso-butanol were obtained from Pascal scientific stores Nigeria Lmd, Akure and are products of BDH Laboratory, England.

**2.2 Methods:**

**2.2.1 Questionnaire:**

Questionnaire for collection of data from the general public read thus:

Dear respondent,

I am conducting a research on ethnobotanical evaluation of pawpaw leaves and roots in this local government Area of Kwara state. Kindly answer the questions below as honestly as possible. All answers supplied by you will be treated as confidential. Thanks for your cooperation.

Instructions: Please tick [ ] the correct answer that suits your opinion and comment where necessary.

Name of Local Government: .....

Sex of Respondent: .....

Age of Respondent: .....

1. Herbs are commonly used in this local government (a) Yes [ ] (b) No [ ]
2. Do you like using herbs? (a) Yes [ ] (b) No [ ]
3. If yes in (2) above, how often? (a) regularly [ ] (b) seldomly [ ] (c) on rear occasion [ ]
4. What is/are the local name(s) of this plant? .....
5. Have you ever used this plant before (a) Yes [ ] (b) No [ ]
6. If yes in (5) above, what part(s) of the plant did you use? (a) leaves [ ] (b) root [ ] (c) stem [ ] (d) all parts [ ]
7. What purpose(s) did you use the part(s) for? .....

8. Is/are this/these part(s) used in combination with other herbs? (a) Yes [ ] (b) No [ ]

9. If yes in (8) above, mention the local name(s) of this/these other herb(s).....

10. What is/are the other traditional use(s) of this plant that you know? .....

### 2.3. Extracts preparation:

The preparation of aqueous extracts of *Carica papaya* were carried out using the method described by Adedapo *et al.* <sup>[5]</sup> and Adesokan <sup>[6]</sup>.

### 2.4 Phytochemical screening:

Qualitative and quantitative phytochemical screenings were carried out using the methods of Sofowora <sup>[7]</sup> and Odotuga and Faremi <sup>[8]</sup> respectively.

### 3. Results

In all the five Local Government Areas covered by this research, a large percentage of the populace use herbs for the treatment of one ailment or the other. 88.40 % of the populace from these Local Government Areas used herbs; some used herbs regularly while others seldom used them. Some members of the public use *Carica papaya* in combination with other herbs. Table 1 shows the prevalence of the uses of pawpaw (*Carica papaya*) plant in five selected Local Governments Areas in Kwara state, north central, Nigeria. The highest percentage of respondents is seen in Offa Local Government Area while the least is recorded in Ekiti Local Government Area. Moro Local Government Area

uses leaves and roots parts of the plant for medicinal purposes. However, Ifelodun, Ekiti and Offa Local Government Areas use all parts of the plant for the treatment of different ailments and diseases.

The use of the plant for the treatment of typhoid, malaria, jaundice and diabetes is common in all selected Local Government Areas. The use of the plant for the treatment of diarrhoea is peculiar to Moro and Offa Local Government Areas (Table 1).

The qualitative phytochemical screening of the extracts revealed the presence of phenolics, saponins, flavonoids, alkaloids, tannins, and steroids while Cardiac glycosides, anthraquinone, phlobatanin and triterpenes were not detected (Table 2).

Table 3 shows the percentage composition of phytochemicals in *Caricapapaya* leaves and roots with saponins having the highest percentage both in the leaves and roots aqueous extracts (0.022 and 0.026 respectively). Tannins have the lowest percentage (0.001) in aqueous leaves extract while steroids have the least percentage in aqueous roots extract (Table 3).

**Table 1:** Ethnobotanical uses of Pawpaw (*Carica papaya*) in selected Local Government Areas of Kwara State, Nigeria

Local Govt. Area	Local Names	Number of Respondents	Percentage of Respondents	Parts of Plant used	Traditional uses
Moro	Ibepe	188	94%	Leaves, Roots	Typhoid, Stomach upset, Malaria, Diarrhoea, Yellow fever, Pile, Diabetes, Body pain, Jaundice.
Ifelodun	Ibepe	176	88%	All parts	Malaria, Stomach upset, Measles, Fibroid, Sedative, Eczema, Pile, Impotence, Hiccups, Tooth paste Typhoid, Dysentery, Jaundice, Blood purification, Diabetes

Ekiti	Ibepe	174	87%	All parts	Diabetes, Asthma, Body pain, Worm expelling, Jaundice, Ulcer, Convulsion, Gonorrhoea, Syphilis, Pile, Typhoid, Malaria, Infertility, Low sperm count, Impotence, Obesity, Tuberculosis.
Afon	Ibepe	152	76%	Leaves, seeds	Asthma, Stomach upset, Tuberculosis, Obesity, Ulcer, Constipation, Impotence, Jaundice, Diabetes, Typhoid, Malaria, Analgesic
Offa	Ibepe	194	97%	All parts	Asthma, Pile, Obesity, Ulcer, Diabetes, Body pains, Measles, Jaundice, Blood purification, Diarrhoea, infertility, impotence, Typhoid, Malaria, Stomach upset.

**Table 2:** Qualitative Phytochemical screening of aqueous extracts of *Carica papaya*

Phytochemical Components	Aqueous Extracts of <i>Carica papaya</i>	
	Leaves	Roots
Flavonoids	+	+
Cardiac glycosides	-	-
Tannins	+	+
Alkaloids	+	+
Anthraquinone	-	-
Steroids	+	+
Saponin	+	+
Phenolics	+	+
Phlobatanin	-	-

- = Absent      + = Detected

**Table 3:** Quantitative phytochemical screening of aqueous extracts of *Caricapapaya*

Phytochemicals present	Percentage composition	
	Leaves	Roots
Alkanoids	0.019±0.10	0.021± 0.01
Flavonoids	0.013± 0.01	0.014± 0.10
Tannins	0.001±0.10	0.12± 0.02
Saponins	0.022±0.10	0.026± 0.01
Phenolics	0.011± 0.01	0.011± 0.01
Steroids	0.004± 0.01	0.006± 0.10

Values are mean of three determinations ± S.D.

#### 4. Discussion

Herbal medicine is gaining popularity in developing countries [9]. Herbal treatments involve mainly the use of plant extracts and other plant products [10, 11] which contain bioactive substances. These phytochemicals have potentials to prevent or cause adverse effects [12]. For example, alkaloids are used medicinally as analgesics or anaesthetics (e.g morphine and codeine). They are also used as antimalarial, anti-hypertension and local anaesthesia in

ophthalmology. Alkaloids are also central nervous system stimulants. They have anthelmintic properties and serve as aphrodisiacs in the treatment of erectile dysfunction [13]. Our study identified alkaloid as one of the major constituents in both the leaves and roots of *Carica papaya* and we hypothesise that this may form the basis for its being use in these Local Government Areas in the management of erectile related dysfunction and several other disorders. For example, our study revealed that the plant is

use in the treatment of impotence in Ifelodun, Afon and Offa Local Government Areas. It is also used for the treatment of infertility in Ekiti and Offa Local Government Areas.

Tannins have been reported to possess antibacterial properties which act by different mechanisms, including enzyme inhibition, reduction in oxidative phosphorylation and iron deprivation amongst others <sup>[14]</sup>. The anti-inflammatory effects of tannins help to control all indications of gastritis, esophagitis, enteritis, and irritating bowel disorders. Tannins not only heal burns and stop bleeding, but they also stop infection while they continue to heal the wound internally. The ability of tannins to form a protective layer over the exposed tissue keeps the wound from being infected. Tannins are also beneficial when applied to the mucosal lining of the mouth <sup>[15]</sup>. Tannins are used indirectly as molluscicides to interrupt the transmission cycle of schistosomiasis. They have also been reported to have anti-viral, antibacterial and antiparasitic effects <sup>[16-21]</sup>. This information also adds credent to the medicinal values of *C. papaya*.

Similarly, saponins have also been implicated to exhibit antibacterial activities <sup>[22]</sup>. Our study revealed that one of the popular uses of *Carica papaya* in some of the Local Government Areas of study is as antibacterial agent. This includes its use in the treatment of diarrhoea in Moro and Offa Local Government Areas, measles and typhoid in Ifelodun and Offa Local Government Areas and gonorrhoea in Ekiti Local Government Area. Saponins have hemolytic, expectorate, anti-inflammatory and immune-stimulating activity. Clinical studies have suggested that these health-promoting components, saponins, affect the immune system in ways that help to protect the human body against cancers, lower cholesterol levels and lower blood glucose response <sup>[23]</sup>. Beyond that, saponins demonstrate antimicrobial properties particularly against fungi and additionally against bacteria and protozoa <sup>[23]</sup>. This may explain why *C. papaya* is used in the treatment of syphilis and gonorrhoea in Ekiti Local Government Area. Saponins bind with bile salt

and cholesterol in the intestinal tract and form small micelles, facilitating its absorption <sup>[24]</sup>. Weintraub <sup>[25]</sup> reported that Saponins exhibit antitumor and anti-mutagenic activities that can lower the risk of human cancers. When ingested by humans, the saponins help immune system and protect them against viruses and bacteria. Saponins, such as the steroidal type from *Anemarrhenaasphodeloides*, have a protective role on bone loss. The non-sugar parts of saponins have also a direct antioxidant activity, which may result in other benefits such as reduced risk of cancer and heart diseases <sup>[25]</sup>. Some saponins (e.g. from oat and spinach) may enhance nutrient absorption and aid in animal digestion. In plants, saponins serve as anti-feedants and protect plants against microbes and fungi <sup>[25]</sup>.

The importance of phenolics as analgesic and anti-inflammatory phytochemical has been reported <sup>[14]</sup> while another study by Newmark <sup>[26]</sup> also reported the use of phenolics as anticarcinogens or mutagens. The presence of phenolics in *Carica papaya* may be the scientific basis of its being use in the Local Government Areas of study for the treatment of body pain as observed in Moro, Afon, Ekiti and Offa Local Government Areas of Kwara State.

Flavonoids possess antibacterial, as well as antiviral and antifungal properties <sup>[27]</sup>. This may also account for its use in treatment of measles and eczema in Ifelodun and Offa Local Government Areas and also it's being use in treatment of typhoid, malaria, yellow fever, tuberculosis, diarrhoea and dysentery in all the local Government Areas. Flavonoids has biological functions such as protection against allergies, inflammation, ulcers and hepatoxins <sup>[28]</sup> which may explain the use of *C. papaya* in the treatment of ulcer in Afon, Ekiti and Offa Local Government Areas of Kwara state.

## 5. Conclusion

*Carica papaya* is seeing in this study as a plant with diverse ethnobotanical uses. The presence of phytochemicals such as alkaloids, tannins,

phenolics, saponins, flavonoids and steroids in both the roots and leaves of the plant give scientific support to these ethnobotanical uses. These various phytochemicals detected in *Carica papaya* are known to have beneficial uses in industries and medical sciences, and also exhibit physiological activity. Our study indicates that these phytochemicals are found relatively in larger quantity in the plant's roots than in leaves. We therefore recommend, based on the results of our study that the roots of *Carica papaya* may be exploited for the industrial synthesis/production of important phytochemicals of medicinal value and be used in phytomedicine.

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