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Quantification of Some Phytochemicals in aqueous pawpaw (*Carica papaya*) plant parts for medicinal usages

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Abstract – *Pawpaw (Carica papaya)* plant parts (ripe and unripe Seeds, peels and leaves) were collected, oven dried and extracted with distilled water. The photochemical analysis of the extract show concentration of saponin ranged from 0.98 ± 0.13 mg/g in ripped seed to 2.98 ± 0.27 mg/g in unripe seed extract. Steroid concentration was highest in the unripe peel extract (0.11 ± 0.07 mg/g)). Tannin was highest in unripe peel extract (5.20 ± 1.25 mg/g) and glycoside was highest in unripe seed extract (6.10 ± 1.45 mg/g) while flavonoid was highest in unripe peel extract (1.88± 0.25 mg/g). The results indicated that unripe pawpaw peel extract has the highest concentrations of all the phytochemicals quantified. This finding therefore established the potency of using unripe aqueous of pawpaw fruit peels for medicinal purposes.

Keywords: Carica papaya, extract, phytochemicals, quantitative analysis, medicinal.

1.0 Introduction

The medicinal value of herbal plants is recently receiving attentions for its safety, efficacy and economy (Abdullahi *et al*., 2013; Aiyegroro and Okoh, 2010). Phytochemicals are plant (phyto) chemicals bio-synthesized by the plants during its physiological development. They are classified into two classes: the primary constituents (proteins, amino acids, sugar, chlorophyll etc) and secondary constituents (alkaloids, terpenoids, phenols, flavonoids, etc) (Abdullahi *et al*., 2013; Aiyelaagbe and Osamudiamen, 2009). These Phytochemicals are precursors for the synthesis of varieties of new drugs.

These Phytochemicals have been reported to be effective in the treatment of different diseases. Alkaloids are the best anaesthetic agents used in various surgical practices and their properties have been described in various pharmacological activities like anti-cancer, anti-malaria, anti-asthama (Aiyelaagbe and Osamudiamen, 2009). Flavonoids are known as anti-oxidants and stimulate several health effects (Okwu *et al*., 2005). All the parts of plants could be exploited for medicinal proposes because of the pharmacological activities of their phytochemicals specially their leaves, roots, barks, stem (Sofowara, 1993).

Carica papaya is commonly known as the pawpaw belongs to the family of *Caricaceae*, is one of the accepted species of genus *Carica* which may be monoecious, dioecious or hermaphroditic (Ikeyi, 2013) in nature, originated from tropics of America, Southern Mexico and neighbouring Central America. It provides 43 kilocalories, rich in vitamin C, and its pulp contains 88% water and 11% carbohydrate (Singh *et al*., 2018).

Practically, every part of *Carica papaya* is of economic value and its use ranged from nutritional to medicinal. The fruits are popularly used and processed into juice and wine, while the fruits are cooked as vegetable (Pallavi *et al*., 2018). The seeds are medically important in the treatment of sickle cell diseases,

poisoning related disorder. The leaf tea or extract has a reputation as a tumor destroyer agent. The fresh green tea is an antiseptic whilst, the brown dried pawpaw leaves are best served as a tonic and blood purifies (Singh *et al*., 2018).

The present study was undertaken to determine the biologically active compounds that contribute to the ethno-medicinal characteristics of various *Carica papaya* plant parts (ripe and unripe). This will help in providing baseline information for ethno-medicinal claims of this plant extract.

2.0 Materials and Methods

2.1 Sample collection and phytochemical extraction

For the present study fresh leaves, seeds and fruit (ripe and unripe) farms in Ede community. The plant materials were washed with distilled water to make it sterile free from any kind of contamination it was washed with 95 % ethanol. All the plant materials were shade dried and grinded with mortar and pestle into fine powder and the stored in the bottles with proper labels. One gram (1g) of dried powder of experimental materials were each soaked in 20 ml of water for 24hrs and kept in shaking incubator at 50-60 rpm at 40 ºC. The mixture was then filtered through the *Whatmann No.*1 filter paper to ensure sediment-free extracts were collected. Colour reaction methods were used to determine the presence or absence of some common Phytochemicals in the aqueous extract of the plant samples.

3.0 Phytochemical analysis

Flavonoids

Flavonoid was determined by colorimetric method as described by (Akimutini, 2006). One gramme of the powdered sample was each weighed differently labeled beakers and 25 ml of 95% ethanol was added to each and left for 24hours. The solutions were filtered separately using *Whatman* filter paper. 0.5ml of the filtrate was taken from each and 1.5 ml of 95 % ethanol was added, 0.1 ml of 10 % aluminium chloride was also added to each of the solution and the mixture was well mixed to obtain homogenous solution. 0.1ml of potassium ethanoate was thereafter added to the mixture followed by addition of distilled water. The mixture was incubated at room temperature for 30 minutes before its absorbance was measures at 415 nm with a visible spectrophotometer (Essam *et al*., 2010).

Alkaloid

The alkaloid content of the extract was determined by gravimetric method using the procedure described by Onwuka, (2005). 5 g of each powdered samples separately measured into conical flasks and 50 ml of 10 % acetic acid in ethanol was added to each flask. The mixture was mixed and allowed to stand for 4 hours before filtration. Each filtrate was evaporated to one-quarter of the filtrate volume on a hot plate. Then 1% concentrated NH_3 was added to each of the concentrated filtrates drop-wise to precipitate the alkaloids. Each of the precipitate was filtered with a weighed *Whatman* filter paper (w_1) and each of the precipitate in the filter paper was dried in an electric oven at 60 ^{0}C for 30 minutes, cooled in the dessicator before and weighed (w_2). The alkaloids content of the sample was by weight difference and expressed in %.

$$\% \text{ alkaloids} = \frac{w2-w1}{Sample\ weight}$$

w_1 = Weight of empty filter paper, w_2 = Weight of filter + filtrate

Tannin

The tannin content was determined by spectrometric the method as described by Akimutini, (2006) with title modification. 2 g of each of the powdered sample was measured and added to 10 ml of distilled water in conical flasks separately. The solution was left to stand for 30 minutes before 2.5 ml from each of the supernatant was pipeted into a 5 ml volumetric flask and 1 ml of *Folin-Denis* reagent was added to each followed by addition of 2.5 ml of saturated Na_2CO_3. Each of the solution thereafter made up to 50 ml in a

volumetric flask and left for 90 minutes before the absorbance was measured at 250 nm in a spectrophotometer.

Cyanide

Cyanide constituent of the samples extract was determined using the method of Wang and Filled as described by (Onwuka, 2005). 5 g of each sample was weighed and added to 50 ml of distilled water in corked 250 ml conical flasks separately and allowed to stand for 24 hours before filtration. The filtrates were poured into five different corked test tubes and then 4 ml of alkaline was added. Each tube was incubated in a water bath at 37 ^{0}C for 5 minutes before the absorbance of each was taken at 490 nm.

Phenolic compounds

Phenolic compound analysis was determined by spectrophotometric method. 0.03 g of the plant samples was weighed into five (5) different test tubes and 10ml of 50 % aqueous ethanol was and left mixtures were for 2 hours. It was filtered using *Whatman* filter papers into five (5) different 50 ml volumetric flask. 2.5 ml of *Folin-Denis* reagent was added to each of the filtrate and was allowed to stand for 30 minutes. 50 ml of saturated Na_2CO_3 was thereafter added to each tube, mixed thoroughly and allowed to stand for 20 minutes before the absorbance of each was taken at 760nm.

Saponin

Saponin quantitative determination was carried out using the method reported by Obadoni and Ochuko, (2002) and Ejikeme *et al*., (2014). 100 cm^3 of 20 % aqueous ethanol was added to 5 grams of each powder sample in a 250 cm^3 conical flask. The mixture was heated over a hot water bath for 4 hours with continuous stirring at a temperature of 55 °C. The residue of the mixture was re-extracted with another 100 cm^3 of 20 % aqueous ethanol after filtration and heated for 4 hours at a constant temperature of 55 °C with constant stirring. The combined extract was evaporated to 40 cm^3 over water bath at 90 °C. 20 cm^3 of diethyl ether was added to the concentrate in a 250 cm^3 separator funnel and vigorously agitated from which the aqueous layer was recovered while the ether layer was discarded. This purification process was repeated twice and 60 cm^3 of n-butanol was added and extracted twice with 10 cm^3 of 5 % sodium chloride. After discarding the sodium chloride layer, the remaining solution was heated in a water bath for 30 minutes, after which the solution was transferred into a crucible and was dried in an oven to a constant weight. The saponin content was calculated as a percentage:

$$\% \text{ Saponin} = \frac{\text{Weight of saponin}}{\textit{Weight of sample}}$$

Table 1: Phytochemical Analysis of Ripe and Unripe Pawpaw plant parts Extract

Sample	**Tannin (mg/g)**	**Steroids mg/g)**	**Saponin mg/g)**	**Flavonoids mg/g)**	**Glycosides mg/g)**
Ripe peels	4.30 ± 0.85	0.09 ± 0.01	2.48 ± 0.14	0.60 ± 0.20	5.90 ± 1.37
Unripe peels	5.20 ± 1.25	0.11 ± 0.07	2.98 ± 0.27	1.88 ± 0.25	5.90 ± 1.30
Ripe seeds	5.10 ± 1.00	0.02 ± 0.01	0.98 ± 0.63	0.98 ± 0.21	5.90 ± 1.35
Unripe seeds	4.10 ± 0.85	0.02 ± 0.01	2.48 ± 0.21	1.44 ± 0.23	6.10 ± 1.45
Leaves	3.00 ± 0.63	0.02 ±0.01	2.00 ± 0.18	0.54 ± 0.22	5.80 ± 1.35

Values are means of triplicate determinations ± S.D

4.0 Results and Discussion

The results indicate that the aqueous extracts of *P papaya* plants parts contained relatively high amounts of flavonoids. The efficacy of the plant extracts in ethno-medical applications can therefore be linked to the antioxidant activity of extract. The highest concentration of flavonoids was contained in the unripe *C. papaya* peel extract (1.88 ± 0.25 mg/g). Flavonoids pharmacological activities have been linked to its free radical scavenging activity (Okoko and Ere, 2012). Flavonoids free radical scavenging ability was known to neutralize the [potentially damaging chain reaction in cell chemistry thus forming stable phenolic radical products in the process (Piession *et al*., 2012). Flavonoids have been reported to have biological activities that are beneficial in the prevention and management of many ailments (Li and Lin, 2010).

Sponinn and glycosides values were in agreement with the previous studies (Taiga, 2013). Aqueous leaf extracts of many plants containing tannins, terpenoids, flavonoids, and alkaloids have been implicated for the various pharmacological activities of the plant including antibacterial and antidiabetic properties (Osadebe and Ukwueze, 2004; Osadebe *et al*., 2004; Murali *et al*., 2011).

5.0 Conclusion

The present study established the high concentrations of all the Phytochemicals analysed in different parts of C. papaya plant. The unripe plant parts contained higher proportions of these phytochemical and therefore the unripe C. papaya plant extracts may be more potent than the extracts of the ripe plant parts.

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