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Qualitative And Quantitative Determination of Plant's Phytochemical Constituents Present In Carica Papaya Leaves By Using Ir Spectroscopy.

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ABSTRACT:
Carica papaya L. belongs to the family Caricaceae and is commonly known as papaya, pawpaw, and kates. It is a perennial horticultural shrub originated from Mesoamerican Centre, Central America, and southern Mexico [2,4] and is mainly cultivated in the tropical and subtropical regions of Brazil, Australia, Malaysia, China, India, Thailand, Myanmar, Philippines, and other adjoining [5]. Papaya is not only cultivated for the ripe sweet fruit, even other parts of the plant such as seeds, leaves, roots, flowers, barks, and latex have been traditionally used for the preparation of various medicinal formulations [6,7].

However, leaves have been emerged as one of the most useful parts with plethora of health-promoting compounds and activities. In traditional medicines, the decoction of papaya fresh leaves is added into a tea to cure malaria, whereas dry and cured leaves are used as cigar for smoking by persons suffering from respiratory disorders such as asthma. Freshly harvested pawpaw leaves were extracted using Two solvents: ethanol, methanol and their phytochemicals determined using standard procedure.

Results obtained showed that alkaloid, flavonoid, saponin, tannin and cardiac glycosides were present while anthraquinone was absent. The percentage yield of phenols using methanol (0.115%) and ethanol (0.214%) solvents were similar. Also the yield of flavonoid using methanol (0.700%) is significantly ($p<0.05$) higher than the yield using other solvents. The yield of phenols using methanol (0.480%) and ethanol (0.470%) solvents were identical.

KEYWORDS: Caricaceae, pawpaw, medicinal formulation, health promoting, phytochemicals.

I. INTRODUCTION:

C. papaya L. belongs to the family Caricaceae and is commonly known as papaya, pawpaw, and kates. It is a perennial horticultural shrub originated from Mesoamerican Centre, Central America, and southern Mexico [2,4] and is mainly cultivated in the tropical and subtropical regions of Brazil, Australia, Malaysia, China, India, Thailand, Myanmar, Philippines,and other adjoining [5]. Papaya is not only cultivated for the ripe sweet fruit, even other parts of the plant such as seeds, leaves, roots, flowers, barks, and latex have been traditionally used worldwide for the preparation of various medicinal formulations [6,7]. However, leaves have been emerged as one of the most useful parts with plethora of health-promoting compounds and activities.

Papaya leaves have been identified to have more than fifty bioactive components and therefore useful in the treatment of different human diseases [11,12]. Scientific studies revealed the existence of considerable levels of glycosides, flavonoids, alkaloids, saponins, phenolic compounds, amino acids, lipids, carbohydrates, enzymes, vitamins, and minerals in papaya leaves [13,14]. The crude form of ethyl acetate isolates of papaya leaves has very good anti- plasmodial effect against Plasmodium falciparum and P. falciparum-resistant strains [15,16]. Few of the studies reported that fresh papaya leaves possess antiseptic properties, while the dried leaves

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can be used as a tonic to purify the blood and to improve digestion. Leaf juice of papaya isnow being known for its potent anticancer [19], antioxidative [4,5], anti-inflammatory [7], antimicrobial [20], and anti-sickling properties [21] along with nephron protective [22], hepato- protective [23], hypo-glycaemic, and hypo-lipidemic effects [24] against toxins in the human system.

PHYTOCHEMICAL COMPOSITION OF PAPAYA LEAVES:

Phytochemicals are chemical components, naturally found in different parts of plants, which make many species beneficial for therapeutic uses. Indeed, leaves of papaya are known to have various health-promoting phytochemicals, as it arose from chemical analysis performed in various studies which clearly illustrated the presence of significant amounts of alkaloids, saponins, glycosides, flavonoids, phenolic compounds, enzymes, amino acids, lipids, carbohydrates, vitamins, and minerals [13]. There were sever flavonoids found in papaya leaves, which were named as quercetin, kaempferol 3-rutinoside, quercetin3-(2G-rhamnosylrutinoside), quercetin 3-rutinoside, kaempferol 3-(2Grhamnosylrutinoside), myricetin 3-rhamnoside. Caffeic acid, protocatechuic acid, quercetin, 5,7-dimethy coumarin, pcoumaric acid, and chlorogenic acid are among the phenolic substances found in the leaves [19].

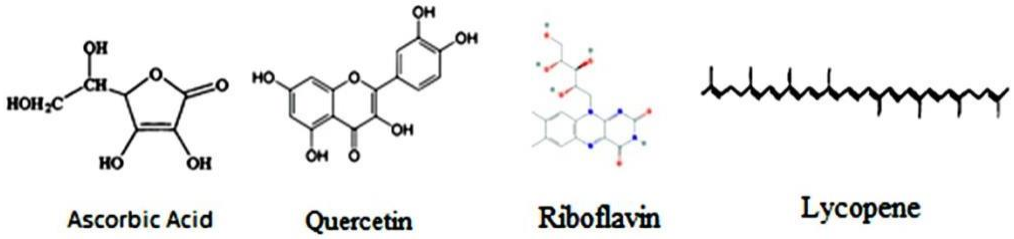

Fig.1 structures of the phytochemicals in pawpaw

There is evidence to suggest that leaves contain a wide range of phytochemicals, including carpaine, kaempferol 3-(2G-glucosylrutinoside), kaempferol 3-(2″- rhamnosylgalactoside), 7-rhamnoside, kaempferol 3-rhamnosyl-(1->2)-galactoside-7-rhamnoside, luteolin 7-galactosyl-(1->6)-galactoside, orientin 7-O-rhamnoside, 11-hydroperoxy- 12,13-epoxy-9-octadecenoic acid, palmiticamide, and 2-hexaprenyl-6-methoxyphenol [25]. Due to these potent bioactive components, extracts of the aforementioned leaves can be used to prepare nutraceuticals and herbal medicinal formulations.

The functional bioactive components of leaves of papaya can elevate the overall antioxidant potential of blood. The leaves of papaya plant are well known to have papain, cystatin, chymopapain, tocopherol, phenolic acids, cyanogenic glucosides, glucosinolates, and vitamin C as main phytochemicals [27]. Mainly alkaloids, saponins, glycosides, phenolic compounds, and flavonoids are responsible for the anti-inflammatory and anticancerous properties of papaya leaves [28]. Vitamins, minerals, and amino acids of papaya leaves are quite helpful to improve the total haemoglobin, proteins, and immunity of human system [29].

Carpaine along with dehydrocarpaine I and dehydrocarpaine II are most important health-promoting and major bioactive components found in the leaves of papaya. Due to the presence of carpaine, these herbal leaves are utilized in Ayurveda formulations for treating various physical disorders and viral fevers such as dengue and chikungunya Carpaine has also been reported to have potent anticancerous and antihelminthic properties and antiplasmodial properties [30][31].

II. Materials And Methods:

Plant collection and identification:

Fresh samples of pawpaw leaves were collected in the Department of Botany, Sri vijay vidyalaya college of pharmacy, Nallampalli, under Dr. Tamil Nadu MGR Medical University, Chennai.

Experimental area:

The extractions, phytochemicals analysis were carried out in laboratories of the Department of Pharmacognosy, Sri Vijay Vidyalaya College Of Pharmacy, Nallampalli.

The extraction process:

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The leaves were cleaned with tap water and later with distilled water, then chopped on a cutting board before loading into the conical flask. The method used in our experiment to carry out the experimentation is done by a maceration method that is the cold extraction method. Two solvents (aqu solvent and ethanol) were used for the extractions. Firstly the pawpaw leaves were dried in a dark room for about 10 days. Then the dried leaves were chopped as a fine powder.

Then it was filled in a conical flask which was diluted with the solvents such as the aqu solvent and ethanol, a cold extraction method was carried out continuously for the next 7days in a dark room and it was stirred twice a day. At the end of the 7th day, the extracts were collected by filtering it. The extracts were then poured into beaker and placed in a water bath and the temperature set to boiling point of each solvent to evaporate the solvent and obtain the pawpaw juice.The temperature of the heating mantle was set at the boiling point temperature of each of the solvents during extraction. The main objective of this study was to conduct phytochemical screening.

Phytochemical screening methods:

A portion of the concentrated extract was used for the screening tests, both qualitative and quantitative analyses, using standard procedure as described by Edeoga et al. (2005).

Phytochemical	Aqu extract	Ethanol extract
Tannin	+	+
Saponin	++	+
Phenols	+	+
Anthraquinones	-	-
Cardiac glycosides	+	+
Flavonoids	+	+
Alkaloids	+	+

+ means the presence of the phytochemicals; - means the phytochemical is absent.

Results showing quantitative analysis of pawpaw leaves of pawpaw leaf extract

	Percentage yield (%)	
Phytochemicals	Aqu extract	Ethanol extract
Phenols	0.115± 0b	0.214±0.001b
Flavonoids	0.700±0.05a	0.500±0.005b
Alkaloids	0.480±0.01a	0.470±0.01a

abc means with different superscript are significantly different (P<0.05)

III. CONCLUSION:

Through our studies, the phytochemical constituents identified were alkaloids, flavonoids,, glycolides, saponins, steroids and terpenoids, alkaloids and phenols are the most abundant. The phytochemicals present in the carcica papaya were determined qualitatively and quantitatively examined by using an IR spectroscopy. The method we used for an extraction is maceration a cold extraction method and the solvents that we are used in our experimentation is aqu solvent and an alcoholic solvent and the experimentation was carried out for about 7days in adark place.Then the extracts were filtered and collected. The collected extracts are given for the IR spectroscopy.

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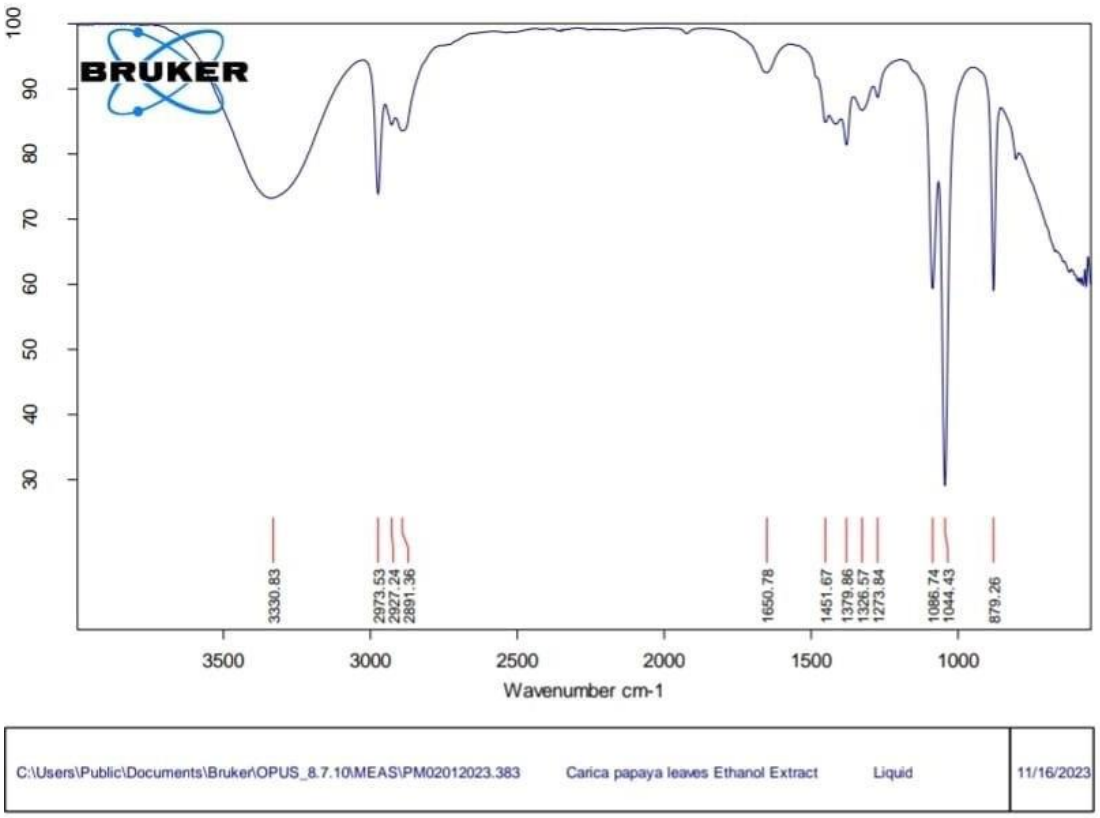

Fig. 2 carica papaya leaves ethanol extract.

Phytochemical	Aqu extract	Ethanol extract
Tannin	+	+
Saponin	++	+
Phenols	+	+
Anthraquinones	–	–
Cardiac glycosides	+	+
Flavonoids	+	+
Alkaloids	+	+

The phytochemicals such as tannin, saponin, phenols, cardiac glycosides, flavonoids and alkaloids are present in our extracted extract but anthraquinones are absent. The percentage yield of phenols using aqu (0.115%) and ethanol (0.214%) solvents .

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