International Journal of Botany Studies
www.botanyjournals.com
ISSN: 2455-541X, Impact Factor: RJIF 5.12
Received: 20-02-2021, Accepted: 24-03-2021, Published: 03-04-2021
Volume 6, Issue 2, 2021, Page No. 392-403

Antipyretic, anti-inflammatory and analgesic properties analysis by GC-MS, FT-IR and phytochemical screening of *Carica papaya* (L.) and nilavembu kudineer choornam

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Abstract

Dengue is a fever generated by a pandemic family transmitted through mosquitoes. For malaria, chikungunya, dengue fever an efficient measure are given by Nilavembu Kudineer Choornam is for all form of fever like. In line with the Government of Tamilnadu, Nilavembu Kudineer Choornam is that the best medicine for break bone fever. Various pharmacological possibilities and low side effects within the biological systems, medicinal plants are very hip in numerous traditional systems of medicines. Many studies available for using *Carica papaya* (L.) leaves and Nilavembu chooranam including many pharmacological activities. Some reports were available on the qualitative and antibacterial activity of *Carica papaya* (L.) Leaves and Nilavembu chooranam. This study concentrated to analyse the phytochemical and biochemical constituents, antibacterial activity, different functional compound using FTIR and qualitative examination of dissimilar extracts of *Carica papaya* (L.) leaves and Nilavembu kudineer choornam (GC-MS). The present study was aimed to analysis of bioactive constituents of *Carica papaya* and Nilavembu Kudineer Choornam. The antibacterial activity of Ethanol, Methanol, Chloroform and Diethyl ether extract of leaf was subjected to Phytochemical Screening, Gas chromatography- mass spectroscopic (GC-MS) and Fourier transform infrared spectroscopy (FTIR) analysis.

Keywords: nilavembu kudineer choornam, *Carica papaya*, extracts, FTIR, GCMS

Introduction

Spices defined as plant substances from indigenous or exotic origin, aromatic or with strong taste, accustomed enhance the taste of foods. Herbs and spices for flavoring, food preservation, and/or medicinal commitments. Currently many ethnic cuisines are familiar for his or her reliance on “signature” herbs and spices. Several readings have endorsed the antimicrobial, antioxidant and pharmaceutical properties of spices and herbs to their phenolic compounds (Shan *et al.*, 2005) [1]. Several studies have shown that spices are able to counteract oxidative stress in *in vitro* and *in vivo* systems (Das *et al.*, 2010., Randhawa and Alghamdi *et al.*, 2011) [2, 3]. Rancidity and oxidation of lipids based on the storage of the food extension will be prevented (Kelen and Tepe, 2008) [4] or over and done with bacteriostatic or bactericidal activity (Nazef *et al.*, 2008) [5] and that they execute the antifungal activity (Kotzekidou *et al.*, 2008) [6]. Spices and their extracts were had various therapeutic properties (Ayodele *et al.*, 2009) [7], they are affect digestion processes differently. Most of them stimulate the secretion of saliva. The medicines of Ayurveda, Siddha and Unani occupy the prominent role within the medicinal world. The origin of Ayurveda medicine before 5000 years ago from India. Whereas, origin of Siddha medicine from Tamil Nadu state and Ceylon. The origin of Unani medicine from Greek-Arabic medicine. In ancient days, for curing diseases and disorders medicinal plants are used. Universally, India is also among the richest biodiversity country and it has a forty five thousand plant species altogether, twenty thousand medicinal plants have been recorded. Recently, 500 traditional communities (Chin *et al.*, 2006) cure different diseases. *Andrographis paniculata* (Nilavembu/ Kirayat: Acanthaceae) Vetiveriazizanioides, *Cymbopogen jwarankusa*, *Santalum album*, *Trichosanthes cucumerina*, *Cyperus rotundus*, *Zingiber officinale*, *Piper nigrum*, and *Mollugo cerviana* these plants contains the similar proportion as "Nilavembu Kudineer" in the dried plant powder (Lavekar *et al.*, 2007; Anbarasu *et al.*, 2011) [8, 9].

GC-MS and FT-IR has played a crucial role in pharmaceutical analysis in recent years (Movasaghi *et al.*, 2008) [10], recently, spectroscopy has emerged ioned of the foremost tools for biomedical claims and has made noteworthy progress within the field of clinical evaluation. Exploration was accepted on a variety of natural tissues using spectroscopic techniques, including FT-IR spectros copy. This study distributed the bioactive compounds present within the *Carica papaya* and Nilavembu Kudineer Choornam in ethanol extract with the help of GC-MS and FT-IR techniques, which can offer a perception in its use of outdated medicine.

Materials and method

Collection of plant sample

The selected plant parts like *Carica papaya* (L.) Leaves collected from Kumbakonam, Tamilnadu. The *Carica papaya* L. Leaves Was collected during the month of April 2018.

Powder extraction

The leaves air-dried under shade at temperature for 8 days. Washed and the stems were removed before use. Cut into small pieces and blended without adding water or other

liquids. The plant sample powdered by use of grinder. Then the powdered stuff was stored in airtight container until the time of use.

Diethyl ether (Brand: SDFCL (Sd Fine-CHEM Limited), purity-99.55%, Impurity-0.50% molecular weight-74.12 boiling Range (34-360c) evaporation: 0.002% acidity: 0.003% supplier 315-317, t.v. industrial estate, 248, Worli road, Mumbai-30).

Methanol (Brand: CDH Central Drug House (p) Ltd., Molecular weight: 32.04 Boiling range: (64.0-65.50c) impurity: 0.005% supplier corp. Office: 7/28 Vardaan house, Daryaganj, New Delhi-110002 (India)).

Chloroform (Brand: Molychem molecular weight: 119.38 acidity: 0.1ml N%water: 0.1% supplier 78/80 Babu Genu road, Mumbai, 400002. India).

Ethanol (Molecular weight: 46.0684 g/mol. Purity: 95-96%, melting point: 78.370c).

Aqueous (Boiling Point: 100%, melting point: 00c molecular weight: 18.01528 g/molt).

Process

The fine powder of 20g added with 500ml of different extracts as methanol, ethanol, chloroform, and water and solvents diethyl ether respectively taken in an exceedingly conical flask. For successive extraction with the powder was allowed incubated for 24 hours with orbital shaking at room temperature. The liquid extracts so obtained was filtered with filter paper. All extract were filtered and targeting a water bath. The yield of the extract was 10% w/w of the liquid extract. This was stored in refrigerator for further and future use.

Phytochemical screening

The different solvent extracts of *Carica papaya* leaves and nilavembu kudineer churanam thus Obtained were subjected to preliminary phytochemical Screening tests supported carbohydrates, tannins, saponins, flavonoids, alkaloids, quinines, glycosides, cardiac glycosides, terpenoids, triterpenoids, phenols, coumarins, steroids, phytosterols, phlobatannins and antraquinones (Yoppi Iskandar *et al*, 2018)[11].

GC-MS analysis

Gas chromatography–mass spectrometry (GC–MS) is a method used to analyze chemical and to identify quantify of metabolites in leaf extracts, obtained using Liquid–Liquid Extraction (LLE). Extraction method made it possible to clean up the extracted sample before derivatization reaction and chromatographic separation and identification. Nowadays, the analysts turn to gas chromatography as a powerful separation method with mass spectrometry to aid identification (Duke, 1992) [12].

The GC-MS analysis carried out using the instrument make Perkin Elmer Clarus 500. The data obtained on a Capillary Column Elite-5MS (5% phenyl 95% dimethyl poly siloxane). Helium (99.999%) used as the carrier gas with a flow rate of 1 mL/min in the split mode (10:1). An aliquot of 1µl of methanol solution of the sample injected into the column with the injector temperature at 270 °C. GC oven temperature started at 110°C and holding for 2 min and it raised to 200°C at the rate of 10°C /min without holding. Holding allowed at 280°C for 9 min with programme rate of 5°C /min (50°C @ 8°C/min to 150°C (5 min) @ 8°C /min to 250°C (10 min). GC interface and Ion source temperature maintained at 200 °C. The mass spectrum of compounds in the samples obtained by electron ionization at 70 eV and the detector operated in scan mode from 40-450 amu (atomic mass units). A scan interval of 0.5 second and fragments from 40 to 450 Da maintained. The total running time was 36 minutes.

FTIR analysis

Fourier transform infrared spectrometry is a rapid, non-invasive, physicochemical analytical technique not resolves the concentration of individual metabolites. Creates the metabolic composition of a snapshot of the tissue within a stipulated time. FTIR cab employed to determine the structure of unknown composition and the strength of the absorption spectra related with the molecular composition or content to the group of chemicals (Surewicz, 1993)[13].

Fourier Transform infrared Spectroscopy (FT-IR) refers to recent in which the data is collected and concerted form interference pattern to a spectrum. The FTIR instrument FT-IR spectrometers fis-41, sconce South Korea was used (Parag et al., 2013). FTIR spectra was record for the sample in the middle IR regin (4000-4000 cm-1) using an avatar-330 FT-IR type instrument. The sample introduced in id3 ATR accessory instrument.

Preparation of Nilavembu Kudineer Chooranam by the institution of Siddha Sasthiriya Medicine; Siddha Vaidhiya Thirattu

The sample is grinded as the fine powder and weighed 20g mixed and makeup to the volume 200ml to different solvents. 20g of sample powder mixed in 200ml of ethanol, methanol, chloroform, diethyl ether and water. The fine powder of 20g with 500ml of methanol, ethanol, chloroform, water and solvents diethyl ether respectively taken in a conical flask. For successive extraction with the powder was allowed incubated for 24 hours with orbital shaking at room temperature. The liquid extracts so obtained filtered with filter paper. All extract filtered and concentrated on a water bath. The yield of the extract was 10% w/w of the liquid extract. This was stored in refrigerator for further usage.

Carbohydrates

Weigh 100mg of the plant sample into a boiling tube; hydrolyze it in the boiling water bath for three hours with 5ml of 2.5M Hydrochloric acid, followed by the room temperature. Neutralize it with solid sodium carbonate until the effervescence cease. Make up the volume to 100ml and centrifuge. Collect the supernatant and take 0.5ml and 1.0ml aliquots for analysis.

Prepare the standard by taking 0.2, 0.4, 0.6, 0.8 and 1.0ml of the aliquots of working standard and make up the volume to 1.0ml in all the test tube including the sample tubes by taking 1ml of distilled water. Add 4 ml of anthrone reagent and heat for eight minutes in boiling water bath. Cool rapidly and read the dark green colour was developed at 630 nm by colorimeter. Standard graph by plotting concentration of the standard on the x- axis and absorbance on the y- axis drawn. From the graph, calculate the amount of

carbohydrate in the sample. The amount of carbohydrates expressed as mg/100g.

Protein

Pipette out 0.2, 0.4, 0.6, 0.8 and 1.0ml of working standard into a test tube series. Make up the volume to 1.0ml in all the test tubes. A tube with 1.0ml of water serves as the blank. Add 4.0ml of reagent C to each tube including blank. Mix well and allowed stand for ten minutes. Blue colour is developed and the colour was read at 660nm by colorimeter. Draw a standard graph and calculate the amount of protein expressed as gram/100g.

Vitamin C

Pipette out 5ml of working standard solution into a 100ml conical flask. Add 10ml 0f 4% oxalic acid and titrate against the dye. End is the appearance of pink will persist for a few minute. The amount of the dye consumed is equivalent to the amount of ascorbic acid. Extract the sample (0.5-5g depending on the sample) in 4% oxalic acid and make up to a known volume and centrifuge. Pipette out 5ml of this supernatant, add 10ml of 4% oxalic acid and titrate against in the dye.

Antimicrobial activity

The antimicrobial activity performed by agar cub plate method (NCCLS, 1993) [114]. Suspend 28.0 grams in 100ml distilled water. Heat until boils and dissolve the medium thoroughly. Sterilize by autoclaving at 15 ibs pressure (121c) for 15 minutes. Mix well and into sterilize petri plates. The E. coli bacteria were collected.

Bioactive compounds

Papaya is rich in vitamin C, A & E and minerals such as magnesium and potassium. Nutrients present in Papaya helps to recover from cardiovascular disorders and to prevent colon cancer, diabetic and heart disease.

Leaf

Papaya leaf is used as an antiseptic and act as a best tonic and blood purifier (Basalingappa et al, 2019). Papaya leaf juice is treating the patients with dengue viral infections as a current remedial action for the diseases. (Fenny Yunita *et al.*, 2012) [15]. *Carica papaya* leaf extract acts as a inducer of platelets count in the body (Senaka Rajapakse *et al,* 2019., Dipu *et al*, 2020) [16,17].

In India, Papaya leaves used specifically for fever, beriberi, asthma, colic (Krishna *et al.*, 2008). The leaves used into tea for malaria treatment and dried and cured leaves used as cigar and smoked by asthmatic persons (Vijay *et al.*, 2015) [18]. Beside these it is also being used for relieve nausea, ease menstrual pain and Consumptions of guava and Papaya fruits reduce oxidative stress and alter lipid profile.

Papaya leaf juice helps to increase the count of white blood cells and platelets by normalizing clotting mechanism and hepatic rejunavation (Dr. Sanath Hettige). Leaves boost the production of Th1-type cytokines, key signalling molecules. Papay leaf extract with different compounds for the ailments. (Jaji *et al.*, 2020) [19].

Nilavembu Kudineer

Nilavembu kudineer controls the fever based on the herbal formula. It exhibits powerful antiviral activity against viruses producing Dengue and Chikungunya fever as well as effective in fevers such as Typhoid and Malaria. Nilavembu kudineer is a mixture of traditional herbal plants used conventionally in the treatment of fever, inflammation, arthralgia, arthritis, gastric ulcer, jaundice and general debility conditions, expressed with a purpose to accomplish the chikungunya fever (Anbarasu *et al.*, 2011) [9].

Vettiver (*Vetiveria zizanioides*)

Vetiver (*Vetiveria zizanioides*) is a perfumery and therapeutic worth since antique times (Lavania, 2003b). The Indian tribes for treating various ailments, diseases and disorders have conventionally used dissimilar parts of the vetiver plant. Including boils, burns, urinary tract infections, malarial fever, epilepsy, fever, headache, toothache and rheumatism (Anbarasu *et al.*, 2011) [9].

Cukku (*Zingeber officinale*)

Cukku is a powerful anti-inflammatory and anti-thrombotic agent (Raquel, 2007). Their tuberous or non-tuberous rhizomes, with strong aromatic and medicinal properties, categorize the Zingiberaceous plants.

Koraikkilanku (*Cyperus rotundus*)

The rhizomes of *C. rotundus* used as an antique medicine in India for fever, dysentery, purities, pain, vomiting and various blood disorders (Aslam, 2002). In particular, plant extracts offer a rich potential source of novel anti–platelet agents (Thomsona *et al.*, 2003) [20].

Santanam (*Santalum album*)

Santanam reduces body temperature in fever, also elevates the mood and creates sense of wellbeing thus helps in speedy recovery from fever (Anbarasu *et al.*, 2005) [21]. *Santalum album* has various biological activities, such as antiviral and chemo preventive effects (Anbarasu *et al.*, 2011) [9].

Milaku (*Piper nigrum*)

Piperine acts as an ant apoptotic, anti-metastatic, ant mutagenic, anti-spermatogenic, anti- colon toxin, insecticidal and larvicidal activities etc. Inhibiting the different enzyme metabolizes will enhance the therapeutic efficacy of numerous drugs, vaccines and nutrients.

Vilamiccamver (*Vetiveria zizanioides*)

Vilamiccamver is act as an anti-inflammatory by reduces the body heat and reduces the fever by inducing perspiration. (Anbarasu *et al.*, 2005) [21].

Botanical taxonomy

Table 1

Ingredients	Botanical name	Part used	Quantity
Nilavembu	*Andrographis paniculata* Burm. f	Leaves	8.75gms
Vilamichamver	*Plectranthus vettiveroides* Jacob	Root	8.75gms
Santhanam	*Santalum album* L.	Wood	8.75gms
Peipudal	*Trichosanthes cucumerina* L.	Whole plant	8.75gms
Koraikizhangu	*Cyperus rotundus* L.	Root	8.75gms
Chukku	*Zingiber officinale* Roscoe	Root	8.75gms
Milagu	*Piper nigrum* L.	Fruit seed	8.75gms
Parpatakam	*Mollugo cerviana* L. Ser	Whole plant	8.75gms
Vettiver	*Vetiveria zizanioides* L.	Root	8.75gms

Result

Table 2: Quantitative Analysis of Carbohydrate, Protein and Vitamin C content of different extract of *Carica papaya* (CP) leaf and Nilavembu kudineer chooranam (NKC)

Solvents	Carbohydrates mg/dl		Protein mg/dl		Vitamin C mg/dl	
	CP	NKC	CP	NKC	CP	NKC
Water	15.33	1.57	14.86	8.36	2.42	5.93
Ethanol	10.13	3.5	4.76	4.09	5.10	4.52
Methanol	8.42	9.86	6.46	7.15	5.52	3.20
Chloroform	10.41	5.68	2.77	5.48	7.18	4.52
Diethyl ether	10.28	10	7.5	4.09	7.39	3.16

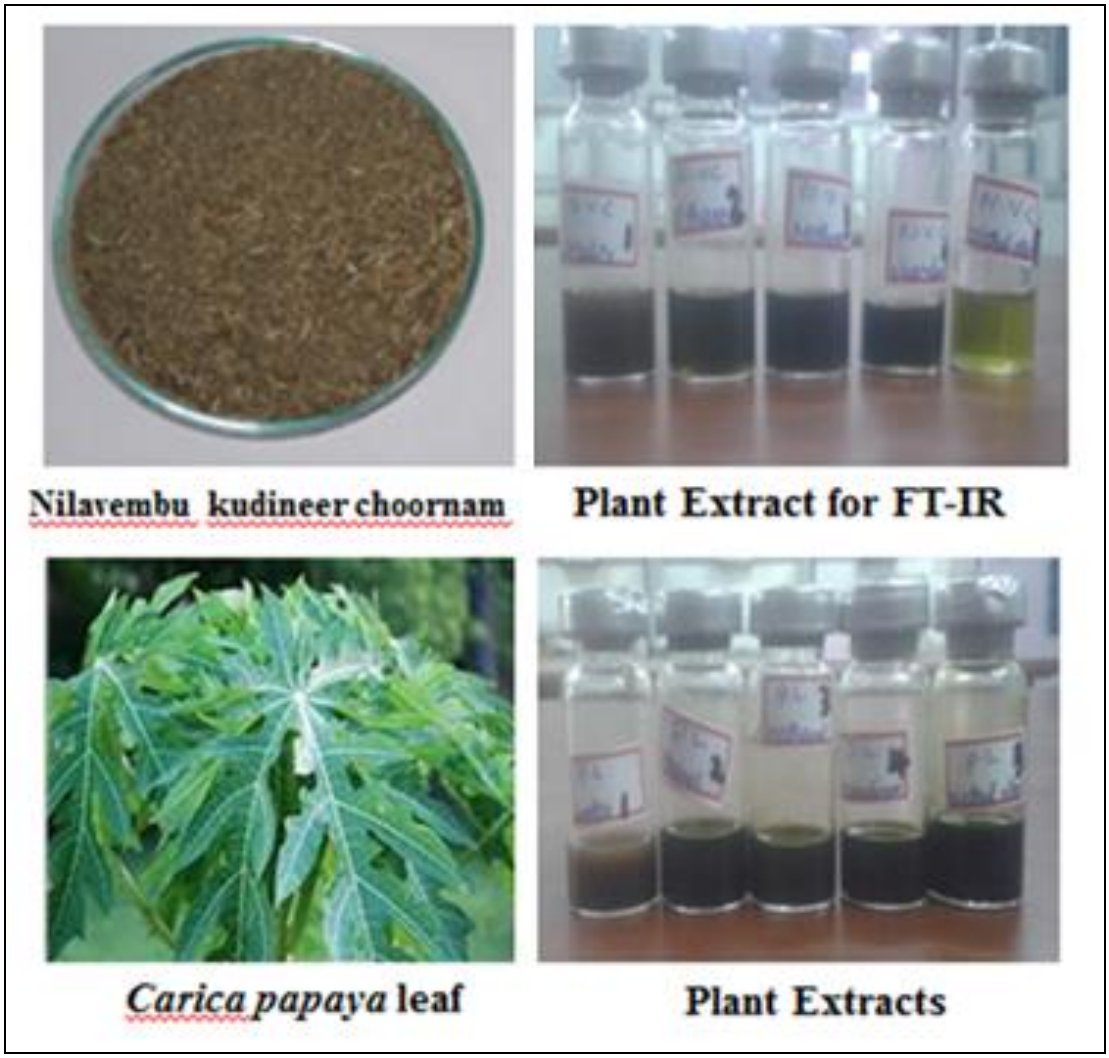


Plate 1: Image of *Carica papaya*, Nilavembu kudineer choornam and plant extract

Table 3: Phytochemical analysis of leaf extracts of *Carica papaya* (CP) and Nilavembu Kudineer chooranam (NKC)

Phytochemical parameters	Water extract		Ethanol extract		Methanol extract		Chloroform extract		Diethyl ether extract	
	CP	NKC	CP	NKC	CP	NKC	CP	NKC	CP	NKC
Alkaloids	+	-	+	+	-	+	+	+	+	+
Flavonoids	-	-	+	+	+	+	+	-	-	+
Saponins	+	+	+	-	+	-	-	-	-	-
Terpenoids	+	-	+	+	+	+	-	-	+	+
Carbohydrate	+	-	-	-	+	-	+	-	+	-
Protein	-	-	+	+	+	+	-	+	+	+
Tannins	-	+	-	+	-	+	+	+	+	+
Anthroquinone	+	-	-	-	-	+	-	+	-	-
Steroids	-	-	+	+	+	+	+	+	+	+
Triterphenoids	-	-	-	+	-	+	-	+	+	+
Phenol	-	-	-	-	-	+	+	-	+	-
Glycoside	-	+	-	-	+	-	-	+	+	+
Phlobatannins	-	-	-	-	-	-	+	-	-	-

(+) Presence; (-) Absence

Table 4: Antibacterial Activity of different solvents extracts of *Carica papaya* Leaf and Nilavembu kudineer choornam

S.No	Solvents	Zone of Inhibition					
		Standard (mm)		Control (mm)		Extract (mm)	
		CP	NKC	CP	NKC	CP	NKC
1	Water	10.2	10.7	7.6	7.8	6.9	8.9
2	Ethanol	15.7	15.8	5.5	5.9	10.2	6.7
3	Methanol	10.6	10.7	5.6	5.7	9.7	10.3
4	Chloroform	9.5	9.9	8.3	8.7	8.5	9.4
5	Diethyl ether	8.2	8.8	5.8	5.9	5.5	12.9
6	Mean	10.84	11.18	6.56	6.8	8.16	9.64
7	Standard deviation	2.865	2.697	1.297	1.363	1.956	2.253

The antimicrobial activity result different solvent of *Carica papaya* leaf concentration dependent activity against all the tested pathogens with the zone of inhibition ranged from 5-20mm at various concentration. Methanolic extract responded as well as for the antibacterial activity gram-negative bacteria (9 mm). Chloroform and ethanol extracts showed moderate activity gram-negative bacteria (8,10mm) with zone of inhibition while gram-negative bacteria marked in lower activity of water and diethyl ether extract (6,5mm). The antimicrobial activity result different solvent of Nilavembu kudineer choornam concentration dependent activity against all the tested pathogens with the zone of inhibition ranged from 5- 20mm at various concentration. Chloroform extract responded as well as for the antibacterial activity gram-negative bacteria (9 mm). Methanol and diethyl ether extracts showed moderate activity gram-negative bacteria (12.10mm) with zone of inhibition while gram-negative bacteria marked in lower activity of water and ethanol extract (6.5mm).

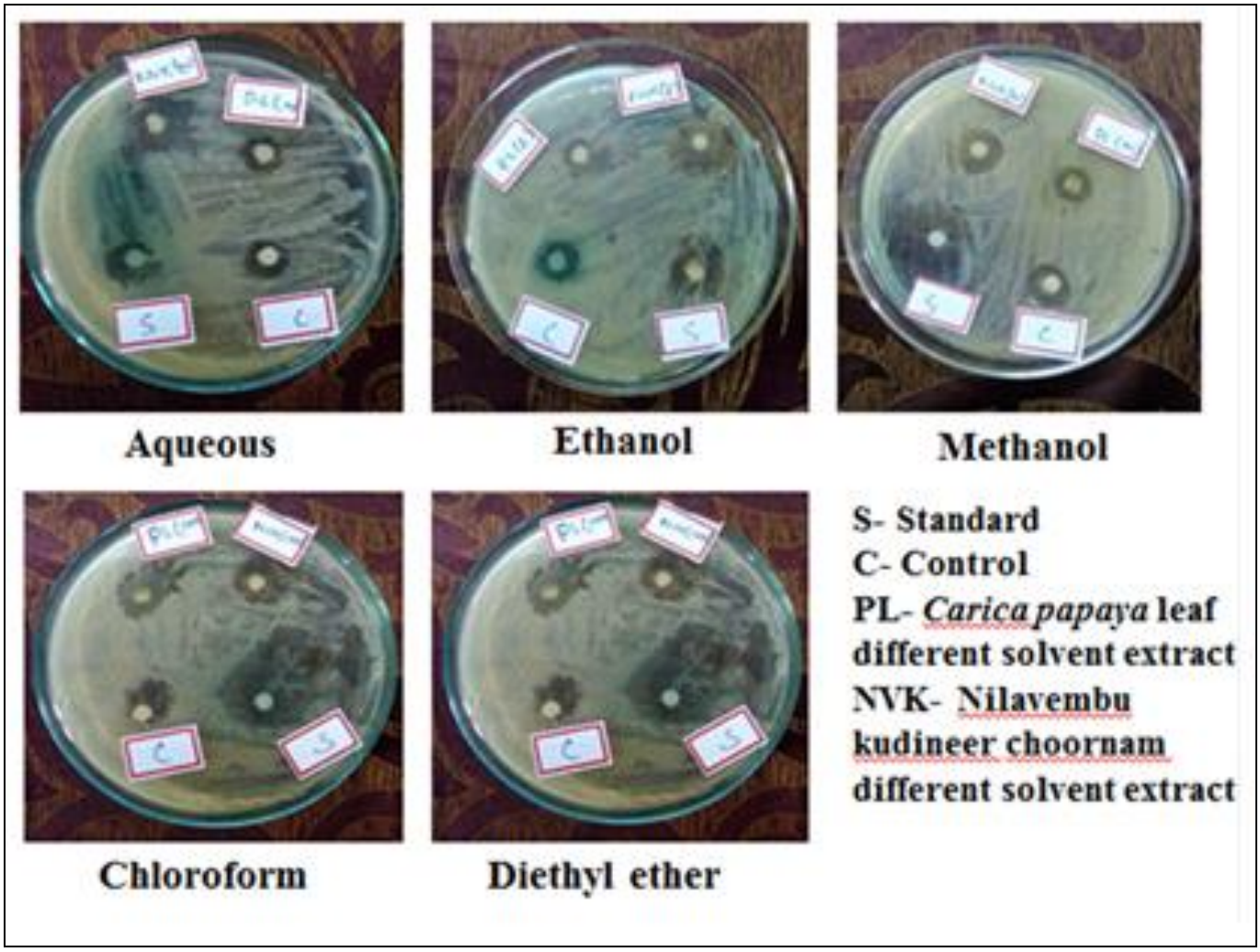


Plate 2: Antibacterial activity of different solvents of extract *Carica papaya* leaf and Nilavembu kudineer choornam

GCMS list of compound ethanolic extract of *Carica papaya* leaf

GCMS Analysis of ethanol extract of *Carica papaya* leaf revealed the existence of 2-Phenyl-hex-5-en-3-ol, Furan, 2-(2-propenyl, -Furanmethanol methyl-, trans, tetrahydro-5 3,5-dihydroxy-6-methyl, 4H-Pyran-4-one, 2,3-dihydro-, Benzenecarboxylic acid, Undecanoic acid, ethyl ester, Methoxy-4-vinylphenol, n-Decanoic acid, Dodecanoic acid, Tetradecanoic acid, 3,7,11,15-Tetramethyl-2-, Tetradecanoic acid, Hexadecanoic acid, methyl ester,

Hexadecanoic acid, ethyl ester, n-Hexadecanoic acid, phytol, 9,12,15-Octadecatrienoic acid, ethyl ester, (Z,Z,Z)-, Oleic Acid.

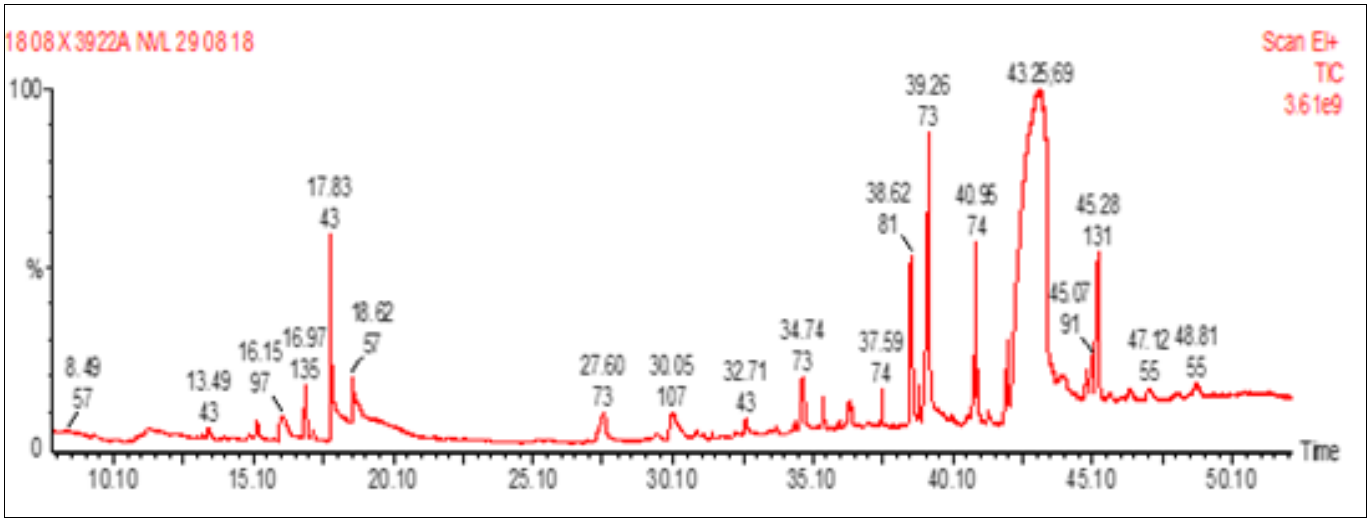


Fig 1: GC-MS Chromatogram of ethanolic extract of *Carica papaya* leaf

GCMS list of compound ethanolic extract of Nilavembu kudineer choornam

GCMS Analysis of ethanol extract of *Carica papaya* leaf revealed the existence of Benzenepropanal, 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-, Benzenecarboxylic acid, 2-Butanone, 4-phenyl-, 2-Furancarboxaldehyde, 5-(hydroxymethyl)-, :Thymol, : 2-Methoxy-4-vinylphenol, Methylparaben, Dodecanoic acid, 1-Cyclohexene-1-acetaldehyde, 2,6,6-trimethyl, Benzenepropanol, 4-hydroxy-à-methyl-, (R)-, à-Cadinol, : Butan-2-one, 4-(3-hydroxy-2-methoxyphenyl)-, 1-Cyclohexanone, 2-methyl-2-(3-methyl-2-oxobutyl), Phenol, 5-(1,5-dimethyl-4-hexenyl)-2-methyl-, (R)-, Tetradecanoic acid, : 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, 1H-3a,6-Methanoazulene-3-carboxylic acid, octahydro-7,7-dimethyl-8-methylene-, [3S-(3à,3aà,6à,8aà)]-, Naphthalene, decahydro-1,1-dimethyl-,: n-Hexadecanoic acid, 9-Octadecenoic acid, ethyl ester, Oleic Acid, Gingerol, Naphthalene-1,4-diol, 4-O-benzoyl(ether), 2-(3,4-Methylenedioxyphenyl) cyclohexanone.

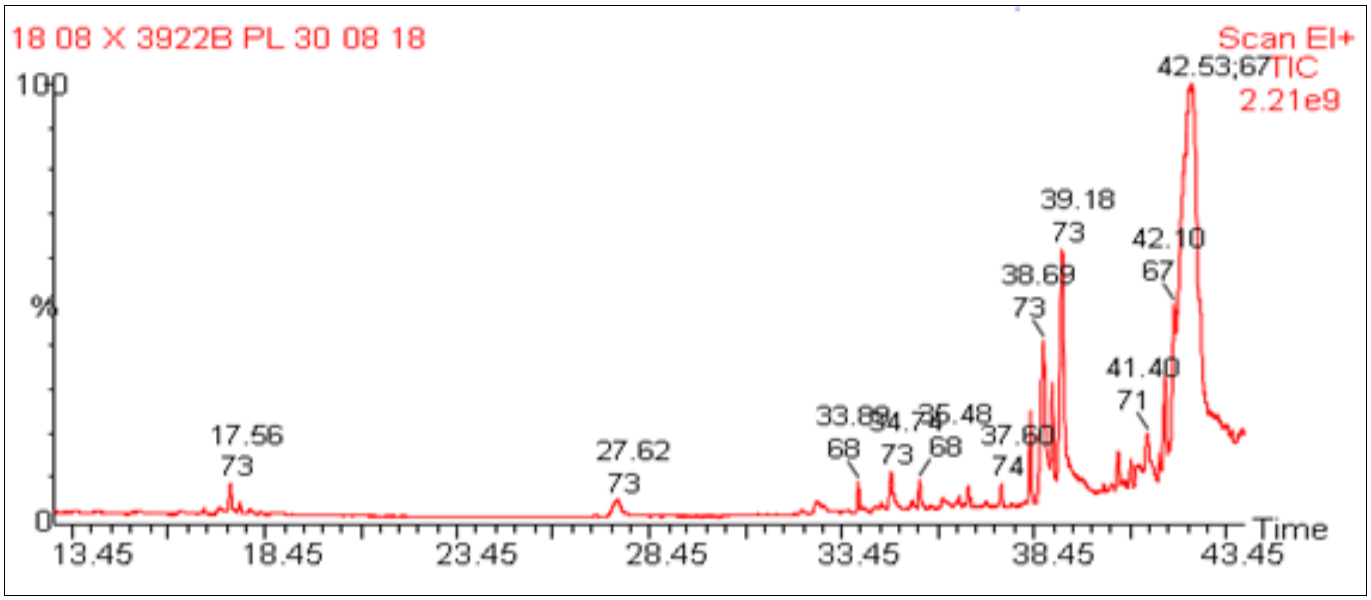


Fig 2: GC-MS Chromatogram of ethanolic extract of Nilavembu kudineer choornam

Table 5: GC-MS list of compounds in ethanolic extract of *Carica Papaya* leaf

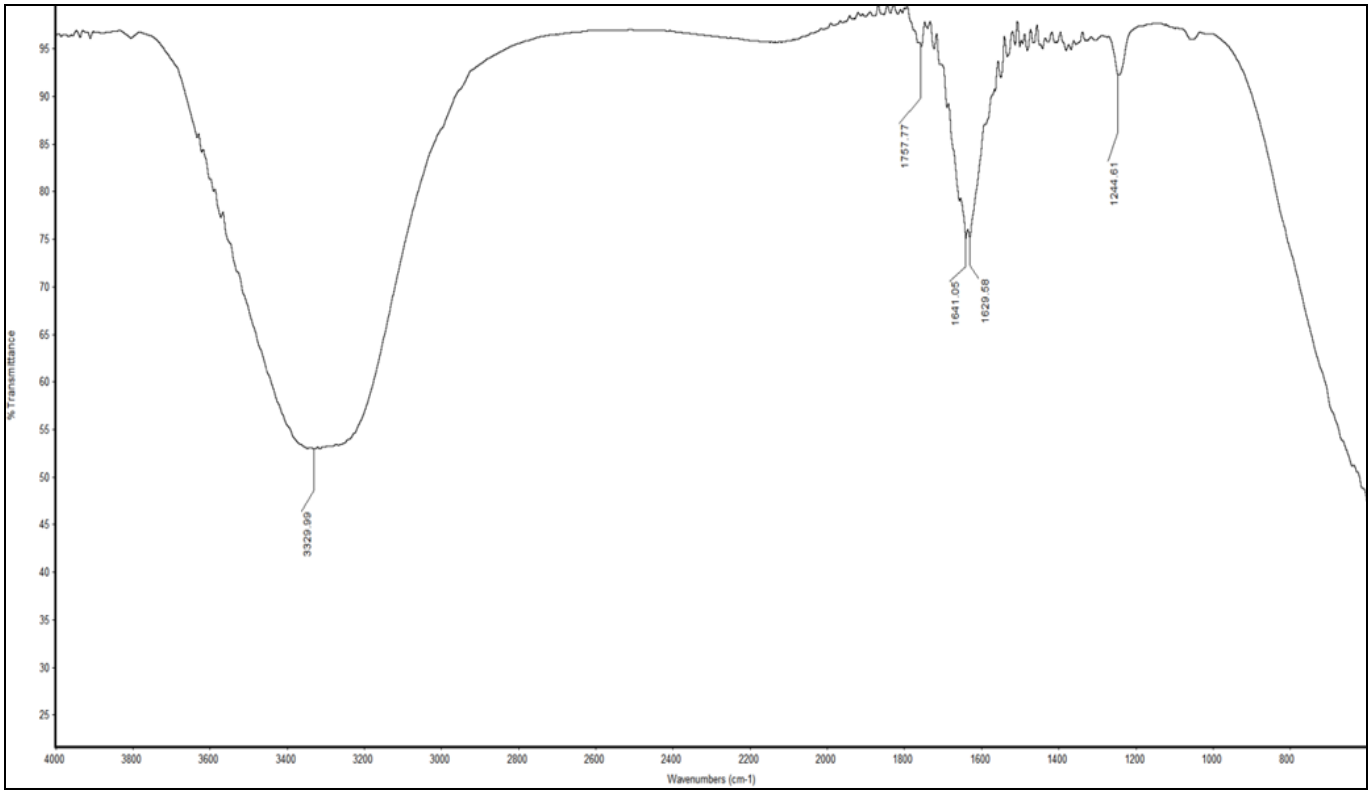
S. No.	Identified compounds	Retention Time	Peak Area	Peak Area (%)
1	Name: 2-Phenyl-hex-5-en-3-ol Formula: C12H16O MW: 176	5.81	401913	0.0541
2	Name: Furan, 2-(2-propenyl)- Formula: C7H8O MW: 108	11.02	937208	0.1262
3	Name: 2-Furanmethanol, tetrahydro-5-methyl-, trans- Formula: C6H12O2	11.95	1213435	0.1634

	MW: 116			
4	Name: 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl- Formula: C6H8O4 MW: 144	13.52	1751298	0.2358
5	Name:Benzenecarboxylic acid Formula: C7H6O2 MW: 122	15.03	1877052	0.2527
6	Name:Undecanoic acid, ethyl ester Formula: C13H26O2 MW: 214	16.86	2291840	0.3086
7	Name: 2-Methoxy-4-vinylphenol Formula: C9H10O2 MW: 150	17.24	1435434	0.1933
8	Name: n-Decanoic acid Formula: C10H20O2 MW: 172	17.56	11563932	1.5570
9	Name:Dodecanoic acid Formula: C12H24O2 MW: 200	27.62	23494770	3.1634
10	Name:Tetradecanoic acid Formula: C14H28O2 MW: 228	32.80	11284821	1.5194
11	Name: 3,7,11,15-Tetramethyl-2-hexadecen-1-ol Formula: C20H40O MW: 296	33.89	10895242	1.4670
12	Name:Tetradecanoic acid Formula: C14H28O2 MW: 228	34.74	25275338	3.4031
13	Name:Hexadecanoic acid, methyl ester Formula: C17H34O2 MW: 270	37.60	6650015	0.8954
14	Name:Hexadecanoic acid, ethyl ester Formula: C18H36O2 MW: 284	38.35	27272554	3.6721
15	Name: n-Hexadecanoic acid Formula: C16H32O2 MW: 256	39.18	159958288	21.5373
16	Name: Phytol Formula: C20H40O MW: 296	41.40	29498892	3.9718
17	Name: 9,12,15-Octadecatrienoic acid, ethyl ester, (Z,Z,Z)- Formula: C20H34O2 MW: 306	41.85	31232852	4.2053
18	Name: Oleic Acid Formula: C18H34O2 MW: 282	42.53	395669696	53.2742

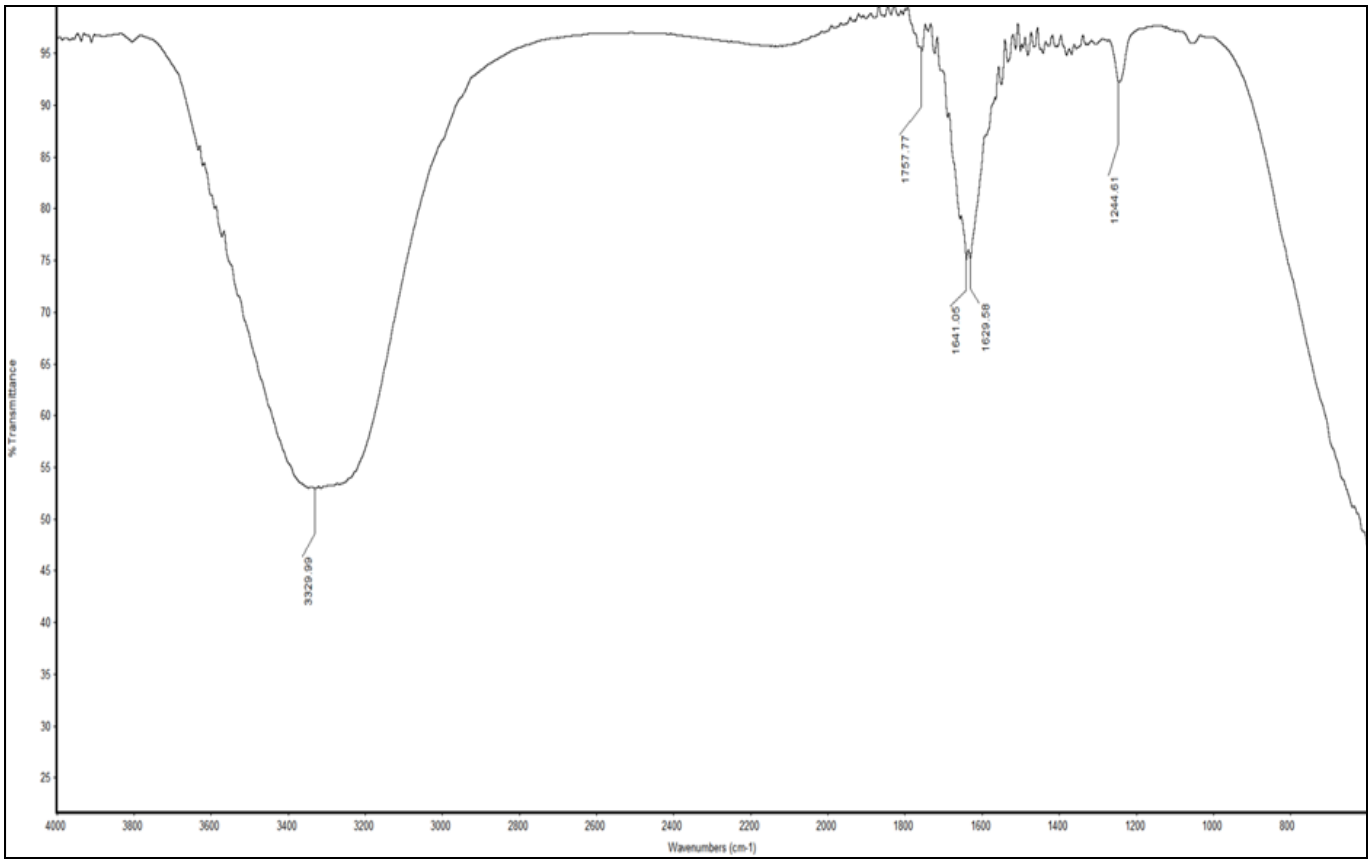
Table 6: GC-MS list of compounds in ethanolic extract of Nilavembu kudineer choornam

S. No.	Peak Name	Retention time	Peak area	Peak area (%)
1	Name:Benzenepropanal Formula: C9H10O MW: 134	13.30	3256004	0.1193
2	Name: 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl- Formula: C6H8O4 MW: 144	13.49	13884676	0.5087
3	Name:Benzenecarboxylic acid Formula: C7H6O2 MW: 122	14.96	9333135	0.3420
4	Name: 2-Butanone, 4-phenyl- Formula: C10H12O MW: 148	15.22	22915936	0.8396
5	Name: 2-Furancarboxaldehyde, 5-(hydroxymethyl)- Formula: C6H6O3 MW: 126	16.15	74572848	2.7322
6	Name:Thymol Formula: C10H14O	16.97	52665804	1.9296

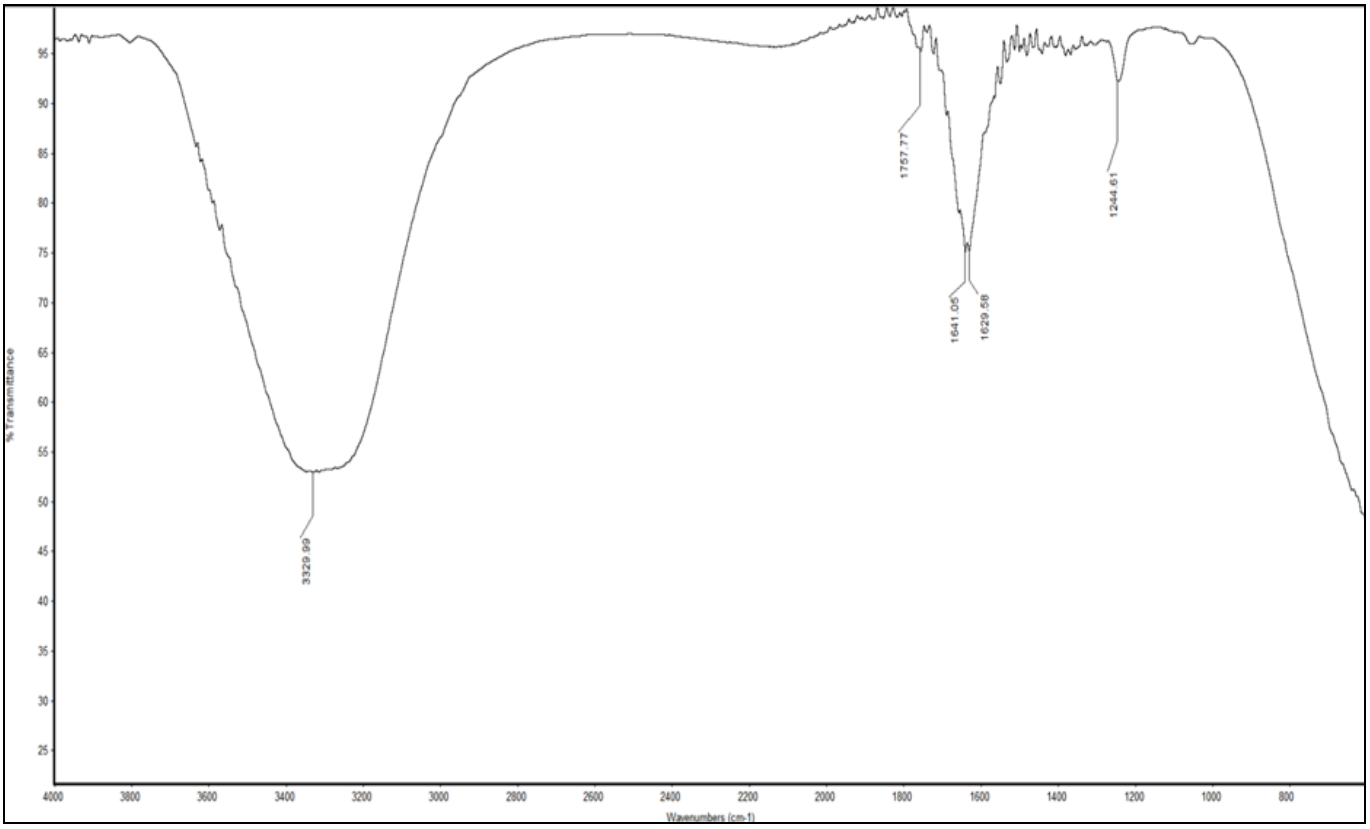
	MW: 150			
7	Name: 2-Methoxy-4-vinylphenol Formula: C9H10O2 MW: 150	17.21	8600350	0.3151
8	Name:Methylparaben Formula: C8H8O3 MW: 152	25.32	2787466	0.1021
9	Name:Dodecanoic acid Formula: C12H24O2 MW: 200	27.60	50444536	1.8482
10	Name: 1-Cyclohexene-1-acetaldehyde, 2,6,6-trimethyl- Formula: C11H18O MW: 166	29.57	18276082	0.6696
11	Name:Benzenepropanol, 4-hydroxy-à-methyl-, (R)- Formula: C10H14O2 MW: 166	30.05	90803496	3.3269
12	Name: à-Cadinol Formula: C15H26O MW: 222	30.94	9872684	0.3617
13	Name: Butan-2-one, 4-(3-hydroxy-2-methoxyphenyl)- Formula: C11H14O3 MW: 194	31.18	7459112	0.2733
14	Name: 1-Cyclohexanone, 2-methyl-2-(3-methyl-2-oxobutyl) Formula: C12H20O2 MW: 196	33.78	11664341	0.4274
15	Name: Phenol, 5-(1,5-dimethyl-4-hexenyl)-2-methyl-, (R)- Formula: C15H22O MW: 218	34.47	13956786	0.5114
16	Name:Tetradecanoic acid Formula: C14H28O2 MW: 228	34.72	75840992	2.7787
17	Name: 3,7,11,15-Tetramethyl-2-hexadecen-1-ol Formula: C20H40O MW: 296	35.47	23162588	0.8486
18	Name: 1H-3a,6-Methanoazulene-3-carboxylic acid, octahydro-7,7-dimethyl-8-methylene-, [3S-(3à,3aà,6à,8aà)]- Formula: C15H22O2 MW: 234	36.39	38236496	1.4009
19	Name: Naphthalene, decahydro-1,1-dimethyl- Formula: C12H22 MW: 166	38.62	159419776	5.8409
20	Name: n-Hexadecanoic acid Formula: C16H32O2 MW: 256	39.26	308381856	11.2987
21	Name: 9-Octadecenoic acid, ethyl ester Formula: C20H38O2 MW: 310	42.03	41581084	1.5235
22	Name: Oleic Acid Formula: C18H34O2 MW: 282	43.25	1500446336	54.9743
23	Name:Gingerol Formula: C17H26O4 MW: 294	44.88	23490330	0.8607
24	Name: Naphthalene-1,4-diol, 4-O-benzoyl(ether) Formula: C17H14O2 MW: 250	45.07	31213846	1.1436
25	Name:2-(3,4 Methylenedioxyphenyl)cyclohexanone Formula: C13H14O3 MW: 218	45.28	137090864	5.0228



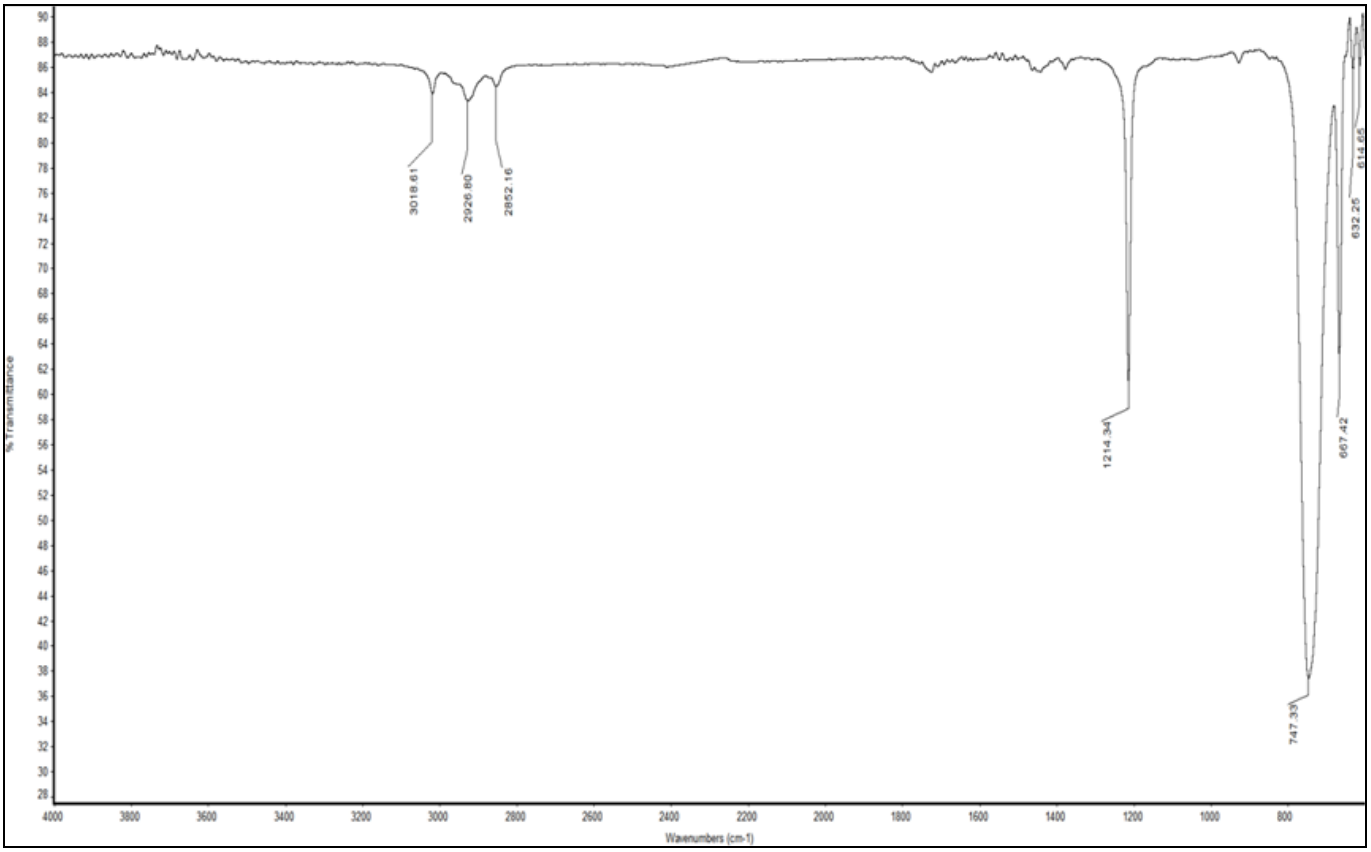
FTIR Analysis of Aqueous Extract of Carica papaya



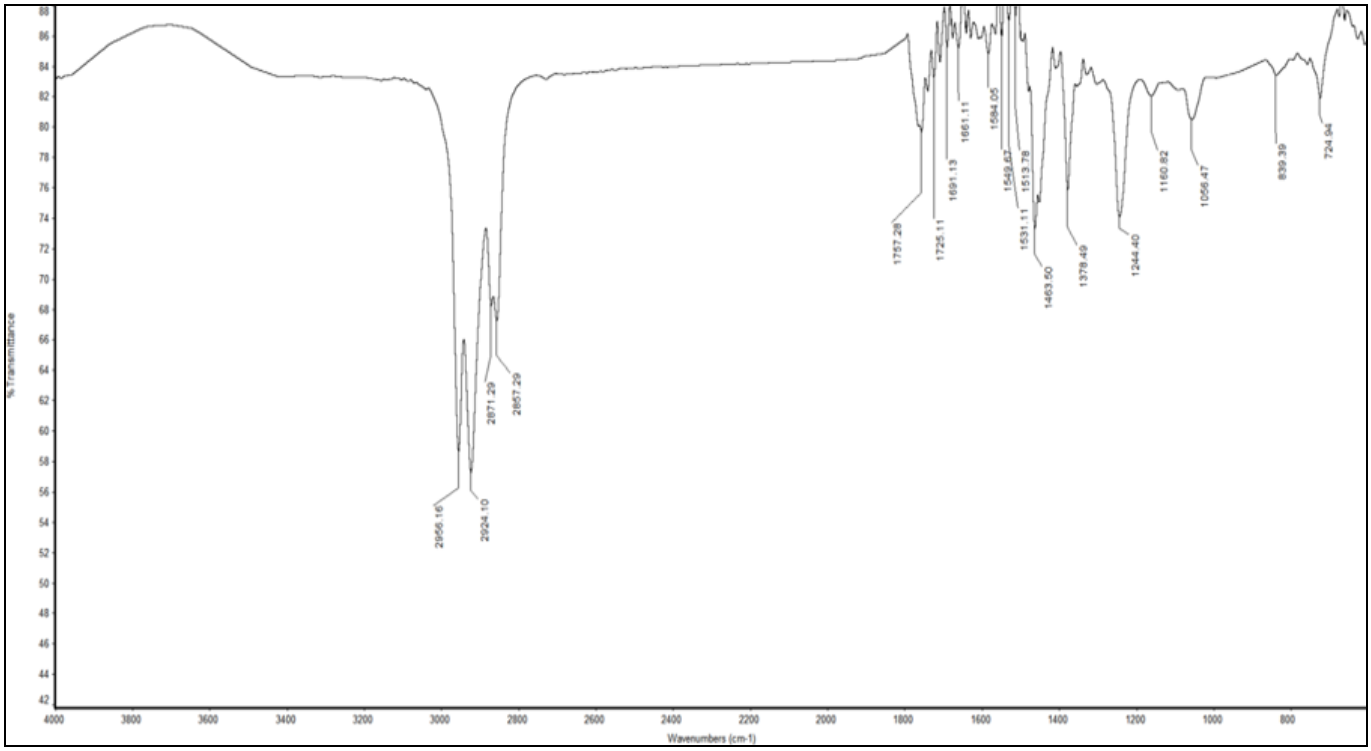
FTIR Analysis of Ethanol extract of Carica papaya leaf



FTIR Analysis of Methanol Extract of Carica papaya



FTIR Analysis of Chloroform Extract of Carica papaya leaf



FTIR Analysis of Diethyl Ether extract of Carica papaya

Fig 3: FTIR analysis of *Carica papaya* and Nilavembu Kudineer Choornam

The different solvent plant extract compounds were identified form leaf of *Carica papaya* and Nilavembu kudineer choornam. The identification of compound and peaks and different functional group are present in separate of leaf extract and number of peaks and compound, minor compound in *Carica papaya* and Nilavembu kudineer choornam identified.

FTIR analysis of different solvents of *Carica papaya* leaf carried out presented in fig-3. The compounds indicates shows that broad band's at 3000 cm^{-1} to 3500 cm^{-1} alcohol group OH stretching of antimicrobial activity and aromatic anhydride C=O anticonvulsant activity, 2850 cm^{-1} to 2990 cm^{-1} alkane C-H stretching of birth control aldehyde arrest embryonic development, apoptotic effect on carcinoma, aromatic anhydride C=O stretching of anticonvulsant activity.

The minor peaks around the 1300 cm^{-1} to 2000cm^{-1} aromatic C=C radical scavenging activity, amide N-H Breakdown of amino acid, alkene C=C antitumor drug, anti-retroviral drug, alkane C-H birth cobtrol aldehyde arrest embryonic development, apoptotic effect on carcinoma aromatic anhydride C=C anticonvulsant activity.

The minimum peaks around 1440 cm^{-1} 1300 cm^{-1} Alcohol C-O Antimicrobial activity, Alkane and Alkyl C-H Birth cobtrol aldehyde arrest the embryonic development, apoptotic effect on carcinoma.

FTIR analysis of different solvents of Nilavembu kudineer chooranam was carried out. The compounds indicates shows that broad bands at 1658.36 cm^{-1} alkene C= stretching of antitumor drug anti-retroviral and 333.93 cm-1 Alcohol O-H Antimicrobial activity.

The minor peaks around the 800 cm^{-1} to 1280cm^{-1} alkene =C-H stretching of Antitumor drug, anti-retroviral drug, Alkyl halide C-F stretching of antifungal activity, aromatic compound C=C, radical scavenging activity. The minimum peaks around 1758.22 cm^{-1} Ester C=O stretching of Anti-inflammatory activity, 2882.83 Aldehyde C-H Antibacterial activity. FTIR analysis was used to identify the functional group of active compound based on peak values in the region of infrared radiation (Gupta *et al.*, 1977) [22].

Conclusion

The complete literature and resources available on this plant shows the medicinal value of *Carica papaya* leaf and Nilavembu kudineer choornam to possess potent antibacterial and antifungal property. The FTIR spectrum of seed extracts of the peak values and the probable functional groups (obtained by FTIR analysis) present in seed extracts (Prepared in Aqueous, Ethanol, Methanol, Chloroform and Diethyl Ether) and *Carica papaya* leaf and Nilavembu kudineer choornam presented in the plant.

The present study conducted to evaluate the antibacterial activity of Aqueous, Ethanol, Methanol, Chloroform and Diethyl Ether extract of leaf of *Carica papaya* and Nilavembu kudineer choornam at the concentration 10µ/100 ml against bacteria (*E.coli*). Methanol and Ethanol extract of *Carica papaya* leaf and Nilavembu kudineer choornam showed maximum zone of inhibition against *Citrus canker*. It also concluded in FTIR analysis of alcohol (C-O) functional group responsible for the antibacterial activity against *E. coli.* The results signify traditional values of *Carica papaya* and Nilavembu kudineer choornam might be accountable for its antibacterial potential.

GC-MS analysis detected 18 active compounds in *Carica papaya* leaf and 25 active compounds in Nilavembu kudineer Chooranam. There are identify of each peak was achieved by comparing the retention time (RT) and mass spectra of the compound in the leaves of extract of *Carica papaya* and Nlilavembu kudineer choornam. The peak 18 was assumed as the major active compound due to has the highest peak with retention time and 22 peak was assumed as the major active compound due to has the highest peak

with retention time. In this study showed that the high peak value of oleic acid showed in Nilavembu kudineer choornam when compare to *Carica papaya* leaf of ethanol extract supports better health surveillance against the dengue fever. Determines the efficacy of antipyretic, anti-inflammatory and analgesic properties in the study. Further studies need to be conducted to prevent the dengue virus and its control in near future. The result of this study would lead to discovery of some compounds that are very useful for the manufacturing of new drugs and demonstration of their safety and efficacy in clinical trials.

Conflict of interest

There is no conflicts of interest.

Abbrevation used

GC MS – Gas Chromatography Mass Spectrometry: FT IR– Fourier transform Infrared.

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