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# Phytochemicals analysis and GC–MS analysis of identification and characterization of bioactive compounds present in methanolic leaf extract *Azadirachta indica*

## Azhagu Madhavan S

**Abstract**
*Azadirachta indica* phytochemicals growth and hostile to bacterial properties. In the specific research, the mixture ability of five mixes that are available in the *Azadirachta indica* with all the eleven proteins through in the silico techniques was done. Plant extricates ensure against harmful compound instigated injury by expanding the body's degrees of cancer prevention agent atoms, for example, glutathione, and improving the action of cell reinforcement chemicals. *A. indica* leaves methanolic extricate GC-MS analysis 47 bioactive compounds present mixes distinguishing proof uncovered the presence of R.T.(3.36) dl-Homoserine, (3.73) 2-Furanmethanol, (4.65) (+-)-4-Amino-4,5-dihydro-2(3H)- Furanone, (6.34) Aziridine, 2-isopropyl-1,3- dimethyl-, trans- (19.39) 5-Bromopentanoic acid, 2-isopropoxyphenyl ester. *In-vitro* anti-oxidant activity of maximum and minimum value. DPPH $IC_{150}$ Values. The after effects of this examination offer a foundation of utilizing *A. indica* leaves as home grown option for different sicknesses. As there are re-established interests in home grown based meds to hinder the symptoms of manufactured medications, the mission to discover new and one of a kind sub-atomic constructions of plant root as significant constituents of some regular items, and those of current medications as methods for battling obstinate sicknesses is likewise on the expansion.

**Keywords:** *Azadirachta indica*, GC-MS, phytochemical analysis, metabolites

## 1. Introduction
The leaves of *Azadirachta Indica* leaves extricates are found to have cancer prevention agent and anticancer exercises. Liminoidsis the rule compound which is liable for all its helpful impacts drug builds, concentrates on scientific classification, poisonousness, substance investigation and pharmacology of plant optional metabolites will in addition to other things, forestall issues related with unpredictable utilize brought about by wrong distinguishing proof, inappropriate documentation and absence of normalization of plant based concentrates and their items [1]. This work presents the compound segments of fundamental oils from A. indica leaves of Nigerian inception, removed utilizing steam, ethanol and hexane with the end goal of additional logical examinations. Tumor or neoplasm is typically described as an improvement of an odd mass of tissue as a result of uncontrolled cell advancement, while infection is the term of each perilous tumor [2]. Various legitimate examinations that focused in on the pharmacological development of bio-dynamic portions from plants starting late augmentation the premium from scholarly neighborhood perceive some novel dangerous developments suppressant [3]. Saponin is used as a smooth cleaning agent and in intracellular his to science staining to allow neutralizing specialist permission to intracellular proteins. In drug, it is used in hypercholesterolemia, hyperglycaemia, cell support, anticancer, relieving, and weight decrease among others [4]. It is likewise known to have antimicrobial properties. Antimicrobial properties of *Azadirachta indica* portions were tried utilizing ditchwell dissemination strategy. *Azadirachta indica* gum is broadly utilized in different enterprises for its business applications. It is utilized in restorative (facial covers, salves, face powder), paper (cement and fortifying the paper), pharamaceutical (disinfectant creams, tablet folio, and coater), material (coloring and printing of textures) and food industry (balancing out specialist, gels and thickening specialist) [5]. Specialists have utilized a wide assortment of insightful procedures for the portrayal of polysaccharides from gum, likely the most far reaching over ongoing years being gas chromatography-mass spectroscopy (GC-MS) [6]. In any case, scrutiny of writing uncovers that GC-MS examination of *Azadirachta indica* gum is completely focussing on the confinement and portrayal of polysaccharides (after

derivatization) and henceforth the current examination was attempted to recognize the different constituents with no derivatization preceding GC-MS investigation.

### 1.1 Phytochemicals shows antioxidant activities

One can keep himself from the disorders produce by movement of free radicals just by deactivation of free progressive [7]. *In – vitro* antibacterial activity showed up by Neem seed oil and the concentrate of various bits of Neem and its seed in water against micro flora of cervico vaginal natural liquid of cows with endometritis. Neem oil separate in normal dissolvable methanol with hexane yielded four divisions. The principle part is methanol miscible (a), the ensuing bit is methanol immiscible (b), the third division is hexane miscible (c) and the fourth part is hexane immiscible (d). The chief division shows most vital antibacterial activity for instance 95%, second and third part shows 85% activity and fourth bit shows 65% activity.

## 2. Material Methods

### 2.1 Plant Collection

The fresh leaves of *Azadirachta indica* were collected from Saliyamangalam, Thanjavur District, Tamil Nadu, India.

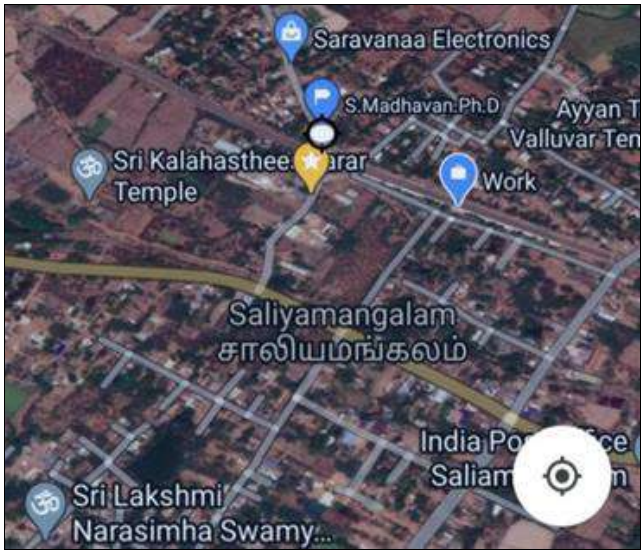



**Fig: 1.** Map 1: Study area

**Fig: 2.** *Azadirachta indica*

### 2.2 Plant material

The *Azadirachta indica* leaves was dried up under shade, crude powder. The crude type of the medication was utilize for the declaration of physicochemical boundaries similar to dampness content, debris esteems, increasing case, frothing evidence, unfamiliar natural issue, extractive qualities, and fluorescence analysis.

### 2.3 Phytochemical Studies

*Azadirachta indica* Secondary metabolites in the present studies were presence of medicinally active constituents. Beneficial drugs and to improve the patient health

### 2.4 Preparation of extracts

The powdered plant samples of leaves (100 g) were used for successive solvent extraction (500ml) with increasing order of polarities like ethanol, methanol. At that point it is kept in an orbital shaker at 190-220rpm for 48 hours. The supernatant was collected, filtered through what man No.1filter paper and the extract were concentrated by a Rotary flask evaporator at a specific temperature was used based on the solvent system. Each time previous to extract through the next solvent the remains was dried thoroughly to remove the solvent used. The acquire dried up concentrate was then specifically gauged, put away in little vials at – 20 °C and utilized for the supplementary examinations.

### 2.5 Phytochemical screening

The preliminary phytochemical evaluation was carried out by using standard procedure [8].

### 2.6 Gas Chromatography-Mass spectrometry (GC-MS) analysis

Clarus 500 Perkin-Elmer (Auto System XL) Gas Chromatograph prepared and coupled to a mass finder Turbo mass gold – Perking Elmer Turbomas 5.2 spectrometer with an Elite-1 (100% Dimethyl handle siloxane), 300 m x 0.25 mm x 1 µm df narrow segment was utilized for GCMS examination. At first, the instrument was set to temperature of 110 °C, and afterward kept up with at a similar temperature for 2 min. toward the finish of this period, the stove temperature was raised upto 280 °C, at the pace of an increment of 5 °C each moment and kept up with for 9 min. The temperature of infusion port was guaranteed as 250 °C and the stream pace of Helium as 1 ml/min. The ionization voltage was 70 eV. The examples were infused routinely in opening mode as 10:1. The assortment of mass range was set at 45-450 (mhz). The substance constituents were distinguished by GC-MS. The brokenness instances of mass spectra were differentiated and those set aside in the spectrometer data base using National Institute of Standards and Technology Mass Spectral data base (NIST-MS). The level of every constituent was determined from connection top space of every segment in the chromatogram.

### 2.7 Identification of compounds

Translation of mass range of GC-MS was directed utilizing the information base of National Institute Standard and Technology (NIST) having in excess of 62,000 examples. The unknown component's spectrum was compared with the spectrum of the known components stored in the NIST library. The structure, name and sub-atomic load of the parts of the test materials was learned.

### 2.8 Antioxidant assays

### 2.9 Determination of DPPH radical scavenging activity (DPPH RAS)

The DPPH radical scavenging assay was carried out according to the method [9]. With some modifications.13 1 ml of extract with various dilutions (25-200 µg/ml) was added to 2 ml of 1 mM DPPH in methanol and incubated for 30 minutes in the dark. The color intensity was measured at 517 nm using a spectrophotometer. Ascorbic acid was used as standard. The DPPH scavenging ability was calculated by the following formula

$$\text{DPPH RSA (\%)} = \frac{\text{Absorbance of control} - \text{Absorbance of sample}}{\text{Absorbance of control}} \text{ X } 100$$

### Statistical analysis

All assays were done in triplicates. Data were presented as mean ± standard deviation (SD) of three determinations. The inhibitory concentration (IC50) was calculated by non-linear regression analysis.

## 3. Results and Discussion

The plants and its auxiliaries may considered as incredible wellsprings of trademark phytochemicals for helpful utilizations, for instance, against danger, diabetic mellitus, cardiovascular diseases, developing and various contaminations related to fanatic instruments. The outcome of the preliminary phytochemical assessment of this current examination may offer reliability to its ethnomedicinal use.

### 3.1 Preliminary phytochemical screening

The consequence of the starter phytochemical examination of this current investigation may offer assurance to its ethnomedicinal utilization. The free revolutionaries present in our body age of numerous sicknesses. In medication, it is utilized in hypercholesterolemia, hyperglycaemia, cell reinforcement, anticancer, calming, and weight reduction among others [10]. It is likewise known to have antimicrobial properties. India is in all probability the best maker of remedial flavours on the planet.

**Table 1:** Qualitative analysis of Phytochemicals analysis *Azadirachta indica leaves* extract

| S. No | Analysed Phytochemicals factor | Methanol | Ethanol |
|---|---|---|---|
| 1. | Tannin | + | + |
| 2. | Saponin | + | + |
| 3. | Flavonoids | + | + |
| 4. | Steroids | + | - |
| 5. | Terpenoids | + | + |
| 6. | Alkaloids | + | + |
| 7. | Polyphenol | + | + |

**Indications: "+" means positive activity, "-" means negative activity**

Each constituent assumes a significant part and lack of any one constituent may prompt unusual advancements in the body [11]. While the component of activity controlled by tannins is by upsetting the worm's negative particle body surge into positive particles (protonization), which at that point pull in sure worm body proteins in the gastrointestinal parcel, accordingly disturbing the digestion and homeostasis of the worm's body.

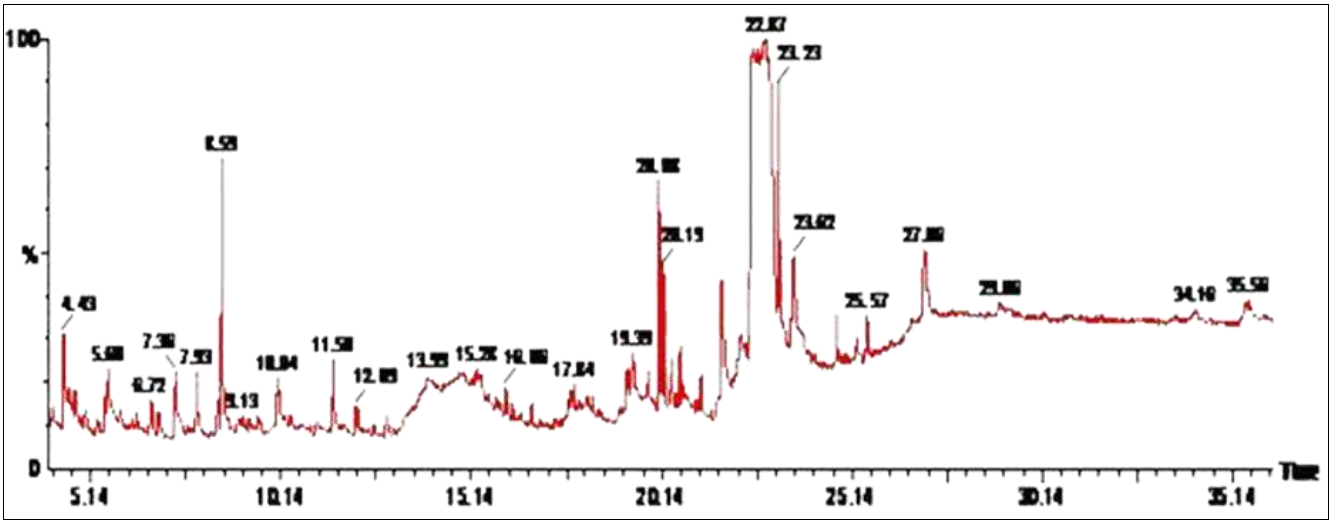
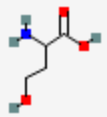
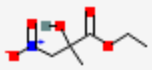
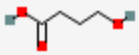
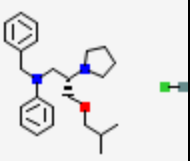
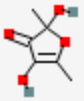
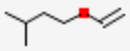
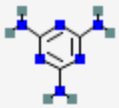
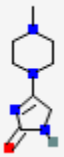
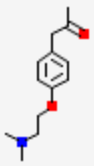
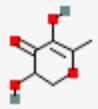
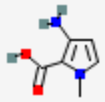
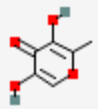
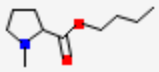
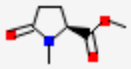
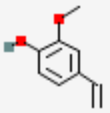
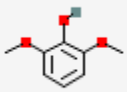
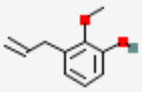


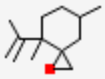
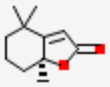
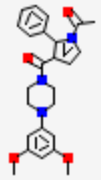
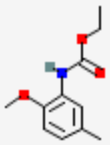
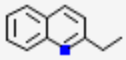
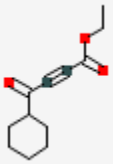
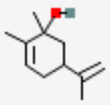
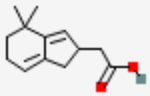

**Fig 1:** GC-MS chromatogram of *Azadirachta indica* methanol leaves extract

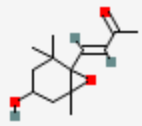
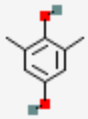
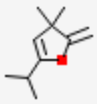
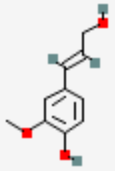
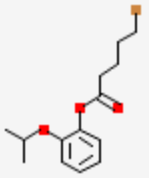
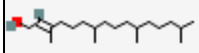
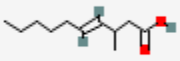
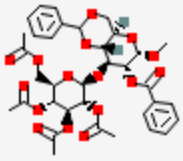
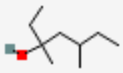
**Table 2:** GCMS analysis - Bioactive compounds *Azadirachta indica* Methanol leaves extract

| S. No. | Retention time | Compound name | Molecular formula | Molecular Weight | Area (%) | Structure |
|---|---|---|---|---|---|---|
| 1 | 3.36 | dl-Homoserine | $C_4H_9NO_3$ | 119 | 0.1589 |  |
| 2 | 3.73 | 2-Furanmethanol | $C_5H_6O_2$ | 98 | 0.2979 |  |
| 3 | 4.14 | 2-Cyclopentene-1,4-dione | $C_5H4O_2$ | 96 | 0.6345 |  |
| 4 | 4.43 | Propanoic acid, 2-hydroxy-2-methyl- | $C_4H_8O_3$ | 104 | 2.6803 |  |
| 5 | 4.56 | Butanoic acid, 4-hydroxy- | $C_4H_8O_3$ | 104 | 1.6129 |  |
| 6 | 4.85 | (+-)-4-Amino-4,5-dihydro-2(3H)-furanone | $C_4H_7NO_2$ | 101 | 0.2036 |  |
| 7 | 5.00 | 1-Pyrrolidineethanamine | $C_6H_{14}N_2$ | 114 | 0.5918 |  |
| 8 | 5.52 | 2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one | $C_6H_8O_4$ | 144 | 0.4571 |  |
| 9 | 5.60 | Glycerin | $C_3H_8O_3$ | 92 | 1.4658 |  |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | 6.22 | 4(H)-Pyridine, N-acetyl - | $C_7H_9N_O$ | 123 | 0.1516 |  |
| 11 | 6.34 | Aziridine, 2-isopropyl-1,3- dimethyl-, trans- | $C_7H_{15}N$ | 113 | 0.4721 |  |
| 12 | 6.50 | Butane, 1-(ethenyloxy)-3-methyl- | $C_7H_{14}O$ | 114 | 0.1535 |  |
| 13 | 6.72 | 2,3-Pentanedione, 4-methyl- | $C_6H_{10}O_2$ | 114 | 0.8311 |  |
| 14 | 7.13 | Butanamide | $C_4H_9NO$ | 87 | 0.0629 |  |
| 15 | 7.36 | 1,3,5-Triazine-2,4,6-triamine | $C_3H_6N_6$ | 126 | 2.0638 |  |
| 16 | 7.93 | 4-(4-Methyl-piperazin-1-yl)-1,5,-dihydro-imidazol-2-one | $C_8H_{14}N_4O$ | 182 | 1.4753 |  |
| 17 | 8.29 | Acetone, 1-[4-(dimethylaminoethoxy)phenyl]- | $C_{13}H_{19}NO_2$ | 221 | 0.0583 |  |
| 18 | 8.47 | 3-Amino-2-oxazolidinone | $C_3H_6N_2O_2$ | 102 | 0.4537 |  |

| | | | | | | |
|---|---|---|---|---|---|---|
| 19 | 8.59 | 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl- | $C_6H_8O_4$ | 144 | 5.0637 |  |
| 20 | 9.13 | N-Methylpyrrole-2-carboxylic | $C_6H_7NO_2$ | 125 | 0.4791 |  |
| 21 | 9.30 | 4H-Pyran-4-one, 3,5-dihydroxy-2-methyl- | $C_6H_6O_4$ | 142 | 0.2474 |  |
| 22 | 9.50 | Proline, N-methyl-, butyl ester | $C_{10}H_{19}NO_2$ | 185 | 0.3525 |  |
| 23 | 10.90 | L-Proline, 1-methyl-5-oxo-, methyl ester | $C_7H_{11}NO_3$ | 157 | 0.0945 |  |
| 24 | 11.50 | 2-Methoxy-4-vinylphenol | $C_9H_{10}O_2$ | 150 | 1.5741 |  |
| 25 | 12.09 | Phenol, 2,6-dimethoxy- | $C_8H_{10}O_3$ | 154 | 0.4274 |  |
| 26 | 12.16 | Phenol, 2-methoxy-3-(2- propenyl)- | $C_{10}H_{12}O_2$ | 164 | 0.6467 |  |
| 27 | 13.10 | 1,5-Diazabicyclo[4.4.0]dec-5-en-2-one | $C_8H_{12}N_2O$ | 152 | 0.0791 |  |

| | | | | | | |
|---|---|---|---|---|---|---|
| 28 | 15.78 | 4-Isopropenyl-4,7-dimethyl-1-oxaspiro[2.5]octane | $C_{12}H_{20}O$ | 180 | 0.2506 |  |
| 29 | 15.86 | 2(4H)-Benzofuranone, 5,6,7,7a-tetrahydro-4,4,7a-trimethyl- | $C_{11}H_{16}O_2$ | 180 | 0.2709 |  |
| 30 | 16.22 | Ethanone, 1-(3,4-dimethoxyphenyl) | $C_{10}H_{12}O_3$ | 180 | 0.2399 |  |
| 31 | 16.73 | (7,7-Dimethyl-2-oxobicyclo[2.2.1]hept-1-yl) methanesulfonic acid, methyl ester | $C_{11}H_{18}O_4S$ | 246 | 0.4413 |  |
| 32 | 16.96 | Ethyl N-(2-methylphenyl) carbamate | $C_{10}H_{13}NO_2$ | 179 | 0.1408 |  |
| 33 | 17.12 | Quinoline, 2-ethyl- | $C_{11}H_{11}N$ | 157 | 0.0863 |  |
| 34 | 17.34 | 2-Butynoic acid, 4-cyclohexyl-4-oxo-, ethyl ester | $C_{12}H_{16}O_3$ | 208 | 0.2590 |  |
| 35 | 17.46 | 5-Isopropenyl-1,2-dimethylcyclohex-2-enol | $C_{11}H_{18}O$ | 166 | 0.1396 |  |
| 36 | 17.84 | (4,4-Dimethyl-2,4,5,6-tetrahydro-1H-inden-2-yl)acetic acid | $C_{13}H_{18}O_2$ | 206 | 0.6382 |  |

| | | | | | | |
|---|---|---|---|---|---|---|
| 37 | 18.34 | 3-Buten-2-one, 4-(4-hydroxy- 2,2,6-trimethyl-7-oxabicyclo[4.1.0]hept-1-yl)- | $C_{13}H_{20}O_3$ | 224 | 0.0199 |  |
| 38 | 18.49 | 1,4-Benzenediol, 2,6-dimethyl- | $C_8H_{10}O_2$ | 138 | 0.1048 |  |
| 39 | 19.00 | 5-Isopropyl-3,3-dimethyl-2-methylene-2,3-dihydrofuran | $C_{10}H_{16}O$ | 152 | 0.1429 |  |
| 40 | 19.23 | 4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol | $C_{10}H_{12}O_3$ | 180 | 1.5913 |  |
| 41 | 19.39 | 5-Bromopentanoic acid, 2- isopropoxyphenyl ester | $C_{14}H_{19}BrO_3$ | 314 | 1.0970 |  |
| 42 | 20.08 | 3,7,11,15-Tetramethyl-2- hexadecen-1-ol | $C_{20}H_{40}O$ | 296 | 2.7085 |  |
| 43 | 20.39 | 4-Decenoic acid, 3-methyl-, (E)- | $C_{11}H_{20}O_2$ | 184 | 1.0329 |  |
| 44 | 22.87 | à-D-Glucopyranoside, à-D- glucopyranosyl | $C_{12}H_{22}O_{11}$ | 342 | 60.5648 |  |
| 45 | 23.61 | 3-Heptanol, 3,5-dimethyl- | $C_9H_{20}O$ | 144 | 4.6519 |  |

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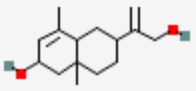
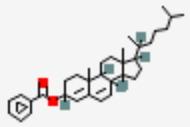
|---|---|---|---|---|---|---|
| 46 | 34.16 | Bicyclo[4.4.0]dec-2-ene-4-ol, 2-methyl-9-(prop-1-en-3-ol-2-yl)- | $C_{15}H_{24}O_2$ | 236 | 1.0618 |  |
| 47 | 35.56 | Cholesta-4,6-dien-3-ol, (3á)- | $C_{27}H_{44}O$ | 384 | 1.7680 |  |

*Acalypha indica* it is an average yearly zest, discovered commonly in the yards of houses and waste spots all through the fields of India. Plants are emetic, expectorant, laxative and diuretic; accommodating in bronchitis, pneumonia, asthma and aspiratory tuberculosis. Leaves are diuretic and antiparasiticide; ground with normal salt or quicklime or lime juice applied distantly in scabies [12]. Leaf stick with lime juice suggested for ringworm [13]. Leaf juice is emetic for youths. However, there are numerous reports on the *in vitro* examination of these mixes and its restorative and harmful properties, there are no in silico contemplates that anticipate the authoritative and dynamic districts particularly with these proteins [14]. Our examination is an endeavor to anticipate the coupling site and the coupling deposits [15]. Be that as it may, approval of our outcomes through *in vivo* and *in vitro* tests and furthermore with creature models will illuminate trust for the future improvement of more powerful medications for the treating Dengue and Lassa [16]. Further examinations the GC-MS chromatogram of the bark ethanol concentrate of *Azadirachta indica* demonstrated 5 pinnacles showing the presence of five mixes [17].

**Table 3:** GCMS analysis – Biological activity

| S. No. | Retention time | Compound name | Molecular formula | Molecular Weight | Biological Activity |
|---|---|---|---|---|---|
| 1 | 3.36 | dl-Homoserine | $C_4H_9NO_3$ | 119 | Cancer Prevention Agent |
| 2 | 3.73 | 2-Furanmethanol | $C_5H_6O_2$ | 98 | Malignancy Preventive |
| 3 | 4.14 | 2-Cyclopentene-1,4-dione | $C_5H4O_2$ | 96 | Hepatoprotective, |
| 4 | 4.43 | Propanoic acid, 2-hydroxy-2-methyl- | $C_4H_8O_3$ | 104 | Rheumatoid Arthritis |
| 5 | 4.56 | Butanoic acid, 4-hydroxy- | $C_4H_8O_3$ | 104 | Anticoronary, |
| 6 | 4.85 | (+-)-4-Amino-4,5-dihydro-2(3H)-furanone | $C_4H_7NO_2$ | 101 | Antiandrogenic, |
| 7 | 5.00 | 1-Pyrrolidineethanamine | $C_6H_{14}N_2$ | 114 | Antiarthritic, |
| 8 | 5.52 | 2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one | $C_6H_8O_4$ | 144 | Antioxidant Activity |
| 9 | 5.60 | Glycerin | $C_3H_8O_3$ | 92 | Anti -Infl Ammatory |
| 10 | 6.22 | 4(H)-Pyridine, N-acetyl - | $C_7H_9NO$ | 123 | Anti- Infl Ammatory Activities |
| 11 | 6.34 | Aziridine, 2-isopropyl-1,3- dimethyl-, trans- | $C_7H_{15}N$ | 113 | Various Biological Activities Such As Antiinfl Ammatory [18] |
| 12 | 6.50 | Butane, 1-(ethenyloxy)-3-methyl- | $C_7H_{14}O$ | 114 | Anti-Candida And Anti-Infl Ammatory |
| 13 | 6.72 | 2,3-Pentanedione, 4-methyl- | $C_6H_{10}O_2$ | 114 | Antimicrobial |
| 14 | 7.13 | Butanamide | $C_4H_9NO$ | 87 | Anti- Infl Ammatory |
| 15 | 7.36 | 1,3,5-Triazine-2,4,6-triamine | $C_3H_6N_6$ | 126 | Anti-Cancer |
| 16 | 7.93 | 4-(4-Methyl-piperazin-1-yl)-1,5,-dihydro-imidazol-2-one | $C_8H_{14}N_4O$ | 182 | Antioxidant, Anti-Microbial And Anti-Infl Ammatory |
| 17 | 8.29 | Acetone, 1-[4- (dimethylaminoethoxy)phenyl]- | $C_{13}H_{19}NO_2$ | 221 | Anti-Infl Amatory, Immunostimulant [19] |
| 18 | 8.47 | 3-Amino-2-oxazolidinone | $C_3H_6N_2O_2$ | 102 | Anti-Diabetic |
| 19 | 8.59 | 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl- | $C_6H_8O_4$ | 144 | Antiarthritic Antiasthma |
| 20 | 9.13 | N-Methylpyrrole-2-carboxylic | $C_6H_7NO_2$ | 125 | Diuretic, Antidiabetic |
| 21 | 9.30 | 4H-Pyran-4-one, 3,5-dihydroxy-2-methyl- | $C_6H_6O_4$ | 142 | Pesticide, |
| 22 | 9.50 | Proline, N-methyl-, butyl ester | $C_{10}H_{19}NO_2$ | 185 | Cancer Preventive, |
| 23 | 10.90 | L-Proline, 1-methyl-5-oxo-, methyl ester | $C_7H_{11}NO_3$ | 157 | Diuretic, Antidiabetic |
| 24 | 11.50 | 2-Methoxy-4-vinylphenol | $C_9H_{10}O_2$ | 150 | Anti-Diabetic |
| 25 | 12.09 | Phenol, 2,6-dimethoxy- | $C_8H_{10}O_3$ | 154 | Antimicrobial And Used In Production Of Mercaptans, Flavours And Fragrances, Alkyl Metals, Halides, Alkyl Silanes And Detergents [20] |
| 26 | 12.16 | Phenol, 2-methoxy-3-(2- propenyl)- | $C_{10}H_{12}O_2$ | 164 | Antioxidant Activity |
| 27 | 13.10 | 1,5-Diazabicyclo[4.4.0]dec-5-en-2-one | $C_8H_{12}N_2O$ | 152 | Automotive Additives, |
| 28 | 15.78 | 4-Isopropenyl-4,7-dimethyl-1-oxaspiro[2.5]octane | $C_{12}H_{20}O$ | 180 | Antimicrobial, |
| 29 | 15.86 | 2(4H)-Benzofuranone, 5,6,7,7a-tetrahydro-4,4,7a-trimethyl- | $C_{11}H_{16}O_2$ | 180 | Antibacterial And Antifouling Activity |

| | | | | | |
|---|---|---|---|---|---|
| 30 | 16.22 | Ethanone, 1-(3,4-dimethoxyphenyl) | $C_{10}H_{12}O_3$ | 180 | Analgesic, Antiinflammatory, Antinociceptive [21] |
| 31 | 16.73 | (7,7-Dimethyl-2-oxobicyclo[2.2.1]hept-1-yl) methanesulfonic acid, methyl ester | $C_{11}H_{18}O_4S$ | 246 | Antimicrobial, Anti-Inflammatory Activity [22] |
| 32 | 16.96 | Ethyl N-(2-methylphenyl)carbamate | $C_{10}H_{13}NO_2$ | 179 | Antimicrobial Antioxidant Anti inflammatory |
| 33 | 17.12 | Quinoline, 2-ethyl- | $C_{11}H_{11}N$ | 157 | Anti-Fungal |
| 34 | 17.34 | 2-Butynoic acid, 4-cyclohexyl-4-oxo-, ethyl ester | $C_{12}H_{16}O_3$ | 208 | Antibacterial |
| 35 | 17.46 | 5-Isopropenyl-1,2-dimethylcyclohex-2-enol | $C_{11}H_{18}O$ | 166 | Antitumor, |
| 36 | 17.84 | (4,4-Dimethyl-2,4,5,6-tetrahydro-1H-inden-2-yl)acetic acid | $C_{13}H_{18}O_2$ | 206 | Chemo Preventive, Lipoxygenaseinhibitor [23] |
| 37 | 18.34 | 3-Buten-2-one, 4-(4-hydroxy- 2,2,6-trimethyl-7-oxabicyclo[4.1.0]hept-1-yl)- | $C_{13}H_{20}O_3$ | 224 | Antifungal, |
| 38 | 18.49 | 1,4-Benzenediol, 2,6-dimethyl- | $C_8H_{10}O_2$ | 138 | Antioxidant |
| 39 | 19.00 | 5-Isopropyl-3,3-dimethyl-2-methylene-2,3-dihydrofuran | $C_{10}H_{16}O$ | 152 | Hypocholesterolemic |
| 40 | 19.23 | 4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol | $C_{10}H_{12}O_3$ | 180 | Antiasthma, |
| 41 | 19.39 | 5-Bromopentanoic acid, 2- isopropoxyphenyl ester | $C_{14}H_{19}BrO_3$ | 314 | Antiviral, |
| 42 | 20.08 | 3,7,11,15-Tetramethyl-2- hexadecen-1-ol | $C_{20}H_{40}O$ | 296 | Anticancer, |
| 43 | 20.39 | 4-Decenoic acid, 3-methyl-, (E)- | $C_{11}H_{20}O_2$ | 184 | Antimicrobial And Antioxidant |
| 44 | 22.87 | à-D-Glucopyranoside, à-D- glucopyranosyl | $C_{12}H_{22}O_{11}$ | 342 | Antimicrobial, |
| 45 | 23.61 | 3-Heptanol, 3,5-dimethyl- | $C_9H_{20}O$ | 144 | Antiarthritic, |
| 46 | 34.16 | Bicyclo[4.4.0]dec-2-ene-4-ol, 2-methyl-9-(prop-1-en-3-ol-2-yl)- | $C_{15}H_{24}O_2$ | 236 | Diuretic, |
| 47 | 35.56 | Cholesta-4,6-dien-3-ol, (3á)- | $C_{27}H_{44}O$ | 384 | Anti-Inflammatory Activity. |

The synthetic mixes recognized in the ethanol concentrate of the bark of *Azadirachta indica* introduced [25]. GC-MS investigation uncovered that the presence of Decosanoic corrosive, 22-trimethyl siloxy)- methyl ester, (1-Benzenesulfonyl-1H–pyrrol–3-yl) acidic corrosive, methyl ester, 1-H-pyrrol-3-propanoic corrosive, 2-(ethoxycarbomyl-4-(2-ethoxy-2-oxoethyl)- 5 methyl ethyl ester, Propanoic acid,2 hydroxy-2-methyl ethyl ester and 3,5-pyridine dicarboxylic corrosive, 2-4-6-trimethyl-diethyl ester. The antimicrobial action of leaves from Psidium guajava and *Azadirachta indica* were broke down by GC-MS. The outcome demonstrated that 47 bioactive phytochemicals mixes were recognized in the ethanol part of *Azadirachta indica* [25]. The current investigation express that the presence of methyl or ethyl esters of unsaturated fats can likewise be considered as qualities of this plant. From this outcome, it very well may be reasoned that every one of these mixes are of pharmacological significance as they have the properties, for example, antibacterial enemy of diabetic and pain relieving.

### 3.2 DPPH radical scavenging activity

The DPPH revolutionary rummaging capability of various dissolvable concentrates of plant materials is given. A steady free revolutionary (DPPH) was regularly used to dissect the cancer prevention agent capability of plant materials. Significantly, $IC_{50}$ of various concentrates was likewise determined to decide the measure of concentrate expected to extinguish half of free extremists. Least focus which showed most extreme cell reinforcement potential movement was considered as $IC_{50}$ upsides of the tried plant materials. Out of which the CH3)2CO separates showed least $IC_{50}$ worth of 48.99 µg/ml, trailed by the methanol remove, showed tantamount cancer prevention agent potential than the other tried solvents. The $IC_{50}$ upsides of standard ascorbic corrosive were seen as 05.51 µg/ml. Be that as it may, the qualities were contrasted and the consequences of our current examination and saw potential extremist rummaging limit in CH3)2CO and methanol removes.

**Table 4:** Determination of DPPH radical scavenging activity (DPPH)

| S. No | *Azadirachta indica Leaves* Methanolic extract | Ascorbic acid |
|---|---|---|
| 25 | 62.49 ± 0.27 | 84.19 ± 0.40 |
| 50 | 67.88 ± 0.40 | 87.26 ± 0.18 |
| 100 | 75.06 ± 0.53 | 89.80 ± 0.22 |
| 150 | 80.27 ± 0.85 | 92.52 ± 0.00 |
| 200 | 84.01 ± 0.67 | 93.45 ± 0.22 |
| $IC_{50}$ | 48.99 ± 1.06 | 05.51 0.28 |

### 4. Summary and Conclusion

The bark separate had the capability of controlling gastric hyper secretion and gastroesophageal and gastro duodenal ulcers. A few restorative plants for their potential antibacterial movement. It has been recommended that fluid and ethanol extricates from plants utilized in allopathic medication are expected wellsprings of antiviral, antitumor and antimicrobial specialists [26]. The conceivable instrument in causing the telephone end or apoptosis is by interfacing with the telephone film proteins and making the telephone discharge its telephone constituents ultimately driving passing or perhaps it can associate with the DNA or cell hailing pathways and controlling the telephone pathways driving or setting off the cell destruction pathways [27-28]. The particular arrangement of action should be moved in nuances, so we could appreciate the particular instrument of action, as this is could be better wellspring of therapy in treating or controlling the Psoriasis ailment or skin related diseases. The extraction system and the dissolvable should be carefully picked by the ideal bioactivity. From the current examination, it was inferred that the rough ethanol bark concentrates of *Azadirachta indica* have incredible

potential as an antibacterial specialist. The result of this work has indicated that the bark concentrates of *Azadirachta indica* against three bacterial strains. GC-MS examination indicated the presence of biological activity. *In-vitro* cell reinforcements are synthetics that associate with and kills free revolutionaries, subsequently keeping harm of cells from extremists. Cell reinforcements are otherwise called "free extreme scroungers" and body makes a portion of the cancer prevention agents to kill free revolutionaries. These cancer prevention agents are called endogenous cell reinforcements. The presence of such assortment of phytochemicals might be credited to the restorative qualities of this plant *Azadirachta indica*. The after effects of this examination uphold the conventional utilization of *Azadirachta indica* bark as an antibacterial specialist. In a few reports, these mixes can be liable for the preventative properties credited to this plant in well-known and conventional medication.

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**6. Conflict of interest**
The authors have declared that there is no conflict of interest.

**7. Source/s of funding**
No source of funding.

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