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# Phytochemical Screening, GC-MS Charecterisation and Antioxidant Activity of N-Hexane Fraction of *Microtrichia perotitii* DC

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**Abstract**

*Microtrichia perotitii* DC belongs to the family Asteraceae (Compositeae) and it is an herb found in the West African countries. The herb has been used ethnomedicinally to treat children's rashes, burns, wounds, jaundice, rheumatism, diarrhea, and skin conditions. The n-hexane fraction of the ethanolic extract of the plant was investigated for the presence of secondary metabolites, characterisation as well as its antioxidant activity with a view to exploring other significant information that would be of benefit to scientific study. The n-hexane extract was subjected to partitioning, phytochemical screening using standard methods as well as spectroscopic characterizations using UV, FTIR and GC-MS analysis including antioxidant activity. The result of the phytochemical screening revealed the presence of alkaloids, tannins, saponins, phenols, glycosides, steroids, terpenoids and flavonoids, but anthraquinones and phlobatannins were absent. The spectroscopy analysis showed a high degree of conjugation and it also reveals the presence of Hydroxyl (O-H), carbonyl (C=O) and methyl (C-H) groups, with the compound, Pentadecanoic acid, 14-methyl-, methyl ester, having the highest abundance while the antioxidant activity using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and Nitric oxide (NO),radical scavenging assays exhibited antioxidant activity with an IC50 value of 4.61mg/mL but less than ascorbic acid which has an IC50 value of 0.84mg/mL. The phytochemical compounds present in the plant could be responsible for its antioxidant property which suggests the use of the plant in the treatment of diseases induced by free radicals. In the light of the importance of this herb in local applications, the research was aimed at exploring the scientific evidences to support the local claims as well as improving information of the efficacy of the plant.

**Keywords:** Microtrichia; perotitii; phytochemical; GC-MS; DPPH.

## INTRODUCTION

There is a long history of using herbal therapy to treat many diseases. Man has used them for the treatment of disease for a very long time, and they are still commonly used today. Before the advent of conventional medicine, humans had long amassed a body of empirical data pertaining to the therapeutic benefits of regional flora. These herbalists and their apprentices have amassed a substantial body of knowledge on medicinal plants over periods of trial, error, and success. The first generation of plant medications, according to Iwu *et al*. (1999), was often simple botanicals used in a more or less raw form. Several potent medications that are utilized in their natural form have been chosen as therapeutic agents (Eluoba *et al*., 2005; Abdullahi *et al*., 2011; Abdullahi *et al*., 2013).

*Microtrichia perotitii* DC belongs to the family Asteraceae (Compositeae) and it is a herb found in West African countries (Hutchinson & Dalzie, 1963). In Nigeria it is found in the northern part of the country where it is known as *Maijankai* or *Sawun keke* in Hausa, *Osete* in Igbira and *Shaware pepe* in Yoruba. Traditionally, *M. perotitii* is used for treating pain related diseases such as toothaches, cuts and burns and rashes in children. Others include, skin disease, rheumatism, diarrhea and jaundice (Magaji, 2003; Abdullahi *et al*., 2011).

**Figure1.** Picture of *Microtrichia perotitti* DC.

## MATERIALS AND METHODOLOGY

### Sample collection

The herb *Microtrichia perotitii* was collected from Zaria Kaduna state, northern Nigeria in July 2023. The fresh herb has already been identified and authenticated by Mal. Shehu Gallah Umar,of herbarium unit of the Department of Biological sciences, Kaduna State University KASU and was given specimen number KASU/BSH/9002 for future references. The fresh herb was allowed to dry under the shade for three weeks and later reduced to coarse powder with a traditional pestle and mortar.

### Extraction of sample

150g of the powdered herb (*Microtrichia perotitii*) was macerated in 1,500 ml of ethanol for 72 Hrs at room temperature with intermittent shaking. The residue was extracted twice with the same fresh solvent and later combined and filtered using whatman filter paper (5 mm) under suction. The extract was concentrated under reduced pressure (Rotary evaporator) at temperature of 45 ºC. The extract was stored in desiccators until needed for the work (Abdullahi & Mainul,2020).

### Phytochemical screening

The crude ethanol extract of *Microtrichia perotitii* was evaluated for the presence of its phytoconstituents by using standard methods Trease and Evans, 2009, Sofowora, 1993 to test for, carbohydrates( Molisch's test), Tannins (Ferric chloride Test), Phlobatannins, Flavonoids; (Shinoda's test), Saponins (Frothing test), Alkaloids (Dragendoff's reagent), Cardiac Glycosides( Keller-Kiliani test), Steroids (Salkowski's test), Terpenoids (Libermann-Burchard test) and Anthraquinones (Borntrager's Test).

### Solvent partitioning

Fractionation of the crude ethanol extract of *Microtrichia perotitii* was done according to the scheme proposed by (Qing-Wen, et al. 2018) but modified. Thus 25 g of the crude was suspending crude in 300 ml of water separately and then partitioned with hexane, n-Butanol, and ethyl acetate that is in an order of increasing polarity by using separating funnel. All the three fractions obtained were dried by evaporation using rotary evaporator and then later weighed.

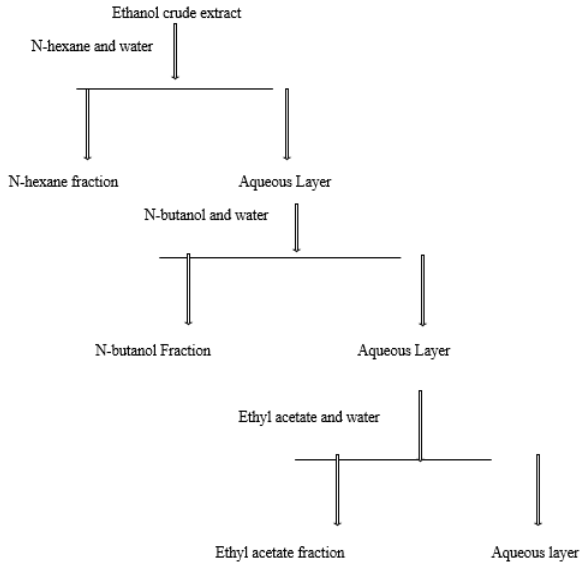



**Figure 2.** Scheme for Solvent Partitioning (Qing-wen, *et al*.2018).

### Antioxidant Activities

#### *DPPH Radical Scavenging Activity Assay*

The free RSA of the N-hexane fraction of *Microtrichia perotitii* was tested using a 2,2-diphenyl-1-picryl hydrazyl (DPPH) technique. A total of 24 milligrams of DPPH were dissolved in 100 mL of methanol to make the stock solution. Filtration of DPPH stock solution using methanol yielded a usable mixture with an absorbance of around 0.973 at 517 nm. In a test tube, 3 mL DPPH workable solutions were combined with 100 µL. Three milliliters of solution containing DPPH in 100 µL of methanol is often given as a standard (Goldschmidt, *et al* 1922). After that, the tubes were kept in complete darkness for 30 min. The absorbance was therefore determined at 517 nm. The following formula was used to compute the percentage of antioxidants or RSA:

$$\%\ of\ antioxidant\ activity = [(Ac - As)\ \div Ac] \times 100$$

where:
Ac : Control reaction absorbance;
As : Testing specimen absorbance.

***Nitric oxide radical scavenging assay***

The procedure was adopted with some modifications to determine the scavenging activity of the plant extracts against nitric oxide radical. Nitric oxide was generated from sodium nitroprusside and measured by the Greiss reaction. Ascorbic acid was used as a standard. Ascorbic acid inhibits induction of nitric oxide synthase and is a naturally occurring direct scavenger of nitric oxide. It reduces the amount of nitrite formed between oxygen and nitric oxide generated from sodium nitroprusside. The absorbance was measured at 596 nm and the percentage of antioxidant activity was calculated using the formula in the equation (Elizabeth & Rao, 1990; Ebrahimzadeh *et al.,* 2008*)*.

$$\%\ of\ antioxidant\ activity = [(Ac - As)\ \div Ac]\ \times\ 100$$

Where:
Ac : Control reaction absorbance;
As : Testing specimen absorbance.

**Chromatographic Procedure**

***Gas Chromatography-Mass Spectrometry Analysis***

GC-MS analysis was carried out on a GC system comprising a Gas Chromatograph interfaced to a Mass Spectrometer (GC-MS) instrument; Schimadzu GCMS-QP2010, employing the following conditions: Column Elite-1 fused silica capillary column (30×0.25 mm ID×1EM df, composed of 100% Dimethyl poly siloxane), operating in electron impact mode at 70 eV; helium (99.999%) as carrier gas at a constant flow of 1ml/ minute and a sample injection volume of 1 µl which was employed (split ratio of 10:1) injector temperature 250°C; ion-source temperature 280°C. The oven temperature was programmed from 110°C (isothermal for 2 minutes), with an increase of 10°C/minute, to 200°C, then 5°C/minute to 280°C, ending with a 9 minutes isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5 s and fragments from 40 to 550 Da. Total run time was 30 min. The compounds were then identified from the GC-MS peaks, using library data of the corresponding compounds. GC-MS was analyzed using electron impact ionization at 70 eV and data was evaluated using total ion count (TIC) for compound identification and quantification. The spectrums of the components were compared with the database of spectrum of known components stored in the GC-MS library using NISP Search. The relative % amount of each component was calculated by comparing its average peak area to the total areas. Measurement of peak areas and data processing were carried out by Turbo-Mass-OCPTVS-Demo SPL software (Duraisamy *et al,* 2015).

***UV Analysis***

Two ml of the sample was placed in beaker of 50 ml then 5 ml of n-hexane was added and shaken thoroughly to reach solution consistency. The cuvette was filled with sample solution and inserted in the device and the results were recorded. The cell was emptied and was read in the instrument at wave length 200 - 800 nm). The absorptions results were recorded(Jain *et al.,* 2016).

***FTIR Analysis***

Fourier-transform infrared spectroscopy (FT-IR) analysis was performed using a Perkin Elmer Spectrophotometer system (PerkinElmer, Waltham, MA, USA) over a frequency range of 400–4000 cm, which was used to detect the characteristic peaks(Dhivya & Kalaichelvi, 2016; Jain, *et al*., 2016).

## RESULTS AND DISCUSSION

**Results**

The results obtained from the Research have shown promising outcomes and thereby suggested the importance of being used locally. Similarly, it has provided an insight in to further Research in to certain areas beyond the scope of this study. The results below are a testimony to the outcome.

**Table 1.** Phytochemical analysis of n-hexane fraction of ethanolic extract of *Microtrichia perotitii*

| Constituent | Test | Observation | Inference |
|---|---|---|---|
| Carbohydrates | Molisch test | Purple colour at interphase | + |
| Tannins | Ferric Chloride test | Greenish black coloration | + |
| Phlobatannins | Hydrochloric acid | No change | - |
| Flavonoids | Shinoda test | A red coloration | + |
| Saponins | Frothing test | Frothing which persist | + |
| Alkaloids | Dragendorff test | Orange yellow precipitate | + |
| Cardiac glycosides | Keller-Kiliani test | Purple ring at interphase | + |
| Steroids | Salkowski test | Pale green colour in the acetic layer | + |
| Terpenoids | Lieberman-Burchard test | Red colour ring | + |
| Anthraquinones | Bontragers test | Bright pink colouration | - |

Key: + = Present and - = Absent

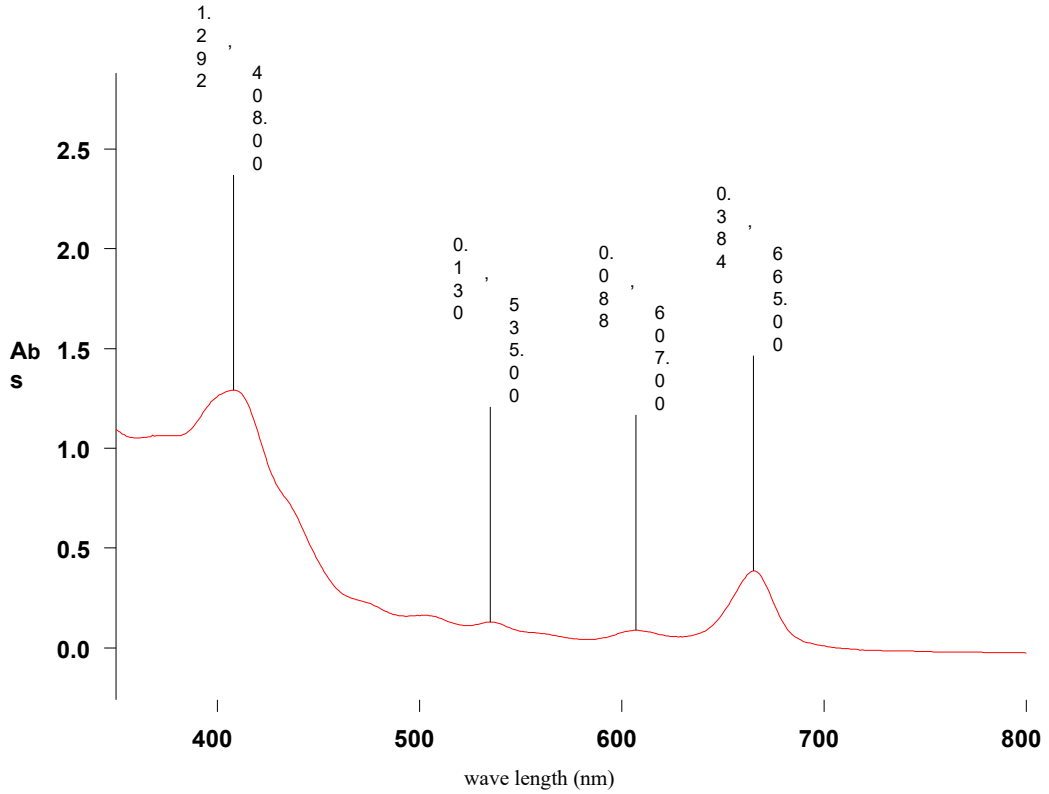



**Figure 3**. UV spectroscopy of n-hexane fraction of *M.perotiiti.*

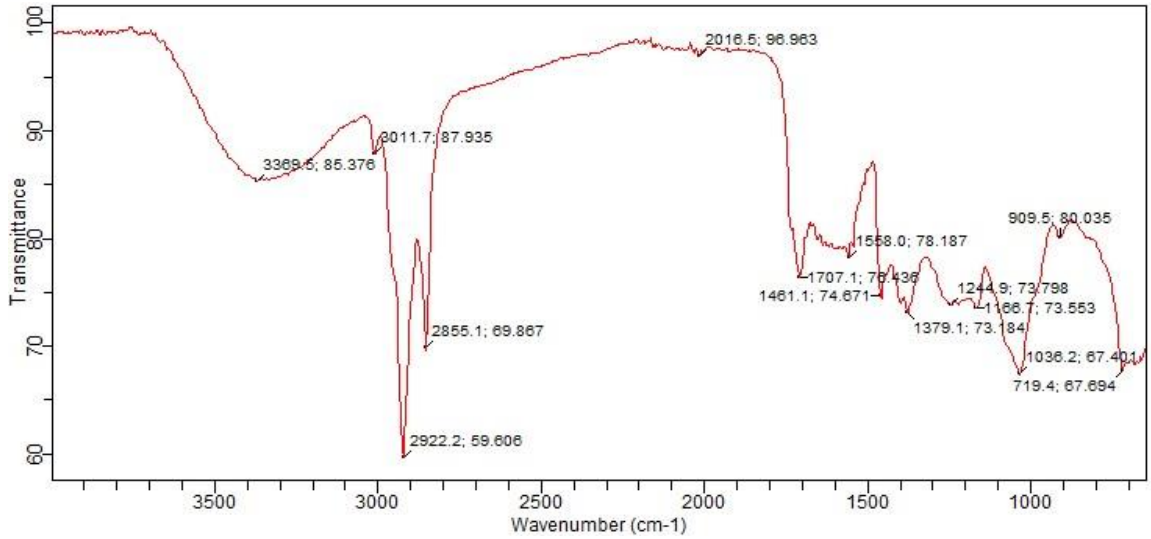



**Figure 4.** FT-IR spectroscopy of n-hexane fraction of *Microtrichia perotitii.*

**Table 2.** GC-MS Analysis.

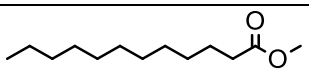
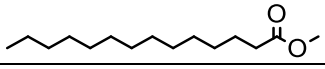
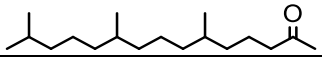
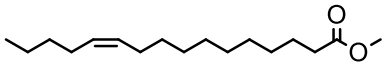
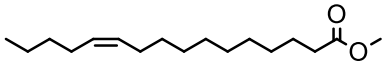
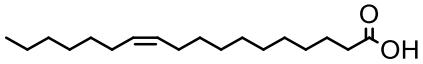
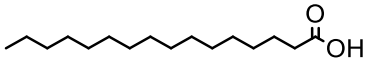
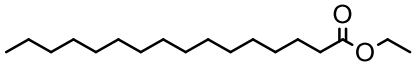
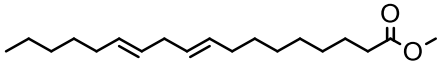
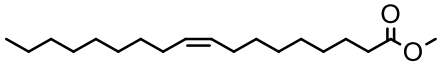
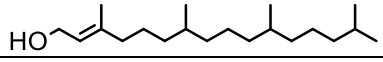
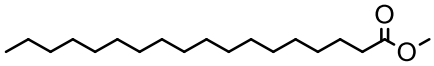
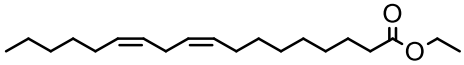
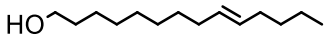
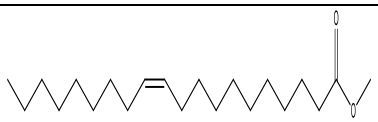
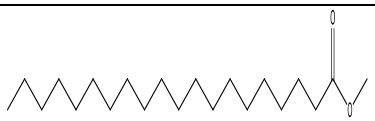
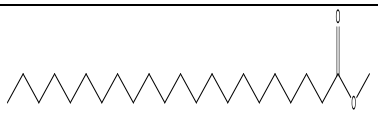
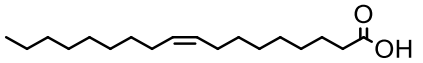
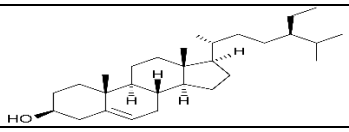
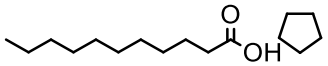
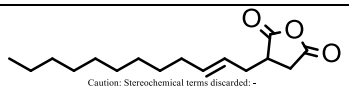
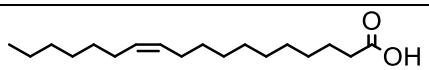
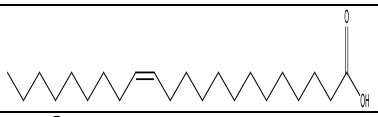
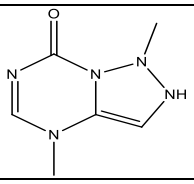
| No | Rt | Area % | Name | Mol. wt | Structure |
|---|---|---|---|---|---|
| 1 | 11.2367 | 0.3862 | Dodecanoic acid, methyl ester | 214.1 |  |
| 2 | 15.7246 | 0.3286 | Methyl tetradecanoate | 242.4 |  |
| 3 | 18.2 053 | 0.2057 | 2-Pentadecanone, 6,10,14-trimethyl- | 268.4 |  |

**Table 2.** *Cont.*

| No | Rt | Area % | Name | Mol. wt | Structure |
|---|---|---|---|---|---|
| 4 | 19.3304 | 0.9035 | (Z)-Methyl hexadec-11-enoate | 268.4 |  |
| 5 | 19.8907 | 29.1986 | Pentadecanoic acid, 14-methyl-, methyl ester | 270.0 |  |
| 6 | 20.6915 | 0.7743 | cis-Vaccenic acid | 282.4 |  |
| 7 | 20.94 | 3.589 | n-Hexadecanoic acid | 256.4 |  |
| 8 | 21.2237 | 3.6954 | Hexadecanoic acid, ethyl ester | 284.5 |  |
| 9 | 22.909 | 4.2005 | 9,12-Octadecadienoic acid, methyl ester | 280.4 |  |
| 10 | 23.1473 | 25.6492 | 9-Octadecenoic acid (Z)-, methyl ester | 296.5 |  |
| 11 | 23.4392 | 1.0329 | Phytol | 296.5 |  |
| 12 | 23.7034 | 3.5635 | Methyl stearate | 298.5 |  |
| 13 | 24.1454 | 2.9496 | Linoleic acid ethyl ester | 310.5 |  |
| 14 | 24.3212 | 0.7167 | 9-Tetradecen-1-ol, (E)- | 212.3 |  |
| 15 | 26.635 | 0.3222 | cis-Methyl 11-eicosenoate | 324.5 |  |
| 16 | 27.1937 | 0.8927 | Eicosanoic acid, methyl ester | 340.5 |  |
| 17 | 30.4322 | 1.5348 | Docosanoic acid, methyl ester | 354.6 |  |
| 18 | 32.589 | 1.8744 | Oleic Acid | 282.4 |  |
| 19 | 33.4393 | 5.0067 | beta-Sitosterol | 414.7 |  |
| 20 | 33.974 | 0.1669 | Cyclopentane undecanoic acid | 254.4 |  |
| 21 | 34.6516 | 0.4221 | 2-Dodecen-1-yl(-)succinic anhydride | 266.3 |  |
| 22 | 36.3376 | 4.7332 | cis-Vaccenic acid | 282.4 |  |
| 23 | 36.4854 | 1.2812 | Erucic acid | 338.5 |  |
| 24 | 37.386 | 6.5723 | 1,4-Dimethyl-7-oxo-4,7-dihydro-triazolo(3,4-c)triazine | |  |

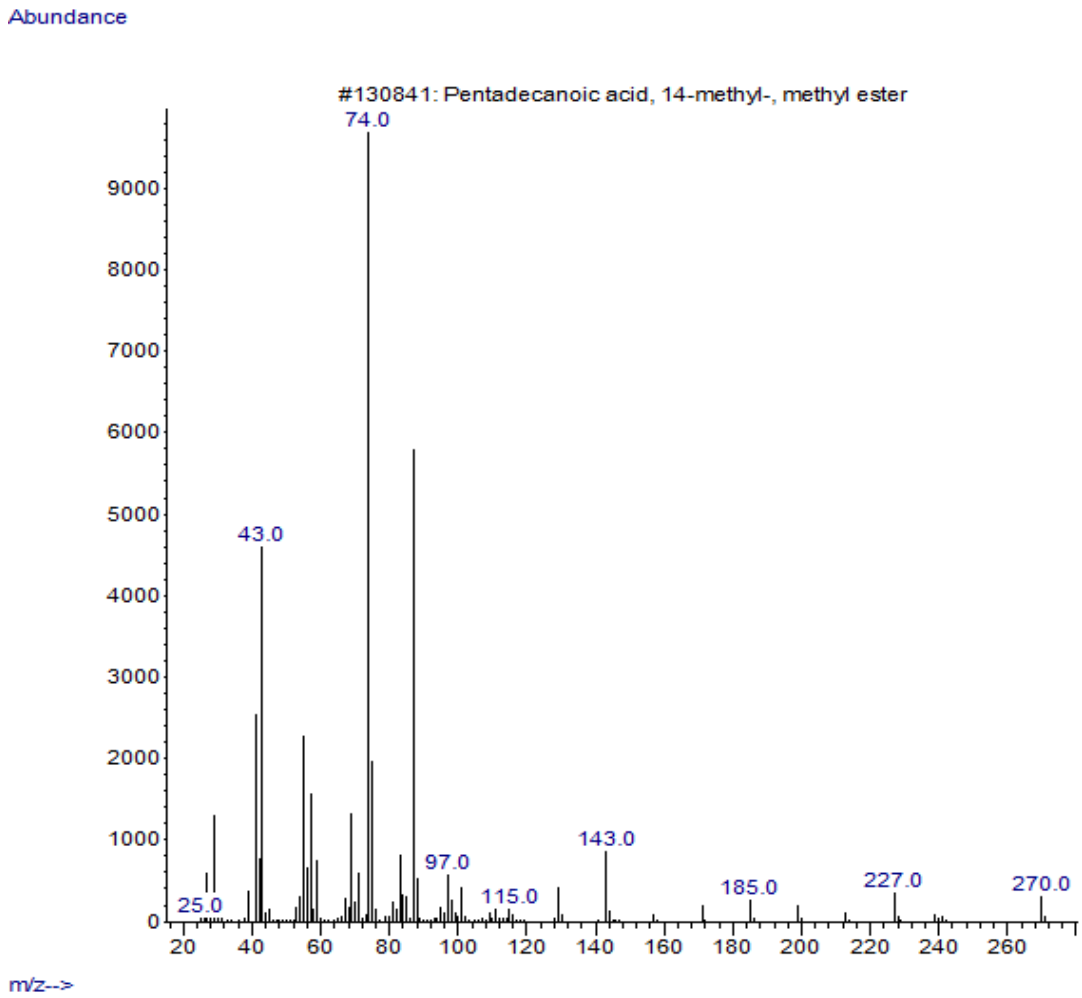



**Figure 5.** Fragmentation of the highest occurring compound (pentadecanoic acid, 14-methyl-, methyl ester).

**Table 3. DPPH Scavenging activities.**

| | Concentration Mg/ml | Absorbance at 517NM | % Antioxidant |
|---|---|---|---|
| Blank | | 2.9015 | - |
| Control | 40 | 0.381 | 86.87 |
| Sample | 40 | 1.2931 | 55.43 |

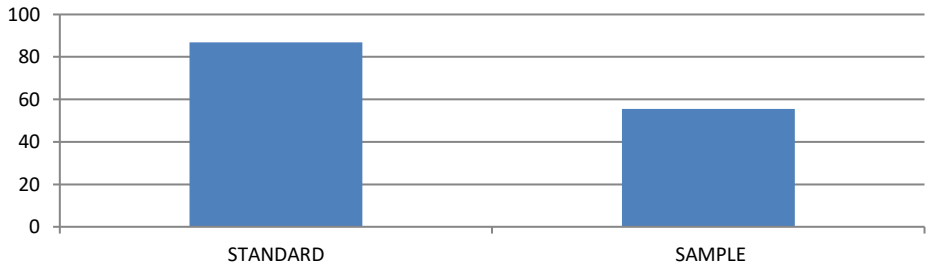



**Figure 6.** Percentage inhibition of the DPPH scavenging activity of sample and ascorbic acid.

| | Absorbance at 542nm | | | | % Antioxidant (RSA) | | | |
|---|---|---|---|---|---|---|---|---|
| | 10ml/ml | 20mg/ml | 30mg/ml | 40mg/ml | 10ml/ml | 20mg/ml | 30mg/ml | 40mg/ml |
| **Sample** | 1.7340 | 1.4680 | 1.4680 | 3.0982 | 53.64 | 60.75 | 60.75 | 17.16 |
| **Control** | 0.4142 | 0.3557 | 0.3913 | 0.4057 | 89.89 | 90.51 | 89.53 | 89.15 |
| **Blank** | 3.74 | | | | | | | |

**Table 4.** Nitric oxide (NO) scavenging activity.

| Sample | | | Ascorbic Acid | | |
|---|---|---|---|---|---|
| **CONC (mg/ml)** | **% RSA** | **IC50** | **CONC (mg/ml)** | **% RSA** | **IC50** |
| 10 | 53.64 | 5.98 | 10 | 88.93 | 0.34 |
| 20 | 60.75 | 5.07 | 20 | 90.48 | 0.67 |
| 30 | 60.75 | 4.15 | 30 | 89.55 | 1.01 |
| 40 | 17.17 | 3.24 | 40 | 89.14 | 1.34 |

**Table 5.** Mean IC50 value of Sample and Standard.

| | **Mean IC50 Value (mg/mL)** |
|---|---|
| Sample | 4.61 |
| Standard | 0.84 |

The IC50 (Inhibitory concentration) values, representing the amount of extract required to decrease the absorbance of DPPH by 50% was calculated from the percentage radical scavenging activity.

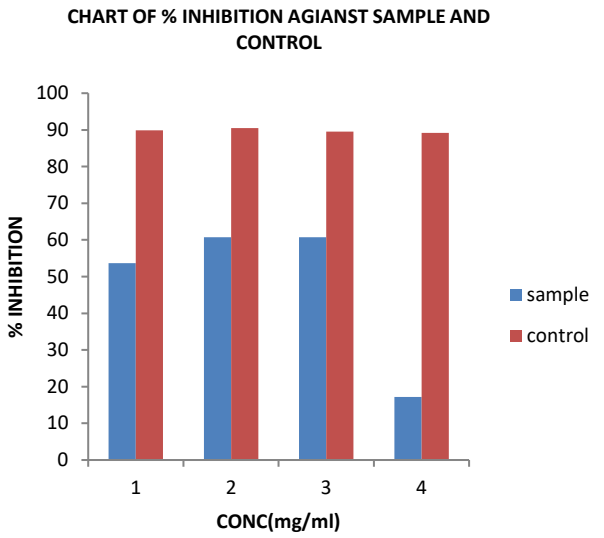



**Figure 7.** Percentage inhibition of nitric oxide of sample and ascorbic acid.

## Discussion

The discussions below were driven from the outcomes of the results with specific comparisons as the case may be.

## Preliminary Phytochemical Screening

The preliminary phytochemical screening of the crude ethanol extract of *Microtrichia perotitii* revealed the presence of secondary metabolites of therapeutically importance. They included alkaloids, saponins tannins, flavonoids, terpenoids, cardiac glycosides while Anthraquinones and phlobatannins were not detected. (Idris *et al.*, 2009; Junaid *et al.*, 2020). Therefore, the N-hexane fraction of the *Microtrichia perotitii* DC contains phytochemicals that contribute significantly to its antioxidant activity. In other studies important phytochemicals identified were phenols, flavonoids, and triterpenes, that is alpha-amyrin acetate, which has been isolated from the plant (Abdullahi et al., 2018; Abdullahi et al., 2011).

## Spectroscopy Analysis

### *UV spectroscopy*

The n-hexane fraction of the sample's UV spectroscopy yielded the highest wavelength of 665 nm. Organic molecules absorb light in the UV region of the electromagnetic spectrum, especially those with a high degree of conjugation (Dyah et al., 2016; Tarun *et al.,* 2020).

**Table 6** UV Spectroscopy of n-hexane fraction of n-ethanolic extract of *Microtrichia perotiiti.*

| **S/no** | **Wave length (nm)** | **Absorbance** |
|---|---|---|
| 1 | 665.00 | 0.384 |
| 2 | 607.00 | 0.088 |
| 3 | 535.00 | 0.130 |
| 4 | 408.00 | 1.292 |

### *FT-IR Spectroscopy*

The FT-IR analysis of the n-haxane fraction of *Microtrichia perotitii* shows various bands, indicating the presence of different functional groups. Peaks 3369.5cm$^{-1}$ indicates strong stretching of a hydroxyl group (OH), band 2922.2cm-1 indicates the presence of a methyl group(C-H), and band 1707.1cm-1 indicates the presence of a carbonyl functional group (C-O) (Perveen & Zaib, 2013; Dyah, *et al*., 2016).

**Table 7.** FTIR Spectroscopy of n-hexane fraction of ethanolic extract of *Microtrichia perotitii.*

| **No** | **Peaks /Bands (cm-1)** | **Functional Groups** |
|---|---|---|
| 1 | 3369.5 | Alcohol (O-H) |
| 2 | 3011.7 | Alkenes (C=H) |
| 3 | 2922.2 | Methylene (C-H) |
| 4 | 2855.1 | Aliphatic (C-H) |
| 5 | 2016.5 | Alkynes (C=C) |
| 6 | 1707.1 | Ketone (C-O) |
| 7 | 1558.0 | Alkene (C=C) |
| 8 | 1461.1 | Alkene (C=C) |
| 9 | 1379.1 | Ester (C-O) |
| 10 | 1244.9 | Ester (C-O) |
| 11 | 1166.7 | Ether (C-O) |
| 12 | 1036.2 | Trans (C-H) |
| 13 | 909.5 | Vinyl (C-H) |
| 14 | 719.4 | Alkene (C-H) cis |

**GC-MS Spectrometry**

The GC-MS analysis of the n-hexane fraction of *Microtrichia perotitii* shows the presence of 27 compounds of which Pentadecanoic acid, 14-methyl-, methyl ester, has the highest abundance with about 29.1986% occurance, followed by 9-Octadecenoic acid (Z)-, methyl ester with about 25.6492% abundance, 1,4-Dimethyl-7-oxo-4,7-dihydro-triazolo(3,4-c)triazine,(6.5723%),beta.-Sitosterol (5.0067%), cis-Vaccenic acid (4.7332%), 9,12-Octadecadienoic acid, methyl ester(4.2005), Hexadecanoic acid, ethyl ester (3.6954%), n-Hexadecanoic acid (3.589%), Methyl stearate (3.5635%), Linoleic acid ethyl ester (2.9496%). Other compounds with below 2% abundance are Docosanoic acid, methyl ester, Erucic acid, oleic acid, phytol, 2-Dodecen-1-yl(-)succinic anhydride, Cyclo pentane undecanoic acid, Dodecanoic acid, methyl ester, Methyl tetradecanoate, 2-Pentadecanone, 6,10,14-trimethyl-Z)-Methyl hexadec-11-enoate, cis-Vaccenic acid, 9-Tetradecen-1-ol, (E)-, cis-Methyl 11-eicosenoate, and Eicosanoic acid, methyl ester.14-methylpentadecanoic acid is a methyl-branched fatty acid that is pentadecanoic acid substituted by a methyl group at position 14. It is a biomarker for rheumatoid arthritis. It has a role as a biomarker and a mammalian metabolite. It is a branched-chain saturated fatty acid, a methyl-branched fatty acid, a long-chain fatty acid and a fatty acid 16:0. It is functionally related to pentadecanoic acid. It is a conjugate acid of a 14-methyl pentadecanoate (Njoku *et al*., 2021).

**Antioxidant Activity**

***DPPH activity***

When free-radical DPPH interacts with an odd electron, the greatest absorption occurs at 517 nm (purple color). A free-radical scavenger antioxidant reacts to DPPH to form DPPHH, which has a lower absorbance than DPPH because of the lower amount of hydrogen. Compared to the DPPH-H state, this radical version causes decolourisation (a yellow hue) as the number of electrons collected increases.

It can be observed from Table 3 that the antioxidant activity of the n-hexane fraction of *Microtrichia perotitii* 40mg/ml shows 1.293 absorbance at 517nm with 55.43 percentage of antioxidant while 100mg/ml shows 1.5018 absorbance at 517 nm with 48.28 percentage of antioxidant.( Siddartha *et al,* 2022) The phytochemicals in *M. perotitii* exhibit strong radical scavenging properties, which are crucial for combating oxidative stress as well as reducing cellular damage. The antioxidant activity is often measured using assays such as DPPH and nitric oxide scavenging, where extracts show significant inhibition rates (Bisso et al., 2022; Hamsalakshmi et al., 2020).

***Nitric oxide activity***

Nitric oxide is a potent pleiotropic mediator of physiological processes such as smooth muscle radical relaxation, inhibition of platelet aggregation, neuronal signaling, and regulation of cell mediated toxicity. It is a diusible free radical which plays many important roles as an e ector molecule in diverse biological systems (vasodilation, neuronal, messenger, and antimicrobial and antitumor activities). Ascorbic acid used as the standard for NO radical scavenging in this analysis showed maximum activity with a percentage RSA (%RSA) of 90.51% and a maximum IC50 value of 1.34 while the 20mg/ml and 30mg/ml concentration of the n-hexane fraction of *Microtrichia perotitii* shows a maximum RSA value of 60.75% and a maximum IC50 value of 5.98. The mean IC50 value of the sample is 4.61mg/mL while the IC50 value of the standard is 0.84mg/Ml (Avani, 2010). Specifically, the n-hexane extract demonstrated an IC50 value comparable to other plant extracts, suggesting its efficacy in scavenging free radicals (Putu *et al.,*2023).

## CONCLUSION

The phytochemical screening of the crude ethanol extract *of Microtrichia perotitii* revealed the presence of carbohydrate, saponins, flavonoids, terpenoids, alkaloids, and cardiac glycosides. The antioxidant activity reveals that the N-hexane fraction of m perotitii inhibits free radicals. The presence of different tannins, phenolics, carbohydrates, flavonoids etc, may be responsible for the antioxidant property of the sample. The antioxidant properties were highest at a concentration of 30mg/ml and lowest at 40mg/ml. This study shows that the N-hexane fraction *of Microtrichia perotitii* has antioxidant properties and might be used in the treatment of diseases induced by free radicals.

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## REFERENCES

Abdullahi, M.N, Ibrahim H, Ilyas N (2011). Phytochemical Screening and Biological Studies of the Leaves of *Microtrichia perotitii* DC(Asteraceae). *British journal o. Medicinal Plants 1(3):*88-97.

Abdullahi, M. N, Ibrahim,H, Iliya,N (2013). Evaluation of phytochemical Screening and Analgesic Activity of Aqueous Extract of the Leaves of *Microtrichia perotitii* DC (Asteraceae) in Mice using Hotplate Method. *Medicinal Plant Research. 3:*537-543.

Abdullahi, R.A.; Mainul. H. (2020). Preparation of Medicinal Plants: Basic Extraction and Fractionation Procedures for Experimental Purposes. *Journal of Pharmacy and Bioallied Sciences.12(1*):1-10.

Avani, P.; Amit, P.;Amit, P.and Patel, N.M. (2010). Determination of polyphenols and free radical scavenging activity of *Tephrosia purpurea* linn leaves (Leguminosae). *Pharmacognosy Research.2(3):*152 -158.

Borel,N. B.; Roland, N.E.N.; Roland, T.T.and Jean, P. D. (2022). Phytochemical Screening, Antioxidant, and Antimicrobial Activities of Seven Under investigated Medicinal Plants against Microbial Pathogens. Hindawi: *Advances in Pharmacological and Pharmaceutical Sciences*. *2022(1):*1-8.

Dhivya, S. M.; Kalaichelvi.K, (2016). UV-visible Spectroscopic and FTIR Analysis of *Sarcostemma brevistigma,*Wight. and Arn. *International Journal of Current Pharmaceutical Research*,9(3):46-49.

Duraisamy, G.; Manokaran, K.; Ganesan, R.; Kanakasabapathi, D. and Chandrasekar, U. (2015). GC-MS Analysis of Bioactive Compounds from the whole plant ethanolic extract of *Evolvulus alsinoide***s** (L.). *Journal of Food Science and Technology. 52(2):* 1212–1217.

Dyah, S.; Sri, A.; Uun, Y,; (2016). Characterization of Fraction of Carica papaya L. Leaves Ethyl Acetate Extract to African Catfish *Clarias gariepinus* Leucocytes Using UV-Vis, FTIR and GC-MS Methods. *International Journal of ChemTech Research. 9, (09):* 247-253,

Ebrahimzadah M, N, Hosseinimehr S, J, Hamidinia A, and Jafari M (2008). Antioxidant and Free Radical Activiity of *Feijoa sellowiana* Fruits peels and leaves. *Pharmacologyonline* 1:7-14.

Elizabeth, K.;Rao, M.N.A, (1990): Oxygen radical scavenging activity of Curcumin. *International Journal of Pharmaceutics. 1990, 58:* 237-240

Elujoba, A. A.; Odeleye, O. M.;Ogunyemi, C.M (2005). Traditional medicinal development for Medical and Dental Healthcare delivery system in Africa. *African Journal of traditional medicines*.2005, 2(1): 46 – 61

Goldschmidt, S.and Renn, K. (1992). Amine oxidation IV. Diphenyl-trinitrophenylhydrazyl. *Chemiacta Berlin. 55*, 628–643.

Hamsalakshmi,S.J.; Akassh, M.(2020). Phytochemical Analysis and In-vitro Antioxidant Activity of Aerial Parts of *Trichodesma indicum. International Journal of Research in Pharmaceutical Sciences,11(2):*1386-1393

Hutchinson J, and Dalzie JM (1963). *Flora of West Tropical Africa*, 2nd edn Vol 12. Crown Agent for overseas Government and Administration Millbank, London SW 1:325-397

Idris, S.; Ndukwe,G.I. and Gimba, C. E. (2009). Preliminary Phytochemical Screening and Antimicrobial activity of seed extracts of *Persea americana* (avocado pear). *Bayero Journal of Pure and Applied Sciences, 2(1):*173 – 176

Iwu, M.W, Duncan,A. R, Okunji, C. O. (1999).: *New Antimicrobials of Plant Origin*. In: Janick, J., Ed., Perspectives on New Crops and New Uses, ASHS Press, Alexandria.

Jain,P.K.;Anjali, S.; Preeti, J, and Jeetendra, B. (2016). Phytochemical Analysis of *Mentha spicata* plant extract using UV-VIS, FTIR and GC/MS technique. *Journal of Chemical and Pharmaceutical Research: 8(2):* 1-6

Junaid R Shaikh and MK Patil (2020). Qualitative tests for Preliminary Phytochemical Screening: An overview. *International Journal of Chemical Studies; 8(2):* 603-608

Njoku, U.O.; Umeh, C. G. and Ogugofor, M.O. (2021). Phytochemical profiling and GC-MS analysis of aqueous methanol fraction of *Hibiscus asper* leaves. *Future Journal of Pharmaceutical Sciences 7(59):*1-5.

Perveen, F. and Zaib, S (2013). Phytochemical and Spectrophotometric Analyses of the Hill Toon, *Cedrela serrata* Royle Methanolic Leaves Extract and Its Fractions. *International Journal of Agriculture Innovations and Research.1(5):* 140-145.

Putu, R.A.S.; Made,D.W.; Desak,P. C. U. (2023). Phytochemical Screening and Antioxidant Activity Analysis of N-Hexane Extract of *Sonneratia alba* Mangrove Leaves. *Biology, Medicine, & Natural Product Chemistry.12(2):* 631-635

Qing-Wen, Z.; Li-Gen, L.; Wen-Cai, Y (2018). Techniques for Extraction and isolation of Natural Products: A Comprehensive Review: *Chinese Medicine:13(20):*1-26

Siddartha. B., Riya, M.; Anjali, P.; Arpana, V.; Archana, G.; Ramendra, P. P.; and Chung-Ming Chang (2022). Determination of Antioxidants by DPPH Radical Scavenging Activity and Quantitative Phytochemical Analysis of *Ficus religiosa. Molecules.; 27(4):* 1326.

Sofowora, A. (1993). Medicinal Plants and Traditional Medicines in West Africa. 2nd edn. London: Spectrum Books.

Tarun, K.P.; Kamlesh, S.; Ramsingh, K.; Seema, U.; Rajendra, J. Ravishankar, C. (2020). Phytochemical Screening and Determination of Phenolics and Flavonoids in *Dillenia pentagyna* using UV–vis and FTIR spectroscopy. *Spectrochimica. Acta Part A: Molecular and Biomolucular Spectroscopy/, 242*. ScienceDirect (Elsevier).

Trease, E. C.and Evans,W.C. (2009). *Pharmacognosy*, 16th edition W.B. Saunders, Toronto. Harcourt Pub Ltd.

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