

Analysis Of The Antioxidant, Antimicrobial, And Neuropharmacological Activities Of The Whole Plant Of *Ruellia Simplex*

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Abstract

Objective: The medicinal plant known as *Ruellia simplex* is frequently utilized and is well-known for the traditional therapeutic capabilities it has. The number of extensive investigations that have been conducted on its neuropharmacological, antimicrobial, and antioxidant actions is, however, limited. Gaining an understanding of these elements may give useful insights into the possible uses of the substance in the medical field.

Methods: This study looked at the whole *Ruellia simplex* plant and its neuropharmacological, antioxidant, and antimicrobial activities. The antioxidant activity was assessed using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assays. Antimicrobial activity was evaluated against a panel of bacterial and fungal species using broth microdilution and agar well diffusion methods. To examine the neuropharmacological effects, The study conducted in vitro and in vivo studies that focused on neurological parameters.

Results: Study findings revealed significant antioxidant activity of *Ruellia simplex* extract , with dose-dependent scavenging of free radicals. Antimicrobial assays demonstrated notable inhibitory effects against a range of pathogens, indicating its potential as an antimicrobial agent. Moreover, neuropharmacological evaluations unveiled promising results, suggesting possible neuroprotective and cognitive-enhancing properties of *Ruellia simplex* .

Conclusion: The whole plant of *Ruellia simplex* exhibits promising antioxidant, antimicrobial, and neuropharmacological activities. These findings underscore its potential as a valuable source of therapeutic agents for various health conditions. Further research is warranted to elucidate the underlying mechanisms and explore its clinical applications.

KEYWORDS: Antioxidant activity, antimicrobial activity, Neuropharmacological, Activities of *Ruellia simplex*

Introduction:

One form of herbal medicine, which is also often referred to as botanical medicine, is the use of the seeds, fruits, vegetables, leaves, roots, bark, or blooms of a plant. This kind of medicine is an expression of the traditional practice of using plants for medicinal purposes. The term "botanical medicine" refers to a category of herbal medicine, which is a sort of therapy that falls within the umbrella of the medical field. The word "botanical medicine", which is another synonym for herbal medicine, is sometimes used interchangeably with the term "herbal medicine." Herbal medicine is another term that is often used to refer to botanical medicine. The word

that is used to denote herbal medicine follows the same pattern. It is common practice to utilize herbal medicine and plant medicine in cooperation with one another or in conjunction with one another. This is a routine way of doing things. Botanical medicine is sometimes referred to by the term "alternative medicine," which is another word that is often used. In addition to this, it is also occasionally referred to by the word alternative medicine, which is another moniker that is used to refer to an alternative medicine(Abreu et al., 2021).

In addition to this, alternative medicine is another term that is regularly used to refer to botanical medicine. Botanical medicine is also frequently referred to as alternative medicine. Over the course of the last few years, the use of herbal medicines as a kind of medical treatment has evolved into a respected alternative therapy that has seen major developments to enhance its effectiveness. Over the course of a few years, this significant change has taken place. While people use herbal treatments or medicines that are created from plants, it is realistic to predict that they will not suffer a substantial number of adverse side effects while they are taking these remedies. This is because these medications and herbal therapies are both derived from plants. It is appropriate to have this anticipation of the situation. The reason for this is because these treatments are derived from plants, which is the most important factor. Having this type of expectation regarding the situation with you is not anything that is considered unacceptable. These medications and therapies are successful because they are derived from plants, which is the reason why they are effective. This is precisely why they are successful. The reason for their success is due to this particular factor. Exactly because of this, they have been so successful in their endeavors. The success that they have achieved may be linked to this particular characteristic, which is the reason for their success. Prior to being made accessible to the general public for use or consumption, a major number of the more modern herbal medicines were submitted to a considerable amount of research and monitoring. This was done before they were made available to the general public. In order to ensure that they were available to the broader public, this was carried out (Alamgir,2021).

People have been employing plants as medicines since the beginning of human civilization, on the idea that they have healing properties. Malaysia's flora is perfect for the cultivation of medicinal plants due to the country's climate, soil, and number of biological zones. According to a survey, between 400 and 600 varieties of the country's flowering plants have substantial medicinal significance. Since a long time ago, the curative properties of medicinal plants have been associated with their active chemical components. A new era of plant-based drug discovery started when drugs like digitoxin, quinine, which cocaine, & codeine were isolated for the first time. The Acanthaceae (Acanthus family) of dicotyledonous flowering plants has approximately 250 genera and 2500 species. While some of them are tropical plants, trees and shrubs, or twining vines, others are epiphytes. There are very few species found in the temperate zones. The continent, and the region are the main producers. Numerous common names are used to refer to the flowers of the genus *Ruellia*, which are also referred to as wild petunias. This genus, which has 250 species overall, may be found in the tropical tropics and temperate regions of both hemispheres. Home to three of the five kinds that were discovered there. The biological, phytochemical, and traditional medicinal uses of the *Ruellia simplex* are all documented in this research study (Abreu et al., 2021).

Background :

Over the course of the last few years, a wide range of applications for the bioactive compounds that are present in medicinal plants have come to the forefront of attention. These applications include antimicrobial food packaging materials, herbal cures, functional foods, additives, nutritional supplements, and other purposes. Additionally, these applications cover additional uses. More than that, these applications include foods that have

functional properties. The field of ethnopharmacy has recently been responsible for the discovery and extraction of a significant number of the bioactive plant metabolites that have been used for many years as treatments for a wide range of illnesses, including high blood pressure, cancer, the common cold, dermatitis, and cholesterol. Metabolites like this have been used in the treatment of a broad variety of chronic illnesses. Secondary metabolites are a broad category of bioactive molecules that may be found in plants. These substances are known to have a wide variety of applications. When seen from a scientific perspective, these compounds are referred to as phytochemicals. Phytochemicals are known to exhibit a wide variety of bioactivities, which include, among other bioactivities, antioxidant, antibacterial, neuropharmacological, antiviral, and anticancer properties. This is a well-known fact about phytochemicals (**Coopoosamy, & Naidoo, 2021**).

Additionally, the antioxidant and antibacterial properties of these compounds were also studied. In order to carry out these tests, free radical standards were used, and the amount of gram-positive and gram-negative bacteria was decreased, respectively. Since the beginning of the twenty-first century, the general public has consistently shown an interest in plants that are used for medicinal reasons as well as aromatic ones. This need has been around for millennia without ceasing. Within the context of this subject, the United States of America has been a particularly prominent focus of attention. This is because these plants pose a significant threat to the use of natural sources in the cosmetics, food, and pharmaceutical sectors all over the globe. This is the reason why this is the case. The reason why things take place in the way that they do is because of this. The bioactive chemicals that may be found in medicinal plants have a wide range of applications and can be found in any number of different places. Applications that come under this area include the production of botanical medicines, functional foods, additives, nutritional supplements, and antimicrobial food packaging materials. These are only few of the applications that use this category. Nevertheless, this list does not include everything. At this point in time, the major focus of attention is on these pharmaceutically active compounds. A significant number of the bioactive plant metabolites that have been used as a treatment for a wide range of conditions, including hypertension, cancer, cold flu, dermatitis, and cholesterol, have been found and isolated for use in ethnopharmacy going back millennia. These metabolites have been employed as a therapy for a variety of maladies. Metabolites like this have been used in the treatment of a broad variety of chronic illnesses. In order to treat the illness, these metabolites have been used as a possible therapeutic medium. The human race has been making use of these metabolites for very extended periods of time. Through the use of metabolites that are analogous to this one, it has been possible to successfully treat a wide range of the chronic diseases that are now being treated. Secondary metabolites are compounds that are created by plants in their natural environment and are classed as secondary metabolites. The term "secondary metabolites" is used to refer to phytochemicals, which are substances that are produced by plants. The term "phytochemicals" is used by the scientific community to refer to these bioactive molecules in order to offer a description of them. The ability of phytochemicals to perform a wide variety of distinct bioactivities, each of which is distinct in relation to the others, has been shown via research. Many various forms of bioactivities, such as antioxidant, antibacterial, neuropharmacological, antiviral, and anticancer effects, are included in this category of biological effects. Additionally, this category encompasses a wide range of additional types of bioactivities. One of the many biological activities that are currently available, the utilization of medicinal plants due to the antioxidant activity that they possess on free radicals, with the goal of reducing or delaying the effects of potentially hazardous health consequences, is a subject that is gaining more and more attention from researchers. This is because medicinal plants possess antioxidant activity. Due to the fact that medicinal herbs have antioxidant action, this is the case (**Ukwubile et al., 2023**).

In recent years, a wide range of applications for the bioactive compounds that are present in medicinal plants have come to the forefront of attention. These applications include a wide number of applications. There are many different kinds of apps that fall under this category. Antimicrobial food packaging materials, herbal cures, functional foods, additives, nutritional supplements, and a wide range of other applications are some of the applications that fall under this category. In addition, some applications come with a more extensive collection of functions. In addition to that, these applications include foods that have properties that are valuable in and of themselves. A significant number of the bioactive plant metabolites that have been used for many years as treatments for a wide variety of illnesses, such as high blood pressure, cancer, the common cold, dermatitis, and cholesterol, have recently been discovered and extracted thanks to the field of ethnopharmacy, which has been responsible for the discovery and extraction of a significant number of these particular plant metabolites. It has been a long time since these metabolites have been used. The therapy of a broad variety of chronic illnesses has been accomplished via the use of metabolites that are comparable to this one (Cragg et al., 2021).

The purpose of the research:

Furthermore, the flower of the *Ruellia simplex* plant has not been researched in this regard, despite the fact that it has been shown that the species that belong to the genus *Ruellia* exhibit potent antioxidant qualities. The plant that is known as *Ruellia simplex* may now be found in various regions of the globe, including the Caribbean, South America, and even Indonesia, in addition to its original. In addition to being able to thrive in tropical and subtropical climates, this plant is most comfortable in environmental conditions that are riverine and terrestrial. In view of the fact that the flower of the *Ruellia simplex* most likely has a potent antioxidant activity, the author is more than glad to collect further knowledge on it. For the goal of measuring the antioxidant capacity of the samples, DPPH test was performed in both ethanol and ethyl acetate. This examination was carried out under the circumstances that were described above. The purpose of this study is to explore the antioxidant effects of floral extracts of *Ruellia simplex* that have been prepared in both ethanol and ethyl acetate. This will be accomplished via the use of phytochemical analysis.

Literature Review :

There are some circumstances that are perfect for the growth of the perennial plant known as *Ruellia simplex*, which has the potential to grow to a height of three feet. In the United States Department of Agriculture's Plant Hardiness Zones 8 through 11, find circumstances that are similar to these. The growth of the plant is able to take place in certain sections of the plant. In this specific occurrence, the leaves and stems of the plant have a dark green tinge that is suggestive of emerald, and this coloring can be observed in this particular instance. Taking into consideration this specific instance, it is not tough to notice that the plant has this particular hue. The arrangement of this item, on the other hand, is completely different from that of a lance, despite the fact that it is created in a manner that is, for the most part, comparable to that of a lance. To put that into perspective, its length may range anywhere from six to twelve inches, and its breadth is just a fraction of an inch less than that. To put it another way, its length might be anything from six and twelve inches for a certain length. It is possible to see the pronounced veins that are distinctive of this species on the underside of the leaf. Due to the presence of veins, this species may be readily identified. Due to the presence of veins, it is feasible to identify this species with a reasonable amount of ease. Considering that veins are present, it is possible to identify this species with a high degree of consistency. Since this is the case, it is feasible to determine the species. Due to the fact that they are able to attract pollinators, the blooms, which have the appearance of trumpets and are a deep purple color, are particularly appealing to pollinating insects such as bees. This is due to the fact that the

flowers have the capacity to entice people to pollinate them. The color of the blooms is not even close to being one that might be described as light purple. A few of these blooms have a shade of purple that is rather dark, while others have a shade of purple that is more light. The cultivar is the single criteria that defines the diameter of the blooms, which may vary anywhere from around half an inch to two inches for each unique bloom. The diameter of the flowers is determined by the cultivar (***Ruellia simplex.*, 2022**).

According to Pachaiyappan et al. (2014), there has been a notable increase in the number of individuals who are seeking for natural antioxidants at this time. This is something that has been noted. In contrast to synthetic antioxidants, natural antioxidants are produced from components that are extracted from plants. The number of people who are interested in natural antioxidants, which are made from these components, is a particular issue. Flavonoids, carotenoids, and polyphenolic chemicals are all examples of antioxidants that may be found in abundance in fruits and vegetables. Vitamins A, C, and E are all examples of antioxidants. It is healthy for the body to consume antioxidants. Both fruits and vegetables contain antioxidants, and the quantities of these antioxidants are rather high. antioxidants and antioxidants are two sources of antioxidants that are very beneficial. The use of antioxidants is also advantageous. Antioxidants may be discovered in both fruits and vegetables, provided that one analyses them with sufficient attention. Not all fruits and vegetables, however, include antioxidants in their composition (**Flieger et al., 2021**).

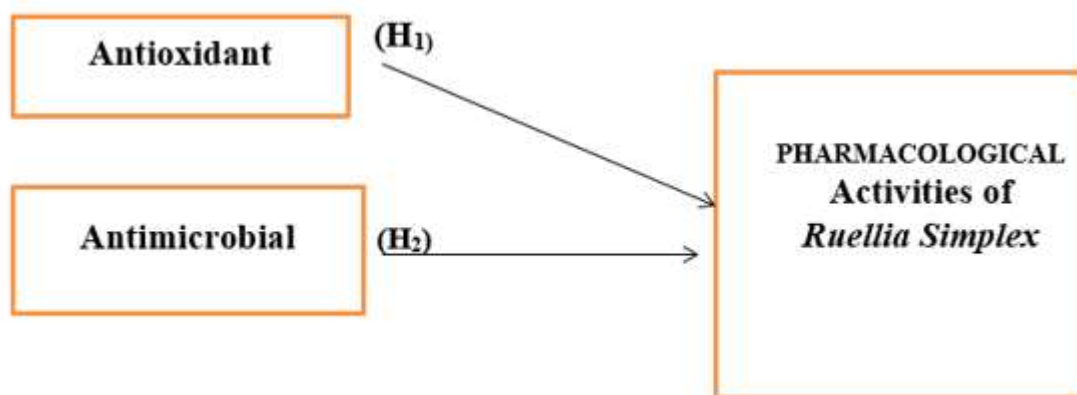
According to Huang et al. (2009), compounds that have the ability to make use of antioxidant features include flavonoids, tannins, and other phenolic components that are found in meals that are created from plants. These compounds are examples of compounds that have the capacity to employ antioxidant properties. Flavonoids are substances that are derived from plants and have the ability to bring down the levels of free radicals. Flavonoids, which are classified as a class of substances, have the capacity to provide protection against the kinds of harm that are brought about by free radicals. Nothing has been done to investigate this matter, and there is no information that has been discovered about it as of yet either. There has been no investigation into this matter. According to the research that is currently accessible, there is no evidence to suggest that extracts of *R. simplex* that were prepared by utilising water or ethanol have been studied for their antioxidant activities in vitro. Additionally, there are no publications that have been found that provide an explanation for the neuropharmacological activities of *Ruellia simplex* or the antibacterial activities of the bacterium. This is the case since there are no publications that have been identified. On account of the fact that there are no articles of this sort, the situation is as follows. In the current moment, there are no studies that are accessible to the general public, which is the reason for this situation (**Pachaiyappan et al., 2014**).

Question:

- 1) Why the antibacterial properties of *Ruellia simplex* extracts in n-hexane, dichloromethane, ethyl acetate, and methanol were investigated against Gram-positive and Gram-negative microorganisms?
- 2) Why the highest levels of antibacterial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa* were seen in the ethyl acetate and methanol fractions?
- 3) Which phytochemical is responsible for antioxidant, antimicrobial, activities?
- 4) How *Ruellia simplex* does play a role in antioxidant, antimicrobial, activity?

Methodology:

Conceptual Framework:



Hypothesis :

- **Variables :**

Here Dependent Variable is to access the Pharmacological activities of *Ruellia simplex* and independent variables are to examine Pharmacological properties like antioxidant , Antimicrobial, Neuropharmacological etc.

Ruellia simplex (Dependent Variable):

Ruellia simplex has been investigated for its potential anti-inflammatory properties, which may involve the inhibition of inflammatory mediators and pathways, leading to reduced inflammation and associated symptoms. Compounds found in *Ruellia simplex* have demonstrated antioxidant activity, scavenged free radicals and reducing oxidative stress. This activity may contribute to its potential protective effects against oxidative damage-related diseases. Studies have suggested that extracts or compounds from *Ruellia simplex* possess antimicrobial properties, inhibiting the growth of bacteria, fungi, or other microorganisms. This antimicrobial activity may be beneficial in the treatment of various infectious diseases. Some research indicates that *Ruellia simplex* may have neuropharmacological effects, potentially influencing neurotransmitter levels, neuronal function, or cognitive processes. These effects may have implications for neurological disorders or cognitive enhancement. There is some evidence to suggest that *Ruellia simplex* extracts may possess analgesic properties, potentially relieving pain through various mechanisms. Research suggests that *Ruellia simplex* may have hypoglycaemic effects, lowering blood sugar levels, and potentially offering benefits in the management of diabetes (Jadid et al., 2018).

Some studies have explored the wound-healing properties of *Ruellia simplex*, suggesting that it may promote the healing process and accelerate tissue repair. Overall, these pharmacological activities indicate the potential

of *Ruellia simplex* as a source of bioactive compounds with diverse therapeutic applications. However, further research is needed to fully elucidate the mechanisms of action and therapeutic potential of this plant.

Antioxidant extract (Independent Variable):

All members of the genus *Ruellia* are effective against bladder stones and chronic sinusitis. Additionally, a leaf paste may be used to skin conditions such as boils. The plant's roots are the source of the pesticides. Whooping cough syrup is one option for treatment. One remedy for dyspepsia is to apply tuber powder. *Ruellia simplex* has a long history of usage in traditional medicine for the treatment of inflammatory pain, syphilis, renopathy, and nociceptive pain. *Ruellia simplex* shows potential as a treatment for stomach tumors, according to research. In traditional Ayurvedic medicine, members of the *Ruellia* genus have been used for a long time to cure aches and pains, gonorrhea in particular. They may potentially have antioxidant and antihypertensive properties. The findings indicate that *Ruellia simplex* is a very effective antioxidant. Some writers have claimed that the *Ruellia prostrata* plant's aerial portions contain antioxidant qualities. Despite the fact that extracts in methanol and n-butanol demonstrated antioxidant properties (Lucci et al., 2017).

On basis of the above discussion the researcher formulated the following hypothesis, which will investigate the relationship between the Antioxidant and Pharmacological activities of *Ruellia simplex*.

H0₁: There is a no significant relationship between antioxidant extract and *Ruellia simplex*.

H₁: There is a significant relationship between antioxidant extract and *Ruellia simplex*.

Antimicrobial extracts:

Indeed, studies have shown that *Ruellia simplex* may possess antibacterial properties. *Ruellia simplex* plant extracts contain antimicrobial characteristics and may be used to fight a broad range of microorganisms, including bacteria, fungi, and parasites. These extracts are derived from the plant's stems, leaves, and roots. Some examples of such studies include one published in the "Journal of Ethnopharmacology" that tested the antimicrobial efficacy of *Ruellia simplex* extracts against *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Bacillus subtilis*. The results demonstrated that the extracts significantly inhibited the growth of these bacteria, suggesting that *Ruellia simplex* may possess antimicrobial characteristics. Additionally, the anti-fungal effects of *Ruellia simplex* extracts against *Aspergillus niger* and *Candida albicans* have been the subject of considerable investigation. These studies suggest that *Ruellia simplex* may be a good candidate for future antifungal medication development. While further research is needed to fully understand the mechanism by which *Ruellia simplex* exerts its antimicrobial activities and identify the specific bioactive compounds involved, the available evidence suggests that the plant has potential as a natural antibiotic (Stoia et al., 2018).

On basis of the above discussion the researcher formulated the following hypothesis, which will investigate the relationship between the antimicrobial extracts and *Ruellia simplex*.

H0₂: There is a no significant relationship between antimicrobial extracts and *Ruellia simplex*.

H₂: There is a significant relationship between antimicrobial extracts and *Ruellia simplex*.

- **Antioxidant activity test**

This study Employs a technique called “2,2-Diphenyl-1-picrylhydrazyl” or commonly known as DPPH method is carried out to find out how much antioxidant activity was in the *Ruellia simplex* extracts. Following the extraction process, 2.9 milliliters of DPPH in methanol were added to the 100 liters of filtrate. A DPPH solution concentration of 0.004% is inferred from the data. When the solution changed color from purple to yellow, it was found that the filtrate had the ability to scavenge free radicals. This is what came out of the adjustment. Following 120 minutes of darkness, the test tube was placed in an incubator set at room temperature. This happened just after the last event. Afterwards, the solvent absorbance measurement was carried out using a spectrophotometer calibrated at 517 nm. This was used in order to do the task. This was determined using the following formula for free radical inhibition, just to give an idea: Dividing the sample absorbance by the blank absorbance will give the percentage of DPPH inhibition. After the value want, increase it by 100.

The DPPH method was used in order to ascertain the quantity of antioxidant activity that was held by extracts that were produced from *Ruellia simplex*. Based on the observations, the concentration of the DPPH solution was found to be 0.004%. Following the transformation of the solution from purple to yellow, it was established that the filtrate has the capability to scavenge free radicals. This was the outcome of the transition. The test tube was placed inside of an incubator that was kept at room temperature and was subjected to darkness for a duration of one hundred twenty minutes. This took place very soon after the previous step was taken. After that, in order to carry out the work of determining the absorbance of the solution, a spectrophotometer was used. This was utilised in order to carry out the task, the following is the formula that was used in order to determine the amount in terms of the inhibition of free radicals: In order to calculate the percentage of DPPH inhibition, it is required to first divide the absorbance of the sample by the absorbance of the blank, and then multiply the result by 100 after you have reached the desired value. The following process is carried out in order to accomplish this evaluation: After the addition of 2.9 millilitres of DPPH at a concentration of 0.004% in ethanol, a total volume of one hundred microliters (μL) of the extracted filtrate was introduced. As the hue of the solution changed from purple to yellow, it was clear that the filtrate had the potential to scavenge free radicals. This was shown by the fact that the solution changed colour. Immediately after that, the test tube was placed in the dark at room temperature for a total of one hundred twenty minutes. The absorbance of the solution was then measured using a spectrophotometer that had a wavelength of 517 nm. This was done after the previous step. In the subsequent stage, the percentage of free radical inhibition was calculated by using the formula that is shown in the following paragraphs: The formula for calculating the percentage of DPPH inhibition is as follows: (Absorbance of sample minus Blank absorbance) divided by (Blank absorbance) followed by 100%. According to one definition, the blank absorbance is the absorbance of DPPH that is measured without the presence of a sample. The absorbance of a sample is equivalent to the absorbance of DPPH while the sample is being considered. The second thing that needed to be done was to figure out the IC50 value, which is the concentration at which the extract's ability to protect against free radicals is fifty percent more than it would be otherwise. In order to get the desired outcome for this calculation, the linear equation $y = a + bx$ is used throughout the process. (R2) equals 0.907 The equation $y = 3.93x + 7.82$ was identified as the standard curve that was used in this inquiry.

Antimicrobial activity assays

An agent or substance's antimicrobial activity is its capacity to suppress or eliminate microorganisms like fungus, parasites, viruses, or bacteria. Lab tests such as the Kirby-Bauer disk diffusion assay and the minimum

inhibitory concentration (MIC) assay may detect this activity among others. When it comes to managing or eliminating hazardous germs in medical, industrial, agricultural, and household settings, many medications, disinfectants, and other products rely on antimicrobial activity.

- **Testing Plant Extracts for Antimicrobial Activity**

A number of different bacteria were used in the research project, including *S. aureus*, *E. coli*, *P. aeruginosa*, *B. subtilis*. Similarly for antifungal activity the fungal strains used were *Candida albicans* and *Aspergillus niger*. Aside from that, the strains of *E. coli* ATCC 25922 and *S. aureus* ATCC 25923 that corresponded to each other were also used. Conventional techniques of morphological, physiological, and biochemical analysis were used in order to carry out study on the bacteria that were selected for the goal of performing the research. The fungi were found to be differentiated from one another by their distinct microscopic and morphological characteristics, as well as by their capacity to flourish in settings that were favourable to their development. This was the conclusion reached by the researchers. Utilising the modified Kirby Bauer disc diffusion method, which has been sanctioned by the CLSI, the goal of this investigation was to ascertain whether or not each bacterial isolate could be treated with antibiotics. It is referred to as "multidrug-resistant" (MDR) when it is discovered that a particular strain of bacteria is resistant to several medications.

Results :

Statistical analysis

The experimental data were represented as the mean plus or minus the standard error of the mean. It was determined via statistical comparison that an independent sample t-test was carried out. A p value was thought to be an indication of statistical significance based on the findings.

- **Antioxidant activity of *Ruellia simplex***

Scavenging of free radicals using the DPPH assay

There is a stable free radical known as the DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical, which has been generally acknowledged as a tool for evaluating the free radical-scavenging effects of antioxidants. An illustration of the percentages of DPPH, or that are still present in the presence on the ME and its percentages at various concentrations is shown below. It was discovered that the proportions of DPPH that remained with the ME and WtF reduced marginally, whereas the proportions of DPPH that remained in EaF and WtF fell significantly in a concentration-dependent way.

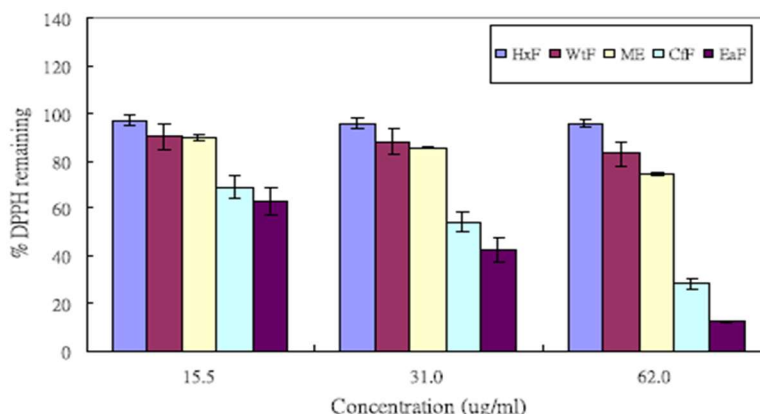


Fig1: the amount of DPPH that was left over after the ethanolic extract (ME) of *Ruellia simplex* and its fractions were added for a period of thirty minutes. The data is given in the form of means plus the standard deviation (nP 3).

• Antimicrobial activity of *Ruellia simplex*

Following the manufacturer's directions, Sabar Dextrose Agar (Hi-media) for fungus and Muller Hinton Agar (Hi media) for bacteria were made. Beef, casein acid hydrolysate, starch, and agar make up Muller Hinton Agar (MHA), which has a pH of 7.4 ± 0.2 . Researchers weighed 38 grams of MHA and dissolved it in 1000 milliliters of purified water. The culture of fungi, especially the pathogenic fungi linked to skin illnesses, was carried out using Sabouraud Dextrose Agar (SDA). Peptone (10 g), dextrose (40 g), and agar (15 g) are included, with a pH of 5.6 ± 0.2 . 65 grams of SDA were dissolved in 1000 milliliters of purified water. Autoclaving the medium at 121 °C for 15 minutes at 15 psi sterile it for use in the experiments. Aseptically, 15 ml of sterile petridishes were filled with sterile molten cold (45 °C) agar, and the plates were let to harden at room temperature under sterile conditions. Once the plates were dried and gelled, the correct microorganisms were added by either uniformly streaking a sterile cotton swab over the medium's surface or pouring the proper microbe onto a dry agar plate that was in peptone broth. To ensure that the culture was evenly distributed around the plate, great care was taken. After 5 minutes, the inoculums were given permission to dry. A hot air oven was used to sterilize the 6 mm diameter discs made from Whatmann filter paper No. 1 at 160 °C for 1 hour. The following substances were added to the discs: DMSO, Amikacin, Gatioxacin, Ciprooxacin, and Amphitrosine. Then, the discs were utilized as a standard. There were 5 µg of the relevant standards on each disk. The agar was covered with sterile Whattman No. 1 filter paper containing 100 mg/ml. Using stemmed forceps, the paper was gently pushed down to make sure it was in touch with the diluted extract. In the middle, one suitable control dry disc was also inserted. The next step was to incubate the plates at a temperature below 37 °C for 24 hours so that the medications might be perfused. A measuring scale was used the next day to measure the inhibition zones. For their confirmation, this experiment was performed three times. The findings were interpreted based on whether the zone of inhibition was present or not. Researchers measured the minimum inhibitory concentration (MIC) of each extract that inhibited the organisms. The smallest inhibitory zone was achieved by repeatedly performing this experimental technique with various dilutions of consecutive extracts.

The whole plant was extracted using n-hexane, chloroform, ethyl acetate, and alcohol in a sequential fashion, and the disc diffusion technique was used to separate the aqueous extract, as shown, for the preliminary

antimicrobial test of *Ruellia simplex*. *Escherichia coli* do not exhibit a typical zone of least inhibition for any of the extracts, as shown. Evidence suggests that, regardless of concentration, none of the extracts impede the development of *Escherichia coli*. Hexane does not exhibit a typical zone of least inhibition for *Pseudomonas aeruginosa* at any dose, in contrast to chloroform, ethyl acetate, and alcohol extracts, which all had zones of 1.0 cm at 50 µl, 200 µl, and 100 µl, respectively.

Table 1. Preliminary antimicrobial test for different solvent extracts of *Ruellia Simplex* whole plant

Name of the Micro organism	H	C	E	M	A	Con
Gram positive bacteria						
<i>Escherichia coli</i> ATCC – 73	–	–	–	–	–	Ak
<i>Pseudomonas aeruginosa</i> ATCC – 25583	–	+	+	+	–	Ak
<i>Klebsiella pneumoniae</i> ATCC – 700693	–	+	+	+	+	Ak
<i>Shigella sonnei</i> ATCC – 29508	+	+	+	+	+	Gt
<i>Protease</i> ATCC -9484	–	+	+	–	–	Cf
Gram negative bacteria						
<i>Salmonella</i> ATCC -10749	–	+	–	–	–	Ak
<i>Staphylococcus spp</i> ATCC – 25923	–	+	+	+	–	Ak
<i>Serratia</i> ATCC -14460	–	+	+	+	+	Gt
<i>Bacillus spp</i> ATCC – 6633	+	+	+	+	+	Gt
Fungus						
<i>Saccharomyces cerevisiae</i>	–	–	–	–	+	A
<i>Aspergillus niger</i> ATCC – 2587	–	–	–	–	–	A
<i>Aspergillus fumigatus</i> MTCC – 2551	–	–	–	–	–	A
<i>Aspergillus flavus</i> MTCC – 1884	–	–	–	–	–	A
<i>Candida albicans</i>	–	–	–	–	–	A
<i>Candida tropicalis</i>	–	–	–	–	–	A

H: n-Hexane, C: Chloroform, E: Ethyl acetate, M: Alcohol, A: Aqueous, Con: Control Ak = Amikacin, Gt = Gentamicin, Cf = Ciprofloxacin, A = Amphotericin, (+) = Positive results, (–) = Negative results.

Discussion:

In the discussion of this study on the antioxidant and antimicrobial activities of the whole plant of *Ruellia simplex*, several key points emerge. Firstly, the observed antioxidant properties indicate the presence of bioactive compounds that could help mitigate oxidative stress-related diseases. Secondly, the antimicrobial activity suggests the potential of *Ruellia simplex* as a natural agent against various pathogens, highlighting its possible application in pharmaceuticals or as a natural antimicrobial. Additionally, the study underscores the importance of exploring medicinal plants like *Ruellia simplex* for their therapeutic potential and further research into their bioactive properties for potential medicinal applications.

Conclusion:

In conclusion, the analysis of the antioxidant and antimicrobial activities of the whole plant of *Ruellia simplex* demonstrates promising results. The study reveals significant antioxidant properties, indicating its potential in combating oxidative stress-related disorders. Additionally, the plant exhibits antimicrobial activity against various pathogens, suggesting its possible use in pharmaceuticals or natural antimicrobial agents. These findings contribute to the growing body of research on the therapeutic potential of medicinal plants like *Ruellia simplex* and underscore the importance of further investigation into their bioactive properties for potential medicinal applications.

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