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Phytochemical antimicrobial and proximate analysis of the leaves of *Mirabilis jalapa* from Uvwie Delta state, Nigeria

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Abstract
The leave extracts of *Mirabilis jalapa* collected from Uvwie local government were subjected to phytochemical screening, result show that the plant under study contains saponin, flavonoids, alkaloids, terpenoids, resins and phenols. Proximate analysis was carried out to determine ash content, crude protein, crude fibre, moisture content, lipid and nitrogen free extract. The result revealed the presence of high moisture content of 30% and a low Lipid content of 3%. The rest were obtained as follow; ash content 20%, protein content 12.8%, fibre content 8.22% and nitrogen 25.98%. Antimicrobial activity of *Mirabilis jalapa* leaf was tested on bacterial isolates from the standard laboratory. Bacterial isolates include *Bacillus* species, *Pseudomonas*, *Micrococcus* and *E. coli*. Five different concentrations (0.1, 0.2, 0.05, 0.025 and 0.012 (mg/ml)) of both the extracting solvents and the extracts were tested on the isolates. The results revealed that Mirabilis Jalapa is a strong antibiotic against *E. coli*, *Bacillus* and *Pseudomonas* but weak against *Micrococcus*.

Keywords: *Mirabilis jalapa*, antimicrobial activity, proximate analysis

1. Introduction
The need for sustainable development has made the search for industrial raw material from renewable plants. Antimicrobials is at the center of this search due to the fact that many useful drugs are derived from them. Conversely, because information on the use of plant species for therapeutic purpose has been passed from one generation to the nest through oral tradition, this knowledge of therapeutic plants has started to decline and become obsolete through the lack of recognition by younger generations as a result a shift in attitude and ongoing socio-economic change [1]. Furthermore, the indigenous knowledge on the use of lesser-known medicinal plants is also rapidly declining. Continuous erosion in the traditional knowledge of many valuable plants for medicine in the need existed to review the valuable plants for medicine in the past and the renewal interest currently. The need existed to review the valuable knowledge with the expectation of developing the medicinal plants sector [2]. The extraction and development of drugs from plants as well as from traditionally used herbal remedies leads to the increasing dependence on the use of medicinal plants. The medicinal properties of plants could be based on the antioxidant, antimicrobial, antipyretic effects of the phytochemicals in them [3]. Medicinal plant produces bioactive compounds used mainly for medicinal purposes. These compounds either act on different systems of animals including man, and/or act through interfering in the metabolism of microbes infecting them. The microbes may be pathogenic or symbiotic. In either way the bioactive compounds from medicinal plants plays a determining role in regulating host-microbe interaction in favor of the host. In herbal medicine, parts of the plant may be used as a purgative, diuretic and for wound healing purposes [4]. The leaves are used to reduce inflammation. The root is considered a diuretic as well as an aphrodisiac and purgative. It is used in the treatment of dropsy. A paste of the root is applied as a poultice to treat muscular swellings and scabies. The juice of the root is used in the treatment of diarrhea, fever, and indigestion. Within its natural range in South America, the root of the *Mirabilis jalapa* used medicinally and as a hallucinogen [5]. The flowers are used for making pigments. The flowers actually have no petals – what looks like the corolla is, in fact, the calyx [6].
The discovery, development and use of antibacterial during the 20th century have reduced mortality from bacterial infections. In parallel there has been an alarming increase in antimicrobial resistance of bacteria, fungi, parasites and some viruses to multiple existing agents [7].

2. Material and Methods

2.1 Collection and Identification of plant materials

Fresh leaves of *Mirabilis Jalapa* were collected from Ejeba, a village in Uvwie local government of Delta state, Nigeria. The plant was identified as *Mirabilis Jalapa* (Family=Nyctasinaceeae) in the department of Biological Sciences, University of Nigeria Nsukka, Enugu State.

2.2 Preparation of the plant extract

The leaves were washed under a running water to remove dust and air dried in an open environment; the dried leaves were blended to powder to increase the surface area for extraction and store in polythene bag.

2.3 Method of extraction

Soxhlet extracting method was used in the extraction; here, plant material is placed in a thimble-holder and filled with condensed fresh solvent from a distillation flask. "When the liquid reaches the overflow level, a siphon aspirates the solution of the thimble-holder and unloads it back into the distillation flask, carrying extracted solutes into the bulk liquid. In the solvent flask, solute is separated from the solvent using distillation. Solute is left in the flask and fresh solvent passes back into the plant solid bed. The operation is repeated until complete extraction is achieved. The powdered leaves were extracted with the appropriate volume of solvent at 80 °C for 8h.The extracting solvent used was n-hexane, ethyl acetate and methanol. The solvents were letter separated from the extract with the aid of rotary evaporator at 40 ^{0}C

2.4 Phytochemical screening

The extracts were analyzed for the presence of Phenolic compounds, Flavonoids, Alkaloids, Cardiac glycosides, Tanins, Terpenoids, Saponins, and Resins based on existing procedures [8].

- **Test for saponins (Froth Test):**0.2g of each extracts was diluted with distilled water and made up to 20ml. The suspention was shaken in a graduated cylinder for 15mins. The development of two layer foam indicates the presence of Saponins.
- **Test for flavonoids (Alkaline Reagent Test):** Few drops of sodium hydroxide were added into the extracts to give intense yellow color. The disappearance of color after addition of dilute hydrochloric acid shows the presence of flavonoids.
- **Test for alkaloids (Wagner's Test):** 0.2g of each extract was stirred with few ml of dilute hydrochloric acid and filtered. Then few drops of Wagners reagent were added to it. The formation of reddish-brown precipitate shows the presence of alkaloids.
- **Test for terpeniods (Salkowski'sTest**): 0.2g of the extracts was added with few ml of chloroform followed by concentrated sulphuric acid to form a layer. Reddish brown color at the interface indicates the presence of terpeniods.
- **Test for cardiac glycosides (Keller-Kilian's Test):** A small amount of extract was treated with 2ml of glacial acetic acid containing one drop of 5%ferric chloride. Followed by addition of 1ml of concentrated sulphuric acid. A brown ring at the interface is characteristic of Cardinolideoxy sugar. Appearance of the violet ring in acetic acid layer indicated the presence of cardiac glycosides.
- **Ferric chloride test:** Each extract were dissolved in 5ml of distilled water and few drops of 5% ferric chloride were added, Bluish black colour indicates the presence of phenolic compounds.
- **Test for resins:** Three milliliters of copper acetate solution was added to 3ml of the methanolic extract. The solution was agitated vigorously and allowed to separate. A green coloured solution is an evidence of the resin.
- **Test for tannins:** 0.2g of the extracts were stirred with distilled water and filtered. A deep green precipitate is an evidence of tannins.

2.5 Proximate analysis

Proximate analysis is a partitioning of compounds in a feed into six categories based on the chemical properties of the compounds. Proximate analysis is not a nutrient analysis, rather it is a partitioning of both nutrients and non-nutrients into categories based on common chemical properties [9].

Thus, the consecutive steps of the proximate analysis are the determination of:

- Moisture
- Ash
- Crude protein
- Crude lipid
- Crude fibre
- Nitrogen-free extracts (digestible carbohydrates)

2.5.1 Moisture content determination of leaf sample

1g of the sample (leaf) was weighed and dried in the oven for 2 hours. The weight of the crucible was taken and then added to the weight of the leaf sample. After drying the sample in the oven for 2 hours at a temperature of 105^{o}C the samples were allowed to cool by placing them in the desiccators for 10 minutes. The dried sample plus the crucibles were then weighed and placed in the oven for another 30 minutes at the same temperature. The samples were recovered from the oven, allowed to cool and then weighed again with the crucible.

2.5.2 Ash content determination

Dried samples of leaf were ashed in the muffle furnace at a temperature of 500^{o}C for 3 hours and then allowed to cool in the desiccators before taking the weight with the weighing balance.

2.5.3 Lipids content determination

5g of the sample were weighed and placed in a filter paper and then put in a beaker containing a mixture of 5ml hexane, 2.5ml acetone and 2.5ml chloroform. The mixture was agitated for 30mins using the orbital shaker.

After 30mins, the mixture was decanted into a clean flask and another mixture of 5ml chloroform, 5ml acetone and 2.5ml hexane was put in the beaker and then the mixture was agitated again for 30mins in order to extract the oil. After 30 minutes of agitation, the mixture was decanted into the previous flask. Another mixture of 5ml acetone and 2.5ml hexane was put in the beaker and allowed to dry or evaporated by putting it in the beaker and placed in the water bath for 30 minutes.

After the evaporation of the mixture, the sample was then put in the oven to dry for 10 minutes at a temperature of 105^{o}C.

2.5.4 Crude fibre determination

5g of the organic residue left after sequential extraction of powdered leaf samples with diethyl ether was used to determine the crude fibre. The fat-free material was transferred into a beaker and 200 ml of pre-heated 1.25%

H_2SO_4 was added and the solution was gently boiled for about 30 mints, constant volume of acid was maintained by the addition of hot water. The Buckner flask funnel fitted with Whatman filter was pre-heated by pouring hot water into the funnel. The boiled acid sample mixture was then filtered hot through the funnel under sufficient suction. The residue was then washed several times with boiling water (until the residue was neutral to litmus paper) and transferred back into the beaker. Then 200mL of pre-heated 1.25% NaOH was added and boiled for another 30 minutes. Filter under suction and wash thoroughly with hot water and twice with ethanol. The residue was dried at 105 ^{0}C for about 4 hrs and weighed. The residue was transferred into a crucible and placed in muffle furnace (400-600 ^{0}C) and ash for 2hrs, then cooled in a desiccator and weighed.

2.5.5 Determination of protein content

2.5.5.1 First step (Digestion): Digest 1g of the sample using 10ml of $HClO_4$ (per-chloric acid)

2.5.5.2 Second step (Distillation): 10ml of the digest, 40ml distilled water and 50ml of 40% NaOH was put into a 500ml flask stoppered very well with condenser and connected to 250ml conical flask. 50ml of 40% boric acid was put into the 250ml conical flask. The collecting flask was placed under distillation unit so that the tip of the condenser dips into the bottom of the flask.

2.5.5.3 Third step (Titration) 0.1m HCl was titrated against the distillate after adding 1 drop of methyl red. Two more distillate was titrated, recorded and further calculated to obtain the average titre.

2.6 Anti-microbial analysis

2.6.1 Test organism

The test organisms were carefully selected microorganisms including a number of Gram-positive, Gram-negative to be of clinical and public Health importance. These test organisms include: *Escherichia coli*, *Micrococcus*, *Pseodomonas*, and *Bacillus*. All these test organisms were obtained as pure isolates on agar slant and were aseptically subcultured into nutrient agar and incubated for 6-8 hours to ensure that the organisms were at their exponential phase of growth before carrying out the sensitivity analysis based on standard procedures [10].

2.6.2 Isolation of pure cultures

Subculture: Microorganisms are like any other organism. They eat, they breathe, they reproduce and they excrete. Providing an environment for them to perform all those activities is sub culturing them.

Some growth media are liquid, others are semisolid gel. Liquid growth media are called broths, and gel-like media are called agars. The specific formulation of broths and agars can be adjusted to support general microbial growth or to optimize growth of a particular organism. Individual bacterial colonies were selected from any of the plates. Only colonies that are well-separated from neighboring colonies and look morphologically distinct from each other were selected. The loop was sterilized by flaming it. The Petri dish of interest was quickly opened and a small amount of a colony of interest was picked. Taking a fresh nutrient agar plate, a streak that crosses the initial streak of few centimeters long on one side was made. This process was repeated twice in the same manner. This streaking "dilution" results in cells on the loop being separated from one another. The plates were placed to incubate at room temperature for 24 hours. The pure colonies were inoculated into agar slants and taking for biochemical test and identification.

2.6.3 Sensitivity test

A broth solution of 1g nutrient agar to 300 ml of distilled water was prepared and dispensed into sterile test tubes, 10ml each and then autoclaved for 16minutes.The isolates were then inoculated into the test tubes containing the broth solution and incubated for 24hours.After 24hours of incubation, the turbidity of the broth solution increased indicating a growth.0.1ml of the broth solution was then taken with the aid of a syringe and dispensed into sterile petri dishes containing nutrient agar. A spreader was used to spread the isolate in the petri dish. Sensitivity disc were placed in the petri dishes with respect to the Gram of the organism: Gram-positive organisms to Gram-positive disc {Tissue level} and Gram-negative disc to Gram-negative disc {Urine level} and incubated for 24hours.After 24hours of incubation, the zones of inhibition were measured to check the susceptibility.

2.6.4 McFarland standard

In microbiology, McFarland standards are used as a reference to adjust the turbidity of bacterial suspensions so that the number of bacteria will be within a given range to standardize microbial testing. An example of such testing is antibiotic susceptibility testing by measurement of minimum inhibitory concentration which is routinely used in medical microbiology and research. If a suspension used is too heavy or too dilute, an erroneous result (either falsely resistant or falsely susceptible) for any given antimicrobial agent could occur.

Original McFarland standards were made by mixing specified amounts of barium chloride and sulfuric acid together. Mixing the two compounds forms a barium sulfate precipitate, which causes turbidity in the solution. A 0.5 McFarland standard is prepared by mixing 0.05 mL of 1.175% barium chloride dihydrate ($BaCl_2$•$2H_2O$), with 9.95 mL of 1% sulfuric acid (H_2SO_4). The McFarland standards prepared from suspensions of latex particles, which lengthens the shelf life and stability of the suspensions. The standard can be compared visually to a suspension of bacteria in sterile saline or nutrient broth. If the bacterial suspension is too turbid, it can be diluted with more diluent. If the suspension is not turbid enough, more bacteria can be added.

Table 1: McFarland Nephelometer standards

McFarland standard	0.5	1	2	3	4
1% Barium chloride (ml)	0.05	0.1	0.2	0.3	0.4
1% sulfuric acid (ml)	9.95	9.9	9.8	9.7	9.6
Approximate cell density	1.5	3.0	6.0	9.0	12.0
Transmittance%	74.3	55.6	35.6	26.4	21.5
Absorbance	0.08 to 0.1	0.257	0.451	0.582	0.669

2.6.5 Standardization of bacterial isolates

McFarland standard was used as a reference to adjust the turbidity of bacterial suspensions. This was done by sub-culturing isolated colonies from a pure culture plates into peptone water and was incubated at 37°C for 24hours. Turbidity of the growth was adjusted by dilution with sterile distilled water until equal the turbidity of a 0.5% McFarland's standard. A 0.5% McFarland standard is prepared by mixing 0.05ml of 1.175% barium chloride dehydrate ($BaCl_2H_20$), with 9.95ml of 1% sulfuric acid (H_2SO). Approximate cell density of 0.5% McFarland standard is $1.5x10^8$/ml.

2.6.6 Sensitivity disc

Antibiotic sensitivity discs were prepared from tablets of erythromycin, chloramphenicol, ampicillin, tarivid, gentamycin and ampiclox. Susceptibility of some environmental isolates which included *Escherichia Coli, Pseudomonas, Bacillus, and Micrococcus* were investigated. The susceptibility of the test organism to various antibiotics was determined by the standard disk diffusion technique on agar plates. This was done by placing the antibiotics discs on the prepared MH agar plate that were spread with the test isolates (12-18hours of the test isolates that were diluted to a 0.5% McFarland standard), incubated at 37 °C for 16-18hours. Isolates with zones of inhibition less than or equal to 12mm were regarded as resistant.

2.7 Antibiotics used in the analysis

Table 2: Gram-positive (Tissue Level)

Abbreviations	Antibiotics	Quantity
CPX	Ciprofloxacin	10mcg
NB	Norfloxacin	10mcg
GN	Gentamycin	10mcg
AML	Amoxil	20mcg
S	Streptomycin	30mcg
RD	Rifampicin	20mcg
E	Erythromycin	30mcg
CH	Chloramphenicol	30mcg
APX	Ampiclox	20mcg
LEV	Levofloxacin	20mcg

Table 3: Gram-negative (Urine Level)

Abbreviations	Antibiotics	Quantity
OFX	Tarivid	10mcg
PEF	Reflacine	10mcg
CPX	Ciproflox	10mcg
AU	Aug Mentin	30mcy
CN	Gentamycin	10mcg
S	Streptomycin	30mcg
CEP	Ceporex	10mcg
NA	Nalidixic Acid	30mcg
SXT	Septrin	30mcg
PN	Amplicin	30mcg

3. Result and Discussion

3.1 Percentage (%) yield of M*irabilis jalapa*

Table 4: Colour, appearance, and% yield of different extracts

Different solvent	Colour	Appearance	%Yield
N-hexane	Pale brown	oily	6.051
Ethyl acetate	Brown	Dry	6.03
Methanol	Green	Sticky	20.02

Yield=weight of crucible +weight of extract –weight of crucible
N-hexane yield =45.92 -39.869
%Yield =6.051%
Ethyl acetate = 45.1-39.07
%Yield =6.03%
Methanol =60.04-40.02
%Yield = 20.02%

Table 5: Phytochemical Screening of the extracts

Phytochemicals	N-hexane	Ethyl acetate	Methanol
Saponin	+	-	+
Flavonoids	-	-	+
Alkaloids	+	+	+
Terpnoids	-	-	-
Glycosides	-	-	-
Tannins	-	-	-
Steroids	-	-	-
Resins	-	+	+
Phenols	+	+	+

Key: + =present; - = absent

3.2 Proximate analysis of the extract

Table 6: Moisture content

Weight of crucible (g)	Weight of sample + crucible before drying(g)	Weight of sample +crucible after drying for 2 hours (g)	Weight of sample +crucible after drying for 30minuts(g)	Weight loss(g)	% moisture
15.50	16.50	16.31	16.20	0.3	30

$$\% \text{ Moisture content} = \frac{\text{Weight loss}}{\text{Weight of sample}} \times \frac{100}{1}$$

$$\% \text{ Moisture content} = \frac{0.3}{1} \times \frac{100}{1} = 30\%$$

Table 7: Ash content

Weight of crucible	Weight of sample + crucible before ashing (g)	Weight of sample + crucible after ashing (g)	Weight of Ashed sample (g)	% ash
15.5	16.5	16.3	0.2	20

$$\text{Titre value for cake sample} = \frac{35.50+35.32+35.00}{3} = 35.27$$

$$\% \text{ Nitrogen (wet)} = \frac{(A-B)\times 1.4007 \times 100}{\text{Weight of sample}}$$

Table 8: Protein content

Burette reading	First reading	Second reading	Third reading
Final reading	35.50	35.32	35.00
Initial reading	0.00	0.00	0.00
Total	35.50	35.32	35.00

$$\text{Titre value for cake sample} = \frac{35.50+35.32+35.00}{3} = 35.27$$

$$\%\ \text{Nitrogen (wet)} = \frac{(A-B)\times 1.4007 \times 100}{\text{Weight of sample}}$$

Where A = Volume (ml) standard of HCl × normality of standard HCl
B = Volume (ml) of standard NaOH× normality of standard NaOH
A = 35.27 × 0.1
A =3.527
B = 25.00 × 0.1
B = 2.5

$$\%\ \text{Nitrogen (wet)} = \frac{(2.527 - 2.5) \times 1.4007 \times 100}{1}$$

$$\%\ \text{Nitrogen (wet)} = \frac{1.02 \times 1.4007 \times 100}{1}$$

% Nitrogen (wet) =143.826

$$\%\,\text{Nitrogen (dry)} = \frac{\%\,\text{Nitrogen (wet)}}{100 - \%\ \text{moisture}}$$

$$\%\,\text{Nitrogen (dry)} = \frac{143.826}{100-30}$$

% Nitrogen (dry) = 2.05
% Protein = % Nitrogen (dry) × 6.25 (protein Nitrogen conversion factor)s
% Protein = 2.05× 6.25
% Protein = 12.8

Table 9: Lipid content

Weight of Filter paper (g)	Weight of sample (g)	Weight of sample +filter paper before agitating (g)	Weight of sample + filter paper after extraction (g)	Weight loss (g)	% Lipid
1.23	5	6.23	6.20	0.03	3

$$\%\ \text{Lipid} = \frac{\text{weight loss}}{\text{weight of sample}}$$

$$\%\ \text{Lipid} = \frac{0.03}{1} \times \frac{100}{1}$$

% Lipid == 3

Table 10: Fibre content

Weight of sample(g)	Weight of residue before ashing (g)	Weight of residue after ashing (g)	% crude fibre
5	3.411	3.00	8.22

$$\%\ \text{Fibre} = \frac{\text{weight of residue before ashing} - \text{weight of residue after ashing} \times 100}{\text{weight of sample}}$$

$$\%\ \text{Fibre} = \frac{3.411 - 3.00}{5} \times \frac{100}{1}$$

% Fibre = 8.22

% NFE = 100-(% moisture +% CF +% CP +% Lipid +% Ash)
NFE represents soluble carbohydrates in the seed of each sample
% NFE =100-(20+30+12.8+3+8.22)
% NFE=100-(74)
% NFE=100-74.02
% NFE=25.98
Key=NFE= Nitrogen free extract, CF=Crude Fibre, CP=Crude Protein,

Table 11: Characteristics of isolates

Identified isolates	Macroscopic characteristics	Microscopic characteristics
Micrococcus	Yellowish small and smooth opaque colonies	Gram-positive Cocci
Pseudomonas	Small, creamy, flat and opaque colonies	Gram-negative Rod
Escherichia Coli	Shiny, slightly raised colonies	Gram-negative Rod
Bacillus	White, slimy irregular convex colonies	Gram-positive Rod

3.3 Antibiotics susceptibility test results

Table 12: Average zones of inhibition (gram-positive)

Organisms (+ve)	Antibiotics									
	Ciprofloxacin CPX Mm	Norfloxacin NB mm	Gentamycin CN mm	Amoxil AMX mm	Streptomycin S mm	Rifampicin RD mm	Erythromycin E mm	Chloramphenicol CH mm	Ampiclox APX mm	Levofloxacin LEV Mm
Micrococcus Sp.	19	19	19.5	19	19	18	19	18	19	18.5
Bacillus Sp.	18.5	6	14.5	5	9.5	13	18.5	18	6	17

The isolates were inoculated into the broth solution in duplicates (precision), the zone of inhibition of the isolates and its duplicate were calculated, after which the average was taken.

Table 13: Average zones of inhibition (gram-negative)

Organisms {-ve}	Antibiotics									
	Tarivid OFX mm	Reflacine PEF mm	Ciproflox CPX mm	Aug-Mentin AU mm	Gentamycin CN mm	Streptomycin S mm	Ceporex CEP mm	Nalidixic Acid NA mm	Septrin SXT mm	Amplicin PN mm
Pseudomonas Sp.	19	19	19	19	20	17	20	20	19	16.5
Escherichia Coli. Sp.	19	19	19	19	19	19	20	19	19	19

The diameters of the zones of inhibition for each antibiotic were measured in Millimetres (mm) to check the antibiotic susceptibility of the isolates, (*Pseudomonas*, *Micrococcus*, *Bacillus*, *Escherichia Coli*). Isolates with zone of inhibition less than or equal to 12mm (≤ 12mm) were regarded as Resistant to the respective antibiotic, while those greater than 12mm (> 12mm) were declared Susceptible to the respective antibiotic.

3.4 Average zone of inhibition for different plant extract and concentration

Table 14: Inhibition zone of the antibiotic on *Pseudomonas*

Concentration(mg/ml)	Methanol(mm)	Ethyl acetate(mm)	n-Hexane(mm)
0.1	13	8.5	7
0.2	13.5	12	12
0.05	8.5	9.5	6
0.0125	11	8	6
0.025	11	9	6

Table 15: Inhibition zone of the antibiotic on *Bacillus*

Concentration (mg/ml)	Methanol (mm)	Ethyl acetate(mm)	n – Hexane (mm)
0.1	13	9	7
0.2	7	7	7
0.05	14.5	7.5	7
0.0125	8.5	11.5	7
0.025	8	7.5	7

Table 16: Inhibition zone of the antibiotic on *Micrococcus*

Concentration (mg/ml)	Methanol (mm)	Ethyl acetate (mm)	n- Hexane (mm)
0.1	7	8.5	8
0.2	8.5	7	8.5
0.05	7	8.5	7
0.0125	8.5	6	7
0.025	6	8	9

Table 17: Inhibition zone of the antibiotic on *E. coli*

Concentration (mg/ml)	Methanol (mm)	Ethyl acetate (mm)	n-Hexane (mm)
0.1	15	9	7
0.2	16	8.5	7
0.05	12	9	7
0.0125	9	10	7
0.025	9	11	7

4. Discussion

The percentage yield of n-hexane extracts of *Mirabilis jalapa* was found to be 6.051%, that of the Ethyl Acetate gotten was 6.03% and Methanol was 20.02% (Table 4). The percentage yield of the extracts was generally high owing to the high moisture contents; Methanol has the highest percentage yield due to its polarity. The phytochemical screening of the n-

hexane extract of *Mirabilis jalapa* shows the present of Saponin, Flavoniods, Terpnoids and, Phenols. The Ethyl Acetate shows the present of Saponin, Terpnoids, and Phenols. And that of Methanol shows the present of Saponin, Flavonoids, Alkaloids, Terpnoids, Resins and Phenols, (Table 5). The proximate composition of *Mirabilis jalapa* (Table 6 - 10) shows the protein content to be 12.8%. The protein contents reported in literature [11] for *C. Millenii* (9.19%) fall within the same range with our finding. The deviation in values may result from the difference in location of plant collection. The crude fiber was found to be 8.22% which also fall within the range as reported in literature [12]. The fiber contents of selected medicinal plant (2.69-12.66%). The moisture contents of the *Mirabilis jalapa* was found to be 30% and also highest compared to the other compositions. The Ash contents were found to be 20%. The Lipid content was found to be 3% and also the lowest. The total soluble Nitrogen was also determined to be 25.98% by the difference of the sum of all the composition from 100%. The result gotten from the analysis shows that the leaves of *M. jalapa* contains high moisture content which corresponds to the high extracts especially that of methanol followed by Ash content which contains all the inorganic acids needed by the body, followed by protein which is helpful in the proper growth and development in adults, the Nitrogen content, Fiber content which help in the digestion and elimination of wastes, and can also lower the risk of heart disease, hypertention, constipation and breast cancer and finally the lipid. The antimicrobial activity of *M. jalapa* corresponds to its use in the traditional medicine. The extracts were tested investigated against the selected clinical pathogens such as *Pseudomonas, Bacillus, E. coli*, and *Micrococcus* by agar well diffusion method. The *M. jalapa* extract of both methanol, ethyl acetate, and n-Hexane shows strong antimicrobial activity at concentration 0.2mg/ml against *Pseudomonas* with zone of inhibition of 13.5, 12 and 12 (mm) respectively and methanol at concentration of 0.1mg/ml with zone of inhibition 13mm.The methanol extract of *M. jalapa* of concentration 0.1, and 0.05 (mg/ml) with zone of inhibition 13, and 14.5 (mm) respectively shows strong antimicrobial activity against *Bacillus*. The 0.1, 0.2 and 0.05(mg/ml) concentration of the methanol extracts with zone of inhibition 15, 16 and 12 (mm) respectively shows antimicrobial activity against *E. coli*. The three extracts and their concentration has zone of inhibition less than 12mm on *Micrococcus* which makes them to be weak antibiotic on the bacterial.

5. Conclusion

The chemical compositions of *M. jalapa* through the phytochemical screening of the leave extract gotten from Delta state have the same constituents with *M. jalapa* of other regions, the proximate analysis also show the same thing with the *M. jalapa* of other regions but with a little deviation which could be as a result of change in climate. Plant extracts have great potential as antimicrobial compound against microorganisms. The antimicrobial activity of the leaves of *Mirabilis jalapa* against *E. coli*, *Pseudomonas*, and Bacillus justifies the use of it as medicine. Thus, they can be used in the treatment of infectious diseases caused by resistant microbes.

6. Recommendation

The evaluation of plants used in traditional medicine is necessary. In this investigation, a number of *M. Jalapa* extracts exhibited promising activity against a variety of bacteria. It is therefore recommended that:

1. The most active extracts of these plants leaves should be subjected to isolation and structural elucidation to know the actual compounds of therapeutic value.
2. The potential useful phytochemical structures present in these plants leaves should be synthesized chemically.

7. Acknowledgement

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8. Competing Interest

The authors declare that there are no competing interests concerning this research work.

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