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PROXIMATE COMPOSITION, PRELIMINARY PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL ACTIVITY OF *DATURA STRAMONIUM* L. LEAVES EXTRACT

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ABSTRACT

Datura stramonium is used in the traditional medicine for a wide range of ailments. The aim of this work was to evaluate the proximate composition of *D. stramonium* leaves, to extract the leaves powder using solvents, petroleum ether, methanol and water and to identify the active constituent(s), and also to evaluate the Antimicrobial activity of these extracts. The Yield% of the leaves extracts using petroleum ether was 7.04%, methanol 7.78% and water was 19.05%. The proximate composition of plant leaves was assessed using the method described by the association of official analytical chemists and revealed 3.55% as moisture content, 15% ash and 84.45% for organic matter. The *in vitro* antimicrobial activity of 10 and 50% concentrations of petroleum ether, methanol and water extracts of *D. stramonium* against bacterial organism; Gram positive (*Staphylococcus aureus*) and Gram negative (*Escherichia coli*, *Pseudomonas aeruginosa*) and the fungus *Candida albicans* was carried out using the agar- well diffusion method. It was showon that the extracts have variable bactericidal activity. *E.coli* and *Candida albican* were the most sensitive organisms to different concentrations of extracts. The result also showed that the plant extracts contain: alkaloids, flavonoid, reducing compound, glycosides, saponins, and triterpens, but all were devoid of tannins. Thin Layer Chromatograpic technique (TLC) was used to separate active compounds of the leaves. The Gas chromatography-mass spectroscopy (GC/MS) analysis detected the presence of Scopolamine, Pyrazine, 1-Propanamine, Butanomic acid, Imidazole, Ascorbic acid and other types of constituents.

KEY WARDS: *Datura stramonium*, antimicrobial activity, proximate composition, TLC, GC-MS techniques.

INTRODUCTION

Plant materials remain an important resource to combat serious diseases in the world. The traditional medicinal method especially the use of medicinal plants still play a vital role that covers the basic health needs in the developing countries. Medicinal plants have been used for centuries as remedies for human diseases because they contain chemical components of therapeutic value (Nostro *et al.*, 2000). According to the World Health Organization (WHO) in 2008, more than 80% of the world's population relies on traditional medicine for their primary healthcare needs (Pierangeli, 2009). The medicinal value of these plants lies in some chemical active substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannin, flavonoids and phenolic compounds (Edeogal *et al*,2005). Within the recent years, infections have increased to a great extent and antibiotics resistance effects become an ever-increasing therapeutic problem *(*Mahesh, *et al*, 2008). Natural products of higher plants may possess a new source of antimicrobial agents with possibly novel mechanisms of action (Ahmad, 2007, Barbour, *et al*, 2004). They are effective in the treatment of infectious diseases while simultaneously mitigating many of action of the side effects that are often associated with synthetic antimicrobials (Iwu *et al*., 1999).

Medicinal plants have become the focus of intense study in terms of validation of their traditional uses through the determination of their actual pharmacological effects. Synthetic drugs are not only expensive and inadequate for the treatment of diseases, but also often with adulterations and side effects. Therefore, there is need to search new infection fighting strategies to control microbial infections (Bhaskarwar, 2008). Number of studies has been conducted in different countries to prove such efficiencies (Salihu and Garba, 2008).

Datura stramonium (Family: Solanaceae, locally known as Elsakran), is an annual herb, widely spread in Sudan (Khalid *et al.*, 2012) and it grows, as well, in Europe, Asia, America, South Africa and through the world (Jarald and Edwine, 2007) (Fig.). It contains major compounds tropane alkaloids are atropine, hyoscyamine

and scopolamine (Das and Basu, 2012).Used for relief of headache, pain of rheumatism, gout, bronchitis, madness, epilepsy, depression and treatment of wounds (Ertekin *et al.,* 2005). Also use to control the gastrointestinal tract, bladder spasms, peptic ulcer, diverticulitis, colic, cystitis, pancreatitis, reduce saliva, increase heart beats, nausea, intestinal camping, ophthalmic (Cieri ,2003).

Fig.1. *Datura stramonium* leaves

The present study on *Datura stramonium* was planned to assess the proximate composition and to identify of the active constituent(s) of the plant leaves and to evaluate the possible antimicrobial activities of the leaves petroleum ether, methanol and water extracts at concentrations of 10 and 50% against three pathogenic bacteria namely *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* and the fungus *Candida albicans.* Then the antimicrobial activity of these extracts was compared to reference antibacterial and antifungal drugs.

MATERIALS AND METHODS

Plant material

D. stramonium was collected from Sudan University, College of Agriculture, Shambat, Khartoum, Sudan, and authenticated by a herbalist at the Medicinal and Aromatic Plants Research Institute -Khartoum, Sudan. The plant leaves were cleaned, coarsely powdered and ground by traditional method.

Microorganisms

Standard microorganisms of *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Candida albicans* used in the present study were kindly provided by the Microbiology Laboratory - Department of Microbiology and Molecular Biology- Faculty of Sciences and Technology, Al-Neelain University, Khartoum, Sudan.

Methods

Proximate analyses

The method used for the proximate analysis was carried out as described and recommended by the AOAC (2005).

Moisture content

Two grams sample of the aerial part were placed in a previously weighted aluminum dishes. The sample was left in an oven at 105ºC for one hour and transferred to desiccators for 3-4 hour till constant weights were obtained. The final sample weight was recorded and the moisture percentage was calculated as follow: Moisture content (%) = difference in weight (g) / sample weight X 100

Ash content

Two grams sample of the aerial parts were put in a previously weighted clean and dried porcelain crucible. The crucible was placed in a muffle furnace at 550 ºC until light grey ash of a constant weight was obtained. The crucibles were cooled in desiccators, weighted and the ash weight was determined and it is percentage `was calculated as follows:

$$\text{Ash (\%)} = \frac{\text{Ash weight (g)}}{\text{Sample weight (g)}} \text{X100}$$

Organic matter

Two grams sample of the aerial parts were put in a previously weighted porcelain crucible. The crucible were placed in a muffle furnace at 550 ºC for 5 hours, transferred to desiccators and then weighted. The ash weight was determined and the percentage of organic compound was calculated as follows:

$$\text{Organic matters\%} = \frac{(X-Y)}{\text{Sample weight}} \text{X100}$$

*X: weight (g) of crucible + sample before ignition
Y: weight (g) of crucible + sample after ignition

Preliminary phytochemical screening

Preparation of plant extracts

The extraction was carried out according to the Soxhlet extraction technique (Kaushik *et al.,* 2007). Two hundred and fifty gm of the powdered leaves of plant was subjected to extraction with different solvents, Petroleum ether (60-80°C), methanol and water. Initially with petroleum ether, then the solvent was separated from the extract using rotary evaporator and plant residue were dried, weighted and extracted with methanol, then the solvent was separated from the extract using rotary evaporator and the plant residue was dried and weighted and macerated in worm distilled water and the extract were separated by filtration through No.1 Whatman paper. The filtrate was concentrated by freeze drier and the residue was weighted.

Then the percentage yield of extraction was calculated using the following formula which was described by Harborne and Turner (1984).

Percentage yield of extraction = (weight of extract /weight of plant) X100.

All extracts were dried at room temperature and stored in sterile containers until used for antimicrobial activity.

Phytochemical screening of extracts

These methods were performed as described by (Rimjhim *et al.,* 2014).The petroleum ether, methanol and water extracts were used for the detection of the following:

Alkaloids: The methanol extract of plant were treated with 2% hydrochloric acid, the mixture was divided in three test tubes, for each portion few drops of Mayer's, Wagner's and Dragondroff's reagents, the creamish, brown and orange precipitate indicates the presence of alkaloids.

Terpenes: Ten ml of ether extract evaporated and the residue dissolved in 0.5ml of acetic anhydride and then in 0.5ml of chloroform, transferred into a dry test tube, conc. Sulphuric acid (1-2ml) added at the bottom of the test tube. At the contact zone, if brownish- red or violet ring is formed and the supernatant layer becomes green or violet it donates the presence of terpenes.

Flavonoides: Alkaline Reagent Test: Extracts were treated with few drops of sodium hydroxide solution. Formation of intense yellow color, which becomes colorless on addition of dilute acid, indicates the presence of flavonoids.

Tannin: The methanol extract were treated with alcoholic ferric chloride reagent, blue colour indicates the presence of tannin.

Reducing compounds: The methanol extract (0.5-1ml) is diluted with water 1-2ml, 1ml of Fehling's reagent added and heated. A brick red precipitate indicates the presence of reducing compounds.

Saponins: The water extract were diluted with distilled water to 20ml and this was shaken in a graduated cylinder for 15 minutes. Formation of 1 cm layer of foam indicates the presence of saponins.

Glycosides: One ml of methanol extract were treated with 1ml of ferric chloride (mixture of 1 volume 5%$FeCL_3$ solution and 99volumes of glacial acetic acid), to this solution a few drops of concentrated H_2SO_4 was added. Appearance of greenish blue color within a few minutes indicates the presence of cardiac glycosides.

Carbohydrates: To two ml of methanol extract, two drops of alcoholic solution of α-naphthol were added, the mixture was shaken well and 1 ml of concentrated sulphuric acid was added slowly along the sides of the test tube and allowed to stand. A violet ring indicated the presence of carbohydrates.

Benedict's test: About 0.3 ml of Benedict's reagent was added to 2.5 ml of the methanol extract and the tube was rolled on boiling water bath and left for 5 minutes. An orange red precipitate indicated the presence of monosaccharides.

Barford's test: About 0.5ml of the methanol extract was placed in a test tube and 0.3 ml of Barford's reagent was added and the tube was rolled and placed on a boiling water bath for 5 minutes. The development of a reddish brown precipitate indicated the presence of reducing sugar.

Antimicrobial activity

Preparation of extract concentrations

The extracts were dissolved in dimethyl sulphoroxide (DMSO).Stock solution of extracts were prepared by weighting 5 mg of extract and dissolved in 5ml of (DMSO) in plastic container to make 100% concentration; serial dilution were made at 10 and 50%.

Preparation of media

Mueller Hinton agar for bacteria, Sabourauds dextrose agar for fungi and Nutrient both for broth were prepared according to the method conducted by Cheesbrough, (2008).

Preparation of the inoculums

Nutrient both were used to prepare broth cultures of bacteria and fungi, 3-5 well isolated colony of organisms selected from plate culture touched with a loop and transferred to tub contain 4-5 ml from Nutrient both then incubated at 37°C for the bacteria and at 28°C for fungi for 24 hours.

Antimicrobial activity tests

Antimicrobial activity of the crude extracts was determined by Agar-well diffusion assay methods. Under

sterile condition, swabs were prepared from the organisms broth culture. Mueller-Hinton agar plates and potato dextrose agar plates were streaked in three directions to insure complete spread of the organisms then the plates were left to stand for 5min. Three equidistant wells of 10 mms in diameter were made on the agar using a sterile cutter. The wells were then labeled with the code numbers of the test crude extracts and controls. 0.1ml of dimethyl sulphoroxide (DMSO) in one well as negative control and 0.1ml of standard antibiotics (Gentamicin for bacteria, Nystatin for fungi) were added in two wells as positive control. 0.1ml of each extracts were added in three well. The treated plates were stored for at least 1 hour to allow diffusion of the extracts into the agar while arresting the growth of the test microbes. The plates were then incubated for 24 hours at 37°C for bacteria, and 48 hours at 28°C for the yeast. Antimicrobial activity was recorded by measuring the diameters of zones of inhibition using a ruler.

Thin layer chromatographic studies

Each solvent extract was subjected to thin layer chromatography (TLC) as per conventional one dimensional ascending method using silica gel 60F254, 7X6 cm (Merck) were cut with ordinary household scissors. Plate markings were made with soft pencil. Glass capillaries were used to spot the sample for TLC applied sample volume 1-micro litre by using capillary at distance of 1 cm at 5 tracks. In the twin trough chamber with different solvent system Hexane: Hexan-ethanol -diethylamine (8 : 1 : 1) solvent system I, In solvent system II Hexane: Hexan-Methanol -diethylamine (8 : 1 : 1), In solvent system III Butanol : acetic acid : water (4 : 1 : 5), In solvent system IV Hexane: Hexan : ethanol : diethylamine (8 : 1 : 1) were used. After pre-saturation with mobile phase for 20 min for development were used. After running, the plates were dried and spray freshly prepared iodine reagents were used to detect the bands on the TLC plates. The movement of the active compound was expressed by its retention factor (R_f) and values were calculated for the samples.

Gas chromatography Mass Spectrometry

The GC-MS analysis was carried out on Agilent 6890/MSD5975B instrument operating in electron impact (EI) ionization mode at 70 eV, with MS transfer line temperature: 280 °C, ion source temperature: 230 °C, quadruple temperature: 150 °C, and mass range: 30–500 amu. An HP-5MS column (30 m×0.25 mm×0.25 µm) was used. The flow rate of the carrier gas (He) was 1 mL/min. The temperature program was 50 to 250 °C, ramped at 10 °C/min and held at the final temperature for 20 min. Injector temperature was 270 °C. The injection was performed in the splitless mode and the injected volume was 1 µL. The identities of the alkaloids were confirmed by comparing the measured mass spectral data with those obtained from the literature and database NIST (Berkov *et al*., 2006).

Statistical analysis

The significant differences between means compared at each time point using Duncans multiple range tests after SPSS for one-way classified data.

RESULTS

The Yield% of the leaves extracts using petroleum ether was 7.04%, methanol 7.78% and water was 19.05%.

Proximate composition

The Proximate analysis of *D. stramonium* leaves revealed 3.55% as moisture content, 15% ash and 84.45% for organic matter.

Preliminary phytochemical screening

The preliminary phytochemical screening of *D. stramonium* leaves extracts using different solvents was shown in Table 2. Moderate amounts of alkaloids were recorded in methanolic and aqueous extracts. The petroleum ether extract contained only trace amounts of terpenoids, alkaloids and flavonoids, while trace amounts of reducing compounds, saponins and carbohydrates were detected in methanolic and aqueous extracts which were devoid of terpenoids and flavonoids. Tannins were not detected in all the prepared leaves extracts. Glycosides were present only in the aqueous extract of the leaves.

Table 1. Preliminary phytochemical screening of *Datura stramonium L* leaves extracts

Phytochemical constituents	Extracts		
	Petroleum ether	Methanol	Aqueous
Terpenoids	(+)	(-)	(-)
Alkaloids	(+)	(++)	(++)
Flavonoids	(+)	(-)	(-)
Tannins	(-)	(-)	(-)
Reducing compounds	(-)	(+)	(+)
Saponins	(-)	(+)	(+)
Glycosides	(-)	(-)	(+)
Carbohydrates	(-)	(+)	(+)

(++) = Moderate, (+) = Trace, (-) = not detected

Antimicrobial activity of *D. astramonium* leaves extracts

All the test organisms were resistant to methanolic extract at the concentration of 50%. High activity of 10% water extract was exerted against *Staph. aureus* (23 mm),while moderate activity was shown against *E. coli* (15 mm). Fifty percent (50%) concentration of the same extract was highly active against *E. coli* and *Ps. aeruginosa* but recorded low activity against *S. aureus.* Both concentrations (10 and 50%) of petroleum ether, 50% methanolic and 10% water extracts were resisted by *Ps. aeurignosa.* Also, concentration of 50% Petroleum ether and water extracts showed poor activity against *E. coli* and *S. aureus* respectively. *Candida albicans* was sensitive (19-23 mm) to all extracts concentrations except for the 50% of methanolic and water extracts.

From the result it is clear that the effects of *D. astramonium* extracts on *E.coli* were comparable to those of the standard drug, gentamicin (Table 3), the case which is not applicable to fungi.

Table 2. Antimicrobial activity of different concentrations of *Datura astromium* L. leaves extracts

Conc. Of extracts (%)	Solvents	Bacteria			Fungi
		S. aureus	***E.coli***	***Ps. aeruginosa***	***Candida albicans***
		Inhibition zone (mm)			
10	PE	(-)	20	(-)	22
50		17	14	(-)	22
10	ME	(-)	20	20	23
50		(-)	(-)	(-)	(-)
10	water	23	15	(-)	19
50		14	21	20	(-)

Conc= Concentration
(-)= no activity
PE+ Petroleum ether, ME= Methanol
S. aureus= Staphylococcus aureus, E. coli= Escherichia coli. Ps.aeruginosa= Pseudomonas aeruginosa
Interpretation of results: >15= High activity, 15= Moderate activity**,** <15= Low activity

Table 3. Antimicrobial activity of the standard drugs and DMSO

Drug	Concentration	Mean diameter of inhibition zone (mm)			
		S. aureus	***E. coli***	***Ps. aeurginosa***	***Candida albicans***
Gentamycin	(10 µg/ml)	21	17	22	
Nystatin	(10 µg/ml)	-	-	-	33
DMSO	(10 µg/ml)	-	-	-	-

NT: not tested
DMSO: Dimethyl sulphoroxide

Thin layer Chromatography (TLC)

TLC investigation of methanolic extract of *D. stramonium* are shown in Table 4. Solvent system 1, Hexane-ethanol -diethylamine (8 : 1 : 1) one spot was detected with Retention Factor (R_f) value of 0.452.I Solvent system 2, Hexane-Methanol -diethylamine (8 : 1 : 1) one spot was also appeared with R_f 0.461. In solvent system 3, Butanol : acetic acid : water (4 : 1 : 5) where a brown colored spot was detected with an R_f of 0.462. The solvent system 4 Hexane : ethanol : diethylamine (8 : 1 : 1) has one spot with blue green color having an R_f of 0.452.

Table.4. TLC Chromatographic analysis of the methanolic extraction for the leaves of *D. stramonium*.

Fraction	Solvent System*	Color	Rf
1	Hexane-ethanol -diethylamine (8 : 1 : 1)	Brown	0.452
2	Hexane-Methanol -diethylamine (8 : 1 : 1)	orange	0.461
3	Butanol : acetic acid : water (4 : 1 : 5)	brown	0.462
4	Hexane : ethanol : diethylamine (8 : 1 : 1)	Blue green	0.452

** Stationary phase: Pre-coated sheet silica gel, with fluorescent indicator UV_{254} layer: 0.25mm*
**Mobile phase: Solvent System*

Gas Chromatography-mass spectrometry

The qualitative and quantitative compositions of the methanol extract were determined by GC/MS and the identity of the components was assigned by the retention times of authentic samples in Chemistation software. Chromatogram (2) illustrates the compounds found in the leaves of *Datura stramonium*. Forty one chemical constituents were identified in methanol crude extract by GC-MS (results not shown).

Chemical constituents of methanol crude alkaloids from the leaves of *D.stramonium* using GC-MS

GC-MS analysis of alkaloid compound clearly showed the presence of seven compounds. The alkaloid compound, formula, molecular weight and exact mass are presented in Table 6. Chromatogram GC-MS analysis of the ethanol extract of *D. stramonium* showed the presence of seven major peaks and the components corresponding to the peaks were determined as follows: The peak at 94m/z corresponding to molecular formula $C_5H_6N_2$ indicated the presence of pyrazine (Fig. 4), while the one at 652m/z corresponding to the molecular formula $C_6H_8O_6$ indicated the presence of ascorbic acid. Another peak at 127 m/z corresponding to molecular formula $C_8H_{17}N$ indicated the presence of 1-Propanamine,2-methyl-N-(2-methylpropylidene). A peak at 263 m/z corresponding to molecular formula $C_9H_{11}F_6NO$ indicated presence of 3,3,3-Trifluoro-1-piperidin-1-yl-2-trifluoromethyl-propan-1-one. A Peak at 110 m/z corresponding to molecular formula $C_6H_{10}N_2$ indicated the presence of Imidazole,1,4,5-trimethylimiazole, while the Peak at 85 m/z corresponding to molecular formula C_4H_7NO indicated presence of pyrrolidinone. A peak at 155 m/z corresponding to molecular formula $C_{10}H_{21}N$ indicated presence of 1-Butanamine and one peak at 126 m/z corresponding to molecular formula $C_3H_6N_6$ indicated presence of 1,3,5-Triazine while the last peak at 303m/z corresponding molecular formula $C_{17}H_21NO_4$ indicate presence of scopolamine.

Table.6. Chemical compounds of Fraction crude alkaloids from the leaves of *D. stramonium* using GC-MS.

N0	Alkaloid compound	Formula	MW m/z	Fig. number
1	Pyrazine	$C_5H_6N_2$	94	Fig 3
2	Ascorbic acid	$C_6H_8O_6$	652	Fig 4
4	Trifluoro-1-piperidin.	$C_9H_{11}F_6NO$	263	Fig 5
3	Propanamine	$C_8H_{17}N$	127	Fig 6
6	Triazine	$C_3H_6N_6$	126	Fig 7
5	Imidazole	$C_6H_{10}N_2$	110	Fig 8
7	Adenosine, N6-phenylacetic acid	$C_{18}H_{19}N_5O_6$	401	Fig 9
8	Scopolamine	$C_{17}H_{21}NO_4$	303	Fig 10

MW = Molecular Weight
Fig. = Figure

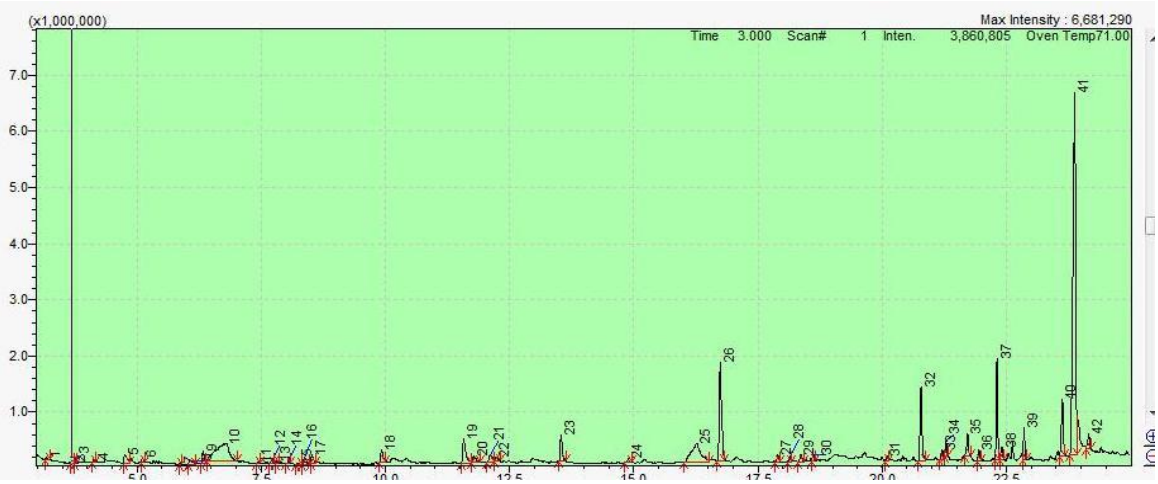

Fig.2. Chromatogram of methanolic crude extract of *Datura stramonium* leaves

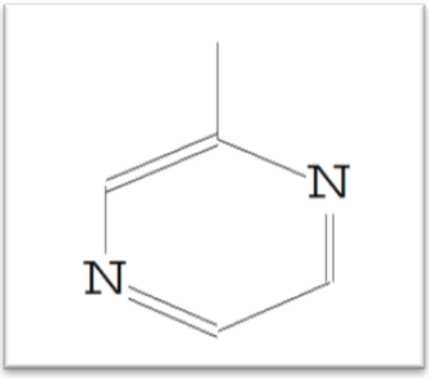

Fig 3. Pyrazine

Fig. 4. Ascorbic acid

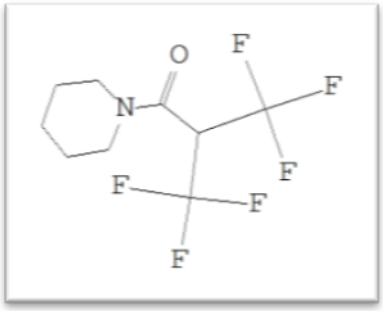

Fig. 5.Trifluoro-1-piperidinImidazole

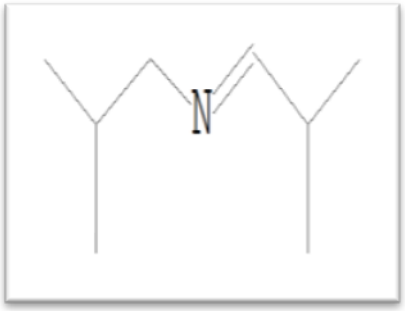

Fig. 67. Propanamine

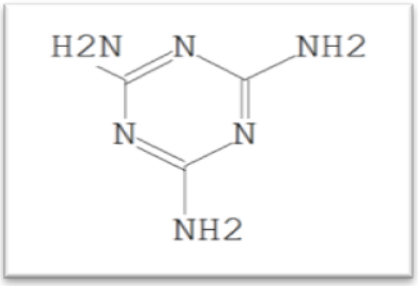

Fig. 7 Triazine

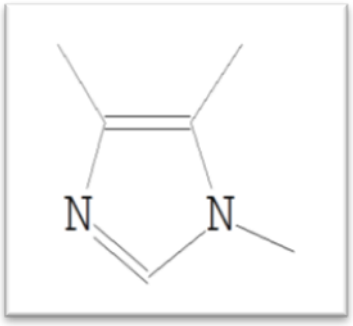

Fig8. Imidazole

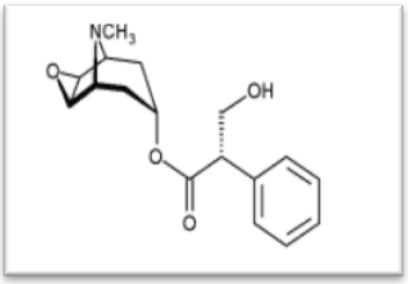

Fig. 9. Scopolamine.

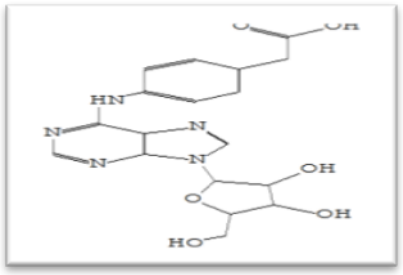

Fig. 10. Adenosine, N6-phenylacetic acid

Fig.5. Structures of alkaloids from the leaves of *D. stramonium* using GC-MS.

DISCUSSION

Plant product drugs and herbal remedies have been employed since prehistoric times to treat human and animal diseases, and several countries still rely on plants and herbs as the main sources of drugs (Ogbonnia *et al*., 2008).

The moisture content of the *D. stramonium* leaves was found to be 3.55%. Ananth (2013) reported the moisture content of *D.stramonium* leaves be about 2.58% which was not high to encourage fungal and bacterial growth. In the present study the ash and organic matter content of *D. stramonium* leaves were 15 and 84.45% respectively higher than 6.4% and 11.61% reported by Anath (2013). The Ash content of the plant part is important in the evaluation of the drug purity i.e the presence or absence of foreign maters such as metallic salts (Musa *et al*.,2006).

Phytochemically, tannins were not detected in all leave extracts and glycosides were moderately detected in the aqueous extract. Glycosides were moderately detected by Oyeleke *et al*. (2015) in the aqueous extract of *D. stramonium* leaves. On the other hand tannins were also detected in moderate amounts in the methanolic extract of the leave extract by the same authors. Tannins have been reported to prevent the development of microorganisms by precipitating microbial protein and making nutritional proteins unavailable for them (Sodipo *et.al.*, 1991). Saponins which are special class of glycosides with soapy characteristics (Fluck, 1973), were also detected in *D. Stramonium* methanolic and water extracts. Gul *et al*. (2012) reported that saponins in *D. stramonium* leave extracts are active antifungal agents and concluded that the extracts of the plants could be useful in the treatment of mycotic infections. In the present study it was shown that *C.albicans* was highly sensitive to all *D. stramonium* extract confirming the previous scientific information.

Medicinal plants represent a rich source of antimicrobial agents and are used in different countries and are sources

of many potent and powerful drugs (Srivastava et al., 1996). Recently, drug resistance has developed against many microbial infections due to the misuse of commercial antimicrobial drugs commonly used in the treatment of infectious diseases. Additionally, antibiotics are sometimes associated with adverse effects on the host including hypersensitivity, immune-suppression and other allergic reactions. A rational approach to solve such a problem might entail the search for new natural antimicrobial substances and therapeutic agents for the treatment of infectious diseases from medicinal plants (Agrawal *et al*., 1996).

In the present study, the Gram =ve and Gram –ve bacteria used to test the antimicrobial activity of *D. stramonium* were found to have variable susceptibility to different extract and concentrations. Methanol extract is highly active against all the tested micro-organisms (except *E. coli*) compared to other solvent extracts. The reason for the differential sensitivity between gram-positive pattern and gram-negative bacterial strains could not be ascribed to their morphological differences or attributed to their chemical compositions. Gram negative bacteria have an outer phospholipids membrane with the structural lipopolysaccharide components, which make their cell wall impenetrable to antimicrobial agents (Nikaido and Vaara, 1985), while the gram-positive bacteria should be more susceptible having only an outer peptidoglycan, which has no effective permeability barrier (Scherrer and Gerhardt, 1971).

Unlike other bacteria, *E. coli* was found to be sensitive, almost, to all types of solvents extracts. *E.coli* was found to be sensitive also to extracts of other datura varieties (*D. metel* Linn) (Sakthi *et al.,* 2011).

CONCLUSION

From this study, we conclude that the plant *Datura stramonium*contain has different types of compounds (secondary compounds) which are expected to be responsible for its diverse biological activities. Phytochemically, the leaves extract contained tannins, reducing compound, alkaloids, saponins, carbohydrate, flavonoid, glycosid compound. The presence of alkaloids may justify the use of this plant in the local traditional medicine for the treatment of many ailments. The antimicrobial activity of the some extracts was comparable with the standard antimicrobial drugs.

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