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(RESEARCH ARTICLE)

Phytochemical and antioxidant screening of *Cassia alata*, *Ficus saussureana*, *Strophanthus hispidus, Momordica charantia* and *Moringa oleifera*

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Abstract

The phytochemical screening of the plants extracts revealed some differences in the phytochemical constituents of the plants tested. All the plants except *Strophanthus hispidus* leaves extract tested positive for flavonoids. Only *Cassia alata* root extract, *Ficus saussureana* leaves extract and *Moringa oleifera* leaves extract tested positive for Phlobatonin. Saponin was found in all the plants extract in *Moringa oleifera* root and *Strophanthus hisidus* root extracts. It was found that terpenoids were present in all the plants extracts except *Strophanthus hispidus* (leaves and root) and *Ficus saussureana* root extracts. Tannins were present in all plants extracts except in *Momordica charantia* leaves and *Moringa oleifera* root extracts. Steroids were present in only *Ficus saussreana* (leaves and roots), *Momordica charantia* leaves and *Moringa oleifer*a root extracts. Alkaloids were present in all the plants extracts, Anthraquinones were present in only *Cassia alata* (leaves and roots), *Strophanthus hispidus* (leaves and root) and *Moringa oleifera* root extracts. The results of the antioxidant property showed that all the plants extracts had an antioxidant activities against free radicals in the blood of the rats. *Ficus saussureana* leaves and *Strophanthus hispidus* leaves extracts had significant ($P<0.05$) higher level of catalase (6.47µmo1/mgprotein and 9.08µmol/mgprotein) respectively. This plants extracts have medicinal and health benefits.

Keywords: Phytochemicals; Antioxidants; *Cassia alata; Ficus saussureana; Strophanthus hispidus; Momordica charantia; Moringa oleifera*

1. Introduction

The medicinal properties of various plant materials and extracts have been recognized since the beginning of the 5th century, with renewed scientific interest in recent times [1]. The World Health Organization (WHO) defines medicinal plants as those containing substances that can be used for therapeutic purposes or as precursors for the synthesis of useful drugs [1]. Investigations in the 19th and 20th centuries, along with the advent of antibiotics like streptomycin, have led to extensive experimentation on numerous plants for their antibiotic and antimicrobial activities [2]. Collectively, plants produce a diverse array of over 500,000 low molecular mass natural products, known as secondary metabolites [3]. The medicinal value of these secondary metabolites is attributed to their potential to elicit specific physiological actions in the human body [4]. Key chemical substances include alkaloids, glycosides, steroids, flavonoids, tannins, saponins, reducing sugars, and terpenoids, among others, which are essential for cell growth, replacement, and body building [5].

Antioxidants in plants, primarily phenolic acids, tannins, phenolic diterpenes, and flavonoids, protect cells against damage caused by free radicals [6]. Oxidative stress, resulting from increased free radical generation or impaired endogenous antioxidant mechanisms, is implicated in various diseases such as atherosclerosis, cancer, diabetes mellitus, myocardial infarction, Alzheimer's disease, and aging [7]. The physiological system has defense mechanisms,

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including antioxidant enzymes like superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH), glutathione peroxidase, and other free radical scavengers such as β-carotene, α-tocopherol, ascorbic acid, and glutathione, to protect cells against cytotoxic reactive oxygen species (ROS) [8]. Evidence suggests that antioxidants may be beneficial in preventing the deleterious consequences of oxidative stress, leading to increased interest in the protective biochemical functions of natural antioxidants found in vegetables, fruits, and medicinal herbs [9].

The medicinal usefulness of plants such as *Cassia alata*, *Ficus saussureana*, *Strophanthus hispidus*, *Momordica charantia*, and *Moringa oleifera* has been the subject of numerous chemical and pharmacological studies [10].

Cassia alata is an ornamental shrub or tree growing up to 12 meters high, widely available in tropical regions, grasslands, and around towns and villages throughout West Africa [11]. Beyond its uses as a source of firewood and timber, it has significant applications in folkloric medicine [12]. In Ghana and Ivory Coast, decoctions of the leaves and roots are used to treat diarrhea, dysentery, and other gastrointestinal problems [13]. The macerated juices of young fresh leaves are applied to eye infections and parasitic diseases [14]. Decoctions of the stem, bark, and roots are used to treat urinary tract infections, bronchitis, and asthma [15]. The plant contains phytochemicals such as tannins, saponins, alkaloids, flavonoids, glycosides, terpenoids, and anthraquinones [16]. In northern Nigeria, particularly in Adamawa and Taraba states, traditional medicine practitioners use the root, stem, and leaves to treat burns, skin and wound infections, diarrhea, gastrointestinal, and upper respiratory tract infections [17]. Recent reports have credited the use of *Cassia alata* in the successful treatment of hemorrhoids, constipation, inguinal hernia, intestinal parasitosis, blennorrhagia, syphilis, and diabetes [18].

Ficus saussureana is a large tropical deciduous evergreen tree growing up to 20 meters tall with a wide-spreading crown, commonly found in the humid forest zones by rivers [19]. It is an attractive tree, often planted in compounds as an ornamental [20]. The plant contains phytochemicals such as tannins, saponins, flavonoids, steroids, glycosides, triterpenoids, and alkaloids [21]. It has been reported to exhibit antimicrobial activities against bacteria such as *Escherichia coli*, *Staphylococcus aureus*, and others [22]. Additionally, *Ficus saussureana* has demonstrated antioxidative actions [23].

Strophanthus hispidus is a deciduous shrub up to 5 meters tall or a large liana up to 100 meters long, with clear, reddish, or white exudate and a stem up to 6 centimeters in diameter [24]. A significant number of cardiac glycosides (cardenolides), collectively called strophanthins, have been isolated from *Strophanthus hispidus* [25]. These glycosides are most abundant in the seeds and are responsible for its activity as an arrow poison, as well as its cardiac and vascular stimulant properties [26]. In Nigeria and Ghana, a leaf and stem decoction is taken as a laxative or to treat fever and is externally applied to sores [27]. A root decoction is used to treat rheumatic afflictions [28]. Extracts of both the roots and leaves have shown in-vitro inhibition of *Escherichia coli*, *Klebsiella pneumoniae*, *Neisseria gonorrhoeae*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Streptococcus pyogenes* [29]. An aqueous leaf extract of the plant has demonstrated a dose-related delay of blood clotting caused by the venom of the saw-scaled viper (*Echis carinatus*), thus inhibiting the effect of its bite [30]. The plant contains important phytochemicals such as tannins, saponins (in the leaf), flavonoids (in the root), glycosides, alkaloids, and anthraquinones, which are responsible for its antimicrobial activities [31]. The medicinal properties of various plant materials and extracts have been recognized since the beginning of the 5th century, with renewed scientific interest in recent times [32]. The World Health Organization (WHO) defines medicinal plants as those containing substances that can be used for therapeutic purposes or as precursors for the synthesis of useful drugs [32]. Investigations in the 19th and 20th centuries, along with the advent of antibiotics like streptomycin, have led to extensive experimentation on numerous plants for their antibiotic and antimicrobial activities [33]. Collectively, plants produce a diverse array of over 500,000 low molecular mass natural products, known as secondary metabolites [34]. The medicinal value of these secondary metabolites is attributed to their potential to elicit specific physiological actions in the human body [35]. Key chemical substances include alkaloids, glycosides, steroids, flavonoids, tannins, saponins, reducing sugars, and terpenoids, among others, which are essential for cell growth, replacement, and body building [36].

Antioxidants in plants, primarily phenolic acids, tannins, phenolic diterpenes, and flavonoids, protect cells against damage caused by free radicals [37]. Oxidative stress, resulting from increased free radical generation or impaired endogenous antioxidant mechanisms, is implicated in various diseases such as atherosclerosis, cancer, diabetes mellitus, myocardial infarction, Alzheimer's disease, and aging [38]. The physiological system has defense mechanisms, including antioxidant enzymes like superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH), glutathione peroxidase, and other free radical scavengers such as β-carotene, α-tocopherol, ascorbic acid, and glutathione, to protect cells against cytotoxic reactive oxygen species (ROS) [39]. Evidence suggests that antioxidants may be beneficial in preventing the deleterious consequences of oxidative stress, leading to increased interest in the protective biochemical functions of natural antioxidants found in vegetables, fruits, and medicinal herbs [40].

Momordica charantia, commonly known as bitter melon, is a tropical vegetable prevalent in Indian cuisine and extensively utilized in traditional medicine for managing diabetes. The plant has been used in various Asian traditional medicine systems for a long time. Like most bitter-tasting foods, bitter melon stimulates digestion. It also possesses many uses as an antidiabetic, laxative, anthelmintic, antimalarial, antiviral, immunostimulant, antioxidant, and insecticidal agent, besides its indication in skin treatment (eczema, mycoses, scabies, and hemorrhoids) [42,44]. Bitter melon has been found to contain phytochemicals such as alkaloids, charantin, saponins, oleic acid, glycosides, peptides, terpenoids, and zeatin. Research has also found that the leaves are nutritious sources of calcium, magnesium, potassium, phosphorus, iron, and B-vitamins [45,46].

The Moringa tree is cultivated and used as a vegetable (leaves, green pods, flowers, roasted seeds), for spice (mainly roots), for cooking and cosmetic oil (seeds), and as a medicinal plant (all plant organs) [47]. *Moringa oleifera* is a highly valued plant distributed in many countries of the tropics and subtropics. It has an impressive range of medicinal uses with nutritional value [48]. Different parts of *M. oleifera* contain important minerals and are a good source of protein, vitamins, β-carotene, amino acids, and various phenolics [47].

2. Material and methods

2.1. Collection of Plant Materials

Fresh leaves and roots of *Cassia alata*, *Ficus saussureana* and *Strophanthus hispidus* were collected from Ezinihittle Mbaise, Local Government Area, Imo state. The leaves and roots of *Moringa oleifera* were collected from Okigwe road, Owerri Imo state. The leaves of *Momordica charantia* was bought from traditional medicine market Suru- Alaba market, Lagos state. The herbs were identified and authenticated by B.O Daramole of the herbarium of the department of Botany, University of Lagos, Lagos State, Nigeria. Voucher specimens of the plants were kept at the herbarium. The freshly collected leaves and roots were washed with clean tap water, air-dried under shade at room temperature (25^{o}C) for 2-3weeks. The plant materials were pounded separately using mortar and iron pestle into smaller particles and then ground to fine power using a blender. The powdered samples were stored in a clean, well–tightened transparent nylon bags labeled adequately; and kept at room temperature (25^{o}C) for 24 hours.

2.2. Phytochemical Analysis

Phytochemical analysis for qualitative detection of saponins alkaloids, flavonids, steroids, tannin, reducing sugar, anthrquinones, terpenoids and phlobatonin, was performed on the plant samples as described by Trease and Evans, [49], and Harborne [50].

2.3. Test animals and Groups

Forty (40) female albino wistar rats (weighing 69-211g) were used for this study. The animals were obtained from the animal house of the department of biochemistry, Nigerian institute of medical research, Yuba, Lagos state, Nigeria. The animals were allowed to acclimatize to laboratory conditions for one (1) week prior to experimentation at normal laboratory temperature. The rats had free access to feed pellet (Animal care services ltd, Lagos Nigeria) and water. The forty (40) rats were divided into Ten (10) different groups of four (4) rats each on the basis of matching the body weights of the animals. The treatment schedule of each group was as follows;

- Group A: Animals in this group were subjected to forceful oral administration of the ethanol extract of *Cassia alata* leaf at a dose of 140mg/ml body weight/day rat for 14 days.
- Group A2: The animals in this group were subjected to forceful oral administration of the ethanol extract of *Cassia alata* root at a dose of 140mg/kg body weight/day/rat for 14 day
- Group B1: The animals in this group were subjected to forceful oral administration of the ethanol extract of *Ficus saussureana* leaf at a dose of 140mg/kg body weight/day/rat for 14days.
- Group B2: The animals in this group were subjected to forceful oral administration of the ethanol extract of *Ficus saussureana* root at a dose of 140mg/kg body weight/day/rat for 14day.
- Group C1: The animals in this group were subjected to forceful oral administration of ethanol extract of *Strophanthus hispidus* leaf at a dose of 140 mg/kg body weight/day/rat for 14days.
- Group C2: The animals in this group were subjected to forceful oral administration of the ethanol extract of *Strophanthus hispidus* root at a dose of 140mg/kg/body weight/ day rat for 14 days.
- Group D: The animals in this group were subjected to forceful oral administration of the ethanol extract of *Momordica charantia* leaf at a dose of 140mg/kg body weight/day/ rat for 14 days.

- Group E1: The animals in this group were subjected to forceful oral administration of the ethanol extract of *Moringa oleifera* leaf at a dose of 140mg/kg body weight/ day/rat for 14 days.
- Group E2: The animals in this group were subjected to forceful oral administration of the ethanol extract of *Moringa oleifera* root at a dose of 140mg/kg body weight/ day rat 14days.

2.4. Group Control

This was the control group, the animals were given only water and feed pellets (Animals care services ltd, Lagos) for 14 days.

The weights of the rats were measured at day 0 prior to experiment, day 7 and day 14 of treatment with the extracts to check the weight gain or loss after each week.

2.5. Animals Sacrifices and Plasma Collection

After 14 days of treatment with the different extracts, the rats were euthanized by anesthesia under chloroform vapour and dissected. Their blood were collected from aorta. This sacrifice was done at the 15th day of the experiment.

2.6. Biochemical estimation of markers of oxidative stress

2.6.1. Estimation of Reduced Glutathione

Reduced glutathione (GSH) was determined by the method of Ellman,. To the plasma, 10% trichloroacetic acid was added and centrifuge to separate the proteins. To 0.01ml of the supernatant, 2ml of phosphate buffer (pH 8.4), 0.5ml of 5'5 dithio, bis (2-nitrobenzoic acid) and 0.4ml double distilled water were added. The mixture was vortexed and the absorbance read at 412mm after zeroing with the reagent blank. The concentration is expressed in nmol/ml.

2.6.2. Estimation of catalase (CAT)

Catalase activity was measured by the method of Sinha, [48]. The supernatant (0.1ml) of plasma was added to 1.0ml of 0.01M (pH.7.0) phosphate buffer and 0.4ml of 2M H_2O_2. The reaction was stopped after 2-3 minutes by the addition of 2.0ml of dichromate-acetic acid reagent (5% potassium dichromate and glacial acetic acid mixed in 1.3 ratio). The concentration of catalase was assayed at 620nm after zeroing with the blank reagent. The concentration was expressed in mmol/min/mg protein

2.6.3. Estimation of Superoxide Dismutase (SOD)

Superoxide dismutase was analyzed by the method described by Kakkar et al., [50]. Assay mixture contained 0.1ml of plasma sample, 1.2ml of sodium pyrophosphate buffer (pH 8.3, 0.052M), 0.1ml of phenazine methosulphate, 0.3ml of nitroblue tetrazolium, and 0.2ml of nicotinamide adenine dinucleotide reduced disodium salt (NADH 750nm). Reaction was started by the addition of NADH. After incubation at 30^0C for 90 seconds, the reaction was stopped by the addition of 0.1ml of glacial acetic acid. Reaction mixture was stirred vigorously with 4.0ml of n-butanol. Mixture was allowed to stand for 10 minutes, centrifuge and the butanol layer was measured at 480nm, after zeroing spectrophotometer with the reagent blank. The concentration of SOD was expressed in SOD/min/mg protein.

2.6.4. Estimation of Thiobarbituric acid reactive substance (TBARS)

Lipid proxidation as evidence by the formation of TBARS were measured by the method of Jiang et al., [51]. About 0.1ml of plasma sample mixed with Tris-HCl buffer (pH 7.5) was treated with 2ml of (1:1:1 ratio) TBA-TCA-HCL reagent (thiobarbituric acid 0.37%, 0.25M HCl and & TCA) and placed in water bath for 15 minutes, cooled and centrifuged at room temperature for 10 minutes at 1,000 rpm. The absorbance of clear supernatant was measured against the reagent blank at 535nm. The concentration was expressed in nmol/ml.

Statistical analysis.The data were expressed as mean ⍰S.D, which for biochemical parameters were analysed statistically using one way analysis of variance (ANOVA) followed by Tukey's multiple comparison test for comparison with control group. $P<0.05$ was considered as significant.

3. Results

The phytochemical screening of all the plants tested revealed the presence of alkaloids (Table 1). All except *Strophanthus hipidus* (leaves) tested positive for the presence of flavonoid and only *Cassia alata* (roots), *Ficus saussureana* (leaves) and *Moringa oleifera* (leaves) tested positive for the presence of Phlobatonin. All except *Momordica*

charantia (leaves) and *Moringa oleifera* (root) tested positive for the presence of tannin. Also all except *Strophanthus hispidus* (root) and *Moringa oleifera* (root) tested positive for the presence of saponin. Only *Ficus saussureana* (leaves and roots), *Momordica charantia* (leaves) and *Moringa oleifera* (root) tested positive for the presence of steroids. All except *Strophanthus hispidus* (leaves and roots) and *Ficus saussureana* (root) tested positive for the presence of terpenoids. Only *Cassia alata* (leaves and roots), *Strophanthus hispidus* (leaves and roots) and *Moringa oleifera* (root) tested positive for the presence of anthraquinones (Table 1.).

The differences in weights before treatment and after treatment for 7 and 14 days were used to determine the percentage gain/loss in weight. Values obtained for percentage weight change for the groups were; A1(2.10%),A2 (4.45%), B1(2.33%), B2(6.09%) C1(4.32%), C2(3.67%), D(15.74%), E1(-2.62%), E2(0.96%), control (3.60%). Their percentage weight were lower when compared with the control group. No differences in percentage weight gain was observed between normal control group and groups A2 C1 and C2. There was a different in percentage weight gain in groups B2 and D when compared with the normal control group. The results are represented in Figure 1.

3.1. Mortality among the groups of the Experimental Rats

Figure 2, represents the percentage mortality per group (%) of the experimental animals (rats) after the treatment with the different plant extracts. There was no death among the animals (rats) A1, A2, C1, E1 and control groups. There was about 25% (i.e one rat each) death in B1, B2, C2, D and E2 groups respectively.

3.2. Estimation of superoxide dismutase (SOD)

The administration of alcoholic extract of the herbs caused a significant ($P<0.05$) increase in the S0D level in the blood of experimental rats rats in all the groups when compared with the control group However, the level of S0D in the blood of the treated rats was found to be significantly higher ($p<0.05$) in group B2 (65.68±1.91) than any other group, as compared with the control group (51.03±1.28). The results are presented in figure 3.

3.3. Estimation of Thiobarbituric acid reactive substances (TBARS)

The effect of alcoholic extract of the five herbs on the lipid peroxidation and endogenous antioxidants of blood of experimental rats in all groups is shown in fig 4. There was significant ($p<0.05$) increase in TBARS concentration in blood of the rats in all the groups: Group C2 (12.88 ± 0.16) had the highest TBARS value and E2 (12.25 ± 0.14) had the least value.

3.4. Estimation of Catalase (CAT)

The treatment of alcoholic extract of the five herbs to normal rats for 14days induced an increase in the level of catalase in the blood. Catalase level in groups B1 and C2 was seen to be significantly ($p<0.05$) very high (B1=6.47±0.17, C2=9.08±0.10) when compared with other groups and D (D=0.52±0.02) having least value. The results are presented in fig 5.

3.5. Estimation of Reduced glutathione (GSH)

There was no significant ($p<0.05$) change of reduced glutathione level in blood in the groups; A2 (0.003±0.001,); B1 (0.003±000) and B2 (0.001±0.001) when compared with the control group (0.001±0.001). The C1 and C2 groups (0.011±0.001) were observed to have a high level of reduced glutathione when compared with other groups (A1=0.005±0.01,D=0.006±0.001,E1=0.005±0.001, E2=0.007±0.002) and the control group (0.001±0.001). The results are presented in fig 6

Table 1 Phytochemical analysis of the 5 medicinal plants

Botanical names of plants	Vernacular name of plants	Plants part	Tan	Sap	Flav	Phlo	Ster	Glyc	Terp	Red	Alka	Anth
Cassia alata	Okoroji, candle stick	Leaves	+	+	+	-	-	+	+	+	+	+
		Root	+	+	+	+	-	+	+	+	+	+
Ficus saussureana	Ogbu	Leaf	+	+	+	+	+	+	+	-	+	-
		Root	+	+	+	-	+	+	-	-	+	-
	Oke-oha	Leaves	+	+	-	-	-	+	-	+	+	+

Strophanthus hispidus		Root	+	-	+	-	-	+	-	-	+	+
Momordica charantia	Okwunulo, bitter melon, papaila ,Ejirin	Leaves	-	+	+	-	+	+	+	+	+	-
Moringa oleifera	Arums trick tree, house radish tree	Leaves	+	-	+	+	-	+	+	+	+	-
		Root	-	+	+	-	+	-	+	+	+	+

Key: - = Negative, + = positive, Tan=Tannin, Sap=Saponin, Flav=Flavonoid, Phlo=Phlobatonin, Ster=Steroids, Glyc=Glycosides, Terp=Terpenoids, Red=Reducing sugar, Alka=Alkaloids, Anth=Anthraquinone.

Table 2 Weight of Experimental Rats before and after treatment with Extracts

S/N	Sample groups	The mean weight before treatment	The mean weight after treatment for seven days	the mean weights after treatment for 14 days r treatment for 14 days
1	A1	143.53±1.37	146.50±8.10	156.80±14.52
2	A2	125.85±1.02	131.43±10.16	133.40±8.40
3	B1	116.53±1.16	119.25±4.38	116.87±2.71
4	B2	94.83±2.73	100.48±3.49	101.20±11.42
5	C1	78.88±5.23	81.75±6.43	91.30±3.90
6	C2	129.90±1.30	134.70±6.71	145.97±6.58
7	D	133.15±0.79	154.05±6.70	154.13±10.95
8	E1	74.73±1.10	72.73±7.01	71.70±13.64
9	E2	122.8±0.66	124.00±1.40	126.10±0.90
10	control	200.55±8.77	207.80±9.70	215.18±5.85

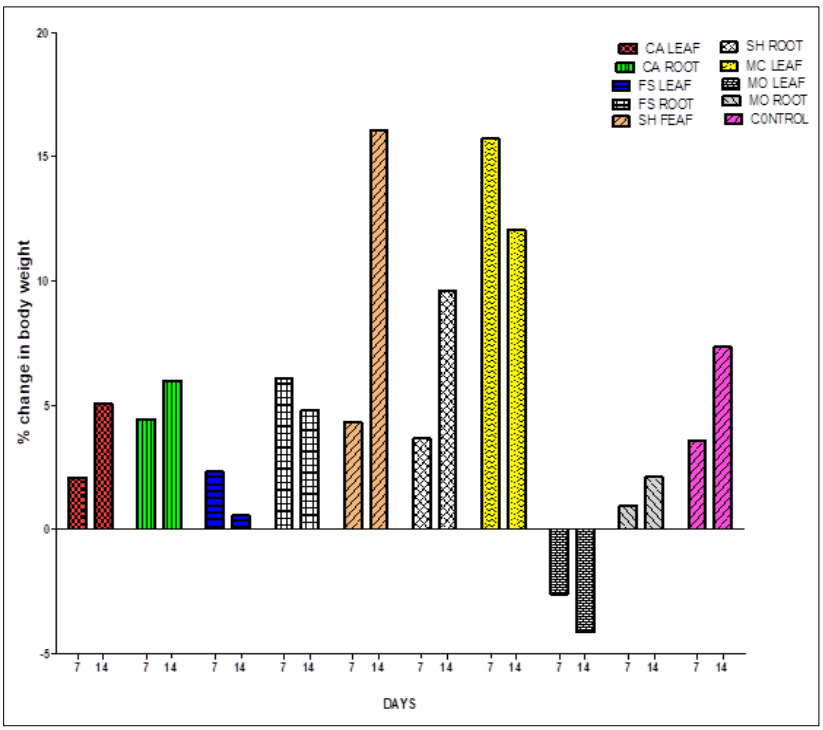

Figure 1 Percentage change in body weights of the animals after 7 and 14 days of treatment with plant extracts. Values are mean ± s.d (n=4). P<0.05(one way analysis of variance) compared with control

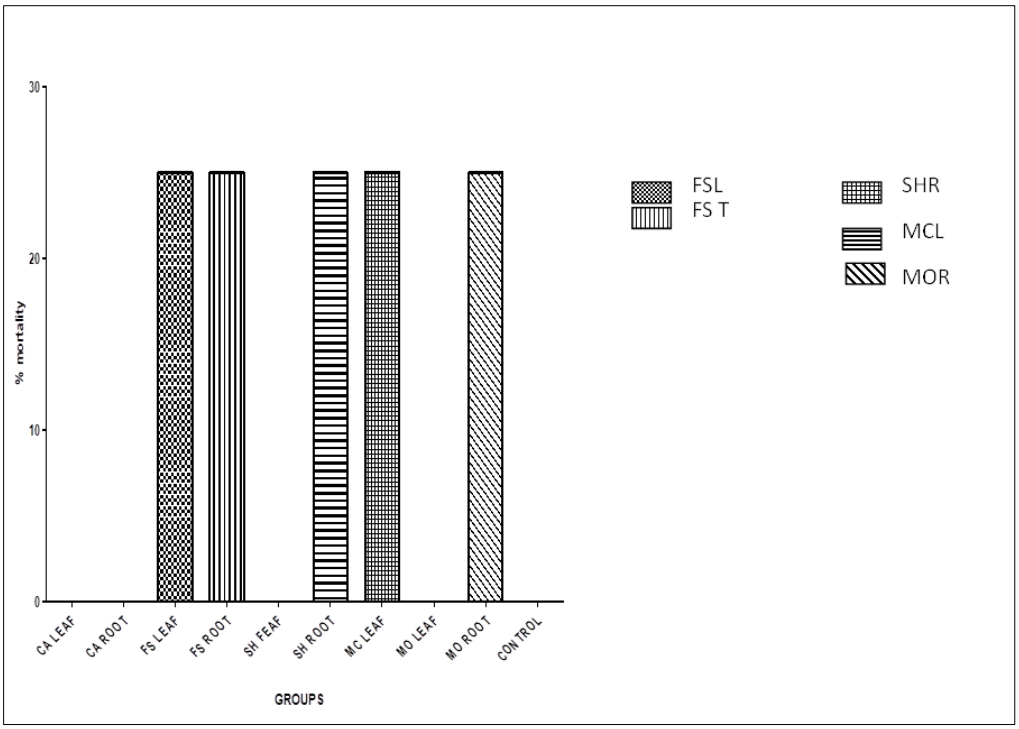

Figure 2 Percentage mortality per group after treatment of the animals with the extracts. CA, *Cassia alata*; FS, *Ficus saussureana*; SH, *Strophanthus hispidus*; MC, *Momordica charantia*; MO, *Moringa oleifera*

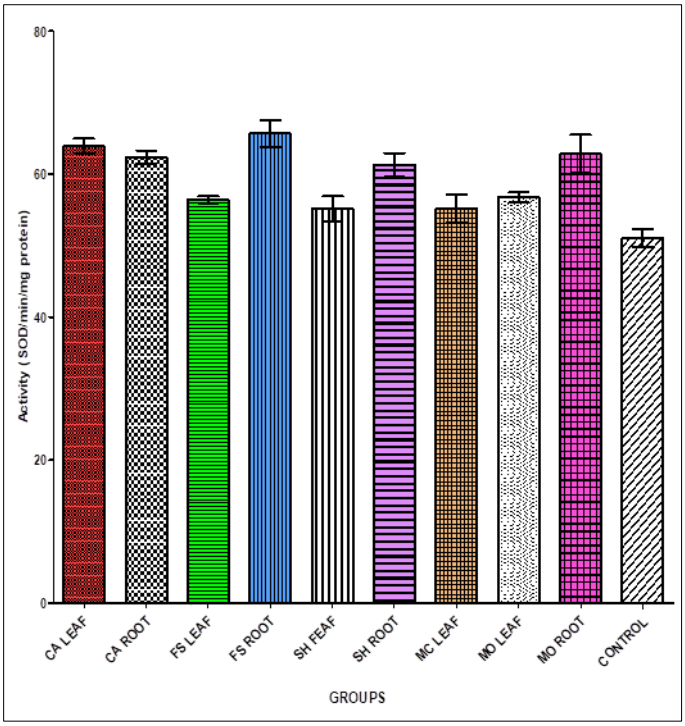

Figure 3 Serum superoxide dismutase activity (SOD/min/mg protein) of the animal groups. CA, *Cassia alata*; FS, *Ficus saussureana*; SH, *Strophanthus hispidus*; MC, *Momordica charantia*; MO, *Moringa oleifera*. Values are mean ± s.d (n=4). $P<0.05$ (one way analysis of variance) compared with control

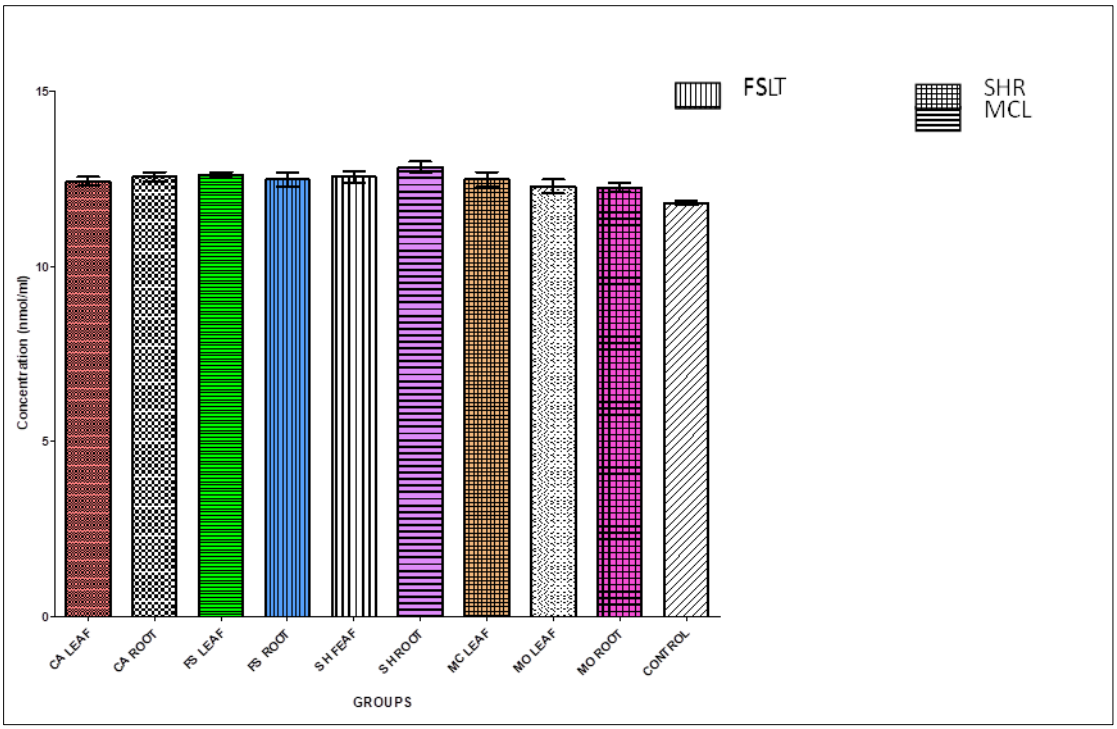

Figure 4 Serum Thiobarbituric acid reactive substances (TBARS) concentration (nmol/ml) of the animal groups. CA, *Cassia alata*; FS, *Ficus saussureana*; SH, *Strophanthus hispidus*; MC, *Momordica charantia*; MO, *Moringa oleifera*. Values are mean ± s.d (n=4). P<0.05 (one way analysis of variance) compared with control

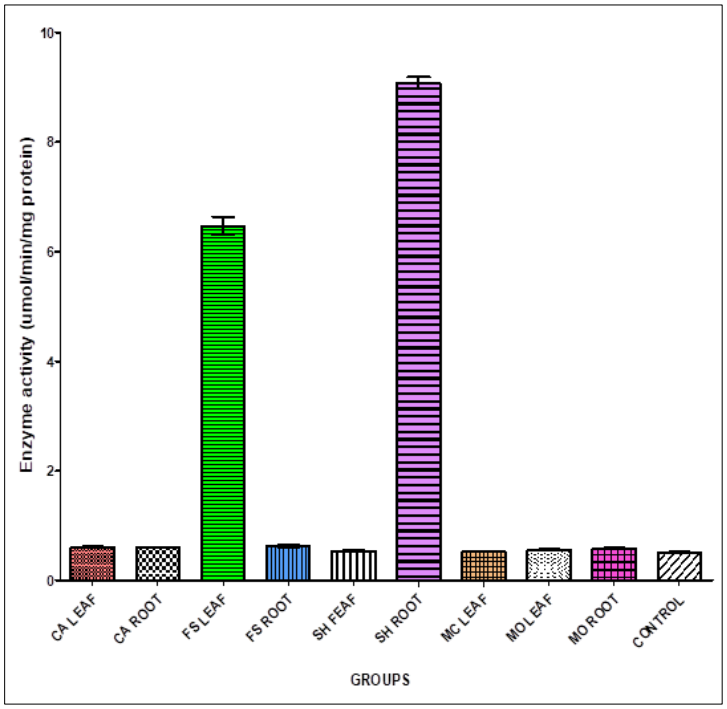

Figure 5 Serum catalase activity (umol/min/mg protein) of the animal groups. CA, *Cassia alata*; FS, *Ficus saussureana*; SH, *Strophanthus hispidus*; MC, *Momordica charantia*; MO, *Moringa oleifera*. Values are mean ± s.d (n=4).P<0.05 (one way analysis of variance) compared with control

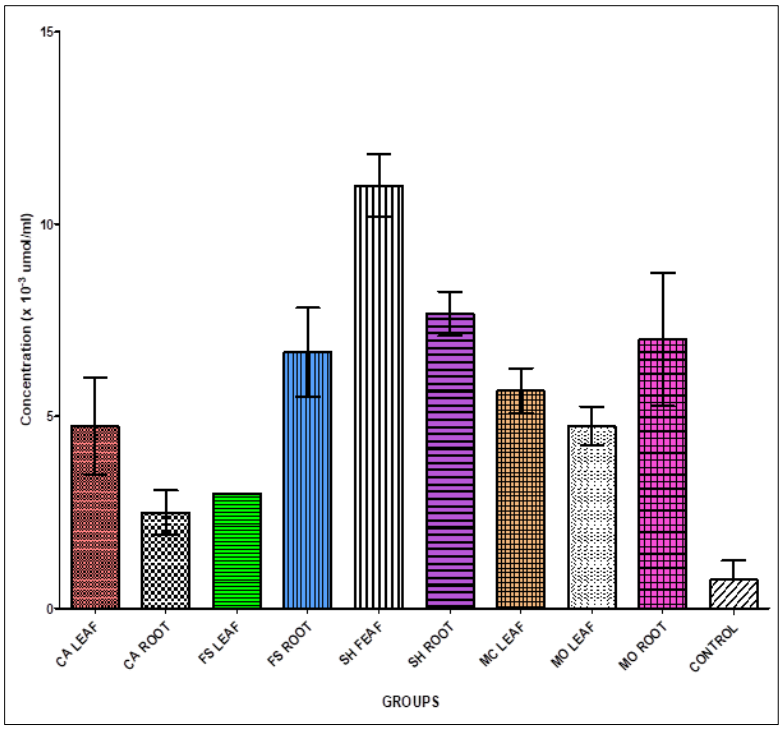

Figure 6 Serum glutathione concentration (umol/ml) of the animal groups. CA, *Cassia alata*; FS, *Ficus saussureana*; SH, *Strophanthus hispidus*; MC, *Momordica charantia*; MO, *Moringa oleifera*. Values are mean ± s.d (n=4).P<0.05 (one way analysis of variance) compared with control

4. Discussion

The phytochemical screening of the plants extracts revealed some deference in the phytochemical constituents of the plants tested. All the plants except *Strophanthus hispidus* leaves extract tested positive for flavonoids. Only *Cassia alata* root extract, *Ficus saussureana* leaves extract and *Moringa oleifera* leaves extract tested positive for Phlobatonin. Saponin was found in all the plants extract in *Moringa oleifera* root and *Strophanthus hisidus* root extracts. It was found that terpenoids were present in all the plants extracts except *Strophanthus hispidus* (leaves and root) and *Ficus saussureana* root extracts. Tannins were present in all plants extracts except in *Momordica charantia* leaves and *Moringa oleifera* root extracts. Steroids were present in only *Ficus saussreana* (leaves and roots), *Momordica ch*arantia leaves and *Moringa ole*ifera root extracts. Alkaloids were present in all the plants extracts, Anthraquinones were present in only *Cassia alata* (leaves and roots), *Strophanthus h*ispidus (leaves and root) and *Moringa olei*fera root extracts.

The reactive oxygen species formed may cause cellular and subcellular damage by peroxidation of membrane lipids, denaturing cellular proteins and breaking DNA strands, disrupting cellular functions. Superoxide dismutase is capable of converting the superoxide free radical anion to hydrogen peroxide, Catalase is capable of scavenging the hydrogen peroxide radical, which is formed during various biochemical and metabolic reactions. The Glutathione is involved in many important cellular functions ranging from the control of physic-chemical properties of free radicals. However, when the balance between these species and antioxidants is attended, a state of oxidative stress results, possibly to permanent cellular damage. In the present study, the increase in weight of the experimental rats in the groups; A1, A2, B1, B2, C1, C2, D E2 is a reflection of nutritional values of the plants extracts. The reduction in weight of the rats in group E1 indicates the toxicity of the plant extract (*M. oleifera* leaves).In vitro antioxidants activities of ethanol extracts of *Cassia alata*, *Ficus saussureana*, *Strophanthus hispidus*, *Momordica charantia* and *Moringa oleifera* were determined by using the thiocyanate method. The administration of *Cassia alata* ethanol extract of 140mg/kg body weight / day significantly (P<0.05) increased the levels of SOD, TBARS, CAT and GSH in the blood of the experimental rats in group A1. SOD metabolizes the superoxide radical anion, which is an effective defense of the cell against endogenous and exogenous generation of superoxide. The GSH metabolism plays a vital role in many biological processes such as the detoxification of xenobics. These results are similar to the reports of Raja et al., [52], on exploring the effect of *Cytisus scoparius* on markers of oxidative stress in Rats.

There was an increase in the levels of SOD, TBARS and CAT in the blood of group A2 rats, treated with ethanol extract of *Cassia alata* roots, when compared with the control group. There was no significant (P<0.05) increase in the level of GSH when compared with the control group. In group B1 treated with the ethanol extract of *Ficus saussureana* leaves, there was a significant (P<0.05) increase in the level of SOD and TBARS and a very high significant (p< 0.05) increase in the levels of CAT (6.47 Nmol/ ng protein). This indicates the ability of *Ficus saussureana* leaves to scavenge hydrogen peroxide radical in the blood. There was no significant (P<0.05) increase in the levels of GSH. The levels of the antioxidants (SOD, TBARS and CAT) also increased significantly (P<0.05) in the blood of rats (group B2) treated with *Ficus saussureana* roots ethanol extract. The extract was found to have no effect on the level of GSH. The ethanol extract of *Strophanthus hispidus* leaves and roots, significantly (P<0.05) increased the levels of SOD, TBARS CAT, and GSH in the blood of rats in groups C1 and C2. The roots extract was found to significantly (P<0.05) increased the level of CAT (9.08 Nmol/ng proten), suggesting the high antioxidant ability of *Strophandlus hispidus* roots extract. This was contrary to the reports of Ayoola et al., [53], on the plants of the family (apocynaceae). This might be due to the methods employed in the experiment. The level of SOD, TBARS and GSH increased significantly (P<0.05) in the blood of rats (group D) treated with *Momerdica charantia* leaves ethanol extract. This agrees with the reports of Sathish et al., (44). There was no significant (P<0.05) increased the levels of oxidative stress tested for suggesting the ability of *Moringa ole*ifera leaves and roots to metabolize free radicals in the blood of rats (group E1 and E2) used for this study. This agree with reports of Sultana et al., [54], Sreelatha and Padina, [55]. This result was also contrary to the reports of Bharali et al., [56]. This might be due to the concentration of the extracts, method of extraction or method employed in the study. Further complex studies are needed to fully characterize the responsible active ingredients present in the plants and elucidate their possible mode of action and mechanism that is in progress.

5. Conclusion

The diverse phytochemical profiles of these plant extracts correlate with their observed antioxidant activities. The pronounced catalase activity in *Ficus saussureana and Strophanthus hispidus* leaf extracts suggests their potential as potent natural antioxidants. These findings support the traditional medicinal use of these plants and underscore their promise for further development in therapeutic applications.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest

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