Original Research Article

The Phytochemical Evaluation of Some Medicinal Plants in Pankshin District of Pankshin Local Government Area of Plateau State, Nigeria

ABSTRACT

Aim: To identify and quantify some phytochemicals present in the extracts of four selected medicinal plants from Pankshin District of Pankshin Local Government Area, Plateau State, Nigeria

Study Design: Three solvents were used for the extractions of nine phytochemicals in four medicinal plants for qualitative, quantitative and Fourier Transformed Infrared (FTIR) analysis

Materials and Methods: The plants were collected from their natural habitat of Pankshin Local Government Council of Plateau State, Nigeria and were washed under running tap water, air dried in a shade at room temperature, milled well into a fine powder using a mixer grinder. The homogenized fine powders of leaf, bark and root for each plant were separately soaked in different conical flasks containing water, ethanol and hexane and the sample extracts were obtained using Soxhlet apparatus. The presence of phytochemical contents of the plant were determined by standard methods. The functional groups analyses were carried out by FTIR. All data were expressed as mean ± standard deviations. Analysis of variance (ANOVA) at p=.05 was performed by SPSS version 23.

Results: The qualitative and quantitative phytochemical screening revealed the presence of tannins, polysteroids, saponins, proteins, alkaloids, flavonoids, phenolics, quinones and ascorbic acids. The plants' extracts showed that the solubility of phytochemicals was not only dependent on the type of solvent used but also on plant type and on the plants' part. The order of the concentration of phytochemicals obtained in this study was phenolics>tanins>alkaloids>saponins>proteins>flavonoids>quinones>polysteroids>ascorbic acid; according plants' organs was P. thonningii leaves>S. latifolius leave> S. latifolius roots >S.longipedunculata leave> E.senegalensis leave> P. thonningii bark > S.longipedunculata root> E.senegalensis root> P. thonningii root> S.longipedunculata bark> S. latifolius bark> E. senegalensis bark and with plants type was P. thonningii> S. latifolius> S.longipedunculata> E.senegalensis. The total contents of the phytochemical analyzed in the three organs indicated that the leave accumulated the highest contents of tannin, alkaloids, phenolics, polysteroids, quinones and ascorbic acid while the roots were the richest in saponins, flavonoids, and proteins and bark was moderate in all the concentrations of the phytochemicals. The FT-IR spectrum of the ethanolic extracts of the parts (leave, bark and root) of the four plants gave characteristic bands (absorptions) occurring at different wavelengths which indicated the presence of C – H, O – H, C – O, C= O, =C-H and C – N (only with S.longipedunculata).

Conclusion: The order of the total phytochemicals detected in this study was phenolics>tanins>alkaloids>saponins>proteins>flavonoids>quinones>polysteroids>ascorbic acid, The leaves was richest in tannin, alkaloids, phenolics polysteroids, quinones and ascorbic acid while the roots accumulated highest levels of saponins, flavonoids, and proteins.

Key words: *Phytochemicals, P. thonningii, S. latifolius, S.longipedunculata, E.senegalensis, Pankshin.*

1. INTRODUCTION

Plant materials are widely use in traditional systems of medicine in several communities of the developing world as the only resources available for the treatment of different infections [1]. Traditional folk remedies from plants have always guided scientists to search for new medications in order to maintain and promote healthy life for human and animals [2, 3]. Modern-day pharmacopoeia contains at least 25% drugs derived from plants and many others, which are synthetic analogues, built on prototype chemical substances isolated form plants [4]. Involvement in medicinal plants as a re-budding health assistance was due to the rising charges of prescription drugs in the safeguarding of human health and the bio

prospecting of new plant derived drugs. In some Asian and African countries, 80% of the population depends on traditional medicine for primary healthcare and more than 100 countries have regulations for herbal medicines [5]

P. thonningii (Ngas = chit) is a commonly consumed herb that has been reported to promote reduction in blood lipids. The tree is perennial in nature and the petals vary from white to pink in color and are produced between November and April. The plant is used to treat wounds, ulcers, gastric/heart pain, gingivitis, and as an antipyretic. In Tanzania and Zimbabwe, a cough remedy is prepared from the root bark which also exhibits significant anti-inflammatory/analgesic activity [6, 5].

Securidaca longepedunculata Fres (Ngas = Wuzalem) is a savanna grown medicinal herb or shrub. The plant has twisted bole or slender erect branches that grow up to 30ft high. It is found in various parts of Western, Northern and Eastern Nigeria, Malaysia, Guinea, Cuba and several Asian countries. *S. longipedunculata* Fresen (Polygalaceae) is a multi-purpose plant with a long history of use in African traditional medicine to treat various sexually transmitted infections, hernias, coughs, fever, ascariasis, constipation, headaches, rheumatism, stomach ache, malaria, tuberculosis, pain, epilepsy, pneumonia, skin infections, and it is also used as an aphrodisiac for men [7].

Sarcocephalus latifolius (Ngas = Nying) is a savannah tree or shrub that can grow up to 12m high, with a twisted bole up to 30 cm in diameter, a spreading open crown with a flexible entangled branches.. The stem is cracked dark grey brown with fibrous reddish slash. It is multi-stemmed and has an open canopy flowers with terminal spherical head like cymes of small whitish flowers. The fruit is a syncarp, the individual fruits being fused together into a fleshy mass with characteristic pitted surface. Traditional medicinal purposes of *Sarcocephalus latifolius* include the treatment of tooth decay, jaundice, indigestion, hernia, wounds, swellings, leprosy, syphilis, fever, malaria, constipation and kidney failure [8,9].

E. senegalensis (Ngas = Khorr) is a common tree in rural areas. It is known for its medical uses and beauty as well as for hedging. It is a perennial tree growing up to 5-15m tall. The branches and bark are rough and with slightly hooked spines measuring about 10mm long [10]. The reported diseases for which *E. senegalensis* is used by the traditional healers include amenorrhea, malaria, jaundice, infections, abortion, wound, and body pain (chest pain, back pain, abdominal pain etc) [11].

Pankshin District abounds with diverse plants and natural resources. About 90 percent of medicinal plants are found growing wild in different parts of the area. The medicinal plants found in various parts of the District are lumbered and sold locally for fuel. With the current trends of the high depletion of plant resources and little is known about most of the plant species, there is need to document the medicinal flora of indigenous communities [12].

2. MATERIALS AND METHODS

2.1 Plants collection

The plants were collected from their natural habitat of Pankshin Local Government Council of Plateau State, Nigeria. The samples were identified at the herbarium section of the College of Forestry, Jos. The plant samples were washed under running tap water, air dried in a shade at room temperature, milled well into a fine powder using a mixer grinder and sieved to give particle size of 50-150mm then stored in air tight containers for extraction.

2.2 Chemicals

The entire chemicals used in the present study were of analytical grade.

2.3 Preparation of plant extracts

Homogenized fine powders of leaf, bark and root for each plant were separately soaked in different conical flasks containing distilled water and organic solvents (99% ethanol and hexane) at a 40% (v/v) and were allowed to stand for an hour on a water bath with occasional shaking and each sample extract was obtained using Soxhlet apparatus [13].

2.4 Qualitative and quantitative determinations of phytochemicals

The presence and concentrations of tannins, saponins alkaloids, flavonoids, phenolic, polysteroids, proteins, quinones and ascorbic acid of the plant were determined by the methods described by 14, 15, 16.

2.5 Fourier transforms infrared spectroscopy (FT-IR) spectra analysis

Dried powder of the plant extracts was used for FT-IR analysis. The dried extract powder was encapsulated in 100 mg of KBr pellet, in order to prepare translucent sample discs. The powdered sample of each extracts was loaded on a Universal ATR sampling accessory infrared spectrophotometer. The ATR inspecting gadget used was a DuraSample IR single-pass jewel covered inner reflection adornment (Smiths Detection, Danbury, CT,USA) and a predictable contact weight was connected by method for a hardened steel bar and an electronic load show. The information retrieved was taken to ensure that the window (2 mm in measurement) of the ATR testing device was secured totally by fiber. FT-IR spectra of the extracts were recorded at room temperature (25 ± 2 °C. a scan range from 550 to 4000 cm^{-1} at a resolution of $4cm^{-1}$ was used while the number of scans per sample was four [17, 18].

2.6 Statistical analysis

All data were expressed as mean ± standard deviations. Analysis of variance (ANOVA) at p = 0.05 was performed by SPSS version 23. A post hoc test (Turkey) was carried out when the differences shown by data were significant (p = 0.05)

3. RESULTS AND DISCUSSION

The biologically active compounds of the plants were qualitatively and quantitatively analyzed from the extracts of the leaves, bark and roots and the results are displayed in Tables 1- 3 below.

Table 1: **Results of the qualitative phytochemical screening of the ethanolic extracts from *Piliostigma thionnjii, S. longepedunculata Fres. S. latifolius* and *E. senegalensis'* organs**

	Piliostigma thionnjii			*S. longepedunculata Fres.*			*S. latifolius*			*E. senegalensis*		
Phytochemicals	Leave	Bark	Roots	Leaves	Bark	Roots	Leaves	Bark	Roots	Leaves	Bark	Roots
Tannins	++	+	+++	+++	++	++	+++	++	++	+++	++	++
Saponins	++	++	++	++	++	++	++	++	+++	++	++	++
Alkaloids	++	+++	+++	++	+++	++	+++	++	++	++	++	+++
Flavonoids	++	+	++	+	++	++	++	+	+	++	+	+
Phenolics	+++	+++	+++	+++	+++	+	+++	+++	+++	+++	+++	+++
Polysteroids	+	+	+	+	+	+++	++	+	+	+	+	+
Proteins	+	+	+	++	+	+	+	+	+	++	+	+
Quinones	+	+	++	+	+	+	+	+	+	+	+	+
Ascorbic acid	++	-	-	+	-	-	+	-	-	+	-	-

Key: *+ = slightly present.* *++ = Present.* *+++ = Highly Present.* *-- = Absent*

The results of qualitative phytochemical analysis of ethanolic extracts of leaves, barks and roots of *P. thionnjii, S. longepedunculata Fres, S. latifolius* and *E. senegalensis*' is shown on Table 1 above. The result revealed that the leave extracts of the plants contained slight levels of polysteroids (except in S. latifolius that was moderate), proteins (except in S. longepedunculata Fres and E. senegalensis that were moderate), and quinones, ascorbic acid in all the leaves (except in P. thionnjii with moderate ascorbic acid); moderate levels of tannins in P. thionnjii (but high presence in the leaves of other plants analyzed), saponins, alkaloids and flavonoids in all leave samples (except the high presence of alkaloids in S. latifolius and slight presence of flavonoids in S. longepedunculata Fres); but phenolics were highly detected in the leaves of all the samples.

The bark indicated slight levels of tannins in P. thionnjii (but moderate in other bark samples), polysteroids, protein and quinones in all the samples analyzed; moderate presence of flavonoids in S. longepedunculata Fres (but slightly present in other samples), saponins in all the bark samples; high levels of alkaloids (except in the bark of S. latifolius and E. senegalensis) and phenolics while ascorbic acid were not detected in all the bark samples in the analyses.

The roots have high quantities of tannins in P. thionnjii (but moderate in other root samples), alkaloids in P. thionnjii and E. senegalensis (but moderate in S. longepedunculata Fres ,and S. latifolius), phenolics (except that slight presence was detected in S. longepedunculata Fres); moderate presence of saponins were detected in all the root samples (except high content was in S. latifolius), flavonoids in P. thionnjii, and S. longepedunculata Fres (but slight presence was detected in S. latifolius and E. senegalensis), quinones in only P. thionnjii (but others indicated slight presence); slight presence of polysteroids and protein were indicated in all the root samples but ascorbic acid were not also detected in the root as in the bark.

Table 2: Results of the quantitative phytochemical screening of the ethanolic extracts (g/100g) from Piliostigma thionnjii, S. longepedunculata Fres. S. latifolius and E. senegalensis' organs

	Piliostigma thionnjii			S. longepedunculata Fres.			S. latifolius			E. senegalensis		
	Leave	Bark	Roots	Leaves	Bark	Roots	Leaves	Bark	Roots	Leaves	Bark	Roots
Tannins	3.12±0.02[a]	0.14±0.01	0.54±0.02	0.25±0.01[a]	1.20±0.03	2.75±0.02	3.18±0.02[a]	0.12±0.01	0.15±0.01	0.53±0.02	0.75±0.02	3.15±0.01 [a]
Saponins	0.81±0.01	0.29±0.1	0.61±0.02	0.28±0.01	0.62±0.01	0.25±0.01	0.320.01	0.32±001	0.75±0.01	0.39±0,02	0.35±0.02	0.580.03
Alkaloids	0.91±0.01	2.25±0.01	2.63±0.02	3.51±0.02	1.95±0.02	0.45±0.01a	0.21±0.01	0.25±0.01	0.52±0.03	2.45±0.02 [a]	0.63±0.03	0.37±0.03
Flavonoids	0.25±0.02	0.17±0.01	0.25±0.02	0.13±0.01	0.22±0.01	0.15±0.01	0.24±0.02	0.15±0,01	0.14±0.02	0.15±0.01	0.31±0.01	0.52±0.03
Phenolics	13.25±0.10	10.42±0.02	8.62±0.02	10.15±0.30	8.57±0.02	9.55±0.01	11.42±0.05	11.6±0.02	13.52±0.03	9.15±0.02	8.95±0.03	8.750.05
Polysteroids	0.12±0.01	0.13±0.01	0.14±0.01	0.21±0.01	0.16±0.01	0.13±0.01	0.12±0.01	0.12±0.01	0.15±0.02	0.12±0.01	0.15±0.01	0.13±0.01
Proteins	0.23±0.01	0.58±0.01	0.63±0.01	0.02±0.02	0.27±0.03	0.35±0.01	0.15±0.01	0.37±0.02	0.28±0.02	0.35±0.02	0.61±0.02	0.42±0.02
Quinones	0.13±0.01	0.15±0.02	0.12±0.01	0.25±0.02	0.21±0.01	0.14±0.01	0.15±0.01	0.23±0.01	0.35±0.01	0.45±0.01	0.25±0.02	0.12±0.02
Ascorbic acid	0.22±0.01	ND	ND	ND	0.12±0.01	0.15±0.01	0.12±0.01	ND	ND	0.01±0.01	0.01±0.01	0.21±0.01

The results obtained from the quantitative analysis from the ethanolic extracts of all the selected four medicinal plants had shown different accumulation of the phytochemicals in the organs of the plants and plant type (Table 2). The highest amount of tannins (3.18g/100g) was reported in *S. latifolius* leave and least amount (0.12g/100g) was observed in the bark of the same plant. In natural medicine, the tannin-containing plant extracts are used as astringents, against diarrhoea, as diuretics, against stomach and duodenal tumours, and as antiinflammatory, antiseptic, antioxidant and haemostatic pharmaceuticals [19]. The highest amount of saponins (0.81g/100g) was reported in *P. thonningii* leaves and least amount (0.28 g/100g) was observed in S*.longipedunculata* leave. Saponins from plants sources are responsible for some pharmacological effects like anti-inflammatory, molluscicidal, antimicrobial, antispasmodic, antidiabetic and anticancer, hypocholesterolemic, andtioxidant, anticonvulsant and analgesic, anthelmintic, antitussive and cytotoxic activities. Generally, saponins are toxic, but consumption of saponins by human beings may be beneficial in reducing heart disease (by binding of saponins with plasma membrane and cholesterol) [20].

S.longipedunculata leave accumulated the highest amount of alkaloids (3.51 g/100g) and least amount (0.21 g/100g) was observed in *S. latifolius'* leave. Alkaloids have many pharmacological activities including antihypertensive effects (many indole alkaloids), antiarrhythmic effect (quinidine, spareien), antimalarial activity (quinine), and anticancer actions (dimeric indoles, vincristine, and vinblastine). Some alkaloids have stimulant property as caffeine and nicotine, morphine which are used as analgesic and quinine as the antimalarial drug [19, 21].

The total flavonoid contents (0.52g/100g) of dry weight) were found maximum in *E.senegalensis* leave and the least (0.13g/100g) were observed in *S.longipedunculata* leave. Flavonoids have been reported to exert multiple biological property including antimicrobial, cytotoxicity, anti-inflammatory as well as antitumor activities but the best-described property of almost every group of flavonoids is their capacity to act as powerful antioxidants which can protect the human body from free radicals and reactive oxygen species [19].

The phenolic compounds presented the highest concentrations (13.52g/100g) in S. latifolius roots and lowest (8.57g/100g) in *S.longipedunculata* bark. Many epidemiological studies have shown that the consumption of phenolics-rich foods is associated with the prevention of chronic diseases. In addition to their antioxidant properties, these compounds have been reported to be potential candidates in lowering cardiovascular diseases, anticarcinogenic, antiallergenic, antiarthrogenic, antiinflammatory, antimicrobial and antithrombotic effects [22].

The result quantitative analysis of ethanolic extract for the polysteroids indicated that, S.longipedunculata leave had the highest amount (0.21g/100g dry weight) with *P. thonningii* leaves and *E.senegalensis* having the lowest (0.12g/100g dry weight). Steroids in plants have been shown to exhibits analgesic properties and responsible for central nervous system activities [21]. The concentrations of protein were in the range of 0.02g/100g dry weight in *S .longipedunculata* leave to 0.63g/100g dry weight in *P. thonningii* root. The highest amount (0.45g/100g dry weight) of quinones was reported in *E.senegalensis* .leaves and the least values (0.12g/100g) were observed in *P. thonningii* root and *P. thonningii* root. Finally; ascorbic acid were not detected in many organs but had the highest content (0,22g/100g dry weight) was recorded in *P. thonningii* leaves. Ascorbic acid and many phenolics play dynamic roles in delaying aging, reducing inflammation, and preventing certain cancers. The consumption of plants containing ascorbic acid and phenolics has been recommended by many agencies and health care systems throughout the world [23].

The orders of the total amount of phytochemical in the plants, in organs of plants and plant type obtained in this study were phenolics>tanins>alkaloids>saponins>proteins>flavonoids>quinones>polysteroids>ascorbic acid, P. thonningii leaves>S. latifolius leave> S. latifolius roots>S.longipedunculata leave>E.senegalensis leave> P. thonningii bark> S.longipedunculata root> E.senegalensis root> P. thonningii root> S.longipedunculata bark> S. latifolius bark> E.senegalensis bark and P. thonningii>S. latifolius> S.longipedunculata> E.senegalensis respectively. The highest values of phenolics amongst the phytochemicals considered in the studied area did not agree with the findings of [24] that found alkaloids as the richest in their study. The total contents of the phytochemical analyzed in the leaves, barks and roots indicated that the leave accumulated the highest contents of tannin, alkaloids, phenolics polysteroids, quinones and ascorbic acid while the roots accumulated the highest in saponins, flavonoids, and proteins but the bark was moderate in all. This agreed with the work of [5] that found the isolated and identified substances from the leaves are mainly aldehydes, alkaloids, saponins, terpenes, alcohols, ketone, flavonoids and these components

have various medicinal properties. Different parts of the same plant may synthesize and accumulate different compounds or a different amount of a particular compound due to their differential gene expression, which in turn, affects antioxidant activities and other biological properties of the plant's extracts [25]. Also, a number of environmental factors such as climate, altitude, rainfall and other conditions may affect growth of plants which in turn affect the quality of herbal ingredients present in a particular species even when it is produced in the same country. These conditions may produce major variations in the bioactive substances.

3.1 Effects of extracting solvents on the phytochemical contents of the various extracts

The total amount of tannins, Saponins alkaloids, flavonoids, phenolic, polysteroids, proteins, quinones and ascorbic acid contents extracted from S. longipedunculata and S. latifolius F. (l) (roots) by using three solvents is displayed in Table 3. The total tannin, saponins, alkaloids, flavonoids, phenolics, polysteroids protein and quinone contents in the two medicinal plants varied from 1.36 in water to 5.70 g/100g in hexane, 0.40 in water to 7.28 g/100g in hexane, 0.30 in water to 4.44g/100g in hexane, 0.24 in water to 5.15 g/100g in hexane, 16.13 in water to 33.14g/100g in hexane, 0.23 in water to 1.6g/100g in hexane, 0.36 in water to 0.86g/100g in hexane, 0.31 to 0.91 mg g/100g respectively, but ascorbic acid was not detected in hexane to 0.57mg g/100g in water.

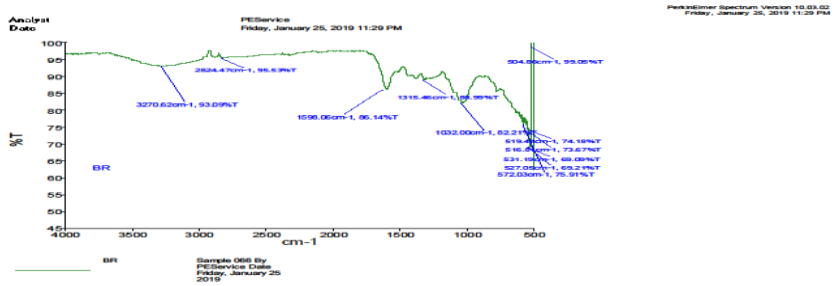
Table 3: Results of quantitative analysis of phytochemicals (g/100g) of *S. longipedunculata* and *S. latifolius* F. (l) (roots) from aqueous, ethanolic and hexane extracts

Phytochemicals/Plant's Type	*S. longepedunculata* Fres.			*S. latifolius*		
	Aqueous	Ethanol	Hexane	Aqueous	Ethanol	Hexane
Tannins	0.11±0.01	0.12±0,01	2.15±0.02a	1.25±0.01	2.75±0.02	3.55±0.01
Saponins	0.25±0.01	0.32±0,01	3.52±0.02a	0.15±0.01	0.25±0.01	3.76±0.01a
Alkaloids	0.15±0.02	0.25±0.01	1.48±0.03a	0.15±0.01	0.45±0.01	2.96±0.0a
Flavonoids	0.120.01	0.15±0,01	3.15±0.01a	0.12±0.01	0.15±0.01	2.00±0.02a
Phenolics	9.51±0.02	11.6±0.02	14.72±0.01	6.62±0.02	9.55±0.01	18.42±0.03a
Polysteroids	0.11±0.02	0.12±0.01	0.75±0.02	0.12±0.01	0.13±0.01	0.85±0.02
Proteins	0.15±0.03	0.37±0.02	0.41±0.02	0.21±0.02	0.35±0.01	0.45±0.02
Quinones	0.16±0.01	0.23±0.01	0.35±0.02	0.15±0.01	0.14±0.01	0.56±0.02
Ascorbic acid	0.32±0.03	ND	ND	0.25±0.01	0.15±0.01	ND

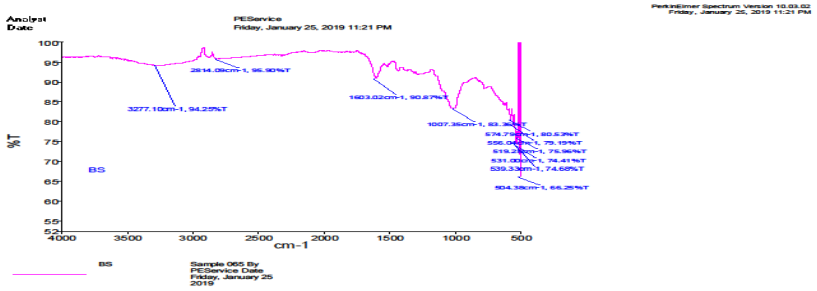
The results showed that the used solvents played important roles in the contents of chemicals and the components. Hexane was identified as the most effective solvent for the extraction compared to ethanol and water resulting to the highest content of all the phytochemical tested except ascorbic acid which was highest with water. This did not agree with the works of [22] who found that, among the four extracts, ethanol extract showed maximum amounts of phenolic content (2.24±0.34 mg/g) and flavonoid content (4.65±0.74 mg/g). This work did not also agree with [17] who confirmed that methanol, a polar solvent, was the best solvent to extract phytochemicals compounds such as phenolic compounds, flavonoids, flavonols, tannins and carotenoids. The solubility of the phytochemicals compounds was mostly influenced by the nature of solvent used and their polarity [25]. Water and ethanol are polar protic solvents, while hexane is non-polar solvent. The recovery of phytochemical from plant could possibly be influenced by dielectric constant, chemical structure of organic solvents, and as well as chemical properties of plant phytochemicals [17]). There were significant differences ($p = 0.05$) in saponins, alkaloids, flavonoids and the phenolics contents in the different extracts of the plants' parts used and the solvent type. Therefore, the plants' extracts demonstrated that, the solubility of phytochemicals compounds is not only dependent on the type of solvent used but also on the plants' parts and type [21].

3.2 FT-IR spectral analysis of extracts

The FTIR spectrum was used to identify the functional groups of the active components based on the peak values in the region of infrared radiation. The FTIR spectrum profile of the ethanolic extracts of leave, bark and root of the four medicinal plants of the study are presented in Figures 1 – 4.



a



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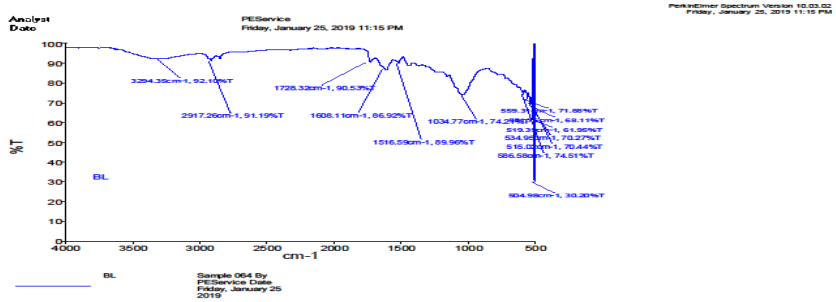
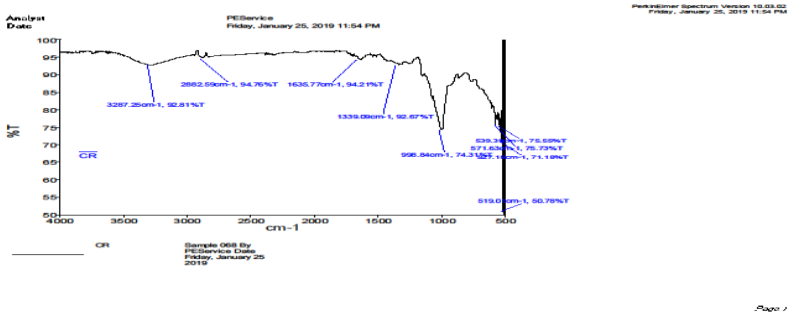
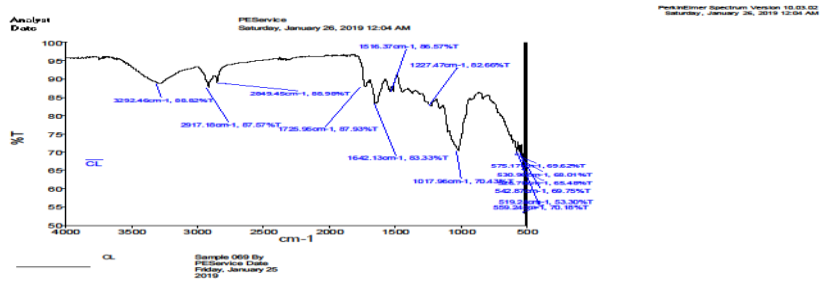


c

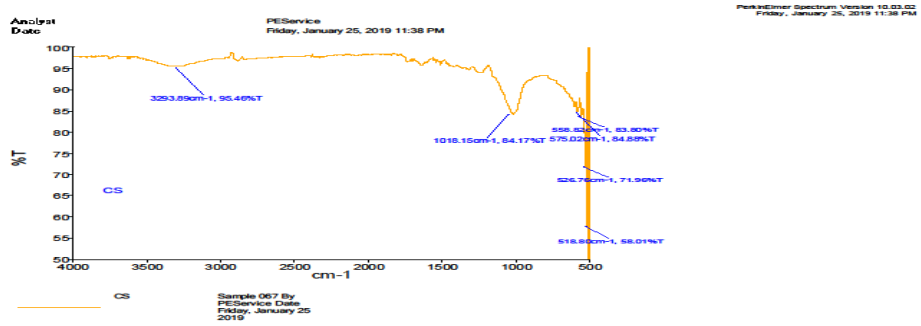
Figure 1: Fourier Transform Infrared (FTIR) Spectra of ethanolic extracts of *Piliostigma thonningii* (a) root (b) bark (c) leaves



d

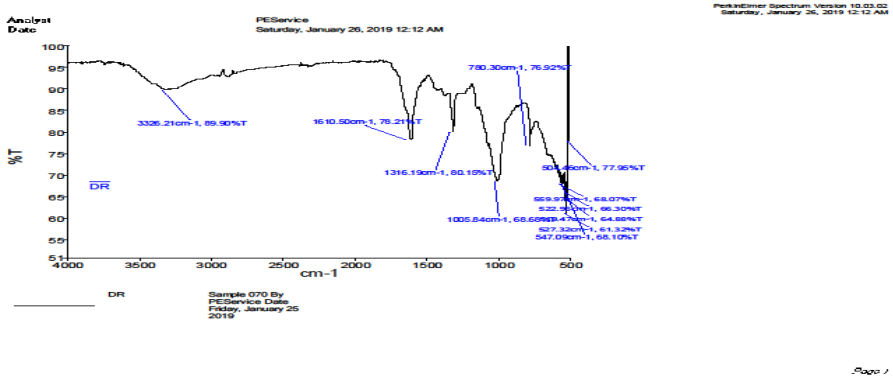


e

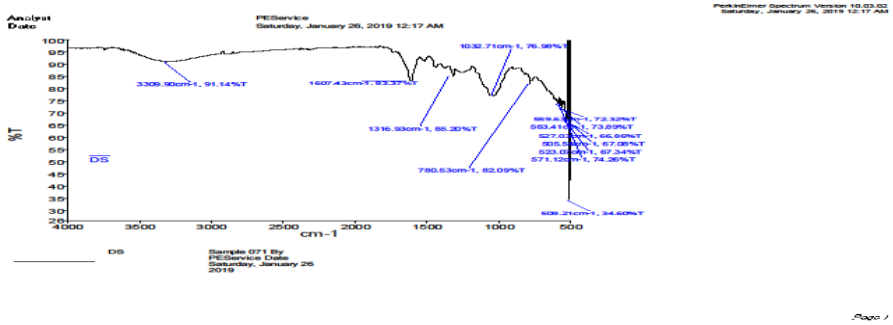


(f)

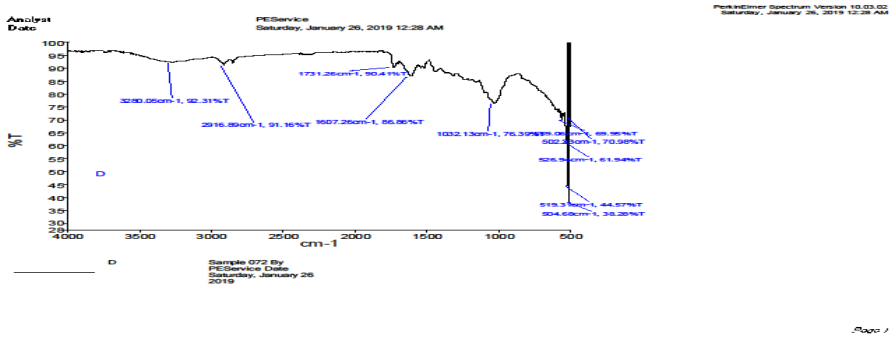
Figure 2: The Fourier Transform Infrared (FTIR) Spectra of the ethanolic extracts of *Securidaca longepedunculata* Fres. (d) Root (e) leaves (c) bark



(g)

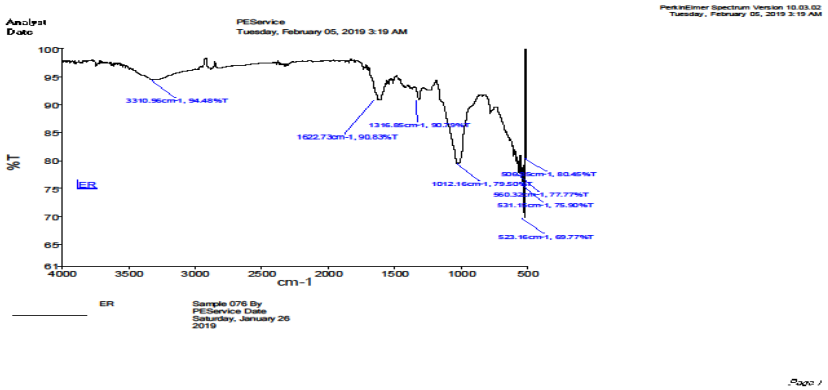


(h)



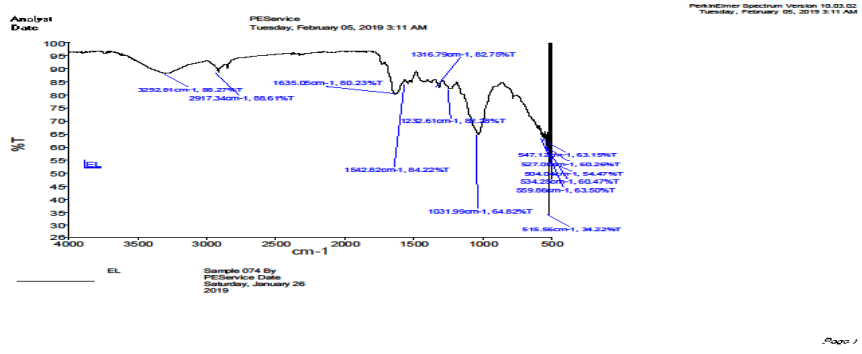
(i)

Figure 3: Fourier Transform Infrared (FTIR) Spectra of *Sarcocephalus latifolius;* (g) root (h) bark (i) leaves



(j)

(k)



(l)

Figure 4: Fourier Transform Infrared (FTIR) Spectra of *Erythrina senegalensis*. (j) root (k) bark (l) leaves

The characteristic bands at 2917.26cm^{-1} (P. thonningii leave), 2917.18cm^{-1} and 2882.59cm^{-1} (*S. longepedunculata* Fres leave and root respectively), 2916.89cm^{-1} (*S. latifolius* Leaves), and 2917.34cm^{-1} (*E. senegalensis* Leaves) could be associated to the C─H symmetric stretching of methylene groups in aliphatic compounds.

Very strong FTIR absorption bands observed with ethanolic extracts of *P. thonningii (*leave*)* at 3294.35cm^{-1}, 3277.1cm^{-1} and 2814.09 (bark) and 3270.62cm^{-1} (root); *S. longepedunculata* Fres extract at 3292.46cm^{-1}, 1018.15cm^{-1} and 3287.25cm^{-1} (leaves, bark and root respectively); *S. latifolius* extract at 3280.05cm^{-1} (leaves), 3309.90 (bark) and 3309.90 (root); *E. senegalensis* extract at 3292.81cm^{-1} (leaves), 3278.15cm^{-1} (bark) and 3310.96cm^{-1} (root) can be assigned to for hydroxyl groups (O-H) indicating the presence of phytochemical carrying hydroxyl group (─OH) of polyphenolics such as, flavonoids and tannins that provide antioxidant activity.

The bands observed in ethanolic extracts of *P. thonningii* at 1728.32cm^{-1} (leave), 1728.32cm^{-1} (bark); *S. longepedunculata* Fres (leave) at 1642.13cm^{-1}, *S. latifolius* (leave) at 1731.26cm^{-1}could be responsible for the stretching vibration of C=O group.

FTIR characteristic bands occurring at 2824.47cm^{-1} in *P. thonningii* (roots) could be due to the stretching =C-H of double bonded compounds. FTIR characteristic bands occurring at 1018.15cm^{-1} in *S. longepedunculata* Fres (bark), *S. latifolius* (bark) at 1316.19cm^{-1} and at 1005.84 cm^{-1} (root); *E. senegalensis* (leave) at 1316.79cm^{-1} and 1232.61cm^{-1} corresponding to the C─O symmetric stretching of acidic groups in the compounds.

The FT-IR spectrum profile of ethanolic extracts of *S. longepedunculata* Fres (Roots) with the characteristic band occurring at 1339.09cm^{-1} could indicate the presence of C - N groups signifying the presence of toxic substances. The various functional groups observed in different extracts reflected the biochemical compositions of *Piliostigma thionnjii, S. longepedunculata Fres., S. latifolius and E. senegalensis'* tissues. The functional groups identified were in agreement with the works of 17 &18

4. CONCLUSION

The order of the total phytochemicals detected in this study was phenolics>tanins>alkaloids>saponins>proteins>flavonoids>quinones>polysteroids>ascorbic acid, The leaves was richest in tannin, alkaloids, phenolics polysteroids, quinones and ascorbic acid while the roots accumulated highest levels of saponins, flavonoids, and proteins. The tannins are used as astringents, against diarrhea, as diuretics, against stomach and duodenal tumors. Flavonoids are known for their capacity to act as powerful antioxidants which can protect the human body from free radicals and reactive oxygen species. Alkaloids have stimulant property as caffeine and nicotine, morphine are used as the analgesic and quinine as the antimalarial drug. Ascorbic acid and many phenolics play dynamic roles in delaying aging, reducing inflammation, and preventing certain cancers. The hexane extract was the richest in the phytochemicals from the plants' tissues followed by ethanol and water was the least. The FT-IR spectrum profile of the leaves, bark and roots extracts of plants indicated characteristic bands corresponding to the C─H, O –H, C=O, C-O, =C-O and –CN reflecting the biochemical compositions of Piliostigma thionnjii.s, S. longepedunculata Fres. S. latifolius and E. senegalensis' tissues.

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CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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