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 in 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 and 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 some of phytochemicals such as tannins, polysteroids, saponins, proteins, alkaloids, flavonoids, polysteriods, quinones and ascorbic acids. The plants' extracts showed that the solubility of phytochemicals compounds dependent not only on the type of solvent used but also on the plants' part compounds present in the plants The order of the phytochemical obtained in this study was phenolics>tanins>alkaloids>saponins>proteins>flavonoids>quinones>polysteroids>ascorbic acid; according to the amount of the phytochemicals in 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 amounts in 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 importance of medicinal plants studied in ethnomedicine may be attributed to the presence of the phytochemical constituents in the plant. These compounds can be harnessed for industrial and pharmaceutical utilization.

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

1. INTRODUCTION

Plant materials are of wide use in traditional systems of medicine, and in several communities of the developing world, are the only resources available for the treatment of different infections (Abubakar et al., 2015). 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 (Nidal, Fatima and Anas, 2015; Kubmarawa, 2009). 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 (Madhu et al., 2016). Involvement in medicinal plants as a re-budding health assistance was due to the rising charges of prescription drugs in the safeguarding of personalized health and well-being and the bio prospecting of new plant derived drug. 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 (Geetha. and Geetha, 2014).

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; this fraction exhibits significant anti-inflammatory/analgesic activity (Ighodaro & Omole, 2012; Geetha. and Geetha, 2014).

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 found in various parts of Western, Northern and Eastern Nigeria, Malaysia, Guinea, Cuba and several Asian countries. Securidaca 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 (Sanusi *et al*., 2015).

Sarcocephalus latifolius (Ngas = Nying) is a savannah tree or shrub up to 12m high, with a twisted bole up to 30 cm in diameter, a spreading open crown with a flexible entangled branches erect then dropping. 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* to include treatment of tooth decay, jaundice, indigestion, hernia, wounds, swellings, leprosy, syphilis, fever, malaria, constipation and kidney failure (Edewor et al., 2015; Magili et al., 2014).

E. senegalensis (Ngas = Khorr) is a common tree in rural areas if 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 (Bunu, Waziri & Umaru, 2018). The main reported diseases for which E. senegalensis was used by the traditional healers are amenorrhea, malaria, jaundice, infections, abortion, wound, and body pain (chest pain, back pain, abdominal pain etc.) (Togola *et al*., 2008).

Pankshin District abounds in diverse plants and natural resources. About 90 percent of medicinal plants are found growing wild in different regions 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 known about most of the plant species, there is need to document the medicinal flora of indigenous communities (Chukwuma & Chigozie, 2016).

2. MATERIALS AND METHODS

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.

Chemicals

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

Preparation of plant extracts

10 grams of homogenized fine powders of leaf, bark and root for each plant were separately soaked in different conical flasks each containing 100 ml of water, ethanol and hexane and were allowed to stand for an hour on a water bath with occasional shaking. These were then kept on rotary shaker at 2000rpm for 24h. Finally, each sample extract was obtained using Soxhlet apparatus (Salem *et al*., 2016; *Madhu et al*., 2016)

Qualitative and quantitative determinations of phytochemicals

The presence and concentrations of tannins, Saponins alkaloids, flavonoids, phenolic, polysteroids, proteins, quinones and ascorbic acid content of the plant were determined by the methods described by Sofowora (1993), Trease and Evans (1989) and Harborne (1973).

Fourier transforms infrared spectroscopy (FT-IR) spectra analysis

FT-IR spectra of extracts were recorded at room temperature on a Universal ATR sampling accessory infrared spectrophotometer. Dried paste of ethanolic extracts were loaded on the sample chamber of FT-IR spectrophotometer at room temperature (25 ± 2 °C) with a scan range from 550 to 4000 cm–1 at a resolution of 4 cm–1.(Felhi et al*.,* 2017.)

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 leaves, bark and roots separately and the results are displayed in Table 1, Table 2 and Table 3 below.

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

	Piliostigma thioninji			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. thioninji.s, 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. thioninji with moderate ascorbic acid; moderate levels of tannins in P. thioninji (but high presence in the leaves of other plants analyzed), moderate 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 only in P. thioninji but moderate in other bark samples, flavonoids indicated moderate presence only in S. longepedunculata Fres but slightly present in other samples, polysteroids, protein and quinones; were slightly present in all the bark samples analyzed, moderate levels were seen of saponins with all the bark samples, highly present 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 of the analyses. The roots have high quantities of tannins only in P. thioninji but moderate in other root samples, high alkaloids contents in P. thioninji and E. senegalensis but moderate in S. longepedunculata Fres ,and S. latifolius, high contents of phenolics in all the root samples except that slight presence was detected in S. longepedunculata Fres, moderate presence of saponins was detected in all the root samples except high content was in S. latifolius; moderate flavonoids presence was detected in P. thioninji, and S. longepedunculata Fres, but slight presence was detected in S. latifolius and E. senegalensis; and moderate presence of quinones in only P. thioninji root sample but others indicated slight presence; slight presence of polysteroids and protein were indicated in all the root samples and 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 thioninji.s, S. longepedunculata Fres. S. latifolius and E. senegalensis' tissues

	Piliostigma thioninji			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 the accumulation of different phytochemicals (Table 2). The highest amount of tannins (3.18g/100g) was reported in S. latifolius leave and least amount of 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 (Saxena *et al*., 2013). The highest amount of saponins (0.81g/100g) was reported in P. thonningii leaves and least amount of 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) (Gnanaraja *et al.*, 2014).

S.longipedunculata leave accumulated the highest amount of alkaloids (3.51 g/100g) and least amount of 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), andanticancer actions (dimeric indoles, vincristine, and vinblastine). Some alkaloids have stimulant property as caffeine and nicotine, morphine are used as the analgesic and quinine as the antimalarial drug (Saxena et al., 2013, Olatunde & Mohammad, 2014).

The total flavonoid contents were found maximum in E.senegalensis leave as 0.52g/100g of dry weight and the least values of flavonoids were observed in S.longipedunculata leave (0.13g/100g). 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 (Saxena et al., 2013).

The phenolic compounds presented the highest concentrations of 13.52g/100g in S. latifolius roots and lowest of 8.57 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 (Soni *et al*., 2014). When the ethanolic extract was quantitatively determined for the polysteroids, S.longipedunculata leave showed the highest amount of 0.21g/100g dry weight with P. thonningii leaves and E.senegalensis leave reported 0.12g/100g as the lowest. Steroids in plants have been shown to exhibits analgesic properties and responsible for central nervous system activities (Olatunde and Mohammad, 2014). The concentrations of protein were in the range of 0.02 in S .longipedunculata leave- 0.63g/100g in P. thonningii rootg/mg. The highest amounts of quinones was reported in E.senegalensis root of 045g/100g of dry weight and the least values of quinones are observed

in C. tinctorium leaves (0.11g/100g). Finally the concentrations of ascorbic acid were not detected in many tissues - 0,22g/100g in P. thonningii leaves. Ascorbic acid and many phenolics play dynamic roles in delaying aging, reducing inflammation, and preventing certain cancers. Increasing the consumption of fruits and vegetables has been recommended by many agencies and health care systems throughout the world (Ammar *et al.*, 2017) The order of the phytochemical obtained in this study was phenolics>tanins>alkaloids>saponins>proteins>flavonoids>quinones>polysteroids>ascorbic acid, according the amount in tissues of 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 amount in plants was P. thonningii> S. latifolius> S.longipedunculata> E.senegalensis. The high values of phenolics in the area contradicted the findings of Khalid *et al*., 2017 with alkaloids being phytochemicals with highest values. 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 highest in saponins, flavonoids, and proteins and bark was moderate in all the concentrations of the phytochemicals. This agreed with the work of Geetha and Geetha, 2014 that found the isolated and identified substances from the leaves are mainly aldehydes, alkaloids, saponin, terpenes, alcohols, ketone, flavonoids and these components have various medicinal properties. Different parts of the same plant may synthesize and accumulate different compounds or different amounts of a particular compound due to their differential gene expression, which in turn, affects antioxidant activities and other biological properties of the plant extracts (Iloki - Assanga *et al,* 2015). 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

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 by using three solvents is displayed in Table 2. The total tannin, saponins, alkaloids, flavonoids, phenolics, polysteroids protein, quinone, contents in the two medicinal plants varied from 3.02 in water to 8.65 g/100g in hexane, 0.63 in water to 11.43 g/100g in hexane, 1.64 in water to 7.21g/100g in hexane, 0.36 in water to 6.92 g/100g in hexane, 21.58 in water to 49.59g/100g in hexane 0.35 in water to 3.25g/100g in hexane, 0.47 in water to 1.51g/100g in hexane, 0.46 to 1.62 respectively, but ascorbic acid was not detected in hexane to 0.77mg g/100g in water.

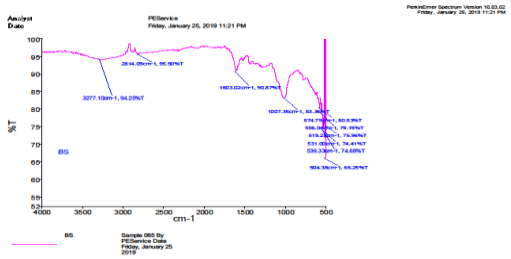
Table 3: Results of quantitative analysis of phytochemicals (g/100g) of S. longipedunculata and S. latifolius F. (l) (roots) from aqueous, ethanolic and hexane extracts

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	9.55259±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 Soni *et al*., 2018 who found that, among the four extracts, ethanol extract showed maximum amount of phenolic content (2.24±0.34 mg/g) and flavonoid content (4.65±0.74 mg/g). This work does not also agree with Felhi *et al*., 2017 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 (Iloki - Assanga *et al*., 2015). Water and ethanol are polar protic solvent, 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 phytochemical (Felhi *et al*., 2017). There were significant differences (p = 0.05) in spooning, alkaloids, flavonoids and the phenolics contents in the different extracts of the plant part 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' part compounds present in the plants (Olatunde & Mohammad, 2014).

The FT-IR spectrum has proven to be a valuable tool to identify the functional group of the active components.

(a)



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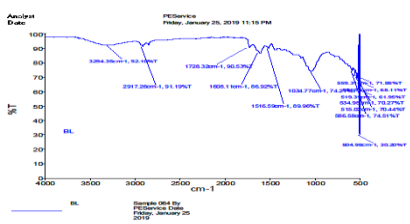
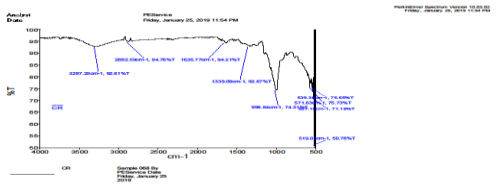


(c)

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



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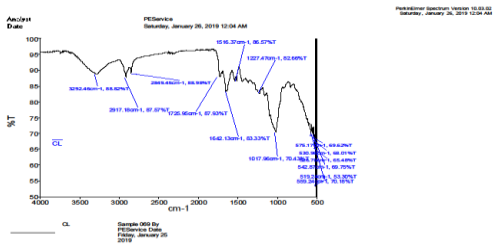

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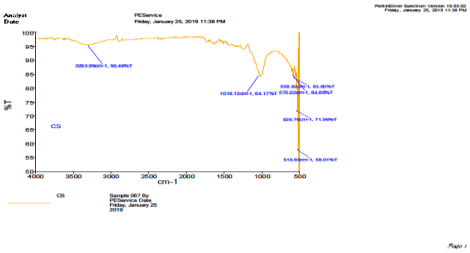
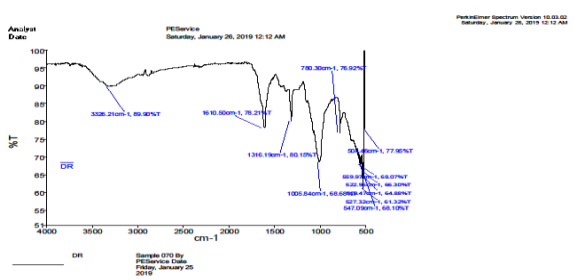
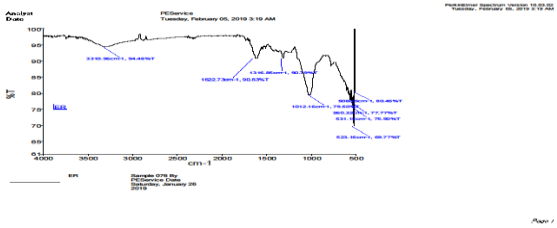


(f)

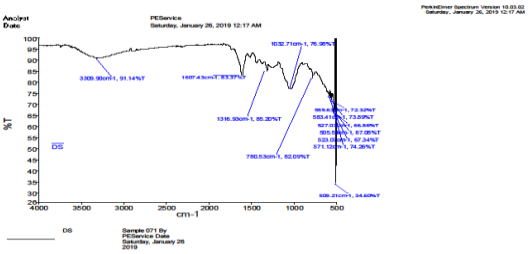
Figures 2 d – f: Fourier Transform Infrared (FTIR) Spectra of ethanolic extracts of *Securidaca longepedunculata* Fres. (d) Root (e) leaves (c) bark



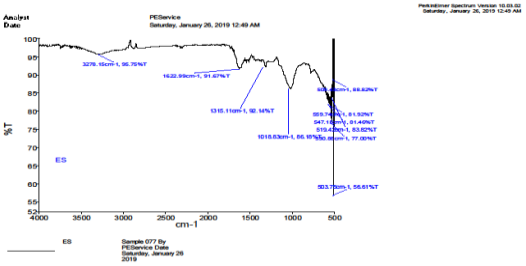
(g)



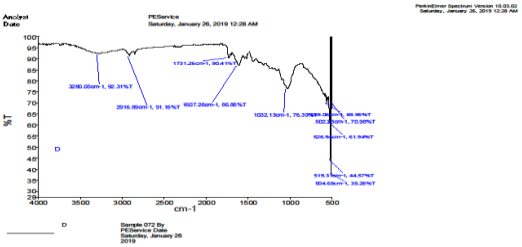
(j)



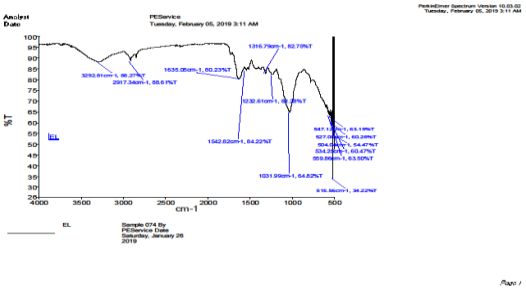
(h)



(k)



(i)



(l)

Figurea 3 g – l: Fourier Transform Infrared (FTIR) Spectra of *Sarcocephalus latifolius.* (g) root (h) bark (i) leaves

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

The FT-IR spectrum profile (Figures 1a - 4l) of the leaves, barks and roots extracts. 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) corresponds to the C─H symmetric stretching of methylene groups in aliphatic compounds. Very strong FTIR absorptions observed with *P. thonningii* ethanolic leave extract 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} for 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} for hydroxyl groups (─OH) indicating the presence of phytochemical carrying hydroxyl group (─OH) of polyphenolic such as, flavonoids and tannins provide a relative ranking of extracts in term of antioxidant activity. The bands observed in ethanolic *P. thonningii* extract at 1728.32cm^{-1} (leave), 1728.32cm^{-1} (bark); *S. longepedunculata* Fres (leave) at 1642.13cm^{-1}, ethanolic *S. latifolius* (leave) extract at 1731.26cm^{-1}, is responsible for the stretching vibration of C=O group. *P. thonningii* (roots) FTIR characteristic bands occurring at 2824.47cm^{-1} is (=C-H) stretching of double bonded compounds. FTIR characteristic bands occurring at 1018.15cm^{-1} *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 *S. longepedunculata* Fres (Roots) ethanol extracts, a characteristic band occurring at 1339.09cm^{-1}indicates that C - N groups in root extracts which means that *S. longepedunculata* Fres root extracts contain some toxic substances. The various functional groups observed in different extracts reflected the biochemical compositions of *Piliostigma thioninji.s, S. longepedunculata Fres. S. latifolius and E. senegalensis'* tissues. The functional groups identified were in agreement with the works of Felhi *et al.,* 2017.

4. CONCLUSION

In the present study tannins, saponins, alkaloids, flavonoids, phenolics, polysteroids, proteins, quinones and ascorbic acid were identified present in the plants' tissues. 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 thioninji.s, S. longepedunculata Fres. S. latifolius* and *E. senegalensis'* tissues.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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