International Journal of Chemical Research and Development
www.chemicaljournal.in
Online ISSN: 2664-6560; Print ISSN: 2664-6552
Received: 04-11-2018; Accepted: 06-12-2018; Published: 06-01-2019
Volume 1; Issue 1; 2019; Page No. 12-14

Phytochemical screening of active compounds of selected medicinal plants used by Kalenjin community, Uasin Gishu County, Kenya

Barmao Abigael[1*], Matasyo Lexa G[2], Tarus Paul K[3]
[1, 2] Department of Biological Sciences, University of Eldoret, Kenya
[3] Department of Chemistry and Biochemistry, University of Eldoret, Kenya

DOI: https://doi.org/10.33545/26646552.2019.v1.i1a.4

Abstract
Phytochemicals are the most important sources for the treatment of various diseases. Therefore, the present study sought to determine phytochemical constituents of two medicinal plants by qualitative analysis. Proteins, carbohydrates, tannins, terpenoids, anthraquinones, diterpenes, phenols, phytosterols, saponins, phlobotannins, and alkaloids were analysed. Carbohydrates, tannins, anthraquinones, phytosterols, saponins alkaloids and trace terpenoids were present in *Fuerstia africana*. On the other hand, *Rubia cordifolia* showed the presence of tannins with traces of phytosterols, saponins and alkaloids. The study therefore concluded that *Fuerstia africana* has high healing potential.

Keywords: phytochemicals, medicinal plants, active compounds

1. Introduction
Medicinal plants have been of age long remedies for human diseases since they contain components of therapeutic value [1]. Plants have designed the basis of classy traditional medicine practices that have been used for thousands of years by people globally and particularly in China, India and many other countries [2].

Plant chemicals are regarded as secondary metabolites because the plants that manufacture them may have little need for them. They are synthesized in all parts of the plant body; bark, leaves, stem, root, flower, fruits, seeds etc. i.e. any part of the plant body may contain active components [3]. These chemicals work with nutrients and fibers to form an integrated part of defense system against various diseases and stress conditions [4]. These chemical substances are called secondary metabolites. The most important of these bioactive groups of plants are alkaloids, terpenoids, tannins, saponins and phenolic compounds [5]. Correlation between the phytoconstituents and the bioactivity of plant is desirable to know for the synthesis of compounds with specific activities to treat various health ailments and chronic disease as well [3]. Generally, the presence of different phytochemicals in crude plant extracts has been linked to the detrimental effects of leachates, root exudates or decomposing residues of such plants on the other vegetation or succeeding crops [6].

Today, there is growing interest in chemical composition of plant based medicines. Several bioactive constituents have been isolated and studied for pharmacological activity. During the last two decades, the pharmaceutical industry has made massive investment in pharmacological and chemical researches all over the world in an effort to discover much more potent drugs, rather, a few new drugs. Some plants have successfully passed the tests of commercial screenings.

Owing to the significance in the above context, phytochemical screening of plants is the need of the hour in order to discover and develop novel therapeutic agents with improved efficacy. Phytochemical analysis of two plants commonly used by Kalenjin traditional healers within Uansin Gishu County was done.

2. Materials and methods
2.1 Collection of plant materials
Fresh leaves, stems and flowers of *Rubia cordifolia* & *Fuerstia africana* were collected from Chepkoilel Kuinet area in September 2014 and January 2015. They were identified by a botanist and voucher specimen numbers deposited in the university herbarium.

2.2 Preparation of extracts
The plant material was harvested, washed and air dried under a shed. Upon drying it was crushed by a mill into powder form. The plant powder was then dissolved into methanol and left to soak for 48 hours. This was filtered using whatmann filter paper. The filtrate was rotor vaporized with the water bath set at 45 ^{0} C to enable methanol to vaporize leaving the extract behind. The final crude extract was allowed to stand open at room temperature where the alcohol vaporized to leave the crude extract. The sample obtained was subjected to phytochemical analysis.

Methanol was chosen as the solvent for extraction because, though it is not the best choice but because it is more polar than ethanol. It is also easier to remove from the final extract compared to ethanol. It was also chosen because it is polar like water which is used in most medicinal preparations.

2.3 Determination of the phytochemical composition
Chemical tests were carried out on the methanolic crude extracts of the two medicinal plants using standard procedures to identify the constituents as described by Adetuyi [7] and Edeoga *et al*. [8] Presence of the compounds was identified by specific colour

changes. The results were reported as (+) for presence and (-) for absence.
Terpenoids (Salkowski test): Approximately 0.2 g of the extract of the sample was mixed with 2ml of chloroform and concentrated H_2S0_4 (3 ml) was carefully added to form a layer. A reddish brown colouration of the interface was formed to indicate positive results.

Alkaloids (Dragondorff's Test): About 0.2 g of the extracts was warmed with 2% H_2S0_4 for two minutes. It was filtered and few drops of Dragondorff's reagent were added. Orange red precipitate indicates the presence of alkaloids.

Tannins *(Braymer's Test)*: Small quantity of extract was mixed with water heated on water bath. The mixture was filtered and ferric chloride was added to the filtrate. Positive tests were confirmed by a characteristic dark green or blue – green colouration.

Phenols (Liebermann's test): To 1ml of extract add 1ml of sodium nitrite, few drops of diluted sulphuric acid and 2ml of diluted NaOH. Appearance of deep red or green or blue colour indicates presence of phenol.

Phlobatannins
A small amount of the sample was dissolved in distilled water and then filtered. The filtrate was then boiled in 2% Hydrochloric acid; a red precipitate indicates presence of phlobatannins [8].

Sterols
The sample was treated with 50% acetic anhydride in sulphuric acid and then heated on a Bunsen flame. Colour change to brown then green indicated presence of sterols.

Saponins (Frothing test): About 5 mL distilled water was added to 200 mg plant material. 0.5 mL filtrate was diluted to 5 mL with distilled water and shaken vigorously for 2 minutes. Formation of stable foam indicates the presence of saponins.

Detection of Proteins & Amino acids (Biuret test): To 0.5 mg of extract equal volume of 40% NaOH solution and two drops of one percent copper sulphate solution was added. The appearance of violet colour indicates that the presence of protein.

Detection of Carbohydrates: About 0.5mg extracts were dissolved individually in five ml distilled water and filtered. The filtrate was used to test the presence of carbohydrates

Detection of Anthroquinones (Borntrager's Test): About 5 mg of the extract was boiled with 10% HCl for few minutes in a water bath. It was filtered and allowed to cool. Equal volume of $CHCl_3$ was added to the filtrate. Few drops of 10% NH_3 were added to the mixture and heated. Formation of pink colour indicates that the presence anthroquinones.

Test for Diterpenes (Copper Acetate Test): The plant extract is dissolved in distilled water and treated with copper acetate solution. Formation of emerald green colour indicates the presence of diterpenes.

3. Results and Discussion

Table 1: Phytochemicals present in active extracts

	PR	CA	TA	TE	ANTH	DIT	PH	PHY	SA	PHL	ALK
Rubia cordifolia	-	-	++	-	-	-	+	-	+	-	+
Fuerstia Africana	-	++	++	+	+++	-	++	-	+++	-	+++

KEY; -Absent, + trace, ++ present, +++ abundant, PR- Proteins, CA – Carbohydrates, TA – Tannins, TE – Terpenoids, ANTH – Anthraquinones, DIT- Diterpenes, PH – Phenols, PHY – Phytosterols, SA – Saponins, PHL – Phlobotannins, ALK - Alkaloids

From the qualitative analysis of the selected the medicinal plants, the presence or absence of proteins, carbohydrates, tannins, terpenoids, anthraquinones, diterpenes, phenols, phytosterols, saponins, phlobotannins, and alkaloids. The results of this study are shown in Table 1.
The result of qualitative analysis of the medicinal plants shows that *Fuerstia Africana* recorded more bioactive compounds than *Rubia cordifolia*. Precisely, carbohydrates, tannins, anthraquinones, phytosterols, saponins alkaloids and traces terpenoids were present in *Fuerstia africana*. On the other hand, *Rubia cordifolia* showed the presence of tannins with traces of phytosterols, saponins and alkaloids.
The present findings could be attributed to the fact that these phytochemicals are known to be biologically active and hence the observed antimicrobial activity. In addition, Kumar *et al.* [9] reported that phytochemicals present in medicinal plants have been found to possess various activities which may help against pathogenic microorganisms. Tannins have been reported to be toxic to filamentous fungi, yeasts and bacteria, steroids also have antimicrobial effects against bacteria causing stomach infections [10]. On the other hand, glycosides have their ability in treating of cardiac disorders [11]. Ademiluyi *et al.* [12] recorded the presence of flavonoids, tannins, saponins and alkaloids in ethanoic leave extract of selected medicinal plants.
Results further reported the presence of saponins, alkaloids, flavonoids phlobatanins, phenolic compounds and terpenoides. Saponins have been reported to possess a wide range of biological activities. The toxicity of saponins to insects (insecticidal activity), parasitic worms (antihelmintic activity), molluscs (molluscicidal), and fish (piscidal activity), and their antifungal, antiviral, and antibacterial activities are well documented [13]. Alkaloids and phlobatanins have their antibacterial affect based on the fact that they help the white blood cells to dispose harmful microorganisms [11]. In addition, Perez *et al.* [14] showed the presence of various phytochemicals such as alkaloids, flavonoids, phenols, steroids and tannins in the crude extract of a group of medicinal plants. Many reports are available regarding anti-viral, anti-bacterial, anti-fungal, anti-helminthic and anti-inflammatory properties of plants [10]. Tannins are known to possess general antimicrobial and antioxidant activities [15]. Recent reports show that tannins may have potential value as cytotoxic and antineoplastic agents [16]. Other compounds like saponins also have anti-fungal properties [15]. Saponins are a mild detergent used in intracellular histochemistry staining to allow antibody access to intracellular proteins. In medicine, it is used in hyper cholesterolaemia, hyperglycemia, antioxidant, anticancer, anti-inflammatory and weight loss, etc. It is also known to have anti-fungal properties [5]. Saponins have been implicated as bioactive

antibacterial agents of plants [11]. Plant steroids are known to be important for their cardiotonic activities, possess insecticidal and anti- microbial properties. Plant derived natural products such as flavonoids, terpenoids and steroids amongst others have received considerable attention in recent years due to their diverse pharmacological properties including antioxidant and antitumor activity. Phenolic phytochemicals have antioxidative, antidiabetic, anticarcinogenic, antimicrobial, antiallergic, antimutagenic and anti-inflammatory [5].

4. Conclusion

It can be concluded that the *Fuerstia africana* is the source of secondary metabolites like tannins, anthraquinones, phytosterols, saponins alkaloids and terpenoids. Due to the presence of these secondary metabolites the plant has high healing potential.

5. References

1. Edeoga HO, Okwu DE, Mbaebie BO. Phytochemical constituents of some Nigerian medicinal plants. African journal of biotechnology. 2005; 4(7):685-8.
2. Sneader W. Drug discovery: a history. John Wiley & Sons, 2005.
3. Kumar S, Pandey AK. Chemistry and biological activities of flavonoids: an overview. The Scientific World Journal, 2013.
4. Kumar A, Ilavarasan R, Jayachandran T, Decaraman M, Aravindhan P, Padmanabhan N, *et al*. Phytochemicals investigation on a tropical plant, Syzygium cumini from Kattuppalayam, Erode district, Tamil Nadu, South India. Pakistan Journal of Nutrition. 2009; 8(1):83-5.
5. Edeoga HO, Okwu DE, Mbaebie BO. Phytochemical constituents of some Nigerian medicinal plants. African journal of biotechnology. 2005; 4(7):685-8.
6. Mubashir S, Shah WA. Phytochemical and Pharmacological Review Profile of Adiantum venustum. International Journal of Pharm. Tech. Res. 2011; 3:827-30.
7. Adetuyi AO, Popoola AV. Extraction and dyes ability potential studies of the colourant in zanthoxylum zanthoxyloides plant on cotton fabric. Journal of Science Engineering Technology. 2001; 8(2):3291-9.
8. Cushnie TT, Lamb AJ. Antimicrobial activity of flavonoids. International journal of antimicrobial agents. 2005; 26(5):343-56.
9. Harborne JB, Williams CA. Advances in flavonoid research since 1992. Phytochemistry. 2000; 55(6):481-504.
10. Ademiluyi AO, Oboh G, Ogunsuyi OB, Oloruntoba FM. A comparative study on antihypertensive and antioxidant properties of phenolic extracts from fruit and leaf of some guava (Psidium guajava L.) varieties. Comparative Clinical Pathology. 2016; 25(2):363-74.
11. Perez C. Antibiotic assay by agar-well diffusion method. Acta Biol Med Exp. 1990; 15:113-5.
12. Mandal PK. Dioxin: a review of its environmental effects and its aryl hydrocarbon receptor biology. Journal of Comparative Physiology B. 2005; 175(4):221-30.
13. De Lucca AD, Cleveland TE, Wedge DE. Plant-derived antifungal proteins.