Annals of Microbiology and Infectious Diseases
Volume 2, Issue 1, 2019, PP 38-42
ISSN 2637-5346

Phytochemical Screening and Analysis of orange-Fleshed Sweet Potato Leaf

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ABSTRACT

The medicinal properties shown by different medicinal plants are due to the phytochemicals present in the plant. These phytochemicals are the most vital sources for the treatment of destructive diseases. Different phytochemicals have an extensive range of activities, which helps to enhance the immune system and give resistance against long term disease to protect the body from harmful pathogens. To screen and analyze the physiochemical compound of orange-flesh sweet potato leaf was the main purpose of this study. The medicinal importance of these plants depends upon the chemically vital and active substances that produce specific physiological action on the human body. Flavoniods, tannins, Steroid, Glycolides, Phenol and alkaloids are the most important bioactive components of plants. Standard procedures were used to test the presence of various phytochemicals. Tannins steroid, terpenoid, cardenolide and glycoside all were found in medicinal plants. Methanolic extracts of powder of leaves were used for the qualitative measurement of various phytochemicals present in these plants. Identification of phytochemicals in medicinal plants is among the first steps in the process of discovering new plant-based drugs. The present study concluded that this medicinal plant has possessed different vital phytochemicals that helps in the medicinal properties of the studied plants commonly used.

INTRODUCTION

Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body (Edeoga et al., 2005). In plants the naturally occurring chemical compounds are phytochemicals. However, the term is generally used to describe chemicals from plants that may enhance health status of organisms, but are not essential nutrients (Srivastava et al., 2011).Because plant based foods are complex mixtures of bioactive compounds, information on the potential health of individual phytochemical is linked to information on the health effects of foods that contain those phytochemicals (Manjula et al., 2009). There is ample evidence to support the health benefits of the diet in the form of fruits, vegetable, legumes, whole grains and nuts (Mojab et al., 2003). Sweet potato is one of the ideal starch staple for food security in Africa (Laban *et al.*, 2015).Sweet potato (*Ipomoea batatas*L.) belongs to family Convolvulaceae and order Polemoniales (Oggema *et al.*, 2007). It is grown around the world in diverse environments, often by small farmers in marginal soils, using low inputs (Amare *et al.*, 2014). It is the third most important crop after potato and cassava in the world and one of the root and tuber crops largely grown in East Africa as staple for rural communities (Laban *et al.*, 2015). In Ethiopia it is mostly cultivated in the southern, southwestern and eastern parts of the country and recognized as the third important crop next to cassava and Potato (Amare *et al.*, 2014). Also, in Nigeria it is

mostly cultivated in the North Central and other part of the North. Although the majority of sweet potato varieties are high in carbohydrates, Orange Fleshed Sweet Potato (OFSP) varieties also provide vitamins A and C (Laban et al., 2015).Deficiency in vitamin A is one of the most prevalent problems and the most common cause of childhood blindness in the developing countries like Nigeria. But among the cheapest and richest sources of vitamin A, OFSP varieties are rich in beta-carotene and are well accepted by young children (Low *et al*., 2007).

The intensity of orange colored flesh in sweet potatoes root indicates the level of beta carotene (Low *et al*., 2001).Therefore, these OFSP varieties could be useful to combat the wide spread VAD that results in blindness and death of250,000-500,000 African children yearly (Workbook and Ogidi, 2014). Hence, this study intends to screen and analyze the physiochemical compound of orange flesh sweet potato leaf.

Material and Methods

Sample Collection

The leaves sample (Orange-fleshed Sweet Potato Leaves) was collected from Agricultural and Rural Training Institute (ARMTI) Ilorin. Thereafter, the leaves sample was tied in a white polyene bag in order to prevent the diffraction of photochemical component present in the plants. The leaf sample was transported to the laboratory where it was rinsed with distilled water and air dried. After then, it was later grinded into powdery form and sieved using 0.50mm sieve size.

Method of Extraction for Qualitative

Determination of phytochemical in orange-fleshed sweet potato leaf sample was extracted using 100ml of methanol and distilled water for 24 h at room temperature. The extract was filtered using number what man filter paper. The filtrate was collected and concentrated with rotary evaporator. The concentrated methanolic and distilled water extracts were subsequently used for qualitative analysis of different phytochemical present in orange-flesh sweet potato leaves. Procedure for Qualitative Phytochemical Analysis of Orange-Fleshed Sweet Potato Leaf.

Test for Tannis

1ml of extract was boiled in 20ml of water in a test and then filtered a few drop of 0.1% ferric chloride was added and observed green or a blue – black coloration which confirms the presence of tannin.

Test for Steroids

2ml of acetic anhydride was added to 2ml of each sample followed by careful addition of 2ml H2SO4. The color changed from violet to blue or green indicating the presence of steroids.

Test for Terpenoids (Salkocoski Test)

5ml of each extracts was mixed with 2ml of chloroform and 3ml concentrated H2So4 was carefully added to form a layer. A redish -brown coloration of the interface was formed to show positive result for the presence of terpenoids.

Test for Cardic Glycosides and Cardenolides (Keller- Killani Test)

5ml of each extracts was treated with 2ml of glacial acetic acid containing one drop of ferric chloride solution. This was underplayed with 1ml of concentrated sulphuric acid. A browning of the interface indicates a deoxysugar characteristic of cardenolodes which confirms a positive presence of cardenolides.

Violet green rings appearing below the browning in the acetic acid layer indicate the positive presence of glycoside.

Test for Chalcones

2 ml of ammonia solution was added to 5 ml of leaf extract and formation of a reddish color confirmed the presence of chalcones.

Test of Phenol

5ml of the extract was pipette into a 30ml test tube, then 10ml of distilled water was added to 2ml of ammonium hydroxide and 5 ml of concentrated mylaconol was also added and left to react for 30min.Bluish-green colour was observedindicating the presence of phenol.

Test for Flavonoids

3ml of aluminium chloride solution was added to 5ml of leaf extract, a yellow coloration was

observed indicating the presence of flavonoids after addition of concentrated H2SO4. A yellow coloration disappeared on standing. The yellow coloration which disappeared on standing indicates a positive test for flavonoids. Test of Phlebatannins Deposition of a red precipitate when 2ml of leave extract was boiled with 17% aqueous hydrochloric acid was taken as evidence for the presence of phlebatannins.

Method of Plant Extraction

Solvent extraction by using soxhlet extraction method, crude plant extract was prepared. In a thimble 20 gram of powdered plant material was loaded and 250 ml solvents were also extracted independently. As a solvent methanol was used. Till the solvent changed to colorless, the process of extraction sustained for 24 hours, in siphon tube of an extractor. Then in a beaker took extract. Then at 30-40°C till all the solvent was evaporated, kept and heated this extract on hot plate. At 4°C in a refrigerator, the dried extract was stored for use in future phytochemical analysis.

Quantitative Analysis of Phytochemicals

Alkaloids

5 g of plants sample are grabbing in a beaker and then solution of C2H5OH and 10% of CH3CO2H of 200 ml is included to plant sample. Encrusted the mixture and allowed it to stand for 4 hours then filtered. In a water bath until it reaches 1/4 of the native volume, extract was enabled to become concentrated then added conc. NH4OH until the precipitation completed. Resolved the whole solution then collect precipitate and wiped with dilute NH4OH and finally filtered. Then dried and weighed the alkaloid which is sublimate.

Flavonoids

10 g of plant sample is frequently separated with 100 ml of 80% aqueous methanol at room temperature. Through filter paper the whole solution is filtered then the filtrate is relocated into a water bath and solution is evaporated into dryness. Weighed the sample until a constant weigh.

Tannins

Quantity of tannins is deliberated by operating the spectrophotometer method. 0.5 g of plant sample is weighed into a 50 ml plastic bottle. 50 ml of distilled is included and agitated for 1 hr. The sample is filtered into a 50 ml volumetric flask and made up to mark. 5 ml filtered sample is then pipette out into test tube and assorted with 2 ml of 0.1 M FeCl3 in 0.1 M HCl and 0.008 M K4Fe(CN)6.3H2O. With a spectrophotometer at 395 nm wavelength within 10 min. measured the absorbance of the sample

Phenols

The quantity of phenols is deliberated operating the spectrophotometer method. Boiled the plant sample for 15 min with 50 ml of (CH3CH2)2O. Added 10 ml of distilled water and 5 ml boiled sample in 50 ml flask. After the introduction of distilled water, in a mixture added 2 ml of NH4OH solution and 5 ml of concentrated CH3 (CH2)3CH2OH. By using a spectrophotometer, the sample is made up to the mark to proceed left for 30 min for color indication and sustained at 505 nm wavelength Result

In qualitative analysis, aqueous and solvent extractions of orange-fleshed sweet potato leaves exhibited presence of seven phytochemical compounds (Table 1) such as tannins, steroids, stepenoid, cardenolide, glycoside, Alkaloids and phlobatannins which are important secondary metabolites.

Table1. *Qualitative Analysis of Orange-fleshed Sweet Potato Leaf*

Parameter	Aqueous Extraction	Methanolic Crude Extract
Tannins	+ +	+ +
Steroid	+	+
Terpenoid	+	+
Cardenolide	+ +	+ +
Glycoside	+ +	- -
Chalcones	-	-
phobatannins	-	-
Alkaloid	-	-

Key++ *(much abundant)* = ++, + *(less abundant)* = +, - *(absent)* = -

Table2. *Quantitative Analysis of Orange-fleshed Sweet Potato Leaf Extract*

Alkaoids	09.3 ± 0.10
Tannins	2.1 ± 0.07
Flavonoids	0.680 ± 0.10
Phenols	0.48 ± 0.08

DISCUSSION

Plant that have biological activities usually contain secondary metabolic which are chemical substance for such activities. It can be deduced that tannins steroid, terpenoid, cardenolide and glycoside are present in the aqueous extraction and methanolic crude extract of the orange-fleshed sweet potato leaves while chalcones, alkaloids and Phlobatannins are absent.

The result obtained from orange-fleshed sweet potato leave extracts shows that the plant was medicinal potential. These phytochemicals are known to be behind the antimicrobial activities, antifungal, anti-allergenic, antispasmodic and anti- inflammatory properties of medicinal plants. The presence of tannins revealed that the extract can be used to prevent cancer by preventing cellular damage and it can also serve as antioxidants to protect heart against disease.

The results shows that steroid also present in the leaf, this indicate that orange-fleshed sweet potato can be used for certain inflammatory conditions such as system vas colitis (inflammation of blood vessels) and myositis (inflammation of muscle) they may also be used selectively to treat inflammatory condition such as rheumatoid arthritis. Also presence of cardenolide indicates that it can be used in treatment of cardiovascular disease. Finally the presence of flavonoid also indicate the particular importance because they posses antioxidant and free radical scavenging activity in food and it can also be used to treat circulatory disease due to the presence of flavonoid.

CONCLUSION

It can be concluded that the source of secondary metabolites like flavonoids, glycosides, tannins steroid, terpenoid, cardenolide alkaloids, phenols and phytosterols are present in the selected medicinal plants which are used in Nigeria. Because of the presence of these secondary metabolites the selected medicinal plants have high healing potential. These phytochemicals render the medicinal values of the studied plants.

CONFLICT OF INTEREST

The authors declared no conflict of interest with anyone.

ACKNOWLEDGEMENT

We thank the Department of Science Laboratory Technology, Osun State College of Technology, Esa-Oke and ARMTI, Ilorin for helping us in this research. We also thank Mr. Olasupo, A.D. and Mr. David Emmanuel for their assistance in the Bench work and Sample collection respectively.

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Citation: *Olagoke, O.V. and Oyewale, O.O " Phytochemical Screening and Analysis of orange-Fleshed Sweet Potato Leaf". Annals of Microbiology and Infectious Diseases 2(1), 2019, pp.38-42.*