©IDOSR PUBLICATIONS International Digital Organization for Scientific Research IDOSR JOURNAL OF BIOLOGY, CHEMISTRY AND PHARMACY 2(1)8-17, 2018.

Phytochemical and Proximate Analysis of *Sphenocentrum jollyanum* Ethanol root Extract and Dry Sample Collected from Ebonyi State, Nigeria

¹Ekpono E. U., ¹Aja P. M., ¹Ugwu Okechukwu P. C., ²Udeozor P. A., ³Clementina Ukamaka Uwa and ⁴Nweke Odinachi Lynda

¹Department of Biochemistry Ebonyi State University, Abakaliki, Ebonyi State.

²Department of Chemical Sciences Evangel University Akaeze, Ebonyi State. ³Department of Biology, Faculty of Science, Federal University Ndufu-Alike, Ikwo, Ebonyi State.

⁴Department of Medical Biochemistry Faculty of Medicine Ebonyi State University Abakaliki.

ABSTRACT

This study was designed to determine the proximate constituents (carbohydrate, protein, moisture, ash, fibre and fat) and quantitative phytochemical constituents (phenols, flavonoids, tannins, alkaloids, terpenoids and steroids) of dry root sample and ethanol root extract of *Sphenocentrum jollyanum* respectively. These were done using well known standard methods. The results revealed the following order of occurrence of phytochemicals (mg/100g): alkaloids > phenols > terpenoids > flavonoids > steroids > tannins and proximate composition (%): carbohydrates > protein > moisture > ash > fibre > fat in the *Sphenocentrum jollyanum* root could be used as nutritional supplement and also would be considered as promising sources of antioxidant phytochemicals.

Keywords: Proximate, Phytochemicals, Sphenocentrum jollyanum and Ebonyi state.

INTRODUCTION

The medicinal plants are useful for healing as well as for curing of human diseases because of the presence of phytochemical constituents [1]. Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables and roots that have defense mechanism and protect from various diseases. Phytochemicals are primary and secondary compounds. Chlorophyll, proteins and common sugars are included in primary constituents and secondary compounds have terpenoid, alkaloids and phenolic compounds [2]. Terpenoids exhibit various important pharmacological activities i.e., antiinflammatory, anticancer, anti-malarial, inhibition of cholesterol synthesis, antiviral and anti-bacterial activities [3]. Terpenoids are very important in attracting useful mites and consume the herbivorous insects [4]. Alkaloids are used as anaesthetic agents and are found in medicinal plants [5].

Plants have been used as sources of food and medicine. The most ancient approach to curing sicknesses and diseases is herbalism [6]. Sphenocentrum jollyanum is a Small, evergreen, dioecious shrub. It is up to 1.5 m tall and sparingly branched. The roots are bright yellow; stem thinly short-hairy when young, later glabrous; bark grey. The Leaves are arranged spirally, but crowded at the end of branches [7]. Flowers solitary on older branches or on stem between the leaves, unisexual, regular; sepals more or less arranged spirally, increasing in size towards the centre, cream-coloured; male flowers sessile, sepals 15-21, outer sepals triangular to ovate-oblong, short-hairy, inner sepals obovate, glabrous outside, $0.5-6.5 \text{ mm} \times 0.5-4 \text{ mm}$, stamens 16-31, erect, free, 1.5-2.5 mm long, filaments inflated; female flowers sessile or with pedicel up to 4 mm long, sepals 9-11 [8]. The Fruit composed of 3-12 drupes, each drupe ellipsoid and changes from yellow to orange at maturity, smooth, fleshy and 1-seeded. Seed with very thin seed coat; endosperm absent; embryo straight,

ellipsoid, 15-18 mm \times 8-9 mm. Seedling with plano-convex cotyledons remaining inside the stone [7].

In indigenous Yoruba language, it is called "Akerejupon". It is also called "Ezeogwu" in Igbo language [7]. It is equally called "Oban Abe" in Edo state, "Adurukokoo" or "Red medicine" in Akan language of Ghana, "Krakoo" in Asante language of Ghana, "Dangbo-Pobè-Niaouli" in Ewe, Eastern of Ghana [9], and Orji-nkoro in Izzi language of Ebonyi State, Nigeria.

Sphenocentrum jollyanum is widely used for medicinal purposes. The plant, mainly the bark, is used as an emetic and purgative, especially when poisoning is suspected [10]. The root is used as an aphrodisiac tonic for men [11]. The sap from chewing sticks made from the root is believed to relieve stomach-ache and constipation, and to boost appetite and sexual drive [11]. The roots are used as a sweetener; they taste sour, but make food eaten thereafter taste sweet. In Côte d'Ivoire the root is pulped into a paste, with salt, fruit of maniguette and palm oil, and the mixture is taken to treat abdominal disorders [11]. Pounded roots are taken to treat high blood pressure. The boiled or pulped roots are given in draught or enema against epileptic fits. In Ghana the pulped roots have been applied to treat breast tumours [11]. In Nigeria a decoction of the root is applied to dress tropical ulcers [11]. A decoction of the

leafy twigs is used as a wash to stop bleeding of wounds, sores and cuts; the wounds are also covered with the powdered bark. Ingestion of crushed leaves curbs spitting of blood [12]. The fruit is edible and is taken against fatigue.

Aim and Objectives

This study was designed to determine the proximate constituents (carbohydrate, protein, moisture, ash, fibre and fat) and quantitative phytochemical constituents (phenols, flavonoids, tannins, alkaloids, terpenoids and steroids) of dry root sample and ethanol root extract of *Sphenocentrum jollyanum* respectively.

MATERIALS AND METHODS Chemicals and Reagents

The chemicals and reagents used were of analytical quality. The chemicals were sourced from May and Baker, England; BDH, England and Merck, Darmstadt, Germany. The reagents used were commercial kits and products of Randox, QCA, USA and Biosystem Reagents and Instruments, Spain.

Biological Materials

Sphenocentrum jollyanum roots were the biological materials used for this study. Fresh roots of Sphenocentrum jollyanum were collected from Aghara-oza Village in Izzi Local Government Area of Ebonyi State and were identified by Prof. S. C. Onyekwelu in the Department of Applied Biology, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria. Part of the identified plant was kept in Applied Biology Department, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria, for reference purposes.

Methods

Preparation of Ethanol Root Extract of Sphenocentrum jollyanum

The fresh plant material was washed and dried at a room temperature (20-25°C) for the periods of four to six weeks and ground to coarse form using electrical blending machine sterilized with ethanol. Part of the coarse form was used for proximate analysis while the rest was macerated in ethanol. The solution was allowed to stand for 3 days after which, the extract was filtered using 0.25 mm sieve cloth. The resulting extract was concentrated via evaporation by allowing it to stand overnight. The concentrated extract of *Sphenocentrum jollyanum* root was then used for the study.

Proximate Analysis of Sphenocentrum jollyanum Coarse Root Sample

Percentage composition of protein, crude fibre, ash, moisture, fat and carbohydrate were determined using the method of [13].

Quantitative Phytochemical Analysis of Ethanol Root Extract of Spenocentrum jollyanum

Determination of Alkaloids, Flavonoids, Glycosides, Terpenoides and Phenols

These were determined according to the method described by [14].

Determination of Saponins

Ekpono *et al*

Ekpono et al

The determination of alkaloid was as described by [15].

Determination of Tannins

This was done according to the method of [16].

Determination of Steroids

This was determined by the method described by [17].

Statistical Analysis

The results were expressed as mean and standard deviation (SD) and data was subjected to one-way Analyses of Variance (ANOVA). Significant differences were obtained at P<0.05. This analysis was estimated using computer software known as Statistical Package for Social Sciences (SPSS), version 18.

RESULTS

The results of proximate constituent of the root of *Sphenocentrum jollyanum* coarse sample showed the presence of fat, protein, ash, moisture, fibre and carbohydrate. The results revealed that carbohydrate (77.26 \pm 4.04 %) was the highest and fibre (2.88 \pm 0.00 %) the lowest among other values. Others were protein (7.35 \pm 0.06 %), moisture (6.37 \pm 0.17 %), ash (3.49 \pm 0.00 %) and fat (2.64 \pm 0.02 %) as shown in Table 1.

results of The the phytochemical constituents of Sphenocentrum jollyanum ethanol root extract showed the presence of phenols, tannins, terpenoids, steroids, flavonoids and alkaloids in the extract sample. The results revealed the following order of of occurrence the phytochemicals of its concentration; alkaloids > phenols > terpenoids > flavonoids > steroids > tannins as shown in Table 2. Glycosides and saponin were not detected in the extract sample.

S/N	Proximate	Composition in %
1	Protein	7.35 ± 0.06
2	Carbohydrate	77.26 ± 4.04
3	Ash	3.49 ± 0.00
4	Fibre	2.88 ± 0.00
5	Moisture	6.37 ± 0.17
6	Fat	2.64 ± 0.02

Table 1: Percentage Proximate Composition of Sphenocentrum jollyanum Root CoarseSample

The results are the mean ± SD of three replicates readings

S/N	Phytochemicals	Composition in mg/100g
1	Alkaloids	3782.64 ± 3.27
2	Phenols	2494.62 ± 0.82
3	Terpenoids	912.12 ± 1.63
4	Flavonoids	856.10 ± 0.82
5	Steroids	55.84 ± 0.82
6	Tannins	9.80 ± 0.49
7	Glycosides	0.00 ± 0.00
8	Saponins	0.00 ± 0.00

Table 2: Phytochemical constituent in mg/100g of *Sphenocentrum jollyanum* ethanol root extract

The results are the mean ± SD of three replicates readings

DISCUSSION

The results of proximate constituent of the ethanol root extract of Sphenocentrum *jollyanum* revealed the presence of fat (2.642%), protein (7.354%), ash (3.494%), moisture (6.366%), fibre (2.882%) and carbohydrate (77.258%) as shown in Table 1. This is in correlation with the work of [18], which reported that proximate composition of Gongronema latifolium and Piper guineese respectively showed the following percentage values: moisture 80±0.35% and 62+0.42%, Ash 14.96±0.5% and 12.83±0.12%, Crude Fibre 7.68±0.1% and 1.616±0.34%, Crude protein 8.40±0.61% and 8.57±0.22%, Crude lipid 60.23±0.44% and 4.13±0.33% and

Carbohydrate 36±0.26% and 51.02±0.67%. This work also agrees with the findings of [19], which reported that dry and wet samples of Talinum triangulare (Water Leaf) leaves contains carbohydrate, steroids, protein, oil content, β -carotene and crude fibre in both sample respectively which also agrees with this current findings. This work equally agrees with the research of [20], which reported that Sphenocentrum jollyanum (Pierre) seed had a moisture content of 25.39%, a moderately high protein content (10.29%) and a Seed ash content of 5.7% comparable to other trees seeds which range from 0.8-22.5%. Although this current finding agrees with the above mentioned reports, but there are differences in the ranges of the results, this variation in the values could be as a result of different locations in which the plants were collected or may be attributed to the part of the plant or species of the plant used.

Availability of protein are helpful in proper growth and maintaining development in adults, children, and pregnant which require good quantity of protein daily [21]. Carbohydrates are known to be important components in foods. many and the digestible carbohydrates are considered as an important source of energy. Our findings revealed that the plant root is a good source of carbohydrate with high energy values which gives the needed energy for good living of human and livestock. Fibers in the diet are necessary for digestion and effective elimination of wastes. and can lower the serum cholesterol, the risk of coronary heart disease, hypertension, constipation, diabetes, colon and breast cancer [22].

The results of the phytochemical constituents of *Sphenocentrum Jollyanum* root showed the presence of phenolics, tannins, terpenoids, steroids, flavonoids and alkaloids in the extract sample. The results revealed the following order of occurrence of the phytochemicals;

alkaloids > phenolics > terpenoids > flavonoids > steroids > tarnins as shown in Table 2. Glycosides and saponin were not detected in the extract sample as shown in Table 2. This finding correlate with the report of [23], which reported the presence of phytochemicals in Sphenocentrum jollyanum leaf. This work is also in agreement with the work of [19], which reported the presence of bioactive compounds namely flavonoids, alkaloids, saponins and tannins respectively in the dry and wet samples of Talinum triangulare (Water Leaf) leaves. This work equally agrees with the findings of [24], who reported that phytochemical screening of Sphenocentrum jollyanum leaf extract showed the presence of flavonoids, steroids, terpenoids, tannins and alkaloids. Generally, the absence of glycosides and saponins in this plant disagrees with the above mentioned findings.

These compounds have been shown to be against potentially significant active pathogens including those that are responsible for enteric infections [25]. Apart from their potential antibacterial activity, compounds present in this study such alkaloids are known as as antimalarial agents, analgesics and can act as stimulants. The presence of flavonoids as shown in Table 2 suggested that the root of this plant may be good for management

the

cardiovascular diseases and oxidative stress, since in

flavonoids are biologic antioxidants. Several studies have shown that certain flavonoids can protect LDL from being [26]. oxidized The valuable pharmaceutical properties in Sphenocentrum jollyanum root may be attributed to the presence of bioactive compound like alkaloid. Alkaloid has been

of

- 1. Nostro A, Germanò MP, D'angelo V, Marino A, Cannatelli MA (2000) Extraction methods and bioautography for evaluation of plant medicinal antimicrobial activity. Lett Appl Microbiol 30: 379-384.
- 2. Krishnaiah D, Sarbatly R, Bono A (2007) Phytochemical antioxidants for health and medicine: A move towards nature. Biotechnol Mol Biol Rev 1: 97-104.
- 3. Mahato SB, Sen S (1997) Advances in triterpenoid research, 1990-1994. Phytochemistry 44: 1185-1236.
- 4. Kappers IF, Aharoni A, van Herpen TW, Luckerhoff LL, Dicke M, et al. (2005) Genetic engineering of terpenoid metabolism attracts bodyguards Arabidopsis. to Science 309: 2070-2072.
- 5. Hérouart D, Sangwan RS, Fliniaux MA, Sangwan-Norreel BS (1988)

used as CNS stimulant, topical anaesthetic ophthalmology, powerful pain relievers, anti puretic action, among other uses [27].

This study indicates that Sphenocentrum *jollyanum* root could be used as nutritional supplement and also would be considered as promising sources of antioxidant phytochemicals.

REFERENCES

Variations in the Leaf Alkaloid Content of Androgenic Diploid Plants of Datura innoxia. Planta Med 54: 14-17.

- 6. Apata, L. (1979). The practice of herbalism in Nigeria: in African medicinal plants, University of Ife press, Ile-Ife, Nigeria. 13-19.
- 7. Moody, J. O., Robert, V. A., Connolly, J. D. and Houghton, P. J. (2005).Anti-inflammatory Activities of the Methanol Extracts and an Isolated Furanoditerpene Constituent of Sphenocentrum jollyanum. Journal of Ethnopharmacology, 104(1-2): 87-91.
- 8. Nia, R., Paper, D. H., Essien, E. E., Iyadi, K. C., Bassey, A. I. L. and Antai, A. B. (2004). Evaluation of the Anti-oxidant and Antiangiogenic Effects of Sphenocentrum jollyanum. African

15

Journal of Biomedical Resources, 7: 129-132.

- Iwu, M. M. (1993). Handbook of African Medicinal Plants. (1st Edition). Chemical Rubber Company Press, U. S. A. 133-135.
- William, G. and Pickup, O. (1991). Textbook of Diabetes II Oxford, 3rd Edition, Blackwell, 977-993.
- 11. Snehal, S. P., Rayendra, S. S. and Ramesh, K. G. (2009).
 Antihyperycemia an Antioxidants Effect of Dihr in Streptozotocin Induced Diabetic Rats. *Indian Journal of Experimental Biology*, 47: 564-570.
- 12. Oliver-Bener, B. (1986). Medicinal Plants in Tropical West Africa, 4th edition, Cambridge University Press. Cambridge United Kingdom. 75.
- 13. A. O. A. C. (1990). Official Methods of Analysis. The Association of Officials of Analytical Chemists, Washington DC, USA. 89.
- 14. Harborne, J. B. (1973).
 Phytochemical Methods: A Guide to Modern Technique of Plant Analysis. Chapman and Hall. Thompson Science, London. 107.
- 15. Sofowora, A. E. (1993). Medicinal Plants and Traditional Medicine in Africa. 2nd Edition. Spectrum Book Ltd. Ibadan, Nigeria. 45-67.

- 16. Pearson, D. (1976). The Chemical Analysis of Foods. 7th edition, Edinburgh, Churchill Livingstone, New York. 575.
- 17. Edeoga, H. O., Okwu, D. E. and Mbaebie, B. O. (2005).
 Phytochemical Constituents of some Nigerian Medicinal Plants.
 African Journal of Biotechnology, 4(7): 685-688.
- 18. Ali, F. U. and Ibiam, U. A. (2014). Phytochemical Studies and GC-MS Analysis of Gongronema latifolium and Piper guineense. International journal of Innovative Research and Development, 3(9): 355-357.
- 19. Aja, P. M., Okaka, A. N. C., Onu, P. N., Ibiam, U. A. and Uraku, A. J. (2010). Proximate Analysis of *Talinum triangulare* (Water Leaf) Leaves and its Softening Principle. *Pakistan Journal of Nutrition*, 9(6): 524-526.
- 20. Yakubu, F. B., Igboanugo, A. B. I. and Tayo, O. S. (2007). Proximate Composition and Medicinal Uses of Sphenocentrum jollyanum (Pierre) Leaves. Journal of Agriculture, Forestry and the Social Sciences, 5(1): 345-347.
- 21. Aletor, V. A. and Adeogun, O. A. (1995). Nutrients and Antinutrient Components of some Tropical Leafy Vegetables. *Food Chemistry*, 54: 375-379.

16

- 22. Ishida, H., Suzuno, H., Sugiyama, N., Innami, S., Todokoro, T. and Maekawa, A. (2000). Nutritional evaluation of chemical component of leaves stalks and stems of sweet potatoes (*Ipomoea batatas* poir). *Food Chemistry*, **68**: 359-367.
- 23. Ibironke, A. A. and Olusola, O. O. (2013). Phytochemical Analysis and Mineral Element Composition of Ten Medicinal Plant Seeds from South-west Nigeria. *New York Science Journal*, 6(9): 1-7.
- 24. Olubukola, O. and Anthony, J. A. (2011). In vivo Anti-malaria Activity of Methanolic Leaf Extracts of Sphenocentrum jollyanum Pierre. African Journal of Pharmacy and Pharmacology, 5(14): 1669-1673.
- 25. Owolabi, O. J., Omogbai, E. and Obasuyi, O. (2007). Antifungal and Antibacterial Activities of the Ethanolic and Aqueous Extracts of *Kigelia africana* (Bignoniaceae) Stem Bark. *African Journal of Biotechnology*, **6**: 1677-1680.
- 26. Dondorp, A. M., Fanello, C. L. and Hendriksen, I. C. (2010). Artesunate versus Quinine in the Treatment of Severe *Falciparum* Malaria in Africa Children. *Lancet*, **373**: 1657-1647.
- 27. Heikens, H., Fliers, E., Endert, E., Ackermans, M. and Van Mont

Frans, (1995). Liquorice-induced Hypertension, a New Understanding of an Old Disease. *Journal of Medicine*, **5**: 230-234.