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Original Research Article

Phytochemical Screening and Antioxidant Property of the Methanol Extract of Spear Grass (*Heteropogon contortus* L.)

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Abstract: Plants are not only indispensable in health care but form the best hope of source for safe future medicines. In spite of the fact that now we have at our disposal a number of modern drugs, it is still genuinely urgent to discover and develop new therapeutic agents. The objective of the study is to determine the secondary metabolites and antioxidant activity of the methanol extract of *Heteropogon contortus*. The phytochemical analysis of the crude plant extract of *Heteropogon contortus* was performed using standard analytical method while the antioxidant activity of the extract was done using DPPH method of analysis. The study recorded yield of 9.22% for the methanol extract. Phytochemical analysis revealed the presence of seven secondary metabolites out of the nine metabolites screened for. The result of antioxidant activity of the crude extract showed good activity with an increase in the percentage inhibition on increase in concentration with the highest percentage inhibition of 57.16±53% at 500 mg/ml this was quite comparable to that of the standard (ascorbic acid) which had percentage inhibition at 500 mg/ml to be 67±32%. In conclusion the findings of the study showed that the methanol extract of *H. contortus* has an appreciable antioxidant activity which could be attributed to the secondary metabolites which it contains.

Keywords: Antioxidants, Free radical, *Heteropogon contortus*, Secondary metabolites.

INTRODUCTION

The term "medicinal plants" includes various type of plants used in herbalism and some of these plants have medicinal activities. Medicinal plants are the "backbone" of traditional medicine, which means more than 3.3 billion people in the less developed countries utilize medicinal plants on a regular basis [1]. These medicinal plants are considered as rich sources of ingredients which can be used in drug development and synthesis. Besides that, these plants play a critical role in the development of human cultures around the whole world. Medicinal plants are an integral component of research developments in the Pharmaceutical industry. Such research focuses on the isolation and direct use of active medicinal constituents, or in the development of semi-synthetic drugs, or still again on the active screening of natural products to yield synthetic pharmacologically-active compounds. Natural products play an important role in drug discovery process including the provision of basic compounds affording less toxic and more effective drug molecules, serve as extremely useful natural drugs, exploration of biologically active prototypes towards newer and better synthetic drugs and modification of inactive natural products by suitable biological or chemical means into potent drugs [2].

Spear grass (*Heteropogon contortus* (L.) Beauv. ex Roem. & Schult.) Is a tropical perennial grass. It grows to a height of 50 to 150 cm, is tufted and highly variable. Its stems are geniculated at the base, erect at their upper levels, often branched, particularly at flowering [3]. The leaves are green or bluish green, usually glabrous or with few long hairs at the base. The leaf-blade is folded when young, and then flat at maturity, 3-30 cm long, 2-8 mm broad, and somewhat canoe-shaped at the apex [3, 4]. The inflorescence is a 3 to 8 cm long raceme borne single or in pairs at the axil of the upper leaves. The spikelets are paired and very dissimilar according to their position on the raceme. Male or sterile spikelets are awnless, sessile and borne at the base of the raceme, or pedicellate and borne at the apex. Bisexual spikelets are only borne at the apex and they are all awned. The long awns (5-10 cm long) and

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the way they become twisted as the seeds mature are a characteristic trait of spear grass. The seed is a caryopsis, 3.5-4.5 mm long, grooved and whitish in colour [3, 4, 5]. There were considerable numbers of local species and varieties in the early botanical literature. Only a few commercial varieties are available, for example "Rocker" from Arizona and "Kahoolawe" from Hawaii [4]. The aim of the study is to determine the secondary metabolite and antioxidant activity of the methanol extract of *Heteropogon contortus* [6].

MATERIALS AND METHODS

Collection of Samples

The leaves of the plant *Heteropogon contortus* [7] was collected from botanical garden of the Faculty of Pharmacy, Delta State University, Abraka, identified and authenticated by a taxonomist in the Department of Pharmacognosy and Traditional Medicine, Faculty of Pharmacy, Delta State University, Abraka. The whole plant was gently uprooted from the ground and then the leaves separated from the root after which they were dried at ambient temperature. The dried leaves were milled to fine powder using electric blender, thereafter it was stored in an airtight container in the prior to its use.

METHOD

Preparation of Extract

About 600.75 g of the sample was extracted with 2.5 litres of 70% methanol using cold maceration method; by soaking the sample for 5 days after which it was filtrated and the filtrate was concentrated under reduced pressure using rotary vacuum evaporator (BÜchi type).

Preliminary Phytochemical Screening

The physiochemical investigation of the methanol and water extracts of *Heteropogon contortus* [8] was carried out with standard procedures for determining the presence and/or absence of phytochemicals

Evaluation of the Antioxidant Activity

The antioxidant activity of the plant sample was determined using [2], 2-diphenyl-1, 1-picryl hydrazyl (DPPH) radical scavenging method described by Rossi *et al*, [7] with little modification.

2, 2-Diphenyl-1, 1-Picryl Hydrazyl (DPPH)

To determine the antioxidant activity of the extract a method based on the reduction of a purple-coloured stable free radical DPPH into the yellow-coloured diphenyl picryl hydrazine was employed. 1 ml of methanolic solution of DPPH (0.1mM) was incubated with 3 ml of different concentration of the extract at room temperature (25°C) for 30 minutes. After incubation, the absorbance of the sample was recorded at 490 nm. Decreases in the absorbance of the DPPH indicate increase in the DPPH radical scavenging activity. For each concentration the assay was done in triplicate. Ascorbic acid solution was used a standard Ic_{50} values (concentration required for scavenge 50% of the free radical) for both ascorbic acid and the leave extract were determined. The radical scavenging activities of the test samples was expressed as an inhibition percentage (IP)

$$DPPH\ radical\ scavenging\ activity = \frac{A_{DPPH} - A_{test}}{A_{DPPH}} \times 100$$

Where: A_{DPPH} is the absorbance of the 0.1 mM of DPPH solution

A_{test} is the absorbance of the presence of the extract or ascorbic acid

RESULTS

Percentage Yield of Extracts of *Heteropogon Contortus*

The 600.75 g of the plant sample extracted using 70% methanol yielded 55.4 g of extract which is equivalent to 9.22% yield.

Phytochemical Screening of Crude Extract

The result of phytochemical screening of methanol extract of *H. contortus* [9] revealed the presence of saponins, tannins, flavonoids, cardiac glycosides, terpenoids, steroids and phenol Alkaloids and reducing sugar were not detected in the methanol extract of the plant (Table 1).

Table 1: Phytochemical Screening Test

Plant Constituents	Results
Saponin	+
Tannin	+
Alkaloid	-
Flavonoid	+
Cardiac glycoside	+
Terpenoid	+
Steroid	+
Phenol	+
Reducing sugar	-

Key:
+ = present
- = absent

DPPH Radical Scavenging of Methanol Extract of *H. Contortus*

The antioxidant activity (DPPH radical scavenging activity) of the crude methanol extract of *H. contortus* [10] was determined using ascorbic acid as the standard. The result showed that the radical scavenging activity of the standard were quite higher than those of the extract with the antioxidant activity decreasing as the concentration decreases (Table 2).

Table 2: Antioxidant Evaluation of Crude Extract and Standard (Ascorbic Acid)

Concentration (mg/ml)	% Inhibition	Ascorbic Acid
	Sample	Standard
500	57.16 ± 0.53	67.96 ± 0.32
400	45.66 ± 0.11	62.82 ± 1.81
300	41.53 ± 0.17	50.96 ± 0.32
200	38.53 ± 0.10	48.16 ± 0.83
100	32.23 ± 0.57	38.49 ± 0.26

DISCUSSION

Preliminary phytochemical screening of the plant methanol extract revealed the presence of seven (7) secondary metabolites out of the nine (9) metabolites screened for with two (2) being absent. Saponins, tannins, flavonoids, cardiac glycosides, terpenoids, steroids, and phenol were reported to be present in the methanol extract while alkaloids and reducing sugar were absent in the methanol extract of *H. contortus*. The presence of flavonoids and tannins in the methanol extract of *H. contortus* might be responsible for the free radical scavenging effect observed in the extract as plant phenolics are a major group of compounds that act as primary antioxidants. This is in line with the study of Lalthanpuii and Lalchhandama [11] who reported the presence of total flavonoids and total phenolic content in the extracts of Copon grass (*Imperata cylindrica*). Medicinal plants are known to contain high number of secondary metabolites owing to their medicinal properties this is seen in the report of Saad *et al.*, [12] who revealed the presence of different metabolites in Malaysian herbs.

Reactive oxygen species (ROS) which is a free radical had been responsible for a lot of degenerative diseases such as Alzheimer and Parkinson disease. Overproduction of ROS can directly attack the polyunsaturated fatty acids of the cell membranes and induce lipid peroxidation [13]. Antioxidants carry out their protective properties on cells either by preventing the production of free radicals or by neutralizing/scavenging free radicals produced in the body [14, 15]. The free radical scavenging ability of *H. contortus* plant extract was revealed to be comparable to those found present in ascorbic acid (standard). The highest scavenging activity was observed in the 500 mg/mL having inhibition percentage of 57.16 ± 0.53 and 67.96 ± 0.32% for both the plant extract and ascorbic acid respectively while the least activity was observed at the lowest concentration of plant extract and ascorbic acid with percentage inhibitions of 32.23 ± 0.57 and 38.49 ± 0.26% respectively, thus, this is indicative of the plant extract of *H. contortus* possess free radical scavenging activity.

CONCLUSION

In conclusion, the result of this study shows that *H. contortus* has good antioxidant activity; this is as a result of the presence of phenolic compounds which is responsible for their redox properties, which allow them to act as free radical scavenger, singlet oxygen quenchers and metal chelators. It is also recommended that the crude be further purified and analyzed for its medicinal potency.

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