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Research Article

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Antioxidant Activities of Hexane, Ethyl acetate, Acetone and Methanol, Extracts of *Mucuna pruriens*

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Abstract Antioxidant activities of methanol, hexane, ethyl-acetate and acetone extracts of *Mucuna pruriens* leaves were evaluated using 1, 1-diphenyl-2-picrylhdrazyl (DPPH) radical scavenging assay in which all the leaf extract shows remarkable activities. The DPPH radical scavenging assay shows that extracts of methanol and acetone showed a good scavenging activity among all the extracts.

Keywords Antioxidant Activities, Extracts, *Mucuna pruriens*

Introduction

Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs [1]. Nature has always remained a great source of medicinal system of the world, it has a used plant based medicines from time immemorial [2]. Oxidation is a chemical reaction that refers electrons from a substance to an oxidizing agent. Oxidation reaction can produce free radical which starts chain reactions that damage cells. Antioxidants terminate these chain reactions by removing free radical intermediates and inhibit other oxidation reaction by oxidize themselves; as a result, antioxidants are often reducing agent such as thiols, ascorbic acid or pohyphenols [3-4].

Ushie *et al*., [5] pointed out that *Mucuna pruriens* steroids, terpenes, alkaloids, saponins, tannins, and flavonoids. The result revealed that almost all the extracts inhibited *Klebsiella aerogenes, Escherica coli, Pseudomonas aeruginosa.* The main aim of this research work is to determine the antioxidant activities of *Mucuna pruriens* acetone, methanol, n-hexane and ethyl acetate extract. This work will give information on the antioxidant activities of acetone, methanol, n-hexane and ethyl acetate extract of *Mucuna pruriens* leave. This will give the scientific bases for the use of plant part for medicinal purpose.

Materials and Methods

Sample Collection, Preparation and Extraction

The *Mucuna pruriens* leaves were collected from their natural habitat in Bekwarra Local Government Area of Cross River State, Nigeria and were air dried for two weeks; the dried sample was chopped and grounded into fine powder. The extracts of the leaves were prepared by soaking 100 g of the sample in 250 ml hexane for 72 hours with

frequent agitation. The resulting mixture was filtered by gravity filtration and the filtrate was concentrated by evaporation using rotatory evaporator, kept in a vacuum oven over night at room temperature to remove all the solvent and weighed. The procedure was repeated on the residue using chloroform, acetone and methanol sequentially in order of polarity. The extracts were stored in a desiccator until required for testing.

Antioxidant Assay using DPPH Assay (2, 2-diphenyl-1-picrylhydrazyl)

The radical scavenging activity of different extracts was determined by using DPPH assay according to Chang *et al.,* [6] and Rahman *et al.,* [7]. The decrease in the absorption of the DPPH solution after the addition of an antioxidant was measured at 517nm. Ascorbic acid (10mg/ml DMSO) was used as reference.

Principle

2, 2- Diphenyl -1- Picryl Hydrazyl is a stable (in powder form) free radical with red color which turns yellow when scavenged. The DPPH assay uses this character to show free radical scavenging activity. The scavenging reaction between (DPPH) and an antioxidant (H-A) can be written as,

(DPPH) + (H-A) $\longrightarrow$ DPPH-H + (A)

Antioxidants react with DPPH and reduce it to DPPH-H and as consequence the absorbance decreases. The degree of discoloration indicates the scavenging potential of the antioxidant compounds or extracts in terms of hydrogen donating ability.

Reagent preparation

0.1mM DPPH solution was prepared by dissolving 4mg of DPPH in 100ml of ethanol.

Working procedure

Different volumes of the extract were taken and made up to 2ml with methanol. The following concentrations of the extract were tested (0.1, 0.3, 0.5, 0.7, and 1.0 mg/ml). Vitamin C was used as the antioxidant standard at concentrations (0.1, 0.3, 0.5, 0.7, and 1.0 mg/ml). 0.5ml of 1mM of DPPH in ethanol was added to each of the sample solutions. A blank solution was prepared containing the same amount of methanol and DPPH. The sample solutions are incubated in the dark for 3ominutes before reading the absorbance at 517nm. The radical scavenging activity was calculated using the following formula:

$$\text{Inhibition (\%)} = \frac{A - B}{A} \times 100$$

Where A = Absorption of the blank sample without extract.

B = the absorption of the extract.

Results

Table 1: Results of the antioxidant activities of of Hexane, Ethyl acetate, Acetone and Methanol, Extracts of *Mucuna pruriens*

Conc. in mg/ml	% Inhibition				
	HE	**EAE**	**AE**	**ME**	**Vitamin C**
0.1	11.27	13.37	26.63	29.63	82.23
0.3	11.74	7.39	32.23	26.48	82.66
0.5	13.84	9.49	39.15	38.10	82.28
0.7	18.84	18.12	46.03	44.91	82.03
0.9	38.69	20.18	51.95	54.00	82.81

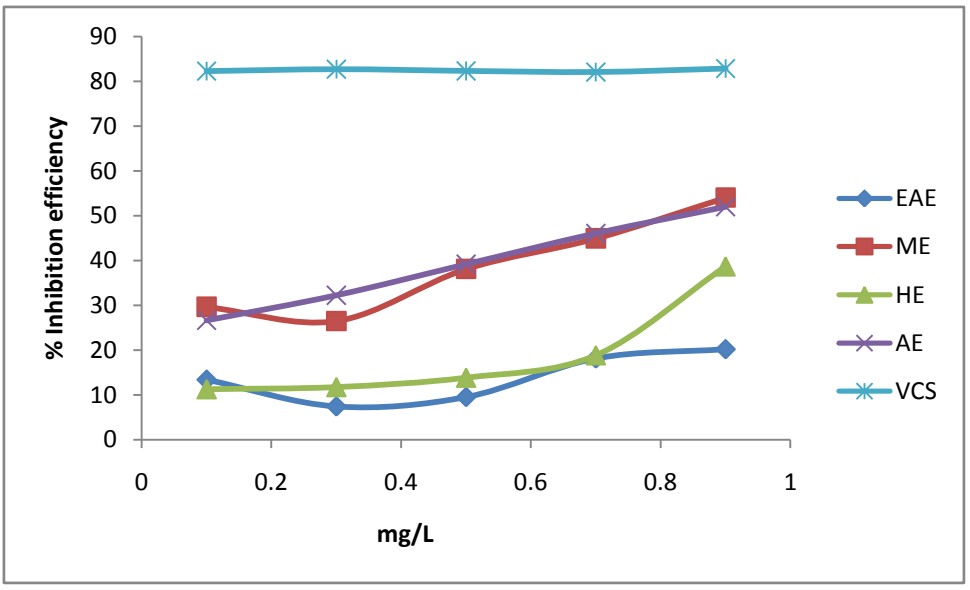

Figure 1: Results of the antioxidant activities of of Hexane, Ethyl acetate, Acetone and Methanol, Extracts of Mucuna pruriens

Discussion

To determined the antioxidant activity of a specific solution, there will be a significant decreased in the absorbance for sample which contain antioxidant compound (purple colour vanishing coupled with the yellow color build up clearly noticed by naked eye) the intensity of the yellow colour was directly proportional with the antioxidant activity in the tested solution, the higher scavenging indicate the higher activity [8]. The free-radical scavenging activity was evaluated by accessing it's discolouration of 2,2-diphenyl-1-picrylhrozyl radical (DPPH) in methanol by a slightly modified method of Williams et al., 1995. The following concentrations of the extract were tested (0.1, 0.3, 0.5, 0.7 and 0.9mg/ml). The decrease in absorbance was monitored at 517nm. Vitamin C was used as the antioxidant standard at a concentrations (0.1, 0.3, 0.5, 0.7 and 0.9mg/ml).

The crude hexane extract of *Mucuna pruriens* displayed inhibition of DPPH radical scavenging activity at the range of 11.27%, 11.74%, 13.84%, 18.84% and 38.69% with the concentration of 0.1, 0.3, 0.5, 0.7 and 1 µg/ml respectively while vitamin C showed minimum radical scavenging activity of 82.23 % and maximum activity of 82. 81% (Figure 2).

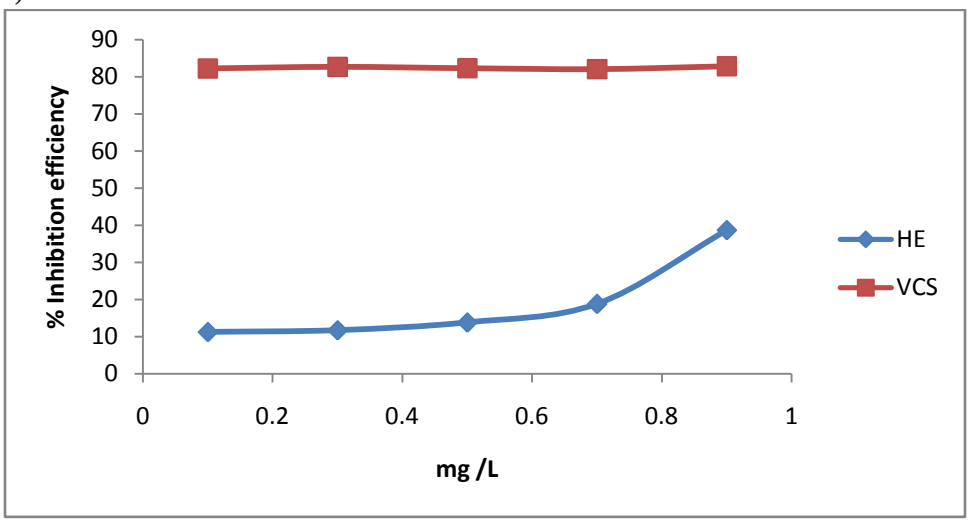

Figure 2: Hexane extract of Mucuna pruriens

The crude ethyl acetate extract of *Mucuna pruriens* displayed inhibition of DPPH radical scavenging activity at the range of 13.37%, 07.39%, 09.49%, 18.12% and 20.18% with the concentration of 0.1, 0.3, 0.5, 0.7 and 1 µg/ml respectively while vitamin C showed minimum radical scavenging activity of 82.23 % and maximum activity of 82. 81% (Figure 3).

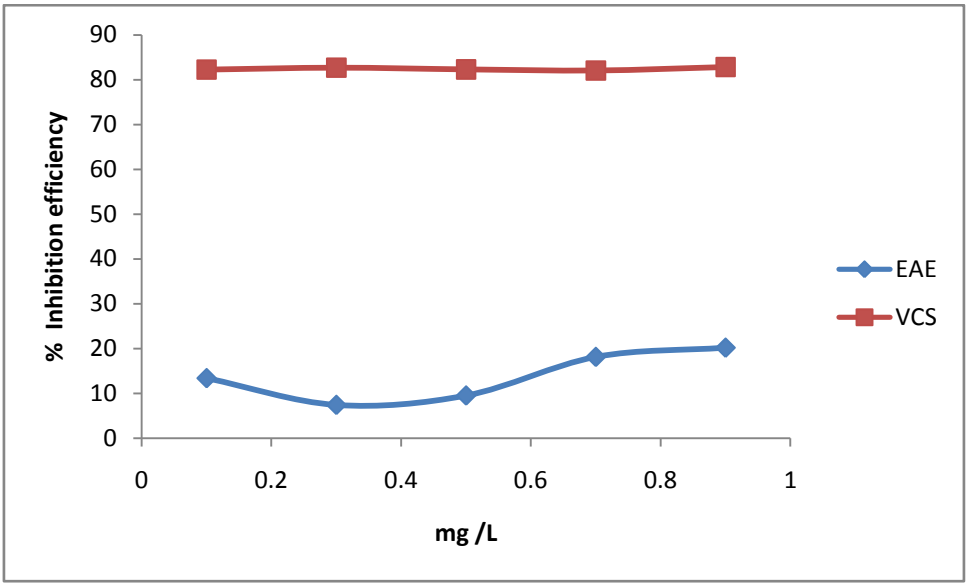

Figure 3: Ethyl acetate extract of Mucuna pruriens

The crude acetone extract of *Mucuna pruriens* displayed inhibition of DPPH radical scavenging activity at the range of 26.63%, 32.23%, 39.15%, 46.03% and 51.95% with the concentration of 0.1, 0.3, 0.5, 0.7 and 1 µg/ml respectively while vitamin C showed minimum radical scavenging activity of 82.23 % and maximum activity of 82. 81% (Figure 4).

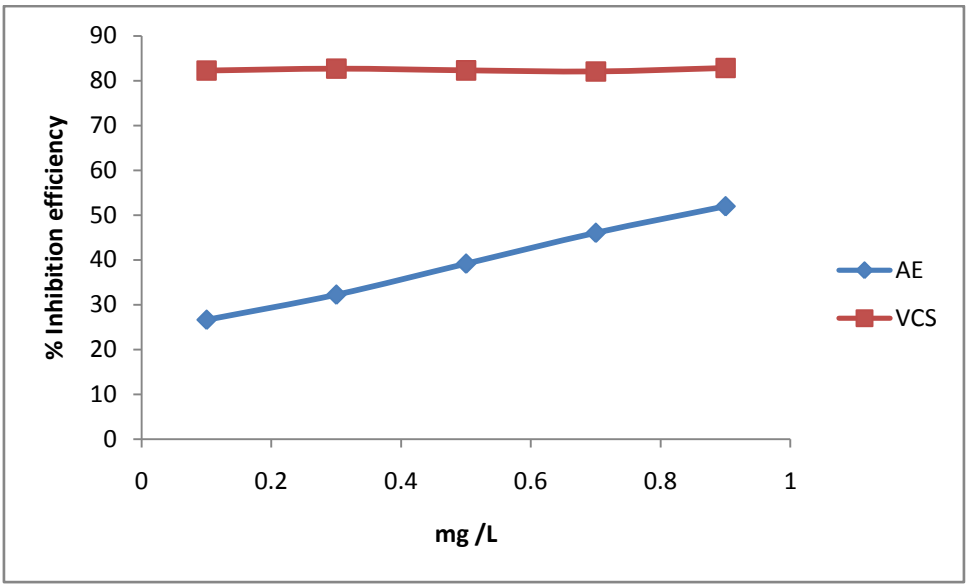

Figure 4: Acetone extract of Mucuna pruriens

The methanol extract of *Mucuna pruriens* displayed inhibition of DPPH radical scavenging activity at the range of 29.63%, 26.48%, 38.10%, 44.91% and 54.00% with the concentration of 0.1, 0.3, 0.5, 0.7 and 1 µg/ml respectively while vitamin C showed minimum radical scavenging activity of 82.23 % and maximum activity of 82. 81% (Figure 5).

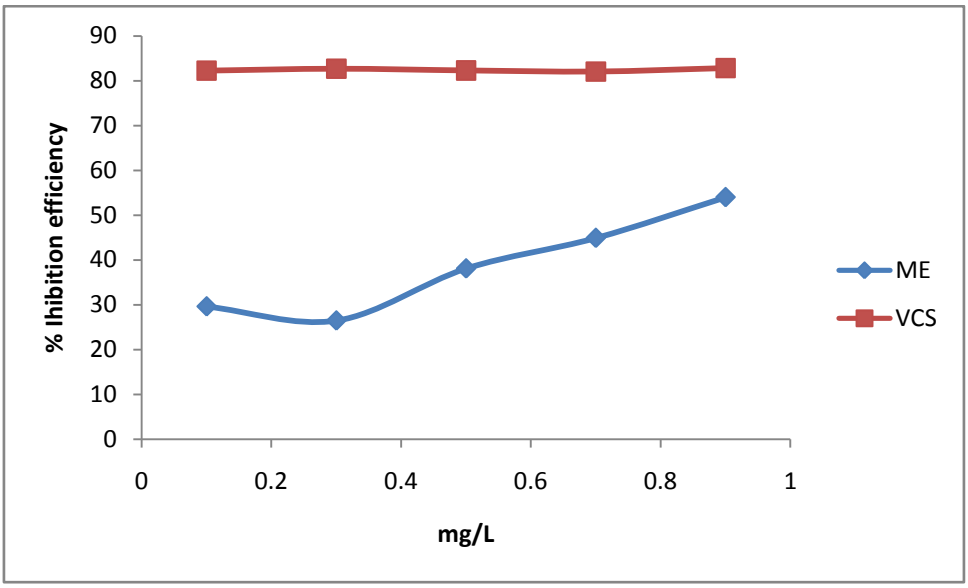

Figure 5: Methanol extract of Mucuna pruriens

Conclusion

In present study hexane, ethyl acetate, acetone and methanol extracts of *Mucuna pruriens* were studied for their antioxidant capacity using DPPH radical scavenging assay. The DPPH radical scavenging assay shows that the extracts of methanol and acetone showed a good scavenging activity among all the extracts. The results obtained showed that this plant is very important from medicinal point of view and it needs further phytochemical exploitation to isolate phytochemical constituents showing antioxidant activity.

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