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Antioxidant Activity of Hexane, Chloroform, Acetone and Methanol Extract of *Swietenia Macrophylla*

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Abstract: *Antioxidant activities of methanol, acetone, chloroform and hexane extracts of Swietenia macrophylla leaves were evaluated. The antioxidant activity of the extracts. The antioxidant activity of S. macrophylla leaf extracts was evaluated using 1,1-diphenyl-2-picrylhydrazyl (DPPH.) radical scavenging assay in which all of the leaf extracts showed remarkable activities. At the concentration of 0.1 mg/mL, the methanol extract, chloroform extract, acetone and the n-hexane extract showed 81.04%, 39.34%, 44.31% and 56.64% scavenging activities respectively.*

Keywords: *Antioxidant, DPPH, Extractions; Swietenia macrophylla*

1. Introduction

Nature has always remained a great source of medicinal agents and medicinal system of the world has used plant-based medicines from time immemorial (Mudasir *et al*., 2011). 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 (Ncube *et al*., 2008). 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 reation by oxidize themselves; as a result, antioxidants are often reducing agent such as thiols, ascorbic acid or pohyphenols (Sies, 1997, Kolapo 2014). Ushie *et al*., 2016 pointed out that *S. macrophylla* can be used as an analgesic, anaesthetic and as social drugs since it contains alkaloids. The alkaloids contained in plants are used in medicine as anaesthetic agents (Herourat *et al.;* 1988). Ushie *et al*., 2016 pointed out that *S. macrophylla* can be used in the treatment of certain illnesses because it contains glycosides which have long been employed as important ingredient for arrow poisons and drugs (Trease and Evans, 1989). The aim of this research project is to study the antioxidant properties of *S. macrophylla* using DPPH assay

2. Materials and Methods

2.1. Sample Collection, Preparation and Extraction

The *Swietenia macrophylla* 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.

2.2. 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.,* (2001) and Rahman *et al.*, (2016). 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.

2.3. 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.

2.4. Reagent Preparation

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

2.5. 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.

3. Results and 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 (Sagare and Singh 2011). All the crude extracts of hexane, chloroform, acetone and methanol were subjected to DPPH radical scavenging assay using different concentrations. The data was presented in Table 1 and the form of line graphs (Figure 1-4).

Table1. *Result of Antioxidant Activities Swietenia macrophylla hexane, chloroform, acetone and methanol extracts*

Extracts		Concentrations			
	0.10	0.30	0.50	0.70	1.00
Chloroform	0.00	9.72	16.11	33.65	39.34
Methanol	35.67	51.66	57.82	71.09	81.04
Acetone	0.00	25.36	32.27	41.94	44.31
Hexane	22.27	36.97	37.2	52.37	56.64

The crude hexane extract of *Swietenia macrophylla* displayed inhibition of DPPH radical scavenging activity at the range of 22.27%, 36.97%, 37.30%, 52.37% and 56.64% with the concentration of 0.1, 0.3, 0.5, 0.7 and 1 µg/ml respectively (Figure 1).

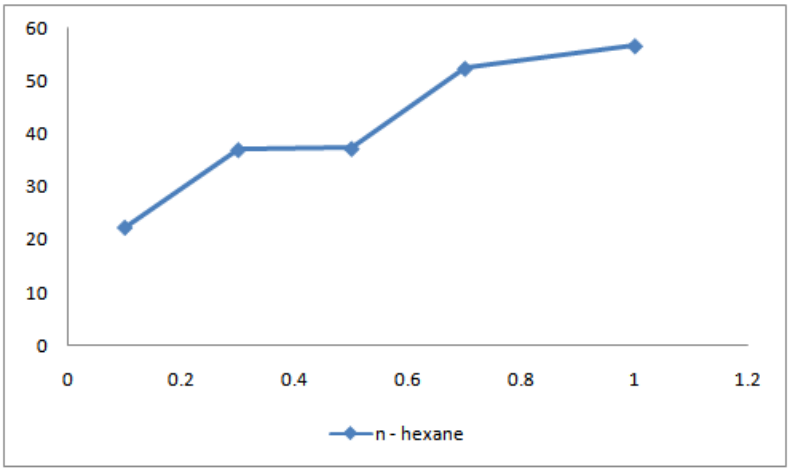

Figure1. *Graph of Antioxidant Activities of Hexane*

Figure 2 present the result of the crude chloroform extract of *S. macrophylla* which displayed inhibition of DPPH radical scavenging activity at the range of 0.00%, 9.72%, 16.11% 33.68% and 39.34% with the concentration of 0.1, 0.3, 0.5, 0.7 and 1 µg/ml respectively.

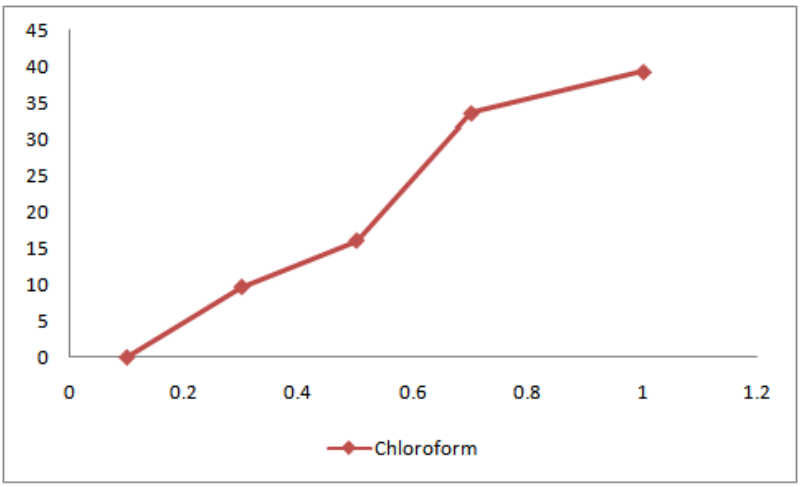

Figure2. *Graph of Antioxidant activities of chloroform of Swietenia macrophylla*

The crude acetone extract of *S. macrophylla* displayed inhibition of DPPH radical scavenging activity at the range of 0.00%, 9.72%, 16.11% 33.68% and 39.34% with the concentration of 0.1, 0.3, 0.5, 0.7 and 1 µg/ml.

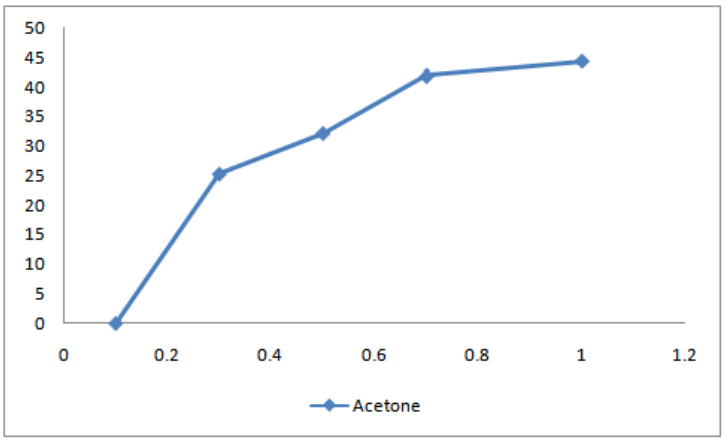

Figure3. *Graph of Antioxidant Activities of Acetone of Swietenia macrophylla*

The crude methanol extract of *S. macrophylla* displayed inhibition of DPPH radical scavenging activity at the range of 35.67%, 51.66%, 57.82% 71.09% and 81.04% with the concentration of 0.1, 0.3, 0.5, 0.7 and 1 µg/ml.

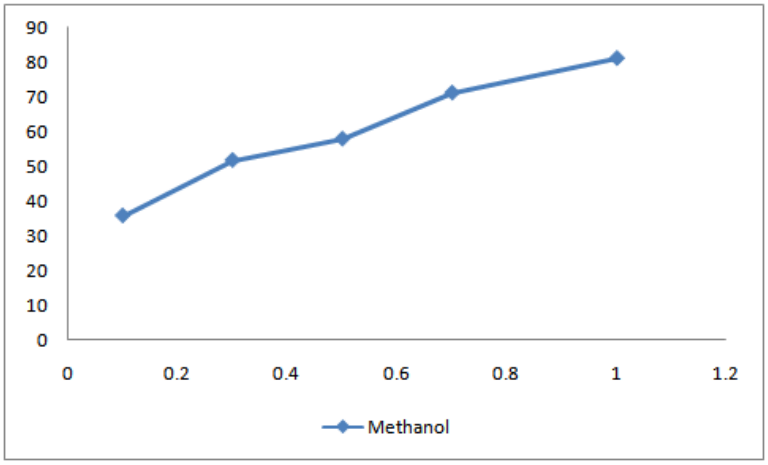

Figure4. *Graph of Antioxidant Activities of Methanol of Swietenia macrophylla*

Figure 5 is a graph and Figure 6 is the histograph showing the various percentage scavenging inhibition. It revealed that chloroform extract of *S. macrophylla* displayed the least inhibition of DPPH radical scavenging activity followed by by the acetone extract. Tne methanol extract of *S. macrophylla* displayed highest followed by the hexane extract. inhibition of DPPH radical scavenging activity

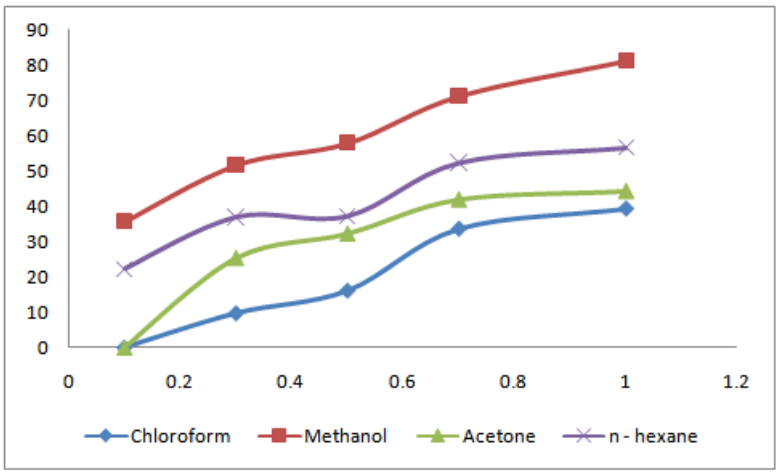

Figure5. Graph of Antioxidant Activities of hexane, chloroform, acetone and methanol of *Swietenia macrophylla*

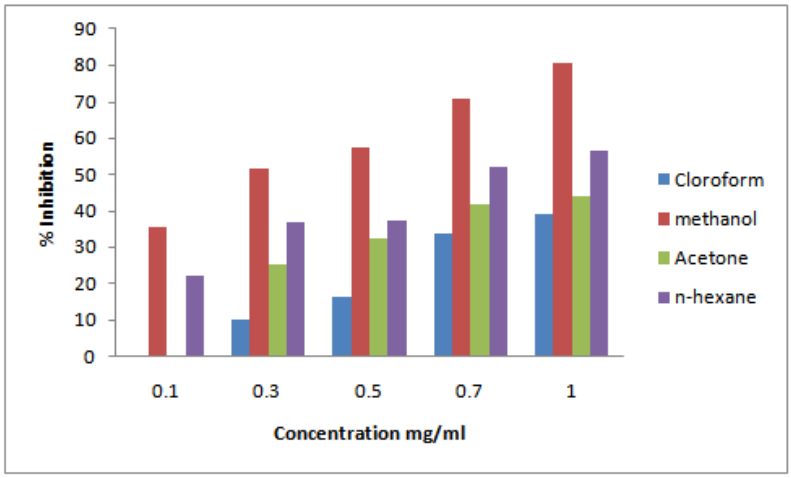

Figure6. *Antioxidant activities of hexane, chloroform, acetone and methanol of Swietenia macrophylla*

Kumar & Sharma (2006) pointed out that the application of synthetic antioxidant possesses severe threats such as carcinogenicity, thus researchers have turned towards the use of herbal plants with efficient antioxidant property that is capable of defending the cells against the damaging effects of

free radicals. Secondary metabolites are potent antioxidants, metal chelators or free radical scavengers which possess health promoting properties. As a rapid and simple measure of antioxidant activity, the DPPH radical scavenging capacity is based on the reduction of the stable radical DPPH to yellow coloured diphenylpicrylhydrazine in the presence of a hydrogen donor (Jothy et al., 2012).

4. CONCLUSION

The extracts (acetone, methanol, chloroform and hexane) of *Swietenia macrophylla* has been found to exhibit antioxidant properties and the leaf extract of the plant can be said to contain some compound that can be used to slow the oxidative reaction.

REFERENCES

[1] Chang, L. C., and A. D. Kinghorn (2001) Flavonoids as Cancer Chemopreventive Agents, In Tringali, Corrado (Ed.). *Bioactive Compounds from Natural Sources.* London:Taylor and Francis. 159-185

[2] Sagar B. Kedare and R. P. Singh (2011).Genesis and development of DPPH method of antioxidant assay. Food Sci Technol. 48(4): 412–422

[3] Herourat, D., Sangwin, R., S., Finiaux, M. A., Sangwan-Norrell , B.,S. (1988). Variations in the leaf alkaloid content of androgenic diploid plants of *Daturu innoxia*, *Planta Medica*, *Journal of Medicinal Plant Research,* 54: 14-20.

[4] Jothy, S. L., Azlan, A. A., Yeng, C. Y., & Sasidharan, S. (2012). Antioxidant activity and hepatoprotective potential of *Polyalthia longifolia* and *Cassia spectabilis* leaves against paracetamolinduced liver injury. *Evidence Based Complementary Alternative Medicine, 4*, 714 - 730.

[5] Kolapo, A. L., Okunade, M. B., Adejumobi, J. A. and Ogundiya, M. O. (2009). Phytochemical Composition and Antimicrobial Activity of Prosopis. *Africana.* **5** (1): 90 – 93.

[6] Kumar, V., & Sharma, S. K. (2006). Antioxidant studies on some plants: A review. *Hamdard Medicus (Pakistan), 4*, 25-36

[7] Mudasir, A.; Mir, R.T.S.; Rameashkannan, M. V.; Riyaz, A.; Pala, M.; B 2011. A comparative study of phytochemical analysis amd antimicrobial properties of stigmas and stamens of saffron (Crocus sativus L.) found in Kashmir. Adv Bio Tech., 11(6):35-38

[8] Ncube NS, Afolayan AJ, Okoh AI. 2008 Assessment techniques of antimicrobial properties of natural compounds of plant origin: current methods and future trends. *African Journal of Biotechnology*; 7 (12): 1797-1806

[9] Rahman, T. U., Khan, T., Khattak, K. F., Ali. A., Liaqat, W., *et al.* (2016). Antioxidant Activity of Selected Medicinal Plants of Pakistan. *Biochem Physiol* 5:208. doi:10.4172/2168-9652.1000208

[10] Sies, H. (1997) Oxidative stress: oxidant and antioxidant. Exp. Physio. 82(2):291-295

[11] Trease G. E and Evans W. C, 1989). Pharmacolognosy, baillere tindall, London pp. 45-50

[12] Ushie O. A., Onen, A. I., Ugbogu, O. C., Neji, P. A. & Olumide,V. B. (2016) Phytochemical Screening and Antimicrobial Activities of Leaf Extracts of *Swietenia macrophylla*, *ChemSearch Journal* 7(2): 64 69.

[13] Ushie, O. A., Egwaikhide, P. A. & Longbab, B. D. (2016). Phytochemical Screening of Some Medicinal Plants in Local Areas of Taraba State, Nigeria. *International Journal of Applied Research and Technology.* 5(9): 27-32.

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