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Evaluation of Neuropharmacological Activity and Determination of Chemical Composition of the Essential Oil of Plectranthus Aegyptiacus Fresh Leaf in Mice

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Abstract

Background: Plectranthus aegyptiacus is an ethnomedicinal plant found in South-west Nigeria where it is used to manage fever, sensory diseases and cough among other ailments. The objective of this study was to evaluate the neuropharmacological activities of the essential oil of P. aegyptiacus fresh leaf in mice in addition to determine the oil's chemical composition. Method: Essential oil of P. aegyptiacus (EOPA) was extracted from fresh leaves of the plant by hydro-distillation and analyzed to determine its chemical composition. The LD50 of the oil was determined orally and intraperitoneally. The EOPA (50-200 mg/kg, i.p., n=6) was tested for novelty-induced behavioural (NIBs), anxiolytic, sedative, anticonvulsant and analgesic activities using standard protocols. The probable mechanism(s) of the effect of the EOPA on the various neural pathways were studied using various antagonists. Results obtained for the oil were statistically analyzed and compared to negative and positive controls. Results: The LD50 values obtained for the EOPA were 2154 and 490 mg/kg for the oral and intraperitoneal routes respectively. The EOPA significantly ($p<0.05–0.01$) inhibited all behavioural display, significantly ($p<0.05$-0.01) increased the time spent on the open arms of the elevated plus maze, blocked the hind limb tonic extension on the maximal electric shock and protected the mice against PTZ–induced mortality, significantly ($p<0.05$-0.001) shortened sleep latency and prolonged total sleeping time induced by ketamine (100 mg/kg), significantly ($p<0.05$)) reduced writhings caused by acetic acid (1% v/v) and significantly ($p<0.05$) increased the reaction time on the hot plate. Flumazenil (2 mg/kg) significantly ($p<0.05$) reversed the effect of the oil on NIBs; atropine, naloxone and cyproheptadine significantly ($p<0.01$-0.001) potentiated the inhibitory effect of the oil, while yohimbine did not alter the effect of the oil on NIBs. Major compounds identified in the oil were antioxine, germacrene-D and p-cimene. Conclusion: The major effect of the oil was depression of the CNS and it demonstrated significant anxiolytic, sedative, anticonvulsant and analgesic activities in mice. The mechanism of action of the oil is suggested to be mainly augmentation of GABAergic neurotransmission. Furthermore, this research inferentially validated the pharmacological basis for the folkloric use of the plant

Keywords: Plectranthus aegyptiacus, chemical composition, central nervous system activities, antioxine.

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Biography:

Dr. I.A. Oyemitan obtained B.Pharm., M.Sc., M.Phil., and PhD (Pharmacology) from Obafemi Awolowo University, Ile-Ife, Nigeria between 1991 and 2011; currently a member Faculty of Pharmacy of the same university where he teaches Pharmacology to undergraduates and postgraduates. He did a Postdoctoral Fellowship at Department of Chemical & Physical Sciences, Walter Sisulu University, Mthatha, South Africa between 2014 and 2016 and is presently a research collaborator with top scientists in the university.

His areas of research interests include neuropharmacological and toxicological evaluation of medicinal and aromatic plants. He is presently an Associate Professor of Pharmacology and has over 30 publications.

Speaker Publications:

1.Idris Oyemitan (2014) Acute toxicity, antinociceptive and anti-inflammatory activity of the essential oil of fresh fruits of Piper guineense Schum & Thonn (Piperaceae) in rodents.Journal of Medicinal Plant Research, 8(40), pp. 1191-1197.

2. Idris Oyemitan (2016) Neuropharmacological profile of ethanolic dried seed extract of Persea americana in mice,African Journal of Pharmacy and Pharmacology, 10(22), pp. 480-492

3.Idris Oyemitan (2016) Neuropharmacological Activities of Ethanolic Extract of Cola millenii Dried Leaf in Rats, European Journal of Medicinal Plants, 6(2): 1-12.

4.Idris Oyemitan (2016) Synthesis of Silver Nanoparticles Using Buchu Plant Extracts and Their Analgesic Properties,MDPI, 14 Jun 2016, 21(6).

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