Antioxidant and inhibitory activity towards acetylcholinesterase and adenosine deaminase of essential oils from Nigeria ginger (Zingiber officinale) and turmeric (Curcuma longa) rhizomes

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Abstract

Studies have shown that neuroinflammatory processes play a vital role within the pathogenesis of neurological disorders. Therefore, plant foods with anti-inflammatory potential might be wont to slow the progression of those diseases. Hence, the current study sought to analyze the effect of essential oils from Nigeria ginger and turmeric rhizomes on some inflammatory biomarkers (IL-6, IL-10, and TNF-Alpha) still as acetylcholinesterase (AChE) and ADA (ADA) activities (key enzymes related to neurodegeneration) in cadmium-induced neuroinflammation in rats. The result revealed that oil from ginger and turmeric rhizomes exert an immunomodulatory effect by preventing alterations of some cytokines (IL-6, IL-10, and TNF-Alpha) levels in Cd-treated rats. additionally, the essential oils inhibited hippocampus and pre-frontal cortex AChE and ADA activities in Cd-treated rats. lastly, volatile oil from ginger and turmeric rhizomes may well be harness as anti-inflammatory drugs/supplements for the management/prevention of neurodegenerative diseases related to inflammation. Studies have revealed that anti-inflammatory agents could provide beneficial effect in lowering the incidence/progression of neurological diseases. Hence, this study sought to research the effect of essential oils from Nigeria ginger and turmeric rhizomes on some cytokines in cadmium induced neurotoxicity.

The result revealed that oil from ginger and turmeric rhizomes exerts anti-inflammatory effect by preventing alterations of some cytokines/inflammatory biomarkers (IL-6, IL-10 and TNF-Alpha) levels and inhibits both hippocampus and prefrontal cortex acetylcholinesterase (AChE) and enzyme (ADA) activities (important enzymes relevant within the management/prevention of neurodegenerative diseases) in Cd treated rats. lastly, volatile oil from ginger and turmeric rhizomes exerts anti-inflammatory properties in Cd induced neurotoxicity. The observed effect may well be thanks to the volatile compounds as revealed by GC-MS analysis. Ginger otherwise called the foundation of stem ginger Roscoe is usually used as spice and discovered to own diverse pharmacological activities like anti-inflammation, antitumor, and antioxidant properties [7–9]. in step with Oboh et al. [10], extract of ginger rhizomes inhibits acetylcholinesterase activity (key regulatory enzyme involved in neurodegeneration) in vitro. Furthermore, essential oil of ginger has been reported to influence both cell-mediated immunologic response and nonspecific proliferation of T lymphocyte [11].Turmeric (Curcuma longa Linn) is one in all the most spices belonging to the family of Zingiberaceae, used as medicine, condiment, and cosmetic worldwide and valued as a functional food thanks to its health promoting potentials [12]. it's comprised of a gaggle of three curcuminoids: curcumin (diferuloylmethane), demethoxycurcumin, and bisdemethoxycurcumin, moreover as volatile oils (tumerone, atlantone, and zingiberone), sugars, proteins, and resins. Several studies have shown that volatile oil from turmeric has significant biological activities including antifungal, insectifuge, antibacterial, Cancer, the seventh most fatal disease within the world, poses a protracted struggle to combat this deadly disease.

Economically and pharmacologically important members of Zingiberaceae family have helped to eradicate variety of ailments worldwide. This review highlights gingers and their wide spectrum of medicinal values focussing on their role as anticancer agents with facts and data obtained from literature review performed using PubMed, PMC, ScienceDirect, Google Scholar in an exceedingly systematic way. Among the numerous genera underlined during this review, several species of Hedychium have emerged as potential cancer treatments with remarkable activity against different sorts of tumour. However this genus isn't much explored to unravel its value to medical research. Several species are found to own cytotoxic, antiinflammatory, antioxidant and antitumour activities but not many attempts made to ascertain the plant principles as anticancer agents.

Extended Abstract

Among the natural plant resources, Angiosperms are a large reservoir of products with medicinal values[8]. One such family with significant pharmacological gravity is that the family of gingers, the Zingiberaceae, which consisted of annual or perennial herbs with creeping horizontal or tuberous rhizomes[9]. The family comprises of fifty genera and about 1500 species distributed throughout tropical Asia[10]. The gingers mostly need shady, humid environments with timely water showers for correct growth.The family Zingiberaceae may be a paramount natural resources that gives many useful products for food, spices, medicines, dyes, perfume and aesthetics[11]. It constitutes a family of rhizomatous, aromatic medicinal plants characterised by the presence of volatile oils and oleoresins[12]. The plants are cosmopolitan mostly in tropical and subtropical regions of Asia especially Thailand, Indonesia, Malaysia, India likewise as in America and Australia[13]. Curcuma, Kaempferia, Hedychium, Amomum, Zingiber, Alpinia, Elettaria and Costus are a number of the economically important genera of Zingiberaceae.

These are all well-known for traditional medicinal uses Several studies have shown that cadmium (Cd) induces nephrotoxicity and lots of plant foods phytochemicals are found useful but their possible mechanism of action still remains unexplored. Hence, this study aimed to analyze the nephroprotective effect of essential oils from Nigeria ginger and turmeric rhizomes in cadmium-treated rats by examining their effect on renal function biomarkers (creatinine, urea and BUN), inflammatory cytokines (IL-6, IL-10 and TNF-Alpha) and renal enzyme (ADA) activity. The result revealed that essential oils from ginger and turmeric rhizomes exert anti-inflammatory effect by preventing alterations of renal function markers and cytokines (IL-6, IL-10 and TNF-Alpha) levels in Cd-treated rats. additionally, the essential oils inhibited renal ADA activity in Cdtreated rats. finally, inhibition of ADA activity and modulation of inflammatory cytokines might be suggested because the possible mechanism of action by which essential oils from ginger and turmeric rhizomes exert their nephroprotective activities. prevention of neurodegenerative diseases related to inflammation.