Erectogenic Effects of Clerodendron capitatum: Involvement of Phosphodiesterase Type-5 Inhibition

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Clerodendron capitatum (Wild.) (family: verbenaceae) is locally named as Gung and used traditionally to treat erectile dysfunction. Therefore, the current study was designed to investigate the erectogenic properties of C. capitatum. The relaxation effect of this plant was tested on phenylephrine precontracted rabbit corpus cavernosum smooth muscle (CCSM). The effects of C. capitatum were also examined on isolated Guinea pig atria alone, in the presence of calcium chloride (Ca2+ channel blocker), atropine (cholinergic blocker), and glibenclamide (ATP-sensitive K+ channel blocker). These effects were confirmed on isolated rabbit aortic strips. The extract, when tested colorimetrically for its inhibitory activities on phosphodiesterase-5 (PDE-5) in vitro towards penbutolol phenyl phosphate (PNPPP), was observed to induce significant dose-dependent inhibition of PDE-5, with an ID50 of 0.161 mg/ml (P < .05). In conclusion, our results suggest that C. capitatum possesses a relaxant effect on CCSM, which is attributable to the inhibition of PDE-5, but not mediated by the release calcium, activation of adrenergic or cholinergic receptors, or the activation of potassium channels.

1. Introduction

Erectile dysfunction is a serious clinical problem in adult men. The malfunction of penile erection could be due to impaired relaxation of the smooth muscle related to the increase in blood flow into the spaces of the corpus cavernosum [1]. Inhibition of cellular enzyme, phosphodiesterase-5 (PDE-5), reduces cyclic guanylate monophosphate breakdown, promoting vascular relaxation in the corpora cavernosa and penile erection during sexual stimulation [2].

Since several synthetic drugs commonly used in erectile dysfunction are associated with undesirable side effects, there is rising interest in discovering new effective drugs. Various reports on natural products with vasodilating effects on corpus cavernosum smooth muscle appeared recently [3, 4].

Clerodendron capitatum (Wild.) (family: verbenaceae), locally named as Gung in Sudan, is an indigenous tropical African plant, which grows fast, erect, well branched and grows up to 0.5–2 m high [5]. In Sudan, the roots of this plant are used traditionally in the management of male erectile dysfunction [6, 7]. In Nigeria, this plant is used to treat diabetes mellitus, obesity, and hypertension [5]. The genus Clerodendron is reported to demonstrate versatile biological activities such as antitumorigenic [8, 9], hypoglycemic, hypolipidemic [10], hepatoprotective activity against CCl4-induced liver injury in rats [11, 12], anti-inflammatory [13–15], radical-scavenging activity [12, 16–18], antidiarrhoeal [19], anitnociceptive, and antipyretic effects [14].

No phytochemical investigation was conducted on C. capitatum to isolate pure compounds. Nevertheless,