

Phytochemical investigation and anti-diabetic screening of tender shoots of *Asparagus racemosus* (Liliaceae)

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Abstract

Diabetes mellitus is a hereditary metabolic disorder characterized by hyperglycemia, glycosuria, polyuria, polydipsia, polyphagia, and gradual weight loss. It has affected millions of people all over the world. Dissatisfaction with efficacy, serious side effects, and cost of modern medicine has made patients throughout the world to look up for classical plant drugs for treatment of many ailments. Many plant species are known in folk-medicine for their hypoglycemic properties and therefore, used in the treatment of diabetes mellitus. *Asparagus racemosus* (Liliaceae) is widely used in traditional Indian system of medicine to treat diabetes. The present study was carried out to isolate and identify the putative anti-diabetic compound from the tender shoots of *Asparagus racemosus*. Dried and powdered shoots of *Asparagus racemosus* were extracted with ethanol and the concentrated ethanol extract was fractionated with solvents such as n-hexane, ethyl acetate and n-butanol, to yield respective fractions. Resolution of n-butanol fraction by column chromatography afforded one compound 'Shatavarin IV'. The isolated compound 'Shatavarin IV' (20 g/kg in 1ml of normal saline) was studied for anti-diabetic activity against alloxan monohydrate- induced diabetic rats. The compound 'Shatavarin IV' produced significant ($p < 0.01$) reduction in blood glucose level. The standard drug, glibenclamide (0.6mg/kg body weight) also produced significant ($p < 0.01$) reduction in blood glucose level against alloxan monohydrate- induced diabetic rats. The results of this study indicate that the isolated compound 'Shatavarin IV' possessed anti-diabetic effects against alloxan monohydrate- induced diabetic rats.

Keywords: *Asparagus racemosus*, Alloxan monohydrate, Diabetes, Anti-Diabetic

Introduction:

Diabetes mellitus is a metabolic disorder of the endocrine system. The disease occurs world wide and its incidence is increasing rapidly in most parts of the world. People suffering from diabetes are not able to produce enough insulin or properly use it in the body so that they have a high level of blood glucose. Diabetes is becoming the third highest killer of mankind, after cancer and cardiovascular diseases, due to its high prevalence, morbidity and mortality [1]. *Asparagus racemosus* (Liliaceae), commonly known as 'Shatavari' (Hindi and Sanskrit), is a tall climber under-shrub found all over India. Almost all parts of this plant are used in Indian traditional system of medicine (Ayurveda and Unani) for the treatment of various ailments in human beings. In particular, the roots are used in dysentery, diarrhoea, tuberculosis, leprosy, skin diseases, epilepsy, inflammations, and as an expectorant [2,3]. Earlier phytochemical investigators reported the isolation of isoflavones [4] steroidal glycosides [5, 6], polycyclic alkaloids and a dihydrophenanthrene derivative [7, 8] from the roots of the plants.

Materials and methods:

Collection of plant material:

The tender shoots of plant *Asparagus racemosus* were obtained from the herbal garden of Northern India Engineering College in the month of February and was identified and authenticated by the Taxonomy and Herbarium Division, NBRI, Lucknow. The voucher specimen was deposited in the herbarium at NBRI for future reference (LWG-93872).

Preparation of plant material:

The shoots of *Asparagus racemosus* were dried, powdered, and defatted with petroleum ether and solvent free powder extracted with 95% ethanol in a soxhlet apparatus at 55°C for 48 h. After the completion of extraction, the extract was concentrated in rotary evaporator to get a dry powder for subsequent experiments [9]. The percent yield was 0.19. The ethanol extract was subsequently partitioned between n-hexane and water in a separating funnel. n-hexane was separated and evaporated to dryness to get n-hexane soluble fraction. The aqueous layer was further partitioned with chloroform, ethyl acetate