

Curculigo orchioides : the black gold with numerous health benefits

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Abstract: *Curculigo orchioides* Gaertn. (family Amarylladaceae) is an endangered rasayana herb which is popularly known as “Kali Musli”. The plant is native to India, and holds a special position as a potent adaptogen and aphrodisiac in Ayurvedic system of medicine. It is an important ingredient of many Ayurvedic preparations and is considered to have aphrodisiac, immunostimulant, hepatoprotective, antioxidant, anticancer and antidiabetic activities. Various chemical constituents like mucilage, phenolic glycosides, saponins and aliphatic compounds from the plant have been reported. The plant is also considered as an important component of various herbal preparations of the Chinese and Kampo medicine. The present review is an attempt to enumerate various biologically tested activities and evaluation of different phytochemicals present in this important medicinal plant.

Keywords: *Curculigo orchioides*; aphrodisiac; medicine, Ayurvedic; extracts

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仙茅:对健康有众多益处的黑金

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摘要: 仙茅(石蒜科)是一种濒临灭绝的多年生草本植物,是印度本土药,作为强有力的适应原和春药在印度传统药物中占有重要位置。它也是多种印度传统药物处方的重要组成部分,被认为具有促进性欲、刺激免疫、保护肝脏、抗氧化、抗癌和治疗糖尿病等作用。已有报道,从仙茅中提取出多种化学成分,如植物黏胶,酚苷、皂苷和脂肪族化合物等。仙茅也是中医和日本汉方医学中各种草药处方的重要成分。本文对仙茅的多种生物活性和其不同化学成分的作用进行了综述。

关键词: 仙茅; 催欲药; 医学, 印度传统; 提取物

Ayurveda, the science of life is one of the branches of “Vedas” — the oldest written texts describing medicinal usage of herbs. Ayurveda deals not only with treatment of disease but also with its preclusion. The disease preventive and health promotive approach of Ayurveda, which takes into consideration the whole body, mind and spirit while dealing with the maintenance, promotion of health and treatment of ailments, is a holistic approach and finds increasing acceptability in many regions of the world^[1]. The disease

preventive, health restorative and adaptogenic approach of Ayurveda is known as Rasayana therapy. Rasayana that improves the sexual function is known as Vajikaran Rasayan. Ayurveda realised the problem of male sexual dysfunction thousands of years ago and developed a separate field of therapeutics known as “Vajikaran”, meaning potentiation in sexual performance^[2]. Vajikaran Rasayana has been described in Ayurvedic system of medicine as herbs or herbo-mineral preparations that enhance the qualities of

rasa and enrich it with nutrients. Rasa is used to describe chemistry and alchemy. The enriched rasa helps in attaining longevity, memory, intelligence, freedom from sexual disorders, and youthfulness^[3]. *Curculigo orchioides* known as Xianmao in vernacular is popularly used as a Vajikaran Rasayana.

Curculigo orchioides Gaertn. (family Amaryllidaceae) is a small herb with a tuberous root stock up to 10 cm long. Roots are stout, short or elongate (sometimes 30 cm long), with copious fleshy root, leaves sessile or petiolate flowers bright yellow^[4, 5]. Dried rhizomes of *C. orchioides* are used in traditional Chinese medicine as a tonic for the treatment of decline in physical strength^[6]. *C. orchioides* is a medicinal herb distributed throughout Nepal from tropical to subtropical regions^[7]. It is also diffused in Japan, China, Malaysia, India and Australia. The plant is available for harvest in the months from August to November, thus leading to a reduced and low supply of the raw material. Over harvesting of the plant has resulted in the endangered status. Promotion of regular cultivation practice for the plant has improved the availability. This review would be helpful for researchers to understand the medicinal benefits of this plant and also serve as a lead for further drug development using *C. orchioides*.

1 Taxonomical hierarchy

Kingdom	Plantae-Plants
Division	Magnoliophyta
Class	Monocotyledon
Order	Liliales
Family	Amaryllidaceae
Genus	<i>Curculigo</i>
Species	<i>orchioides</i>

2 Ethnopharmacological usage of the plant

Amongst various medicinal claims attributed to the plant a few have been discussed in brief here under. Juice of the tuber of *C. orchioides* is mixed with the juice of garlic (*Allium sativum*) and used as eye drop to cure blindness and white spot on the eye ball. Juice of plant is applied on cuts and wounds (like tincture of iodine) and is considered as an effective anti-infective and healing agent. Rhizomes have been reported to be useful in asthma^[8]. In most Ayurvedic formulations the plant is used as a substitute to “safed musli”^[9]. Rhizomes are prescribed in treatment of piles, jaundice, asthma, diarrhoea, and gonorrhoea. The plant also holds the reputation of being a demulcent, diuretic, tonic and aphrodisiac^[10, 11]. *C. orchioides* Gaertn. is named “Xianmao” in *Pharmacopoeia of the People’s Republic of China* and described as a tonic^[12].

In the Unani system of medicine (originating

from the Persian traditional healing system of medicine), the root is considered as bitter, sweet, carminative, tonic, aphrodisiac, antipyretic, useful in bronchitis, ophthalmia, indigestion, vomiting, diarrhoea, dyspnoea, gonorrhoea, gleet, hydrophobia, pains in the joints, etc. The rhizome is prescribed for asthma, piles, jaundice, diarrhoea and gonorrhoea. Leaves of *C. orchioides* have been shown to possess anticancer property^[13]. A decoction of the pounded rhizome along with the crushed ajwain (fruits of *Trachyspermum ammi*, Fam. Umbelliferae) is reportedly given to children in order to gain consciousness. Rhizomes have been claimed for the antidiabetic properties in various studies^[14].

3 Pharmacognostic studies

Although pandemic in usage, there is still insufficient pharmacognostical evaluation carried out on the rhizomes of *C. orchioides*. Bisht *et al*^[15] studied the macroscopic and microscopic characters of the rhizome of *C. orchioides*. Pandey *et al*^[16] reported the characterization of the drug with different chemical reagents. The fluorescence characters and retention factor values including physical values were reported as a thorough phytochemical evaluation profile. With the recent availability of different markers from *C. orchioides*, which are mainly the glycosides, standardization of *C. orchioides* has become easier from a pharmacognostical point of view.

4 Phytochemical studies

A variety of phytoconstituents have been reported from the rhizomes of *C. orchioides* (Figure 1 — 7). Since the rhizomes are considered to be the most vital as far as the medicinal value of the plant is concerned, we would discuss in detail the different components isolated from the tubers of *C. orchioides*.

Rao *et al*^[17] reported the presence of mucilaginous component in the rhizomes of *C. orchioides*. The composition of the mucilage was found to be mannose, glucose, glucuronic acid in the molecular ratio of 6 : 9 : 10. The total amount of the mucilage was found to be 8% — 9%.

Tiwari *et al*^[18] isolated new glycoside 5, 7 dimethoxymyricetin 3-O- α -L xylopyranosyl 4-O- β -D glucopyranoside from the rhizomes of *C. orchioides*. Rhizomes also contain β -sitosterol, sapogenin and alkaloid lycorine^[19]. By using *in vitro* cultures grown as bulbils in shake flasks the two new glucosides of substituted benzylbenzoate curculigoside C and curculigoside D were reported^[20]. Kubo *et al*^[21] isolated new phenolic glucoside named curculigoside and its structure was elucidated as 5-hydroxy-2-O- β -D-glucopyranosylbenzyl 2, 6-dimethoxybenzoate. Two phenolic glycosides, curculigoside E and orchioside D, were isolated and characterized from the rootstock of *C.*

orchioides and compounds were elucidated by means of spectroscopic methods such as one-dimensional (1D), two-dimensional (2D) nuclear magnetic resonance (NMR) and mass spectrometry^[22].

The various aliphatic compounds isolated from alcoholic extract were named as 21-hydroxytetracontane-20-one, 4-methylheptadecanoic acid, 27-hydroxytriacontan-6-one and 23-hydroxytriacontane-2-one^[23, 24]. Rhizomes yielded hentriacontanol, sitosterol, stigmasterol, cycloartenol, sucrose and new phenolic glycoside, named corchioside A (orchinol-3-beta-D-xylopyranosyl-(1 → 6)-beta-D-glucopyranoside)^[25]. The rhizome also contains curculigol, a cycloartane triterpene alcohol^[26]. Xu *et al*^[27-30] reported that several new cycloartane glycosides were isolated. One new triterpenoid saponin named curculigenin A, which was common to all the saponins, was identified as 3β, 11α, 16β-trihydroxycycloartane-24-one by mass spectrometry, 2D NMR analysis and chemical evidence. On the basis of chemical evidence and spectral data, the structure of curculigosaponins A–F was elucidated and also four new cycloartane-type triterpene glycosides named curculigosaponins G, H, I and J were isolated. Two new triterpe-

noid saponins named curculigenins B and C, which are formulated as (24S)-3β, 11α, 16β, 24-tetrahydroxycycloartane and 3β, 11α, 16β-trihydroxycycloartane-24(25)-en, respectively by ¹H, ¹³C NMR, 2D NMR analysis and chemical evidence, and one new phenyl glycoside and two new chlorophenyl glycosides were isolated. The structure of curculigoside B, curculigenins B and C was elucidated to be 2-β-D-glucopyranosyloxy-5-hydroxybenzyl-2'-methoxy-6'-hydroxybenzoate (I), 24-dichloro-3-methyl-5-methoxy-phenol-O-β-D-apiofuranosyl (1-6)-β-D-glucopyranoside (III) and 2,4,6-trichloro-3-methyl-5-methoxyphenol-O-β-D-xylopyranosyl (1-6)-β-D-glucopyranoside (IV), respectively. Yamasaki *et al*^[31] determined the curculigoside by measuring the content of 2,6-dimethoxybenzoic acid by high-performance liquid chromatography (HPLC). Lu *et al*^[32] determined curculigoside by HPLC using Intersil ODS-3 chromatographic column, mobile phase of methanol-water-ice-acetic acid (45 : 80 : 1) and detect wavelength was set of UV 283 nm. Gupta *et al*^[33] isolated two phenolic glucosides named orchiosides A and B. Ethanolic extract of the roots of *C. orchioides* also yielded phenolic glycoside orcinosides A, B, and C^[34].

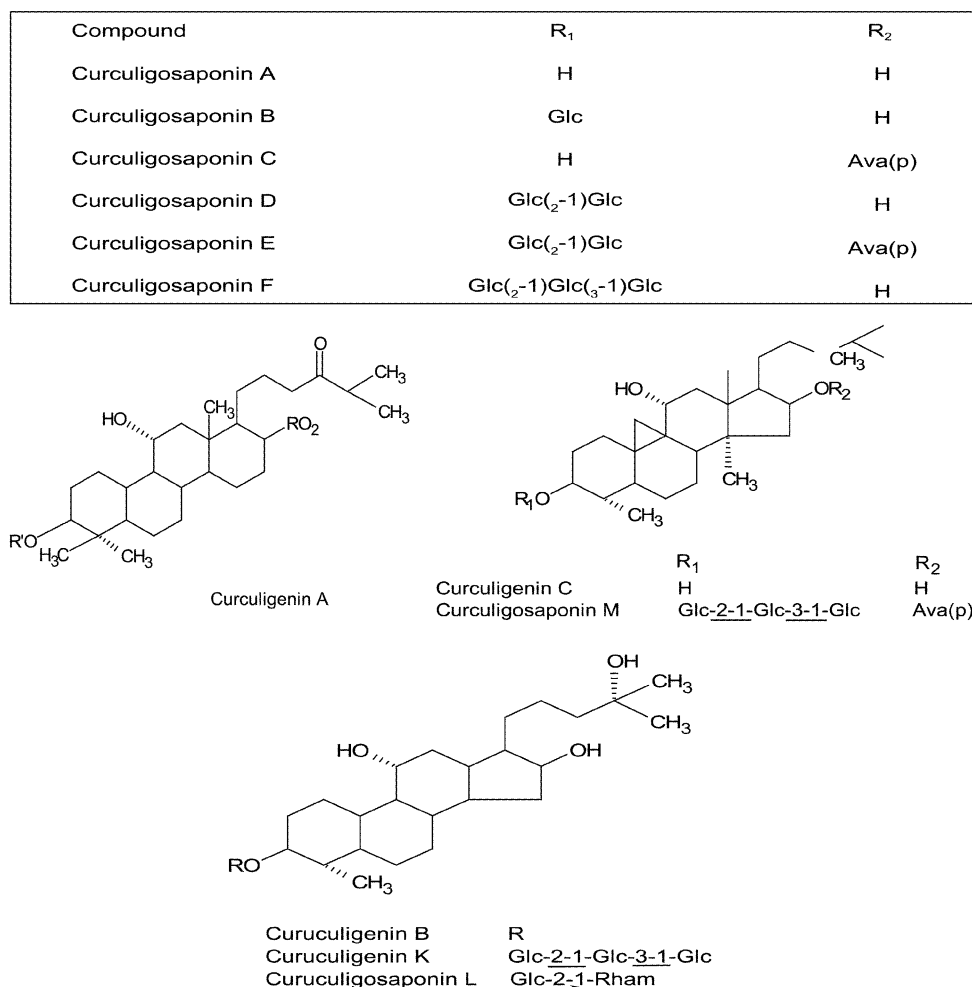


Figure 1 Structure of different saponins isolated from *C. orchioides*

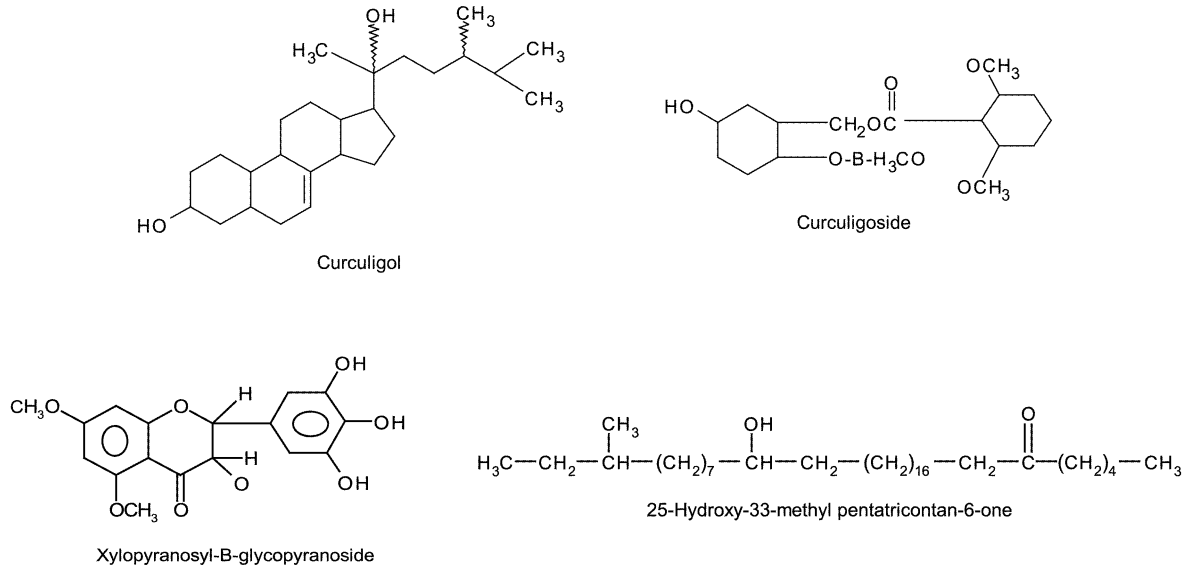


Figure 2 Structure of phenolic compounds isolated from *C. orchoides* (I)

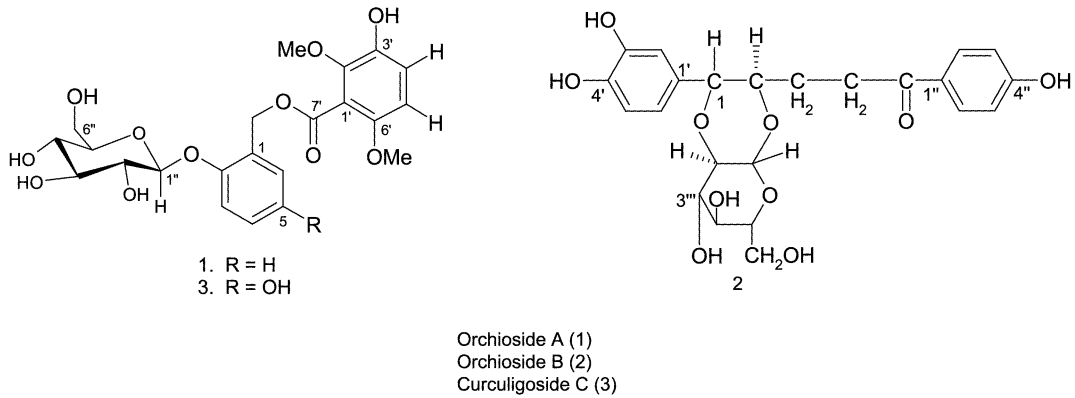


Figure 3 Structure of phenolic compounds isolated from *C. orchoides* (II)

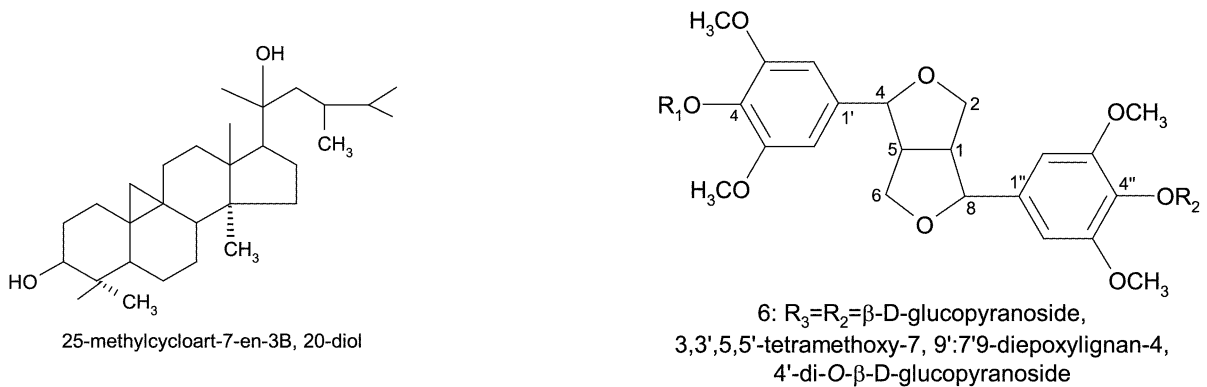
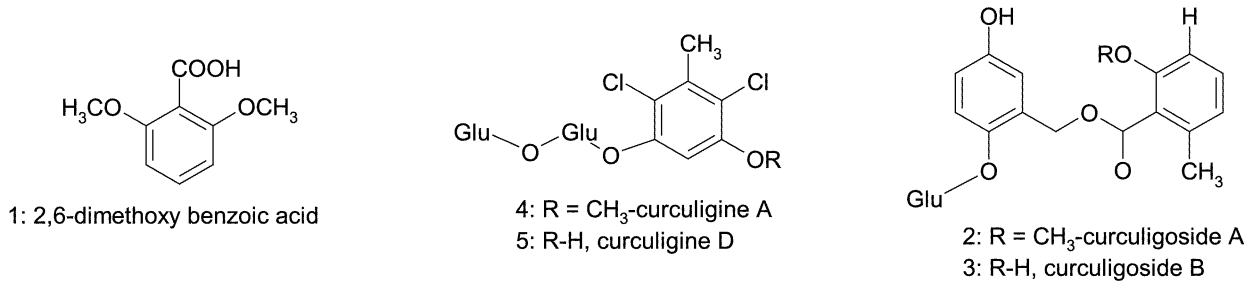


Figure 4 Structure of phenolic compounds isolated from *C. orchoides* (III)

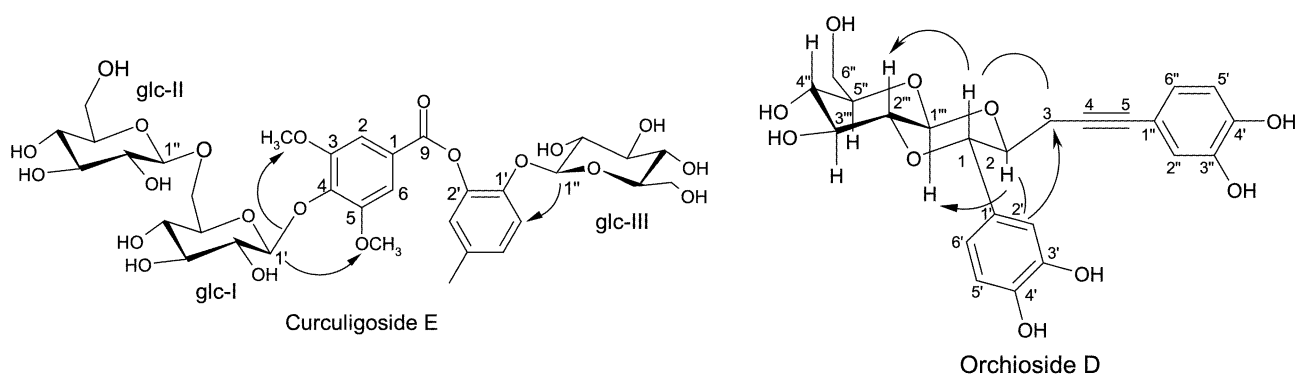


Figure 5 Structure of phenolic compounds isolated from *C. orchoides* (IV)

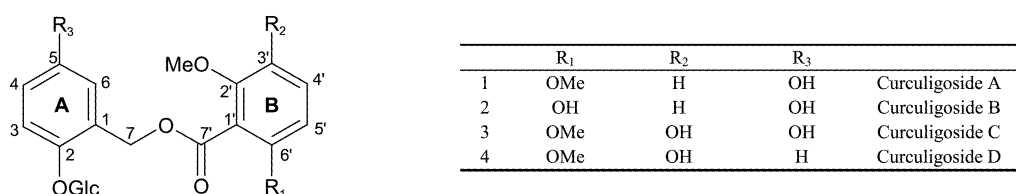


Figure 6 Structure of phenolic compounds isolated from *C. orchoides* (V)

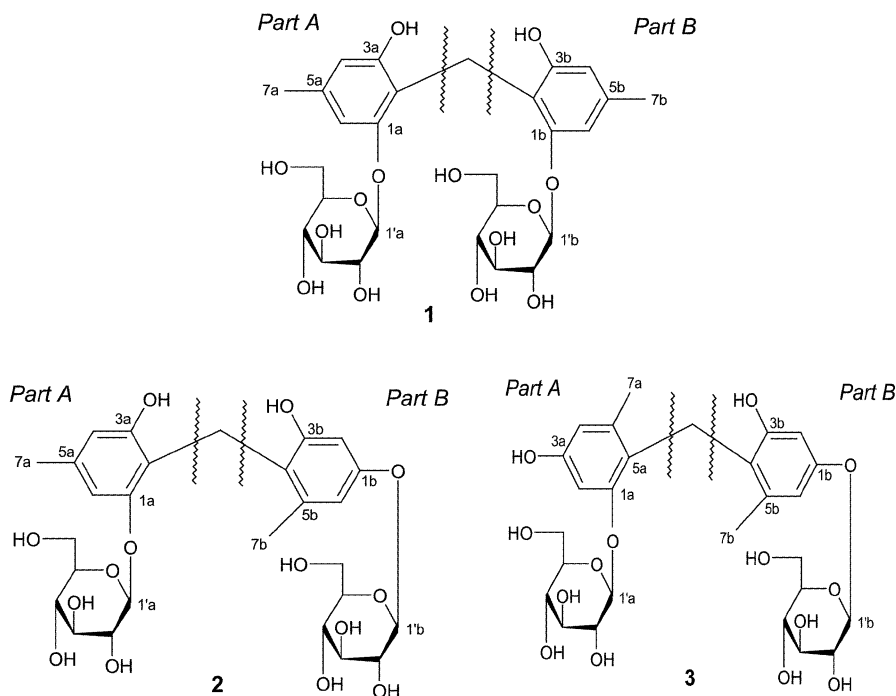


Figure 7 Phenolic glucosides named orcinosides A, B, and C (1, 2, and 3, resp.) isolated from *C. orchoides*

Four esters namely *n*-decan-3-olyl pent-3'-en-1'-oate, and *n*-hexadec-9, 11-dienyl cinnamate, *n*-tridecanyl-hex-2', 4'-dien-1'-oate, *n*-heneitriacont-13-en-5, 10-diol hex-2'-en-1'-oate, were isolated from the rhizomes of *C. orchioides* and characterized by the combination of chemical reactions and spectral data analysis^[35]. A preparative high-speed counter-current chromatography (HSCCC) was used to isolate and separate curculigoside and curculigoside B from herb *C. orchioides*. Some parameters including two-phase solvent system, separation temperature, flow rate of the mobile phase and revolution speed of the apparatus were all investigated, and a successful isolation and purification was achieved at the following conditions: the two-phase solvent system composed of ethyl acetate-ethanol-water at a volume ratio of 5 : 1 : 5 was selected and the lower phase of the system was used as the mobile phase at the flow rate of 2.0 mL/min, and the isolation temperature and revolution speed were set at 30 °C and 800 r/min. The isolation produced a total of 14.5 mg curculigoside B and 72.8 mg curculigoside with purities of 96.5% and 99.4% determined by HPLC from 300 mg crude extract after cleaning-up by D101 macroporous resin, which was necessary for the excellent purification. The recoveries of the two compounds were 91.6% and 92.5%, respectively^[36]. High-performance thin-layer chromatography using toluene : ethyl acetate : glacial acetic acid (12.5 : 7.5 : 0.5, volume ratio) was used to estimate gallic acid in crude drug^[37].

5 Pharmacological properties

5.1 Oxytocic activity Sharma *et al*^[38] observed a oxytocic activity of a flavone glycoside.

5.2 Hepatoprotective activity Rao *et al*^[39] suggested the anti-inflammatory and hepatoprotective activities of *C. orchioides*. Rao *et al*^[40] showed a hepatoprotective activity against rifampicin-induced hepatotoxicities. Rao *et al*^[41] isolated curculignin A and curculigol and screened for their anti-hepatotoxic activity against thioacetamide and galactosamine-induced hepatotoxic. Venukumar *et al*^[42, 43] showed anti-oxidant activity of methanol extract in carbon tetrachloride-induced hepatopathy in rat.

5.3 Immunomodulatory activity Lakshmi *et al*^[44] isolated two phenolic glycosides and a purified glycoside fraction and observed significant immunostimulant activity in purified glycoside-rich fraction isolated from the ethyl acetate extract. Bafna *et al*^[45] showed that methanol extract when studied on humoral and cell-mediated immunity in normal, as well as cyclophosphamide-induced immunosuppressed mice produced an increase in humoral antibody titre, delayed-type hypersensitivity and levels of white blood cells in a dose dependent manner.

5.4 Aphrodisiac activity The ethanolic extract of rhizome improved sexual behavior in male rats. Extract significantly changed the sexual performance as assessed by determining parameters such as penile erection, mating performance, mount frequency and mount latency. Moreover a pronounced anabolic and spermatogenic effect was evidenced by weight gains of reproductive organs. The treatment also markedly affected sexual behavior of animals as reflected in reduction of mount latency, an increase in mount frequency and enhanced attractability towards female. Penile erection index was also incremented in treated group. It also increased spermatogenesis and orientation behavior in male rats^[46, 47]. The lyophilized aqueous extracts of *Asparagus racemosus* Willd., *Chlorophytum borivilianum* Sant. F., *C. orchioides* Gaertn., *Dactylorhiza hatagirea* (D. Don) Soo and *Orchis latifolia* Linn. significantly ($P < 0.05$) improved the pendulatory activity in male rats after 14 days of treatment. Similarly, the extract could also preserve the *in-vitro* sperm count significantly when compared with control group after 30 min of incubation^[48]. The lyophilized aqueous extract of the plant showed significant improvement in sexual activity at a dose of 200 mg/kg body weight. The extract showed significant anabolic effect as evidenced by weight gains in the body and reproductive organs. There was a significant variation in the sexual behavior of animals as reflected by reduction of mount latency, ejaculation latency, post ejaculatory latency, intromission latency, and an increase of mount frequency. Penile erection was also considerably enhanced. Reduced hesitation time (an indicator of attraction towards female in treated rats) showed an enhancement in sexual behavior of extract-treated animals^[49]. The aqueous extract protected the reproductive organs from heat-induced sexual dysfunction, as the extract was useful in ameliorating the reduced spermatogenesis as well as overcoming the heat-shock protein generation in rats. The treatment with extracts resulted in significant amelioration of sexual behavior and the mount, intromission and ejaculatory latencies were significantly reduced while the frequencies for the same parameters were significantly restored in rats exposed to heat and treated with extracts as compared to heat-exposed control group alone. Epididymal sperm count was reduced significantly in heat-treated control group animals, whereas the extracts significantly prevented the decrease in sperm count in rats as compared with positive control group, exposed to heat^[50].

5.5 Antidiabetic activity Both ethanolic and aqueous extracts also possess antihyperglycemic activity in normal, glucose-loaded and alloxan-induced diabetic rats. The extract exhibited significant hypoglycemic activity in all the three animal models when compared with the control.

The activity was also comparable to that of the effect produced by a standard antidiabetic agent glimeperide, 500 $\mu\text{g}/\text{kg}$ (p.o.). Dose-dependent antihyperglycemic effect was observed after treatment with extract^[51, 52].

5.6 Estrogenic activity Ethanolic extract of rhizome possesses estrogenic activity as it showed a significant increase in percentage of vaginal cornification, uterine wet weight ($P < 0.01$), uterine glycogen content ($P < 0.01$) and a proliferative changes in uterine endometrium as compared with the control^[53].

5.7 Antiosteoporotic activity *C. orchioides* ethanolic extract showed potential antiosteoporosis activity as it prevented bone loss in the trabecular bone of the tibia in ovariectomized rats without affecting the weights of the body and the uterus, and increased serum phosphorus, calcium, and osteoprotegerin levels, decreased serum deoxy-pyridinoline crosslinks to creatinine ratio, tartrate-resistant acid phosphatase, adrenocorticotrophic hormone, and corticosterone levels, but did not alter serum tumor necrosis factor- α , interleukin-6, and alkaline phosphate levels in ovariectomized rats^[54].

5.8 Antiasthmatic activity Ethanol extract of *C. orchioides* showed antiasthmatic activity as it was effective against histamine-induced contraction. In isolated goat tracheal chain preparation and isolated guinea pig ileum preparation, the extract exhibited maximum relaxant effect ($P < 0.01$) against histamine at concentrations of 100 g/mL and 25 g/mL respectively. Biochemical estimations in milk-induced total leukocyte count and milk-induced differential leukocyte count showed that there was maximum increase in leucocytes and lymphocytes (99%) and maximum decrease in eosinophils up to 0% at a dose of 375 mg/kg body weight (p.o.) was observed. In histamine-induced bronchoconstriction in guinea pigs, egg albumin-induced passive paw anaphylaxis in rats and haloperidol-induced catalepsy in mice *C. orchioides* showed significant ($P < 0.01$) protection at lower doses while further increase in the dose level showed reduced activity^[55].

5.9 Antibacterial activity The root oil of *C. orchioides* showed significant antimicrobial activity against various bacteria strains such as *Bacillus anthracis*, *B. subtilis*, *Salmonella pullorum*, *S. newport*, and *Staph. Aureus* and fungi stains such as *Fusarium monili forme*, *F. solani*, *Aspergillus flavus* and *Cladosporium*^[56].

6 Polyherbal formulations

Maharishi Amrit Kalash (MAK) is an Ayurvedic compound containing *C. orchioides* used as a supplement along with chemotherapeutic drugs for reducing chemotherapy-induced vomiting, anorexia and improving general well being of patients^[57]. Latha *et al*^[58] showed that herbal

preparation HPN-12 orally administered to male albino rats, 10 mL/kg body weight was found to be effective against liver damage. Rajesh *et al*^[59] showed that Kamilari, an Ayurvedic preparation containing *C. orchioides*, had efficacy in alcoholic liver cirrhosis. Tang *et al*^[60] showed antioxidant and antiglycation properties of traditional Chinese medicine formulations containing *C. orchioides*. Prema^[61] had done clinical study of Progen Capsule in infertility. Wenxin Capsule which contains *C. orchioides* decreased total amount of thromboxane A_2 in treated rats and showed antiplatelet action^[62].

7 Tissue culture

This plant species have now become endangered due to reduction in the natural habitat that supports vegetation. Among the contributory factors, the following are the major ones: (1) extensive denudation of the forest floor, caused by cattle grazing and collection of leaf litter; (2) removal from the wilderness for tuberous roots which are highly priced in the market for its metabolic-enhancing principles and aphrodisiac formulations; (3) poor seed setting and germination; (4) high incidence of viral and bacterial diseases affecting rhizomes; (5) use of the rhizome as an edible flour by many tribal people and (6) use of the plant as a substitute for safed musli^[63]. It is an endangered plant species of medicinal importance. Multiple shoots were obtained from the meristem tip culture on Murashige and Skoog (MS) medium supplemented with 6-benzyladenine (BA) (2.21 $\mu\text{mol}/\text{L}$). The shoots were rooted either on half strength of MS basal medium or on the one supplemented with 1-naphthaleneacetic acid (0.53 $\mu\text{mol}/\text{L}$). *In vitro* plantlets were transferred to pots containing a mixture of vermiculite and soil (1 : 1) for acclimation for a period of two to three weeks. At the end of a three-month period, averages of 125 plants were obtained from a single meristem^[63].

Suri *et al*^[64] suggested a method for large-scale multiplication of *C. orchioides* through bulbil formation of leaf explant in shake flask culture. Suri *et al*^[65] reported that by using a method developed for rapid multiplication through direct organogenesis and bulbil formation *in vitro* leaf and underground stem explants produced maximum number of shoots on B5 medium supplemented with 4.4 $\mu\text{mol}/\text{L}$ benzylaminopurine. Prajapati *et al*^[66] showed *in vitro* regeneration of *C. orchioides*. Suri *et al*^[67] suggested a method for rapid multiplication through somatic embryogenesis and bulbil formation directly from leaf explants. An extract from *in vitro* cultures of *C. orchioides* grown as bulbils in shake flasks, afforded two new glucosides of substituted benzylbenzoate curculigoside C and curculigoside D together with two known compounds — curculigoside A and curculigoside B. Their structures were elucidated on the basis of spectral evidence, in particular by using 2D NMR

methods. Their vasoactive properties were assessed in isolated rat aortic rings^[68].

Micropropagation of leaf explants of *C. orchioides* cultured on a MS medium without cytokinins produced a limited number of plantlets that originated directly from the cut end of the midrib. BA (0.44 – 5.66 mol/L) was needed to produce plantlets from rhizome explants. A higher concentration of BA (2.22 – 4.44 mol/L) resulted in nodular callus that when transferred to cytokinin-free medium formed shoots^[69]. An efficient protocol was developed for *in vitro* clonal propagation of *C. orchioides* Gaertn. through apical meristem culture. Multiple shoots were induced from apical meristems grown on MS basal medium supplemented with 1.5 mg/L BA, 100 mg/L adenine sulfate (Ads) and 3% sucrose. Inclusion of indole-3-butyric acid (IBA) or indole-3-acetic acid in the culture medium improved the formation of multiple shoots. The highest frequency of multiplication was obtained on MS medium supplemented with 1.5 mg/L BA, 100 mg/L Ads, 0.25 mg/L IBA and 3% sucrose. Rooting was achieved upon transferring the microshoots to half-strength MS medium containing 0.25 mg/L IBA and 2% sucrose. Micropropagated plantlets were hardened in the greenhouse and successfully established in soil^[70]. Sharma *et al*^[71] reported that the effect of three arbuscular mycorrhizal (AM) fungal inocula on posttransplanting performance of *in vitro* raised *C. orchioides* plantlets. The three AM fungal inocula consisted of two monospecific cultures of *Glomus geosporum* and *G. microcarpum* and one crude consortium of AM fungal spores isolated from rhizosphere soil of *C. orchioides* growing in natural habitat. Complete plantlets of *C. orchioides* were raised by direct organogenesis of leaf explants on half strength MS medium devoid of any growth hormone. *C. orchioides* plantlets responded significantly differently to all three mycorrhizal treatments. The study suggests use of mixed consortium of AM fungi over monospecific cultures for the sustainable cultivation and conservation of endangered medicinal plant: *C. orchioides*. Direct inoculation of leaf pieces on MS medium supplemented with various concentrations of benzylaminopurine (BAP) (2 – 8 $\mu\text{mol/L}$) or thidiazuron (TDZ) (2 – 8 $\mu\text{mol/L}$) alone or in combination with naphthalenacetic acid (NAA) (0.5 and 1.0 $\mu\text{mol/L}$) produced low shoot induction both in terms of percentage of response and number of shoots per explant. Hence, leaf explants were pretreated with 15, 25 or 50 $\mu\text{mol/L}$ TDZ, for 6, 24 or 48 h with the aim of improving shoot regeneration from cultured explants. The pretreatment of explants with 15 $\mu\text{mol/L}$ TDZ for 24 h significantly promoted the formation of adventitious shoots and the maximum response was observed on MS medium supplemented with 6 $\mu\text{mol/L}$

TDZ^[72]. Use of different elicitors viz., methyl jasmonic acid, salicylic acid and ethephon influenced the production of curculigosides contents of leaves in *in-vitro* plantlets culture maintained on MS medium containing BA and IBA 0.1 mg/L each. Elicitation resulted in increased flux of phenolics and some new derivatives were produced. This involved changes in accumulation, transport and synthesis^[73].

8 Summary and conclusion

C. orchioides is reported to be an anticarcinogenic, hypoglycemic, aphrodisiac, immunomodulatory and tonic herbs. Plant was also reported to contain various phenolic, lignan, saponins and aliphatic compounds. So more researches will be needed in area of activity of phytomolecule. The herbs are available three months only but techniques like tissue culture make it possible to regenerate and multiply throughout the year. The present review is a practical approach to accrue the findings on *C. orchioides*.

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第 11 次全国中西医结合防治呼吸系统疾病学术研讨会征文通知

由中国中西医结合学会呼吸病专业委员会主办、中国中医科学院广安门医院承办的“第 11 次全国中西医结合防治呼吸系统疾病学术研讨会暨全国呼吸病中西医结合研究高级进修班”定于 2010 年 10 月底在北京召开。会议主题突出“临床实用”。届时将邀请呼吸内科领域的名老中医及北京协和医院、北大医院等单位的著名专家进行学术讲座,交流中医、中西医结合防治呼吸系统疾病的基础理论、临床治疗经验和最新进展。现将会议征文事宜通知如下。

1 征文内容 肺部感染、哮喘、慢性阻塞性肺疾病、弥漫性肺间质疾病、肺血管病、呼吸睡眠暂停综合征、肺动脉血栓栓塞症、胸膜和纵隔疾病及其他呼吸疾病的临床治疗经验、综合防治策略或基础研究等方面的文章,呼吸系统少见病、疑难病中西医结合诊治的临床报道,临床治疗上述疾病的名老中医专家经验总结及介绍等。

2 征文要求 论文须尚未公开发表,字数不超过 3 000 字,摘要不超过 300 字;注明作者姓名、工作单位、通讯地址、邮政编码及第一作者的电子邮箱及联系电话;论文格式为 Word 文本,标题黑体 3 号字,内容宋体 5 号字。

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