

CISSAMPELOS PAREIRA: A PROMISING ANTIFERTILITY AGENTSamanta Jhuma^{1*}, Bhattacharya S²¹Rayat & Bahra Institute of Pharmacy, Sahauran, Kharar, Mohali, Punjab, India²School of Pharmacy, NIMS University, Jaipur, Rajasthan, India

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ABSTRACT

Population explosion is a serious problem through out the world. Population is a major problem in our country. Birth control becomes essential part of our life. Synthetic antifertility agents have severe side effect like breast cancer, cervical cancer etc. The practice of traditional medicine for the control of fertility in most part of India is based on the uses of plant medicines of many years. *Cissampelos pareira* Linn. is a perennial twining shrub with small yellow flower commonly, is one of the folk medicinal plant used as an agent for birth control among rural people. The present review encompasses botanical information, description, geographical distribution, phytochemical properties, uses and recent research on *Cissampelos pareira* Linn which may help us to know the effectiveness of *Cissampelos pareira* Linn. as antifertility agent.

KEYWORDS: Population explosion, *Cissampelos pareira*, antifertility agents, folk medicinal plant

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INTRODUCTION

Cissampelos pareira was first described from Latin America, but actually occurs throughout the tropics; in some countries it has been introduced for its ornamental value. Throughout the tropics preparations of *Cissampelos pareira* are applied against a variety of complaints. People take an infusion of the bitter rhizome, and sometimes of leaves and stems, to cure gastrointestinal complaints such as diarrhoea, dysentery, ulcers, colic, intestinal worms and digestive complaints, and also urogenital problems such as menstrual problems, venereal diseases, infertility, uterine bleeding and threatening miscarriage.² A rhizome decoction or pounded leaves are also widely taken or externally applied as a febrifuge and stomachic, and against cough, heart trouble, rheumatism, jaundice, snake bites and skin infections such as sores, boils, scabies and childhood eczema.³⁻⁴ Tribal people in India use the plant to prevent pregnancy.⁵⁻⁷ Methanolic extract of leaf of *Cissampelos pareira* shows antifertility activity in female albino rat.⁹

DESCRIPTION

Cissampelos linn (family –Manispermaceae) is a perennial climbing herbs/shrubs with small greenish-yellow flowers, peltate or orbicular-reniform, ovate-subreniform leaves with truncate cordate base, glabrous or hairy above up to 3-12 cm long. It produces inedible,

dark, grape-sized berries. It belongs to the genus *Cissampelos*, of which thirty to forty species are distributed in the tropical and subtropical world. One species occur in India. (Wealth of India-Raw Materials, II, 183). Flowers unisexual; pedicel up to 2 mm long; male flowers with 4(-5) sepals, ovate to obovate, c. 1.5 mm × c. 0.5 mm, keeled, hairy outside, greenish or yellowish, corolla cup-shaped, c. 1 mm long, filaments of stamens completely fused; female flowers with 1 sepal c. 1.5 mm long, 1 obtriangular to kidney-shaped petal c. 1.5 mm × 2 mm, ovary superior, hairy, 1-celled, style thick with spreading, 3-lobed stigma. Fruit a short-hairy, orange to red drupe c. 5 mm long, curved with style-scar near base; stone with 2 rows of very prominent transverse ridges, 1-seeded. Seed horseshoe-shaped; embryo elongate, narrow, embedded in endosperm, cotyledons flattened. The flowers of *Cissampelos pareira* are probably pollinated by small insects. The plant is common in orchards, hedges, park and gardens of moist soils, either creeping or twining around other plants, also common on the hilly tracts along water courses. It can also be propagated from root cuttings, planted at the beginning of monsoon. Sometimes it dies back in hot water. *Cissampelos pareira* is mostly collected from the wild. *Cissampelos pareira* is very widespread and locally common. The quantity and composition of the alkaloids

found in the leaves and roots seem to differ between plants from different regions. This may be a result of its great genetic diversity

GEOGRAPHICAL DISTRIBUTION

Cissampelos pareira was first described from Latin America, but actually occurs throughout the tropics; In Africa it has been recorded from eastern DR Congo, Tanzania, south to north Angola, and Zambia. It also occurs in Comors, Madagascar and Island.

PROPERTIES

Cissampelos pareira contains a number of alkaloids, especially bisbenzylisoquinoline alkaloids. The rhizome contains hayatine, hayatidine, hayatinine, d-4"-O-methylbebeerine, l-bebeerine, isochondrodendrine, dicentrine, dehydrodicentrine, insularine,¹¹⁻¹³ the rhizome and leaves contain cycleanine,¹⁴ while cissampareine has been isolated from the whole plant¹⁵ and the chalcone-flavone dimer cissampeloflavone from the aerial parts. The rhizomes have also been found to be a rich source of tropoloisoquinoline alkaloids. Pareirubrine A, pareirubrine B, grandirubrine, isoimerubrine and pareitropone have been isolated, all of which showed potent antileukaemic activity. Furthermore, two cytotoxic azafluoranthene alkaloids, structurally strongly related to tropoloisoquinoline alkaloids, have been isolated from the same extract, as has cissamine chloride. *Cissampelos* plants contain a group of plant chemicals called isoquinoline alkaloids. Since the late 1960s, these chemicals have received a great deal of attention and research. Out of thirty-eight alkaloids thus far discovered in abuta, one, called *tetrandrine*, is the most well documented. The main chemicals in *Cissampelos linn* are alkaloids, arachidic acid, bebeerine, berberine, bulbocapnine, cissamine, cissampareine, corytuberine, curine, 4-methylcurine, cyclanoline, cycleanine, dicentrine, dehydrodicentrine, dimethyltetrandrinium, essential oil, grandirubrine, hayatine, hayatinine, insularine, isochondrodendrine, isomerubrine, laudanosine, linoleic acid, magnoflorine, menismine, norimeluteine, nor-ruffscine, nuciferine, pareirine, pareirubrine alkaloids, pareitropone, quercitol, stearic acid, and tetrandrine.

USES

Clinical research over the years has found tetrandrine to have pain-relieving, anti-inflammatory, and fever-reducing properties.¹⁶ More than one hundred recent clinical studies also describe this chemical's promising actions against leukemia and some other cancer cells, and research is ongoing.¹⁷ However, the therapeutic dosages of tetrandrine used in these animal studies are much higher than one can reasonably obtain from natural abuta root or vine. Other recently published studies

examined tetrandrine's possible cardio active and blood pressure - reducing effects through numerous pathways and mechanisms of action at much smaller dosages.^{18,19}

Another well-known alkaloid chemical, berberine, has been documented to have hypotensive, antifungal, and antimicrobial actions. This chemical has been used for the treatment of irregular heartbeat, cancer, *Candida*, diarrhea, and irritable bowel syndrome.²⁰⁻²⁷ Another alkaloid called cissampeline is sold as a skeletal muscle relaxant drug in Ecuador.

The protective effect of ethanolic extract of *Cissampelos pareira* root (CPE) against gastric cancer has been found. The bioassay-guided fractionation of the CPE yielded a compound, identified as 2-(3,4-dihydroxyphenyl)-3,5,7 trihydroxy-4H-chromen-4-one (Quercetin) Several experiments on rhizome extracts of *Cissampelos pareira* have been done in recent years. Ethanolic rhizome extracts have shown antihistaminic, hypotensive, antispasmodic and anticonvulsant properties. In a test to confirm the antifertility use of the plant, a methanol extract of the leaves administered to rats caused a significant increase in the duration of the dioestrus and a reduction in the number of litters. Altered gonadotropine and oestradiol secretion were involved.⁹ *Cissampelos pareira* exhibits curare-like activity, depressing the central nervous system and relaxing smooth muscles, and has hypotensive and hypoglycaemic actions. The compound hayatinine is structurally similar to tubocurarine from *Chondrodendron tomentosum*, the active compound in curare. It shows comparable neuromuscular blocking activities. Cycleanine has shown significant inhibition of nitric oxide production in macrophages. Cycleanine and bebeerines suppressed hepatic injury and reduced the level of tumor necrosis factor in mice treated with lipopolysaccharide and BCG, a model for the study of fulminate hepatitis.

PROSPECTS

Methanolic extract of leaf of *Cissampelos pareira* shows antifertility activity in female albino mice. Treatment of mice with leaf extract decrease the mean no. of litters suggesting the antifertility effect of the extract. Plant is not abortifacient and teratogenic in albino mice. High LD₅₀ i.e. 7.3 gm /kg in mice establish the safe nature of the drug. But the chemical constituent responsible for antifertility activity not yet known. Other aerial parts like stem, flower are also used as antifertility agent in traditional medicine in different parts of the world. However, scientific research of this plant as antifertility agent is still fragmentary. Research area is still open to validate *Cissampelos pareira* as anti fertility agent and to identify the chemical constituent responsible for the particular activity.

CONCLUSION

More than 40 % of the Indian population is living below the poverty line. Most of the people do not know the side effects and drug interaction of synthetic contraceptives. Therefore, a research thrust is required for a relatively cheap, widely available, widely accepted and effective contraceptive of plant origin in order to meet the increasing need for population control. Contraceptives of plant origin should be non-invasive in administration, non-hormonal in action, non-toxic and that is relatively long-acting. *Cissampelos pareira* was first described from Latin America, but actually occurs throughout the tropic which implies that it is widely available. It is obvious that *C. pareira* is cheaper as it is widely available. Throughout the tropics preparations of *Cissampelos pareira* are applied against a variety of complaints which implies that it is widely acceptable and non-toxic. One phytoconstituent / herbal formulation can be developed from *Cissampelos pareira* which may be cheap and widely available.

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TABLE 1: BOTANICAL INFORMATION

Botanical Name	<i>Cissampelos pareira</i> L.
Family	Menispermaceae
Habit	Climber
Used In	Ayurveda, Folk, Homeopathy, Tibetan, Sidha, Modern and Unani
Chromosome number	<i>n</i> =12
Synonyms	<i>Cissampelos madagascariensis</i> Miers (1871).
Vernacular names	Velvetleaf, false pareira, abuta (En). Liane patte cheval (Fr). Pareira brava, butua (Po). Kishiki cha buga, mkasisi mkiwa, mlagalaga (Sw).
Language (No. of Names)	Vernacular Name
Assamese (1)	tubukilota
Bengali (2)	akanadi, kijri
English (1)	false pareira root
Hindi (20)	pardhi, akanadi, akauadi, dakhnirbissi, harjeuri, harjori, nirbisi, dak nirbisi, daku-nirbisi, pahre, parha, taur, pahan, batindu, bhatindu, mathiari, chhoti taan, kalipar, tan, chhoti-taan
Kannada (12)	padavali, padvali, aamaradaavalli, gutte, kaaduballi, kandaguduchi, neemukha, parera beru, ambashtha, cisha boddi, hondike balli, maneballi
Khasi (1)	jyrmi salla
Malayalam (6)	kattuvalli, patakkilannu, patuvalli, pata, battuvalli, cattuvalli
Marathi (14)	pahad-mul, pahad-vel, paharval, pahadamoola, padavali, padavel, pahadvel, paharmul, paharvel, pahaad, pahaad mool, pahaadvel, phaharmool, bhatvel
Nepali (2)	sulara, barel-panrhe
Oriya (10)	ghodakur
Sanskrit (54)	akaisika, akastila, ambashtha, ambashthai-patha, ambashthika, ambastha, ambostha, aviddhakarni, avidhakarni, brihatika, brihattikta, chchinnavki, devi, ekashthila, kuchela, kucheli, laghupatha, mahanjasi, malati, malavi, papacheli, papachelika, papanalil, papehlika, patha, patika, piluphala, prachina, prachinambastika, pracina, pratanini, rasa, ruchishya, shishira, shreyasi, sriyesi, sthapini, susthira, tiktapushpa, trishira, trivrita, uthika, vallika, vanitiktika, vara, varatikta, vatsadini, venivalli, venivel, vidhakarni, vriddhakarnika, vriddhakarnika, vrittaparni, eshika
Tamil (75)	paadakkizhangu, appatta, punaittita, puttutiruppi, sina, titta, tuvan, tuvigaba, vattattiruppi, urikkakodi, ponmucuttai, vattattirumpi, ampasta, ampastaki, ampastam, ampattai, apamattar, appakacceti, appakam, appam, appattar, camuttiracoki, pon-musuttai, vattat-tiruppi, pomushtie, ponmoototai, vatatirupie, vattathiruppi, poi mooshtie, poon mooshtie, vata tirupie, carakki, cina, cinavattam, curati2, curuttimuli, malaimattiri, mancatkatakakkoti, mancatkatakam, mataltiruppi, mataltiruppicceti, matamatakki, matapani, matapannicceti, matappani, matappanni, matarapani, matarapannicceti, matarappanni, matipani, mayali, papaceti, patai 2, patila, perikam 2, piratekiyam, pittuttiruppi, ponmaittittai, porumpilaver, pukuttiruppi, putkuttiruppi, puttuttiruppi, titapitta, titta@, tittaki, tittakicceti, tittar, mulanitari, vilappotti, viraicceti, viri, tuttina, vanatitta, varititta, vartevi
Telugu (13)	adivibankatige, pata, visaboddi, shedsugandi, adavi banka teega, pateru tivva, pata visha boddi, esaboddi, paterutivva, adavibankatheega, chiruboodi, paata, bodi
Tibetan (3)	batha, patha (p), pa-tha
Urdu (1)	Patha