

## REVIEW

RECENT STUDIES ON APHRODISIAC HERBS FOR THE MANAGEMENT  
OF MALE SEXUAL DYSFUNCTION – A REVIEWNEELESHP MALVIYA<sup>1\*</sup>, SANJAY JAIN<sup>1</sup>, VIPIN BIHARI GUPTA<sup>2</sup> AND SAVITA VYAS<sup>3</sup><sup>1</sup>Smriti College of Pharmaceutical Education, Indore, India<sup>2</sup>BR Nahata College of Pharmacy, Mandsaur, India<sup>3</sup>MGM Medical College, Indore, India

**Abstract:** An aphrodisiac is a type of food or drink that has the effect of making those who eat or drink it more aroused in a sexual way. Aphrodisiacs can be categorized according to their mode of action into three groups: substances that increase libido (i.e., sexual desire, arousal), substances that increase sexual potency (i.e., effectiveness of erection) and substances that increase sexual pleasure. Some well-known aphrodisiacs are *Tribulus terrestris*, *Withania somnifera*, *Eurycoma longifolia*, *Avena sativa*, *Ginko biloba*, and *Psoralea coryifolia*. Ethnobotanical surveys have indicated a large number of plants as aphrodisiacs. The paper reviews the recent scientific validation on traditionally used herbal plants as aphrodisiac herbs for the management of sexual disorder erectile dysfunction.

**Keywords:** aphrodisiacs, herbal plants, erectile dysfunction

An aphrodisiac is defined as any food or drug that arouses the sexual instinct, induces veneral desire and increases pleasure and performance. This word is derived from ‘Aphrodite’ the Greek goddess of love and these substances are derived from plants, animals or minerals and since time immemorial they have been the passion of man (1). There are two main types of aphrodisiacs, psychophysiological stimuli (visual, tactile, olfactory and aural) preparations and internal preparations (food, alcoholic drinks and love portion) (2).

Erectile dysfunction (ED) or (male) impotence is a sexual dysfunction characterized by the inability to develop or maintain an erection of the penis (3). There are various underlying causes, such as cardiovascular leakage and diabetes, many of which are medically treatable. The causes of erectile dysfunction may be physiological or psychological (4). Folk remedies have long been advocated, with some being advertised widely since the 1930s (5). The introduction of the first pharmacologically approved remedy for impotence, sildenafil (trade name Viagra), in the 1990s caused a wave of public attention, propelled in part by heavy advertising (6).

There are many herbal drugs that have been used by men with ED with varying degrees of suc-

cess. Most potent herbal aphrodisiacs are available and have little or very little side effects (7). Some of the herbs are Gokhru (*Tribulus terrestris*) Zygophyllaceae (active parts – fruits), onion (*Allium cepa*) Liliaceae (active parts – bulb), garlic (*Allium sativum*) Liliaceae (Active parts – bulbs) etc. (8, 9). Other herbal plants with aphrodisiac activity are *Datura metel*, *Atropa belladonna*, *Hyoscyamus niger*, *Cannabis sativa*, *Eurycoma longifolia*, *Avena sativa*, *Ginko biloba*, *Psoralea coryifolia*. Here is the list of plants with their description, experimental study, chemical constituents and conclusion about the aphrodisiac activity of plants (10).

***Phoenix dactylifera***

The date palm pollen (DPP) is used in the traditional medicine for male infertility. Experimental study – The effect of *Phoenix dactylifera*, pollen, on sperm parameters and reproductive system of adult male rats was studied and the results indicated that the consumption of DPP suspensions improved the sperm count, motility, morphology, and DNA quality with a concomitant increase in the weights of testis and epididymis. Constituents – The date palm contains estradiol and flavonoid components that have positive effects on the sperm quality.

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Conclusion – DPP suspension seems to improve sperm quality, enhance fertility in the male adult rat. Therefore, it may be useful to solve infertility problems (11).

#### *Fadogia agrestis*

Experimental study – The phytochemical constituents and the aphrodisiac potential of the aqueous extract of *Fadogia agrestis* (Rubiaceae) stem in male albino rats were evaluated. All the doses resulted in significant increase in mount frequency, intromission frequency and significantly prolonged the ejaculatory latency ( $p < 0.05$ ) and reduced mount and intromission latency ( $p < 0.05$ ). There was also a significant increase in serum testosterone concentrations in all the groups in a manner suggestive of dose-dependence ( $p < 0.05$ ). Constituents – Phytochemical screening revealed the presence of alkaloids and saponins while antraquinones and flavonoids are weakly present. Conclusion – The aqueous extract of *Fadogia agrestis* stem increased the blood testosterone concentrations and this may be the mechanism responsible for its aphrodisiac effects and various masculine behaviors. It may be used to modify impaired sexual functions in animals, especially those arising from hypotestosteronemia (12).

#### *Chione venosa*

The Caribbean island of Grenada furnishes the popular aphrodisiac drug “Bois Bande”, which consists of the stem bark and the roots of *Chione venosa* (SW.) URBAN var. *venosa* (Rubiaceae), a native tree growing in the islands rain forest. Constituents – The phytochemical investigation of dichloromethane and methanolic-aqueous extracts of the bark and the roots yielded three acetophenone derivatives described for the first time in plants – *ortho*-hydroxyacetophenone azine, acetophenone-2-O- $[\beta$ -D-apiofuranosyl-(1',6')- $\beta$ -D-glucopyranoside] and acetophenone-2-O- $\beta$ -D-glucopyranoside, along with five known compounds,  $\alpha$ -morrisonide, sweroside, diderroside, daucosterol and  $\beta$ -sitosterol. Their structures were elucidated by 1D and 2D NMR analysis, UV–Vis and ESI–MS spectroscopy. Conclusion – It was concluded that the study of the chemical composition of *Chione venosa* (SW.) URBAN var. *venosa* has revealed the presence of three acetophenones hitherto unknown in plants, three iridoids and two well-known triterpenes. These results not only enhance the knowledge of a traditionally used medicinal plant but also contribute to the aphrodisiac potential of the plant (13).

#### *Montanoa tomentosa*

Cihuapatli, the Mexican zoapatle (*Montanoa tomentosa*) has an extensive ethnomedical history of use as a traditional remedy for reproductive impairments. Experimental study – Copulatory behavior of sexually active male rats receiving doses of 38, 75 and 150 mg/kg of the aqueous crude extract of *M. tomentosa*, was assessed. In addition, it was evaluated the effect of a 75-mg/kg dose of the extract on males with anesthetization of the genital area and on sexual behavior of sexually inactive male rats (non-copulators). Constituents – The exact constituents have to be discovered. Conclusion – The study provides evidence that the aqueous crude extract of *M. tomentosa* is a potent stimulator of sexual behavior, particularly of sexual arousal in male rats, and that it promotes the expression of masculine sexual behavior in previously sexually inactive animals. On these bases, this extract can be considered to possess aphrodisiac properties (14).

#### *Butea frondosa*

*B. frondosa* (Fabaceae), is traditionally claimed to possess aphrodisiac, expectorant, emmenagogue, diuretic and astringent properties. The plant *Butea frondosa* has also been indicated in the Indian system of medicine as a plant augmenting memory and as a rejuvenator. The skin of the bark and resin contains tannic and gallic acids. The plant gives a resin gum, called as Kino oil, proteolytic and lipolytic enzymes, palasonin, sitosterol, amyirin, monospermin, lectins and lactone. Experimental study – The study done by S. Ramachandran, confirmed the claims of *B. frondosa* as an aphrodisiac agent. Sexually active and inactive animals showed increased and improved sexual performance, when *B. frondosa* extract (400 mg/kg b. w.) was administered for a period of 21 to 28 days. Mount latency (ML), intromission latency (IL), ejaculation latency (EL), mounting frequency (MF), intromission frequency (IF), ejaculation frequency (EF) and post-ejaculatory interval (PEI) were the parameters observed before and during the sexual behavior study. Constituents – Monoamines were present as an active constituent. Conclusion – The extract reduced significantly ML, IL, EL and PEI ( $p < 0.05$ ). The extract also increased significantly MF, IF and EF ( $p < 0.05$ ). These effects were observed in sexually active and inactive male rats (15).

#### *Myristica fragrans*

*M. fragrans* commonly known as nutmeg, widely used as spice and in alternative medicine,

has been reported to have aphrodisiac, stomachic, carminative, tonic, nervous stimulant, aromatic, narcotic, astringent, hypolipidemic, antithrombotic, antifungal, antidysentric and anti-inflammatory properties. Nutmeg is the dried kernel of broadly ovoid seed of *Myristica fragrans* Houtt. (Myristicaceae). It has been mentioned in Unani medicine to be of value in the management of male sexual disorders. Experimental study – The study was undertaken to evaluate the aphrodisiac effect of 50% ethanolic extract of nutmeg along with its likely adverse effects and acute toxicity using various animal models. The suspension of the extract was administered (100, 250 and 500 mg/kg, *p.o.*) to different groups of male rats daily for seven days. The female rats involved in mating were made receptive by hormonal treatment. The general mating behavior, libido and potency were studied and compared with the standard reference drug sildenafil citrate. Constituents – The nutmeg contains a volatile oil, a fixed oil, proteins, fats, starch and mucilage. The fixed oil contains myristin and myristic acid. Nutmeg yields 5–15% of volatile oil, which contains pinene, sabinene, camphene, myristicin, elemicin, isoelemicin, eugenol, isoeugenol, methoxyeugenol, safrole, dimeric phenylpropanoids, lignans and neolignans. Conclusion – The 50% ethanolic extract of nutmeg possesses aphrodisiac activity, increasing both libido and potency, which might be attributed to its nervous stimulating property. The study thus provides a scientific rationale for the traditional use of nutmeg in the management of male sexual disorders (16).

#### ***Ruta chalepensis***

*Ruta chalepensis* has been used medicinally in many ancient cultures. In ancient Turkish and Chinese literature, its use as an abortifacient and uterine stimulant was reported. Plant showed the presence of alkaloids, flavonoids, coumarins, tannins, volatile oil, sterols and/or triterpenes. Experimental study – The plant had a spermatrophic action demonstrated by Abdullah and Qarawi, in experimental study, by an increase in sperm count, motility, living percent, and a decrease in encountered sperm abnormalities. The hormonal profile was also influenced by the *R. chalepensis* extract. The testosterone and FSH levels were significantly increased with no change in the LH and prolactin levels. Constituents – From the naturally occurring coumarins, only the 3-phenylcoumarins have been present in *Ruta chalepensis* possessing potent estrogenic activity. Conclusion – The stimulatory effects

of *Ruta chalepensis* mediated through a pituitary-testicle axis participating in the physiological events of spermatogenesis (17).

#### ***Satureja khuzestanica***

*Satureja khuzestanica* Jamzad is an endemic plant that is widely distributed in the Southern part of Iran. It is famous for its medical uses as analgesic and antiseptic in folk medicine. The genus *Satureja* belongs to the family Lamiaceae, subfamily Nepetoideae and the tribe Mentheae. There are evidences indicating that carvacrol and flavonoids are the main constituents of *Satureja* spp. Four compounds  $\beta$ -sitosterol,  $\beta$ -sitosterol-3-*O*- $\beta$ -D-glucopyranoside, ursolic acid and 4',5,6-trihydroxy-3',7-dimethoxyflavone were characterized from the dichloromethane extract of the aerial parts of *Satureja khuzestanica*. Experimental study – The study was undertaken to see the effect of *Satureja khuzestanica* essential oil (SKEO) in male rat fertility. SKEO was administered orally at doses of 75, 150, and 225 mg/kg/day for 45 days in drinking water. Treated and control rats were mated with female on day 45 of treatment. SKEO significantly improved all the parameters evaluated such as potency, fecundity, fertility index, and litter size. Constituents – It contains more than 0.5% of essential oil. Conclusion – The concentrations of FSH and testosterone were significantly increased in SKEO-treated groups. Also the weights of testes, seminal vesicles, and ventral prostate weights were increased by SKEO (225 mg/kg). Histopathological analysis showed that in male rats treated with SKEO (150, 225 mg/kg) the number of spermatogonium, spermatid cords, Leydig cells, and spermatozooids were increased (18).

#### ***Lepidium meyenii***

*Lepidium meyenii* (Maca) is a Peruvian hypocotyl that grows exclusively between 4000 and 4500 m in the central Andes. Maca is traditionally employed in the Andean region for its supposed fertility-enhancing properties. Experimental study – Adult male rats were exposed for 21 days to an altitude of 4340 m and treated with vehicle or aqueous extract of Maca (666.6 mg/day). The lengths of the stages of the seminiferous epithelium and epididymal sperm counts were obtained at 0, 7, 14 and 21 days of exposure. The stages of the seminiferous tubules were assessed by transillumination. A dose–response study was also performed at sea level to determine the effect of Maca given to male rats at doses of 0, 6.6, 66.6 and 666.6 mg/day for 7 days on body weight, seminiferous tubule

stages and epididymal sperm count. Constituents – Dry Maca hypocotyls have 59% carbohydrates, 10.2% proteins, 8.5% fiber, 2.2% lipids and a number of other compounds, including most of the essential amino acids. Arginine, a constituent of Maca, has been clinically proven to play a role in male fertility. Maca also contains sterols, such as campesterol, stigmasterol and sitosterol that enhance fertility. Conclusion – The study concluded that treatment of rats with Maca at high altitude prevented high altitude-induced spermatogenic disruption (19).

### *Eurycoma longifolia*

*Eurycoma longifolia* Jack commonly known as Tongkat Ali is well known among various ethnic groups in Malaysia for treating disease and enhancing health and as such, it is sometimes referred to as 'Malaysian ginseng'. A recent research reports the isolation of several quassinoids from *Eurycoma longifolia*. Certain quassinoids, isolated from *Eurycoma longifolia* are known to possess a variety of biological activities, including antitumor, antiviral, antifeedant, antiamebic and anti-inflammatory activities. Experimental study – The effects of *Eurycoma longifolia* Jack were studied on the sexual qualities of middle aged male rats after dosing them with 0.5 g/kg of various fractions of *E. longifolia* whilst the control group received 3 mL/kg of normal saline daily for 12 weeks. Constituents – Phytochemical screening revealed the presence of alkaloids, lactones and phenolics. Conclusion – The study shows that *E. longifolia* Jack enhanced the sexual qualities of the middle aged male rats, and further studies should be conducted to determine if this plant has the above property in middle aged men (20).

### *Eriosema kraussianum*

Zulu traditional health practitioners have claimed that the roots of *Eriosema kraussianum* N. E. Br (Papilionaceae) and other *Eriosema* species (Zulu indigenous umbrella name of "uBangalala") are effective remedies for the treatment of erectile dysfunction and/or impotence. Five pyranoisoflavones (kraussianones 1–5) have been isolated from the rootstock of *Eriosema kraussianum* and were screened for smooth muscle relaxation of rabbit penile muscle. The most active of the compounds had an activity of 75% of that found in Viagra in the erectile dysfunction test on rabbit penile smooth muscle. Kraussianone 1 showed an activity close to that of Viagra, thus living up to the plant's traditional use (21).

## WORLDWIDE RESEARCH ON SCREENING OF MEDICINAL PLANT FOR APHRODISIAC POTENTIAL

Benson et al. extracted total flavonoids from *Palisota hirsuta* leaves, which modified the sexual parameters such as the latent time of observation (LTO) and the number of tentative of intromission (NTI) (vaginal penetration) among the male rats. They justified the use of *Palisota hirsute* leaves as an aphrodisiac in traditional herbal medicine (22). Chauhan et al. evaluated ethanolic extract of rhizomes of *Curculigo orchioides* for its sexual behavior in rats. The treatment reflected reduction of mount latency, increase in mount frequency and enhanced attractability towards female. Penile erection index was also incremented in treated group (23). It was explained that the rhizomes of *Curculigo orchioides* Gaertn have been traditionally acclaimed as aphrodisiac. Administration of 100 mg/kg b. w. of ethanolic extract has pronounced effect on orientation of male towards the female rats. These findings support the folk use of this plant as aphrodisiac. The study explores the utilization of Rasyana herbs for effective management of sexual dysfunction (24). Cherdshewasart et al. studied the effect of *Butea superba* on erectile dysfunction (ED) in Thai males. The plant preparation appears to improve the erectile function in patients without apparent toxicity (25). Gauthaman et al. studied the aphrodisiac properties of *Tribulus Terrestris* extract (Protodioscin) in normal and castrated rats. They reported that the mechanism of extract activity was probably due to androgen increasing property (26). Hosseinzadeh et al. reported the aphrodisiac activities of *Crocus sativus* stigma aqueous extract and its constituents, safranal and crocin in male rats. Safranal did not show aphrodisiac effects (27). Ilayperuma et al. determined the effect of methanolic extract of *Withania somnifera* (L.) Dunal roots on sexual competence of male rats. The root extract induced a marked impairment in libido, sexual performance, sexual vigor, and penile erectile dysfunction. They determined that use of *W. somnifera* roots may be detrimental to male sexual competence (28). Marion Meyer et al. isolated and identified the active constituents of *Securidaca longepedunculata* and determined their activity in the relaxation of corpus cavernosal smooth muscle. They concluded that *S. longepedunculata*'s xanthones stimulate the relaxation of corpus cavernosum smooth muscle, which supports the traditional use of its root bark (29). Nocerino et al. reported the aphrodisiac and adaptogenic properties of ginseng. The endothelial and

neurogenic effects of ginsenosides in inducing relaxation of the corpus cavernosum may account for the aphrodisiac effect of *Panax ginseng* (30). Subramoniam et al. reported the aphrodisiac property of *Trichopus zeylanicus* extract in male mice (31). Subramoniam et al. evaluated aphrodisiac property of the elephant creeper *Argyreia nervosa* and suggested that the plant has promising potential to be developed into an effective medicine for stimulating male sexual activity with an influence on sex ratio favoring males (32). After the studies on aphrodisiac activity of *Vanda tessellata* (roxb.) extract in male mice, it was reported that activity was found in the alcohol extract of the flower (33). Thakur et al. studied the effect of lyophilized aqueous extracts obtained from the roots of *A. racemosus*, *C. borivilianum*, and rhizomes of *C. orchioides* on sexual behavior of male albino rats. There was a significant variation in the sexual behavior of animals providing a scientific basis for purported traditional usage of these plants (34). The effectiveness of aqueous extract of *D. hatagirea* was also validated in improving as well as preventing the functionality of sexual organ as well as substantiate the hype that herb have aphrodisiac activity and may be helpful in improving the sexual behavior and performance (35). Watcho et al. studied the effects of *Mondia whitei* Hook (Skeels) on the sexual behavior and some fertility parameters of sexually inexperienced male rats and concluded that *Mondia whitei* has a sexual enhancement potential (36).

## CONCLUSION

Management of ED by herbal remedies is useful because of long cultural history of utilization and the current renewed interest in natural products to sustain health globally. As a way recognizing the values and roles of traditional medical knowledge in health care provision, further research into the efficacy and safety of herbal approach for the management of ED is necessitated worldwide. The search for natural supplement from medicinal plants is being intensified probably because of its reduced side effects, its ready availability and reduced cost. The potency of the herbal plant drug is significant. Therefore, the increasing search for medicinal plants with aphrodisiac potentials has necessitated the need for screening medicinal plants with aphrodisiac potentials. All the herbal plants in this review have exhibited significant pharmacological activity. The herbs can be an effective aphrodisiac, moreover, isolation and identification of active constituents from plants may bring a dynamic change in the modern world.

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