Herbs for Erectile Dysfunction

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Abstract

Erectile dysfunction (ED) is a symptom and not a single disease with multiple possible causes, although atherosclerosis (and concomitant endothelial dysfunction), metabolic syndrome/diabetes mellitus, and psychosocial factors are the most common causes by far, other than the obvious population of men after pelvic surgeries (primarily prostatectomies) with iatrogenic ED. Herbal strategies to treat and prevent these major underlying problems, and thus alleviate the symptoms of ED, are reviewed. Antiatherosclerotic herbs, such as *Allium sativum* (garlic), *Punica granatum* (pomegranate), and *Ginkgo biloba* (ginkgo), are discussed for arteriogenic ED. Endothelial function-improving herbs, such as *Epimedium* spp. (horny goat weed) and *Butea superba* (red *kwao krua*), are discussed next for this same problem. The adaptogens with the most male-reproductive affinity, *Panax ginseng* (Asian ginseng) and *Withania somnifera* (ashwagandha) are then reviewed. Aphrodisiac herbs, principally effective for psychogenic ED are reviewed, including *Pausinystalia yohimbe* (yohimbe), *Turnera diffusa* (damiana), *Crocus sativus* (saffron), and *Lepidium meyenii* (maca).

Introduction

Erectile dysfunction (ED) is a common, though usually mild, symptom in men. ED should perhaps be termed erectile hypofunction, as it is truly describing "inability to attain or maintain a fully rigid penile erection during sexual intercourse" and not other conditions such as priapism (clearly a dysfunction of erection, but not what is usually meant by ED).[1] The more common term ED is retained in this article but will be used throughout to mean *erectile hypofunction*.

ED is most commonly caused by atherosclerosis, metabolic syndrome/diabetes, or some combination of these factors (although iatrogenic ED secondary to drugs or pelvic surgeries is also fairly common).[2] It should not be surprising that this is the case, as the penile artery is arguably the smallest functional artery in the body, at 1-mm diameter on average, compared to 3–5 mm in the coronary arteries, and given how obvious it is when this artery is not functioning well.[3] Psychologic ED, alone or combined with these physical causes, is also very common.[4]

The unfortunate tendency today is to treat ED as an independent condition without any investigation of underlying causes. This occurs in large part because of the invention and intensive marketing of phosphodiesterase type five (PDE5) inhibitors (PDE5i) such as sildenafil and tadalafil. While these drugs can definitely help the symptom of ED—and this article is not a categorical argument against their use—they have caused a lot of problems as well, ranging from failure to investigate the causes of ED clinically and thus subjecting men to worse cardiovascular events later on that could be prevented, increased urinary-tract infections in female sexual partners, and dangerous hypotensive interactions with nitrates (used for angina pectoris and also combined recreationally with amyl nitrate) and alcohol.[5,6]

Pharmaceutical companies have successfully changed the nomenclature and scope of male sexual dysfunction in their marketing. What used to be called impotence, which admittedly carried more negative connotations, was altered to ED, a more acceptable and non-judgmental terminology.[7] The maker of the sildenafil citrate brand name drug Viagra (Pfizer Corp.)—the first PDE5i to hit the market—successfully expanded the market from men with severe ED or ED due to serious conditions (such as prostate surgery or uncontrolled diabetes mellitus) to the much larger population of men with mild or transient ED, without delving into the genesis of the problem.[8]

Assuming there are no obvious causes, such as drugs known to interfere with erections, any patient seen with ED today should be checked for the presence of atherosclerosis and/or diabetes mellitus.[9,10] Most of the focus of this article is on botanical treatments for arteriogenic ED, with a significant portion of the article also addressing psychogenic ED or a mixture of the two conditions, as these are, by far, the most common causes of ED. ED does sometimes herald other conditions, such as neurologic or endocrine disorders, but this is rare.

Antiatherosclerotic Herbs

Several herbs have been shown to prevent or reverse atherosclerosis. While these are obviously most important in preventing life-threatening cardiovascular events, such as heart attacks and ischemic strokes, these herbs also have a role in helping relieve arteriogenic ED. Reduction of ED symptoms

likely suggests a reduction in atherosclerosis in these patients, so it is not like one has to choose what is being treated. The clinical maxim might be: "What is good for the arteries in general will be good for the penile artery."

Allium sativum (garlic) bulb, now grouped in the Amaryllidaceae family, is the best proven herb to reverse atherosclerosis in general. In a 4-year, double-blinded, randomized clinical trial, allicin-containing garlic extract 900 mg daily reversed atherosclerosis, compared to placebo.[11] This trial involved 152 retired German men and women. The patients in the placebo group actually had progression of their atherosclerotic plaques. Plaques were assessed by ultrasound in the carotid and femoral arteries. In another study of 56 Iranian adults with coronary artery disease, 3 months of garlic extract significantly decreased carotid intimal medial thickness, measured ultrasonographically, compared to placebo.[12] This was a randomized, double-blinded trial.

Garlic has not been studied in humans specifically for reversing or preventing arteriogenic ED. One product of metabolism of garlic's sulfur compounds, *S*-allyl cysteine, has been shown to reduce oxidative damage sufficiently enough to restore erectile function in diabetic rats.[13] As discussed below, a relative of garlic known as Chinese leek (*Allium tuberosum*) has shown some potential benefit combined with other agents. The equivalent of 1 fresh clove of garlic per day is recommended long-term to prevent and treat atherosclerosis of the penile artery and thus help preserve erectile function.

Punica granatum (pomegranate) juice has been heavily researched as an antiatherosclerotic. Unfortunately, most of the clinical trials on pomegranate juice have been small, poorly designed, and often did not show a statistically significant benefit.[14]

For example, in a recent randomized open clinical trial, pomegranate juice, compared to water, improved endothelial function and lowered blood pressure (BP) in 21 patients with hypertension after just 2 weeks.[15] The small sample size and lack of blinding (which is admittedly difficult with the strong-tasting juice) greatly weaken this trial.

A better-quality trial randomized 101 patients on chronic hemodialysis—a situation that greatly increases atherosclerosis and associated complications—to 100 mL of pomegranate juice or a placebo juice 3 times per week for 1 year.[16] Serum high-density lipoprotein (HDL) levels rose and triglyceride levels fell significantly in the pomegranate group, compared to placebo group. Low rates of cardiovascular events meant that no difference between the groups in these outcomes could be detected. Pomegranate juice and extracts contain tannins that can, theoretically, bind medications such as PDE5i, if taken simultaneously and reduce their absorption. For greatest safety, PDE5i should be taken 30 minutes before or 2 hours after taking pomegranate juice.

A randomized, crossover double-blinded trial in 53 men with mild-to-moderate ED compared pomegranate to placebo juice for 2 weeks.[17] Improvement in erectile function just missed statistical significance favoring pomegranate over placebo. This suggests that, with a larger sample size and longer duration of treatment, small improvements could likely be seen, although such trials remain to be performed to prove this. A typical dose of pomegranate juice is 4–8 oz per day. Given the sugar content in most such juices, water should be added and the juice should be taken in two divided doses per day with food. Other than gastric distress, also abated by taking it with food, pomegranate juice is very safe. Further research is needed to be certain if pomegranate juice has a place in treating arteriogenic ED, although given the juice's safety, there is little harm in trying it as long as not too much is expected.

Ginkgo biloba (ginkgo) leaf, in the Ginkgoaceae family, is another cardiovascular tonic with the potential to help men with primarily arteriogenic ED. In one early randomized, double-blinded trial, 80 mg of a standardized extract of ginkgo t.i.d. for 9 months improved erectile function, compared to placebo.[18] Two uncontrolled studies also found standardized extracts of ginkgo could help alleviate sexual dysfunction caused by antidepressants, although a later double-blinded trial failed to confirm this.[19,20] Ginkgo is promising for ED of various types, but more work remains to be done to determine how effective this herb might be.

Endothelial Functional Enhancers

Part of the progression of atherosclerosis involves failure of the vascular endothelium to function normally. A major part of normal function is the complex nitric oxide (NO) cascade. In health, erotic stimuli trigger a cascade that activates NO synthase in the penile arteries, which forms NO. Some NO is also contributed by nitrergic nerve endings. NO stimulates soluble guanylyl cyclase in vascular smooth-muscle cells, which converts guanosine triphosphate (GTP) to cyclic guanosine monophosphate (cGMP). cGMP, in turn, stimulates protein kinase G, which phosphorylates many proteins ultimately resulting in a decrease in calcium in vascular smooth-muscle cells and thus inducing vasodilation. More blood can then reach the corpus cavernosa (which also dilates as calcium exits smooth-muscle in its endothelium), which leads to erection.

PDE5 converts cGMP to noncyclic GMP, inactivating it and thus interrupting this cascade. PDE5i drugs obviously block this enzyme. Sympathetic signaling via norepinephrine and neuropeptide Y normally keep the penile arterial system constricted and the penis flaccid. The effects of these erectile inhibitors are mediated significantly by the rho-kinase enzyme system, which ultimately affects the myotubule system in smooth muscle to maintain flaccidity. Rho-kinase inhibitors may thus also play a role in overcoming endothelial dysfunction in ED.

No herb has been shown definitively to be a PDE5i or rho-kinase inhibitor in human clinical trials, although numerous herbs have been shown in preclinical studies to act in these and related fashions (see Table 1). Unfortunately, PDE5i drug or drug analogue adulteration of herbal products is rampant in the marketplace, and, unless a reported trial specifically overcomes this problem, it casts significant doubt on their outcomes.[21,22] Patients should never be referred to purchase the herbs discussed in this article from unknown sources on the

Table 1. Selected Pro-Erectile Herbs in Preclinical Studies

Herb & compound	In vitro result	Citation
Artemisia capillaris (capillary wormwood, *yīn chén hāo*) leaf, capillarisin (a chromone)	Stimulated increased cGMP independent of NO	Kim, et al. 2012[a]
Punica granatum (pomegranate) fruit	NO-independent vasodilator	Oztekin, et al. 2014[b]
Matricaria recutita (chamomile) flower	Weak PDE5i	Maschi, et al. 2008[c]
Vitis vinifera (grape) skin; malvidin (a flavonoid)	Moderate PDE5i	Dell'Agli, et al. 2005[d]
Sophora flavescens (sophora, *kǔ shēn*) root; sophoflavescenol (a flavonoid)	Strong PDE5i	Shin, et al. 2002[e]
Cnidium monnieri (cnidium, *shé chuáng zǐ*) seed; coumarins	Moderate PDE5i	Chiou, et al. 2001[f]
Resveratrol	Promoted NO/cGMP pathway by unclear mechanisms	Dalaklioglu & Ozbey 2013[g]

[a]Kim HK, Choi BR, Bak YO, et al. The role of capillarisin from *Artemisia capillaris* on penile erection. Phytother Res 2012;26:800–805; [b]Oztekin CV, Gur S, Abdulkadir NA, et al. Analysis of pomegranate juice components in rat corpora cavernosal relaxation. Int J Impot Res 2014;26:45–50; [c]Maschi O, Cero ED, Galli GV, et al. Inhibition of human cAMP-phosphodiesterase as a mechanism of the spasmolytic effect of *Matricaria recutita* L. J Agric Food Chem 2008;56:5015–5020; [d]Dell'Agli M, Galli GV, Vrhovsek U, et al. In vitro inhibition of human cGMP-specific phosphodiesterase-5 by polyphenols from red grapes. J Agric Food Chem 2005;53:1960–1965; [e]Shin HJ, Kim HJ, Kwak JH, et al. A prenylated flavonol, sophoflavescenol: A potent and selective inhibitor of cGMP phosphodiesterase 5. Bioorg Med Chem Lett 2002;12:2313–2316; [f]Chiou WF, Huang YL, Chen CF, Chen CC. Vasorelaxing effect of coumarins from *Cnidium monnieri* on rabbit corpus cavernosum. Planta Med 2001;67:282–284; [g]Dalaklioglu S, Ozbey G. The potent relaxant effect of resveratrol in rat corpus cavernosum and its underlying mechanisms. Int J Impot Res 2013;25:188–193.
cGMP, cyclic guanosine monophosphate; PDE5i, phosphodiesterase type five inhibitor; NO, nitric oxide.

internet, as adulteration and contamination problems are simply too likely to occur.

The leaves of five species of *Epimedium*, *E. brevicornum* (Fig. 1), *E. koreanum*, *E. pubescens*, *E. sagittatum,* and *E. wushanense*, are used interchangeably as horny goat weed or *yín yán huò* in Chinese medicine. The leaves of this Berberidaceae family plant are used. Horny goat weed is considered a Kidney Yang tonic in Chinese medicine, which roughly equates in Western medicine to a treatment for increasing libido, erectile function, and fertility, among other actions.[23] This herb should be viewed as an endothelial and perhaps hormonal tonic, working long-term to improve erectile function when there is compromised vasculature.

In vitro, various extracts and flavonoid compounds in these horny goat weed species have been shown to be PDE5i, to enhance NO synthase activity in penile endothelium, and to enhance cGMP production.[24–26] The prenylated flavonoid glycoside icariin (found in all five *Epimedium* spp. mentioned here) has received a great deal of attention. In vitro icariin was approximately one-tenth as strong as sildenafil for increasing cGMP levels, although icariin was not a simple PDE5i and instead seemed to work on multiple pathways.[27] Icariin combined with the flavonoid scutellarin (also known as breviscapine), both found in horny goat weed, were significantly more effective than either constituent alone for improving erectile function in spontaneously hypertensive rats.[28] The two agents both inhibited PDE5 and rho-kinase in this study.

A double-blinded, randomized clinical trial was conducted in 63 men with mild-to-moderate ED in Thailand, using a formula featuring horny goat weed.[29] The formula contained predominantly (but in unclear absolute amounts) deer antler velvet (*lù róng*), horny goat weed (*E. brevicornum*), *Cynomorium songaricum* (cynomorium; *suǒ yáng*) stem, *Cistanche deserticola* (broomrape; *ròu cōng róng*) stem, and *Carthamus tinctorius* (safflower; *hóng huā*). The formula also contained significantly smaller amounts of *Dioscorea opposite* (yam; *shān yào*) tuber, *Lycium chinense* (Chinese wolfberry; *gǒu qǐ zǐ*) fruit, *Broussonetia papyrifera* (paper mulberry; *chǔ shí zǐ*) fruit, Chinese leek (*jiǔ cài zǐ*) seed, *Morinda officinalis* (morinda; *bā jǐ tiān*) root, *Ilex cornuta* (Chinese holly; *gǒu gǔ yè*) leaf), *Cornus officinalis* (Asiatic cornelian cherry; *shān zhū yú*) fruit, and honey. The formula was given as a single tablet 1 hour before sexual activity, which is highly unlike any traditional use of these herbs. The formula was not analyzed for adulteration with PDE5i drugs. Nevertheless, it reportedly improved erectile function significantly, compared to placebo, without significant adverse effects.

The current author has previously written about the problems with deer antler velvet, notably that the deer from which this is harvested are often kept in harsh conditions, crowded deer populations are subject to the prion disease (chronic wasting disease), and the velvet is harvested inhumanely.[30] Only New Zealand-source deer antler velvet should ever be used as it is less inhumane and more sustainable.

Another clinical trial compared a combination of 6 herbs, including horny goat weed, to the Chinese herbal formula *jiā wèi xiāo yáo sǎn* (Augmented Rambling powder, known in Japanese as *kamishōyō-san*; see Table 2).[31] The trial product contained undisclosed amounts of horny goat weed, deer antler velvet, *Panax ginseng* (Asian ginseng) root, garlic aged bulb, *Cuscuta chinensis* (dodder, *tù sī zǐ*) seed, and cattle gallstone (*niú huáng*). This trial product thus combined several traditional male-reproductive tonics (horny goat weed, deer antler velvet, dodder) with a male tonic and adaptogen (Asian ginseng) and a digestive tonic (cattle gallstone). This open trial randomized 49 men with mild-to-moderate ED between the

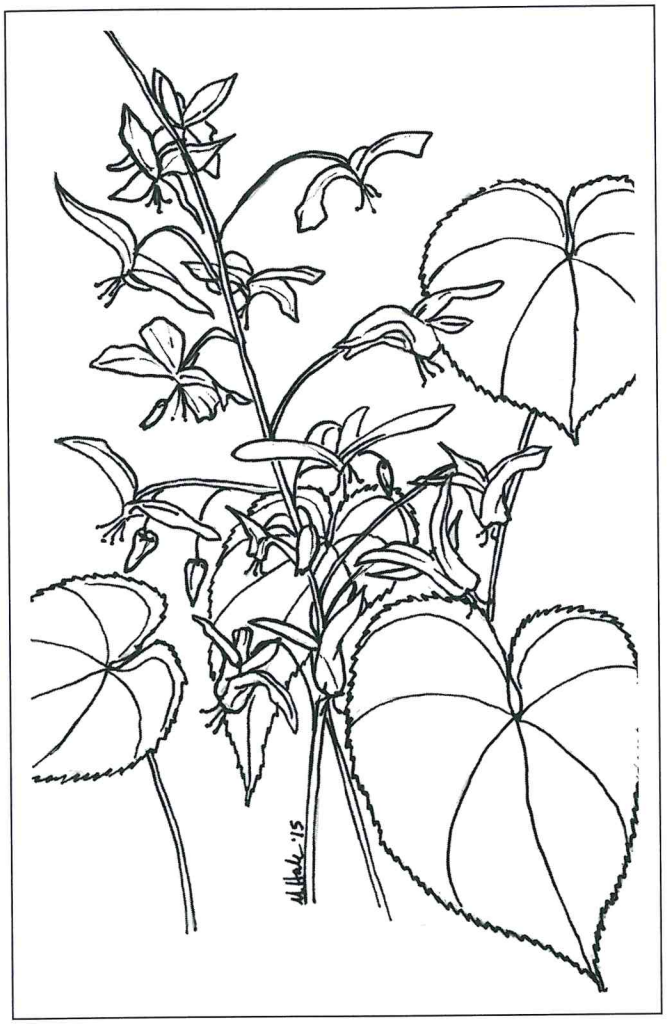

Figure 1. ***Epimedium brevicornum*** **(horny goat weed). Drawing by Meredith Hale, 2015, and reprinted with permission.**

groups for 6 months. Erectile function improved significantly more in the trial group than in the Augmented Rambling powder group. These products were used more in line with the traditional approach of taking them constantly and not on demand, and lowered the concern that there might have been drug adulteration of the formula in this trial.

The usual dose of horny goat weed is 3 g of crude herb infused in 1 cup of water for 15 minutes, strained, and drunk three times per day. Alternatively, a spray-dried aqueous extract, known as a granulation, can be taken in doses of 1–2 g t.i.d. A tincture is usually dosed at 0.5 mL t.i.d. Horny goat weed is generally very safe, but occasionally causing intestinal upset unless the herb is taken with food. There is one rat study suggesting that large oral doses (500 mg/kg daily) interfered with absorption of sildenafil.[32] So many such reports do not end up being validated in humans, so this rat study should only be considered highly preliminary. It is a simple matter to keep the herb and the drug separated in time if they are being used contemporaneously to avoid any risk.

Butea superba (butea gum tree; red *kwao krua*) tubers in the Fabaceae family are regarded as a treatment for ED in traditional Thai medicine. The tubers' flavonoids and isoflavones have shown preliminary in vitro evidence of PDE5 inhibition.[33] This treatment has improved erectile function in healthy and diabetic rats.[34,35] In an attempted double-blinded randomized trial, 39 Thai men with ED were given either 500 mg of red *kwao krua* crude root powder b.i.d. or placebo for 3 months.[36] None of the participants who were randomized to placebo returned for follow-up assessment, likely because of the placebo's inefficacy. Eight of the original 25 patients randomized to red *kwao krua* also did not follow up. Of the patients, taking the red *kwao krua* with follow-up results, 82% reported improvement in erectile function, compared to baseline. No toxicity could be discerned.

In another attempted randomized trial, 32 Mexican men with ED were given either red 100 mg of *kwao krua* or 50 mg of sildenafil daily for 1 week.[37] Both agents were equally effective for improving erectile function. In a follow-up randomized trial, after a 1-week washout, a different batch of the red *kwao krua* was no more effective than a starch placebo in those men whose conditions had initially responded to the red *kwao krua*. Further analysis revealed that the original batch of herbal material had been adulterated with a PDE5i drug. The researchers concluded that red *kwao krua* does not have acute PDE5i-type effects. This highlights the danger of interpreting studies on herbs for ED when no analysis to exclude adulteration is given. Red *kwao krua* remains to be tested properly, but

Table 2. ***Jiā Wèi Xiāo Yáo Sǎn*** **(Augmented Rambling powder,** ***Kamishōyō-san*****) Ingredients**

Latin name	Mandarin Chinese name	English common name	Part used	Amount per day
Angelica sinensis	*Dāng guī*	Dang quai	Root	3 g
Paeonia lactiflora	*Bái sháo*	White peony	Root without bark	3 g
Wolfiporia cocos	*Fú líng*	Hoelen	Sclerotium	3 g
Atractylodes macrocephala	*Chāo bái zhú*	Atractylodes	Dry-fried rhizome	3 g
Bupleurum falcatum	*Chái hú*	Thorowax	Root	3 g
Paeonia suffruticosa	*Mǔ dān pí*	Mountain peony	Root	1.5 g
Gardenia jasminoides	*Chāo zhī zi*	Gardenia	Dry-fruit fruit	1.5 g
Glycyrrhiza uralensis	*Zhì gān cāo*	Chinese licorice	Prepared root	1.5 g

more likely works in the long-term as a mild cardiovascular tonic and not as a short-acting agent.

Adaptogens

Adaptogens can help patients with many types of ED. By helping the mind and body cope with the effects of stress, these herbs can help patients deal with psychogenic ED. Adaptogens' beneficial effects on the cardiovascular system can also be helpful for patients with arteriogenic ED. Two adaptogens are historically considered as being fairly male-specific and are the focus of the discussion below, although other adaptogens could also be useful.

Asian ginseng root, in the Araliaceae family, is the best studied and perhaps most important male adaptogen. Red ginseng (also from *P. ginseng*), in which 4-year-old roots are steamed and dried, was shown to be effective for addressing ED in a meta-analysis of seven clinical trials involving a total of 349 men.[38,39] This herb was helpful for addressing arteriogenic, psychogenic, and mixed ED, compared to placebo. A range of doses were used, from 1 g daily to 600 mg t.i.d. Asian ginseng fruit, which is likely to be more sustainable than the root, was also found to be effective for reducing ED, compared to placebo, in a randomized, double-blinded trial.[40] The dose used was 1400 mg q.d., and the trial ran for 8 weeks.

Another study used a complex formula highlighting Asian ginseng for Indian men with mild-to-moderate ED.[41] As the ingredients listed in Table 3 show, besides the adaptogenic Asian ginseng, this formula has endothelial tonics, such as horny goat weed, *Crataegus rivularis* (hawthorn), and ginkgo; and hormone modulators such as *Serenoa repens* (saw palmetto) and *Tribulus terrestris* (caltrop vine); and aphrodisiacs such as *Turnera diffusa* (damiana; formerly known as *T. aphrodisiaca*) and *Ptychopetalum olacoides* (muira puama). The trial randomized 78 men to either 2 720-mg capsules of the formula b.i.d. or a placebo for 12 weeks. The trial was double-blinded. Adulteration with PDE5i drugs was specifically ruled out. Erectile function improved more significantly in the herbal formula group than in the placebo group, with no difference in mild adverse effects between the groups. This formula deserves more research, but appears to support the common contention in herbal medicine that mixing herbs with multiple different mechanisms of action is superior to using single herbs or single molecules.

Usual doses of crude or granulated Asian red ginseng are 1–3 g b.i.d.–t.i.d. depending on body size and severity of the condition. Typical doses of tincture are 1–2 mL t.i.d. Asian ginseng is extremely safe, with no major adverse events reported in 40 randomized trials on all types of Asian ginseng preparations used in a wide range of populations.[42] This herb can sometimes be overstimulating but, more often than not, it is actually relaxing or has no effect on energy levels.[43,44] Prior concerns that it might raise BP have been quelled by clinical trials actually showing it lowers BP, which aligns well with the idea that Asian ginseng is actually a cardiovascular protectant that is useful for men with arteriogenic ED.[45]

The root of *Withania somnifera* (ashwagandha), in the Solanaceae family, is the other most clearly male-specific adaptogen. It has a long traditional use in Ayurvedic medicine for addressing ED. Only one clinical trial could be located on this subject and it involved 89 Indian men with psychogenic ED.[46] The trial was randomized and single-blinded, and compared 2 g of crude ashwagandha powder t.i.d. to placebo for 2 months. There was no difference in results between the groups. The dose was appropriate in this trial, which suggests that ashwagandha does not live up to its traditional reputation. A larger trial with a more concentrated extract or use of a higher

Table 3. Proprietary Formula Studied for Erectile Dysfunction

Latin name	Common name	Part used	Amount/capsule
Panax ginseng	Asian ginseng	Root	100 mg
Serenoa repens	Saw palmetto	Fruit	100 mg
Crategus rivularis	Hawthorn	Fruit	100 mg
Ginkgo biloba	Ginkgo	Leaf	100 mg
Turnera diffusa	Damiana	Leaf	100 mg
Tribulus terrestris	Caltrop vine	Herb	75 mg
Erythroxylum catuaba	Catuaba	Bark	50 mg
Ptychopetalum olacoides	Muira puama	Bark	50 mg
Cuscuta chinensis	Dodder	Seed	25 mg
Epimedium sagittatum	Horny goat weed	Leaf	15 mg
Bioperine[a]	N/A	From *Piper nigrum* fruit	5 mg

Adapted from Ref. 44.
[a]Bioperine is a constituent; hence, there is no Latin name.
N/A, not applicable.

dose for a longer period of time is still warranted before making a final decision on ashwagandha's efficacy for addressing ED. Ashwagandha is very safe, although it might be more appropriate to try Asian ginseng in patients first, given that herb's stronger research and historical backing.

Aphrodisiac Herbs

A subset of herbs known as aphrodisiacs stimulate libido and are most useful for psychogenic ED. Often, performance anxiety complicates arteriogenic and other physical forms of ED, so many patients have mixed ED and thus aphrodisiacs have wide applicability.

Pausinystalia yohimbe (yohimbe) bark in the Rubiaceae family and its indole alkaloid β-yohimbine is the best-documented aphrodisiac. It is native to western and central Africa. β-Yohimbine acts in the central nervous system primarily by blocking presynaptic α-2 adrenergic receptors that act to reuptake catecholamines from the synapse. Mood and libido tend to go up as catecholamines linger in the synapse as a result of this effect.

A meta-analyses of clinical trials of the purified alkaloid β-yohimbine consistently showed that it was more effective than placebo for addressing psychogenic ED, although these trials had typically had small sample sizes and have been relatively methodologically weak.[47] The whole herb is also clinically effective, and the author uses 5 drops twice a day of a tincture (1:3 weight:volume ratio) routinely in patients. The main clinical use is to help confirm if psychosocial factors are playing a role in ED; a patient is essentially treated for 2–4 weeks with yohimbe tincture. If that patient's condition improves significantly, then psychogenic ED is confirmed better. At that point, the tincture is generally stopped, and milder and safer nervine aphrodisiacs are substituted while counseling is initiated to try to treat underlying issues.

Long-term use of yohimbe is not recommended. It can raise BP and cause anxiety. It is contraindicated in post-traumatic stress disorder, panic disorder, and obsessive–compulsive disorder. Yohimbe and yohimbine are safe for use with antidepressants and can actually enhance the efficacy of selective serotonin reuptake inhibitor and tricyclic antidepressant drugs.[48]

Milder and less well-documented aphrodisiacs abound. *Turnera diffusa* (damiana), now considered part of the Passifloraceae family, is one of the better known agents.[49] It is far milder than yohimbe and is actually more calming for patients. Animal research has confirmed that damiana promotes the NO pathway helping erectile function and is anxiolytic.[50,51] Apigenin, a flavonoid, appears to be important for the calming effects of this herb.[52] Clinical trials are lacking, but traditional support for damiana's use is strong. Usual doses of tincture are 3–5 mL t.i.d. This is another herb that needs to be used regularly—not on demand—for men with psychogenic ED.

A bridge herb with evidence that it is both an endothelial protector and a calming aphrodisiac is *Crocus sativus* (saffron). The stamens of this plant in the Iridaceae family are used as medicine. It looks very promising for treating major depression in human clinical trials.[53]

A small pilot study in 20 Iranian men with ED had them all take 200 mg of saffron daily for 10 days.[54] Compared to baseline, sexual function and erectile rigidity improved significantly. A follow-up, open crossover trial randomized 346 Iranian men with ED to either 30 mg of saffron b.i.d. or sildenafil on demand for 12 weeks.[55] This study showed no benefit from saffron while sildenafil was dramatically effective for improving erectile function.

A double-blinded randomized trial in 36 Iranian men with major depression treated with fluoxetine (a known cause of ED) compared 15 mg of saffron b.i.d. to placebo for 4 weeks.[56] Saffron significantly improved many measures of erectile function and libido, compared to placebo without any significant adverse effects. These conflicting results, all using similar extracts, suggest that saffron is more likely to be helpful for addressing psychogenic and antidepressant-induced ED, compared to arteriogenic ED. Higher doses appear to be more promising but remain to be determined. More work remains to be done to clarify saffron's role in addressing ED.

Lepidium meyenii (maca) is a native Andean member of the Brassicaceae family, the hypocotyl (seed leaf) and fused taproot of which are an important food with a reputation for general tonification, but most specifically sexual tonification. An American corporation attempted to patent methods of extraction and use of this plant for sexual dysfunction, but, ultimately, these patents were revoked when indigenous people showed that these methods and this use were long-held traditional knowledge. In any event, while maca does appear to have some libido-enhancing properties based on randomized trials, it is not clear if it can be sourced in a way that supports indigenous people; thus, this herb is not recommended until—and unless—that situation is clarified.[57]

Conclusion

Many herbal medicines have had at least preliminary work to establish they can help men with various types of ED resulting from various underlying causes. The strongest evidence is for adaptogens and aphrodisiacs, although more research is needed on optimal extracts, doses, and indications for all the herbs discussed here. These relatively safe agents—although yohimbe has to be dosed and monitored carefully—are worth considering in any man's treatment program for mild-to-moderate ED. With the exceptions of horny goat weed (and this problem is not well-documented) and pomegranate juice, which should not be taken simultaneously to avoid the very slim possibility of interactions, these herbs can be used safely in combination with PDE5i drugs. Unlike these drugs, herbs need to be taken regularly for prolonged periods in most cases (yohimbe is an exception; it is used for a few weeks consecutively at most) to have optimal effects. In the meantime, underlying causes of ED must be identified and treated, whether they are in the cardiovascular system or in the mind. ■

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