



Review

Aphrodisiacs from plant and animal sources—A review of current scientific literature

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ABSTRACT

The use of aphrodisiacs dates back thousands of years in Chinese, Indian, Egyptian, Roman, and Greek cultures. Although the scientific basis of these substances was not understood, aphrodisiacs were valued for their ability to enhance the sexual experience. Their use allowed for human procreation and the ability to obtain a sexually fulfilling relationship. Aphrodisiacs used historically include ambrein, *Bufo* toad, Spanish fly, yohimbine, *Tribulus terrestris*, horny goat weed, muira puama, MACA root, *Panax ginseng*, nutmeg, saffron, and cacao. Previous studies on these substances have shown potential aphrodisiac properties using animal models and in human clinical trials. Aphrodisiacs were shown to relax corpus cavernosum smooth muscle tissue in animals, improve erection quality in humans and animals, or increase sexual behavior and satisfaction in humans and animals. Although most studies showed positive effects of aphrodisiacs on sexual enhancement, more studies are needed to understand their mechanism of action. The need for clinical trials using larger populations is also evident to prove the effectiveness of aphrodisiacs for human use. This paper will review recent scientific studies conducted on these commonly used aphrodisiacs, and determine whether the results support or refute their use for human sexual enhancement.

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Abbreviations: ED, erectile dysfunction; CCSM, corpus cavernosum smooth muscle; TT, *Tribulus terrestris*; PTN, protodioscin; ICP, intracavernous pressure; NO, nitric oxide.

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1. Introduction

The reliance on aphrodisiacs by society has been demonstrated for thousands of years. In historic Chinese, Indian, Egyptian, Roman, and Greek cultures, such substances were used in traditional remedies for the purpose of enhancing the sexual experience (Elferink, 2000). The scientific basis of these natural aphrodisiacs was not understood, but the observed sexual enhancing properties popularized their use in these cultures.

Procreation was the single most important goal in historic cultures, and the inability to procreate drove efforts to discover natural sources of sexually enhancing substances (Elferink, 2000; Yakubu, Akanji, & Oladiji, 2007). Aphrodisiacs could be used to aid in a family's ability to have children, but would also allow for sexual fulfillment within a marriage which was otherwise unsatisfactory (Yakubu et al., 2007). In Aztec cultures, a large family was encouraged and was both respected and admired within society (Elferink, 2000). A childless marriage was considered to be a failure within the family. For these reasons, aphrodisiacs were highly sought and valued.

The term aphrodisiac is derived from Greek mythology, where Aphrodite was the goddess of love and beauty (Shamloul, 2010). The Greek word 'aphrodisia' means sexual pleasure (Krychman, Gubili, Pereira, Holstein, & Cassileth, 2007). The modern definition of aphrodisiac can vary, but is generally regarded as a substance that increases sexual desire (i.e. libido) and/or sexual pleasure. The definition has been extended to include those substances which enhance sexual performance or aid in the proper functioning of the male and female sex organs (Sandroni, 2001; Shamloul, 2010). Substances include foods, beverages, vitamins, minerals, and other natural and synthetic chemicals (Krychman et al., 2007).

Aphrodisiacs can be classified according to their effects when consumed or administered. Aphrodisiacs can have psychological effects, thereby increasing sexual desire and pleasure through hallucinogenic properties or other mood stimulating properties. Aphrodisiacs can also act physiologically, enhancing erection through hormonal changes, increased blood flow, and smooth muscle-relaxing properties (Sandroni, 2001).

Society is currently relying on synthetic products such as sildenafil (most commonly sold as Viagra) and tadalafil (most commonly sold as Cialis) to treat erectile dysfunction (ED). However, these substances can produce negative side effects such as headache, muscle pain, and blurred vision, and may have dangerous interactions with other medications (Sandroni, 2001). These products also do not increase libido (Shamloul, 2010). The ability of these synthetic products to treat ED has heightened the search for natural substances that can enhance the sexual experience without the negative side effects. Interest has also increased in the area of finding libido enhancing products to treat those with low sex drive (Shamloul, 2010). This review will present recent work conducted on natural aphrodisiacs and assess their potential as sexual enhancers. The substances focused on are those that have been scientifically studied, either *in vitro*, *in vivo* on animal models, or in human clinical trials, and show potential as an aphrodisiac. Major outcomes of the studies are summarized in Table 1. A brief section on less common aphrodisiacs that lack scientific studies is also included in the review.

2. Aphrodisiacs with sexual enhancing properties supported with scientific studies

2.1. Ambrein

The triterpene alcohol Ambrein is a major constituent of Ambergris, formed in the intestinal tract of the sperm whale (*Physeter catodon*) (Taha, Raza, & El-Khawad, 1998). Historically, its use ranged from perfume preparations to the treatment of health conditions. In traditional Middle Eastern medicine, Ambergris has been used to treat

headaches, rheumatism, common colds, and constipation due to its alleged anti-inflammatory and antinociceptive properties (Sandroni, 2001; Shamloul, 2010; Taha et al., 1998). It has also been used to enhance sexual performance, with recent studies supporting its validity as a natural aphrodisiac.

In a 1998 study, Taha and colleagues studied the ability of isolated ambrein to reduce the effects of vasoconstricting hormones on various animal smooth muscles (Taha et al., 1998). Ambrein was shown to reduce spontaneous contractions of rabbit jejunum, rat uterus, and guinea pig vas deferens *in vitro* at concentrations of 10–250 µg/mL. It was also shown to reduce acetylcholine-, adrenaline-, prostaglandin-, and oxytocin-induced contractions in various smooth muscles (Taha et al., 1998). The ability of ambrein to reduce muscle contractions shows the potential of the aphrodisiac to facilitate erection due to increased blood flow.

A 1995 study by Taha's group showed that ambrein increased sexual behavior in male rats. After being administered 100 and 300 mg/kg body weight of ambrein, the rats increased their number of penile erections in the absence of females, as well as increased intromissions and anogenital investigatory behavior in the presence of females. Based on the results, the authors concluded that sexual behavior in rats is modified by ambrein which supports its historical use as an effective aphrodisiac (Taha, Islam, & Ageel, 1995).

2.2. Bufo Toad

The skin and gland secretions of *Bufo* Toad have traditionally been used for medicinal and aphrodisiac purposes (Abdel-Rahman, Ahmed, & Nabil, 2010). The ancient Chinese medication *Chan su* and Indian aphrodisiac 'Love Stone' are produced from these secretions and contain the psychoactive ingredients bufotenine (Bick, Poindexter, Sweney, & Dasgupta, 2002). *Chan su* has been used to treat heart conditions, provide local anesthetic, and control bleeding, although the mechanisms are unclear. However, its aphrodisiac properties may be explained by the presence of bufotenine and its O-methylated derivative 5-methoxy-M,N-dimethyltryptamine (5-MeO-DMT) contained in *Bufo* Toad, which is a hallucinogenic that provides stimulatory effects (Sandroni, 2001). Sexual enhancement due to topical application providing anesthetic has also been suggested as a possible explanation for its aphrodisiac properties. Studies have demonstrated the negative effects of *Chan su* and *Bufo* Toad secretions on heart rate and cardiomyocyte contractility but have not related any findings to increased or decreased sexual performance (Abdel-Rahman et al., 2010; Bick et al., 2002).

2.3. Spanish fly (*Cantharides*)

The Spanish fly (*Lytta vesicatoria*) is the most well known of a collection of blister beetles traditionally used as aphrodisiacs. The beetle secretes cantharidin, a toxin used as part of its defense mechanism. At high doses cantharidin is toxic to humans, but despite the risk, it has historically been used to enhance sexual function (Karras, Farrell, Harrigan, Henretig, & Gealt, 1996; Tagwireyi, Ball, Loga, & Moyo, 2000; Waddell, Jones, & Keith, 1981). Its use has been dated back 2000 years in Chinese and African herbal remedies by grinding the beetle to a powder before dissolution in a solvent for ingestion (Tagwireyi et al., 2000). When ingested, urethral irritation occurs which may cause priapism in both males and females (Karras et al., 1996; Waddell et al., 1981). This occurs by inhibition of phosphodiesterase and protein phosphatase activity by cantharidin, which stimulates β-receptors, inducing vascular inflammation of the genitourinary tract (Karras et al., 1996; Sandroni, 2001).

In 1969, Leavitt tested the ability of cantharidin to enhance sexual behavior in rats. Rats were administered 0.67 mg/kg cantharidin and placed in a test chamber with females brought to estrous (Leavitt, 1969). No differences in sexual behavior (mounts, intromission, and

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