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Anti-Infertility Effect of *Tribulus Terrestris*

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ABSTRACT

Introduction*: Tribulus terrestris is an herbaceous, annual plant that belong to family Zygophyllaceae naturalized in the Americas and Australia. The aim of this study was to overview anti-infertility effects of Tribulus terrestris.*

Objective*: This review article is aimed to overview anti-infertility effect of Tribulus terrestris.*

Methods*: This review article was carried out by searching studies in PubMed, Medline, Web of Science, and IranMedex databases. The initial search strategy identified about 107 references. In this study, 62 studies were accepted for further screening and met all our inclusion criteria [in English, full text, Anti-infertility effect, Tribulus terrestris and dated mainly from the year 2002 to 2016.The search terms were "Anti-infertility effect, Tribulus terrestris "pharmacological effects"***.**

Result*: The result of this study suggested that the Tribulus terrestris possess anti-infertility activity in both men and women as TT increases some of the sex hormones, possibly due to the presence of protodioscin in the extract. It is shown that TT extract aphrodisiac activity probably due to androgen increasing property of TT.*

Conclusion*: it was concluded that T. Terrestris extract and C. officinalis extract exhibited concentration-dependent relaxation in an organ bath. Besides, T. terrestris extract is safe and effective in the treatment of female sexual dysfunction. A positive effect of TT administration on rat sperm production, associated with unchanged levels of circulating androgens was observed.*

Keywords*: Tribulus terrestris, Anti-infertility**, Phytochemicals*

INTRODUCTION

herbal medicine is shown to contribute effectively in remedy and well-being of many diseases [1-24]. *Tribulus terrestris* is a herbaceous, annual plant that belong to family Zygophyllaceae naturalized in the Americas and Australia [25].

It is small prostrate, 10-60 cm height, hirsute or silky hairy shrub [26]. Leaves are opposite, often unequal, paripinnate [27]; Flowers are yellow in color. Its carpel fruits are of characteristic, stellate shape, somewhat round-shaped, compressed, five cornered, and covered with princkles of very light yellow color. The fruits of the herb are globose, consisting of five, nearly glabrous, muriculate, wedge-shaped, woody cocci [28].

This whole plant is used in the form of decoction to treat urinary tract infections, urolithiasis, dysmenorrhea, and edema [29]. It is believed to be useful in kidney, bladder, urinary tract, and uro-genital related conditions, where it is said to act as a diuretic. *T. terrestris* extract can be used in body building as a dietary supplement with the belief that it increases testosterone levels [30].

TT has been used for centuries in Ayurveda to treat impotence, venereal diseases, and sexual debility [31]. TT is used in folk medicines as a tonic and cardiotonic properties, aphrodisiac [32], palliative, astringent, stomachic, antihyperplasia [33], antihypertensive, diuretic, lithotriptic, and urinary disinfectant. It is a vital constituent of *Gokshuradi Guggul***,** a potent Ayurvedic medicine used to support proper functioning of the genitourinary tract and to remove the urinary stones [34]. The dried fruit of the herb is very effective in most of the genitourinary tract disorders [35].

In an animal study, it has shown that *T. terrestris* can alter sexual behavior. It was found that "Tribulus terrestris improve desire in women with hypoactive sexual desire disorder. The plant is used as a folk medicine for treating impotence [36]. In traditional Chinese medicine, the fruits were used for treatment of edema [37], abdominal distension, emission, morbid leucorrhea, and sexual dysfunction. Restoring the depressed liver, for treatment of fullness in the chest, mastitis, flatulence, acute conjunctivitis, headache, and vitiligo. In Unani medicine, TT is used as diuretic, mild laxative, and general tonic [38].

RESULT

Anti-infertility

The possible role of T. terrestris on semen quality and physiological parameters was evaluated. The results demonstrated that T. terrestris decrease body fat while increase lean mass and dihydrotestosterone levels. Besides, Results indicate Tribulus terrestris is an anti-infertility agent for men through offering changed semen parameters and infertility therapy [39].

The role of Tribulus terrestris in males with unexplained infertility and its effect on serum testosterone and semen parameters was evaluated. The result showed that the levels of testosterone and LH and semen and testosterone and LH and semen parameters pre- and post-therapy was not different. Tribulus terrestris was shown to be ineffective in the treatment of idiopathic infertility [40].

In an animal study, the aphrodisiac effect of the Tribulus terrestris on the GDF9 and BMP15 expression in the oocytes and cumulus cells was investigated. T. terrestris triggered a decrease in the BMP15 mRNA level in the oocytes and an increase in the cumulus cells. The GDF9 mRNA level increased remarkably in both oocytes and cumulus cells. BMP15 and GDF9 show a markedly sensitivity to the biological constituents of T. terrestris [41].

The therapeutic effect of TT on fertility disorders resulted from sex hormones and gonadotropins in opioid users was investigated. Oral intake of TT could noticeably oppose to reduce sex hormones and gonadotropins as a result of morphine addiction [42].

The relaxing effect of a T. terrestris extract on the corpus cavernosum [CC] and erectogenic role of an oral extract were investigated. The T. terrestris extract relax the CC in an induced concentration-dependent manner. Moreover, in an in vivo study, the T. terrestris extract increase ICP in concentration-dependent considerably [43].

The effects of Tribulus terrestris and Cornus officinalis extracts on relaxation of the smooth muscle of the corpus cavernosum [CC] was examined. T. Terrestris extract and C. officinalis extract exhibited concentration-dependent relaxation in an organ bath. The mixture of T. terrestris extract and C. officinalis extract may improve erectile function [44].

The results of a study indicate that T. terrestris consumption masculinize in a dose dependent manner improving the male portion. Besides, results revealed that the testes of fish treated with T. terrestris extract consisted of whole steps of spermatogenesis, obviously demonstrating that the consumption of T. terrestris extract to P. latipinna stimulated spermatogenesis [45].

The results of a study showed that the T. terrestris extract is safe and effective in the treatment of female sexual dysfunction [46]. The possible effects of Tribulus terrestris in the erectile dysfunction therapy was evaluated. Result showed that at the dose- and interval- dependent manner, Tribulus terrestris was not more effective than placebo on improving symptoms of erectile dysfunction or serum total testosterone [47].

In male Wistar rats, role of ethanolic extract of Tribulus terrestris against reproductive toxicity was investigated. Tribulus terrestris treatment in group-IV increased testes and epididymis weight, sperm head counts, sperm motility, live sperm counts, testosterone and total protein content. The research suggested that Tribulus terrestris possess reproductive system enhancement and antioxidant activity [48].

In a study on male rats, the effects of Tribulus terrestris [TT] on endocrine sensitive organs in intact and castrated male as well as in a post-menopausal female was investigated. Tribulus terrestris was not able to induce endocrine sensitive tissues such as the prostate, seminal vesicle, uterus and vagina in Wistar rats, indicating lack of androgenic and estrogenic activity in vivo. It was showed a positive effect of TT intake on rat sperm production, related to unchanged levels of circulating androgens [49].

The increasing effect of testosterone anabolic and androgenic action through the activation of endogenous testosterone production was investigated. Result showed that the short-term T. terrestris therapy showed no impact on the endogenous testosterone metabolism of the two patients [50].

In an animal study, Hormonal effects of Tribulus terrestris [TT] in erectile dysfunction were evaluated. TT increases some of the sex hormones, possibly due to the presence of protodioscin in the extract. TT may be useful in mild to moderate cases of erectile dysfunction [51]. The effects of Tribulus terrestris [TT] on sex reversal was examined. TT treated recently born progenies showed prosperous sex reversal, spermatogenesis, and better development rate than untreated progenies [52].

The effects of Tribulus terrestris on sexual function in menopausal women was studied. After 3 month, Tribulus terrestris showed to be effective in treating sexual complications among menopausal women [53].

The safety and efficacy of Tribulus terrestris in women with hypoactive sexual desire disorder during their fertile years was assessed. Result showed that Tribulus terrestris may safely and effectively improve desire in women with hypoactive sexual desire disorder [54]. The protective effects of the fruit extract of Tribulus terrestris on the metronidazole induced alterations was evaluated. The fruit extract of TT ameliorates the MTZ-induced alterations in the testis [55].

The erectile dysfunction efficacy of oral Tribulus terrestris therapy was evaluated. Therapy with this plant augment erectile and ejaculation function and sexual quality of life in patients with mild-moderate erectile dysfunction [56].

In an in vitro study, the potent cytotoxic and genotoxic, and endocrine disrupting activities of T. terrestris was investigated. Tribulus terrestris had estrogenic and genotoxic activities. The study was useful in specifying its toxicological effects and the precautions intake [57].

In an animal study, the effect of TT on nicotinamide adenine dinucleotide phosphate-diaphorase [NADPH-d] activity and androgen receptor [AR] immunoreactivity was evaluated. The mechanism was due to the androgen increasing property of TT [58].

Aphrodisiac activity of TT was assessed. The increase in ICP which confirms the proerectile aphrodisiac property of TT could possibly be the result of an increase in androgen and subsequent release of nitric oxide from the nerve endings innervating the corpus cavernosum [59].

The efficiency of T. terrestris extract in the treatment of polycystic ovary was evaluated. It can be concluded that T. terrestris have a luteinizing effect on ovarian cysts, relating to its gonadotropin-like activity; the extract showed to be able to eliminate efficiently ovarian cysts and resume ovarian activity at a high dose [60].

In a human study, the influence of Tribulus terrestris extract on androgen metabolism was investigated. The findings anticipate that Tribulus terrestris steroid saponins possess neither direct nor indirect androgen-increasing properties [61]. There was also a mild to moderate improvement of the sexual behavior parameters. It is concluded that TT extract possesses aphrodisiac activity probably due to androgen increasing property of TT [62].

CONCLUSION

It was concluded that T. Terrestris extract and C. officinalis extract exhibited concentration-dependent relaxation. Besides, T. terrestris extract is safe and effective in the treatment of female sexual dysfunction. A positive effect of TT administration on rat sperm production, associated with unchanged levels of circulating androgens was observed**.**

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