

## **HERBALISM: THE NEXT GENERATION REPRODUCTIVE BIOMEDICINE**

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### **SUMMARY**

**Reproductive biomedicine covers all stages of the human lifespan from birth to death. Any kind of imbalance or abnormality in the development, growth and physiology of the reproductive and associated systems causes great physical and psychological discomfort that often results in embarrassment for the individual. Although allopathy provides immense relief and comfort to patients, the costs involved are now becoming prohibitive for the average citizen. This crisis has led us to search for alternate forms of reliable medicine. Herbalism is one form of ancient folklore medicine that has been neglected and at times brushed aside as witchcraft. However, an increasing awareness and a change of attitude has prompted a re-exploration of the potentials of this practice with a scientific bent of mind. Herbs with safer and more effective ingredients are currently being isolated and tested for use in reproductive biomedicine. The advances in information technology have also made it possible to establish databanks for various kinds of reproductive disorders and to link them with remedies offered by nature's laboratory. In this review we focus on some of the problems related to reproductive health and highlight the variety of herbs that could be used to deal with such situations effectively.**

Key words: Fertility; herbalism; lactation; male reproduction; menopause; pregnancy; puberty; sexual activity.

### **INTRODUCTION**

Herbalism has emerged as an alternative medicine for many reasons: the recognition of the value of traditional and indigenous pharmacopoeias, the incorporation of some drugs derived from these sources into pharmaceuticals, the need to make healthcare affordable for all and the perception that natural remedies are somehow safer and more efficacious than remedies which are chemically derived (1,2). It is believed that mixtures of several crude extracts when used in formulations enhance the beneficial effects through synergistic amplification or diminish any possible adverse side effects (3). It is also presumed that such combination could prevent the gradual decline in efficacy that is frequently observed, when single drugs are administered over a prolonged period of time. In this review we briefly examine the vast potentials of herbalism in reproductive biomedicine and emphasize the need to evolve a universal regulatory system that would give herbal remedies the required authenticity to flourish.

## HISTORY

Herbal treatments have been considered by most allopathic practitioners to be innocuous, or alternatively, potentially problematic (4). At the beginning of the twentieth century only a few of them had any appreciation of the number of remedies which had their origin in herbal medicine and most had only a vague impression of what herbalism or other forms of alternate medicinal practices implied (5,6). By mid-century pharmacology was a dying science. Dicta of the day, as outlined by law, required proof of the safety and efficacy of herbal preparations (7). This policy determined that only chemically defined and clinically evaluated medicines had value and if pharmaceutically derived, had to be prescribed by allopathic practitioners. However, with the change of time and the revival of herbalism, self-medication became common and indigenous remedies were used with impunity and complete disregard for any adverse effects (8,9). Soon these medicines were introduced and permitted, as culturally they were already considered "acceptable". In addition, the convention on biodiversity made it feasible to broadly categorize herbal medicinal systems into Asian, European, Indigenous and Neo-Western. This meant that the medical doctrine of each ethnic group could retain its own identity. The strict patent laws, now in force, have not halted the mad rush to explore and exploit the "magic of herbs" in the Asian countries. Henceforth, it is likely that herbalism will become as popular as other conventional types of medicine.

## MALE REPRODUCTIVE SYSTEM

There are several clinical conditions associated with the male reproductive system that requires medical attention. Some of the most well-known and familiar ailments are discussed here. Representative examples of herbs used are listed to emphasize the importance of herbalism in the treatment and toning up of the reproductive function (Table 1).

**Table 1. Action of herbal extracts on the Male Reproductive System**

### Contraceptive/antifertility

<i>Azadirachta indica</i>	Tablets of neem leaf ingested for one-month produces reversible male infertility without affecting sperm production
Calendula	Extract from the flower used as vaginal suppository shows a high degree of spermicidal activity
<i>Carica papaya</i>	Antifertility due to decreased sperm motility
Clover	A natural spermicidal, causes significant drop in sperm counts
<i>Colebrookia oppositifolia</i>	Affects testicular cell population dynamics in rats
<i>Hibiscus rosa sinensis</i>	Extracts of the flower affect generation of sperm as well as endocrine function of the testes.
<i>Mondia whitei</i> L	Anti-spermatogenic and the antifertility effect is reversible

<i>Malvaviscus conzattii</i>	The flower has a marked anti-spermatogenic activity, reduces male sex hormone production.
<i>Montanoa frutescens</i>	Decreases cell viability and sperm motility
<i>Phytolacca dodecandra</i>	Fruit has potent spermicidal activity, saponin being the active component
<i>Striga orobanchioides</i>	Antifertility activity through endocrine disruption
<i>Tripterygium wilfordii</i>	A Chinese herb, affects only the sperm in men, it, produces temporary sterility without any side effect.

#### **Male fertility dysfunctions/prostate health**

Ashwagandha	An East Indian sexual tonic herbs. Promotes fertility and sexual potency. A safe, non-irritating ayurvedic tonic that does not over stimulate sexual energy.
Cornsilk	Diuretic, useful for bladder and prostate problems
Catuaba	The most famous among sexual enhancing plants in Brazil, highly regarded as male libido enhancer and sexual stimulant.
Epimedium	Used for curing impotence, stimulating sexual activity and sperm production.
Ginkgo	Found to be reliable peripheral vasodilator has been shown to be an excellent agent for treating arterial erectile dysfunction. It has direct effect on endothelial cells, which enhance blood flow of both penile arteries and veins without any change in systemic blood pressure.
Ginseng	Male tonic, support physical stamina and has long been used to support male sexual health used for nervous disorders and indigestion, normalizes body systems such as blood sugar.
Gravel Root	Soothes mucosal irritations especially in urinary tract, bladder and prostate.
Muiru puama	Increase sexual desire in men, acts as nervous system tonic
Sarsparilla	Aphrodisiac and male tonic, hormonal precursor that is used to increase energy, protect against harm from radiation exposure, regulate hormones, and has diuretic properties. Useful for frigidity, hives, impotence, infertility, nervous system disorders, premenstrual syndrome and disorders caused by blood impurities.
Saw Palemetto	A diuretic and urinary antiseptic, inhibits the production of dihydrotestosterone, a hormone that contribute to enlargement of prostate. Good for poor appetite and prostate disorders, also a tonic that enhances sexual functioning and desire.

Stone Root	Used as sedative, antispasmodic, astringent, diuretic, and for the treatment of swollen prostate.
<i>Tribulus terrestris L.</i>	Protodioscin the main agent derived from this plant improves sexual drive and enhances erection in men.
<i>Turnera aphrodisiaca</i>	It has long ancient reputation of male sexual enhancing ability. Also known by the name of Damania
Yohimbe	Can serve as a sexual aid for men suffering with poor sexual responses or impotence, act as stimulating aphrodisiac, increase tonicity, stimulate male potency, cause penile erection giving relief of impaired sexual function.

## REPRODUCTIVE DYSFUNCTION

Herbs have been successfully used to treat erectile dysfunction, one of the problems commonly faced by impotent men. Without an adequate flow of blood to and from the penis, it is impossible to achieve an erection. A database survey reveals that two primary herbs *Ginkgo biloba* and *Oriental (Panax) ginseng* can help increase circulation to erectile tissue and promote healthy male performance. A large number of pharmacological agents are consumed orally and vasoactive agents are inserted intraurethally or injected intrapenially, to retain good erection. But it must be borne in mind that these modern phytochemicals have been developed from traditional herbs. Protodioscin derived from *Tribulus terrestris L* plant is one such agent, which has clinically been proven to improve sexual desire and enhance erection, via the conversion of protodioscine to dehydro epiandrosterone (10).

Premature ejaculation (PE) is another situation believed to be psychological in nature but the organic basis seems to be penile hypersensitivity. This condition has successfully been treated with a topical agent (SS-cream) containing 9 oriental herbs, which prolongs the sensory conduction and reduces penile hyper excitability (11).

Prostate enlargement, also known as benign prostatic hypertrophy (BPH) is one of the most widespread concerns for aging men. Generally, this is caused by the accumulation of a potent form of male hormone, dihydrotestosterone (DHT) that contributes to the overproduction of prostate cells, leading to prostate enlargement. This puts pressure on the urethra and ultimately results in disturbed urinary function. Corrective measures include procedures like balloon dilation, transurethral resection, in addition to oral medication using alpha-blockers and proscar (finasteride). But of late, there seems to be a shift in favor of using herbs to tide over this condition. The fat-soluble extract of the Saw palmetto berry and Pygeum, an extract from the bark of an African tree (*Pygeum africanum*), have recently been used in a herbal formula for effectively supporting prostate health (12).

Herbal medications have been used to improve semen quality, sperm counts and other characteristics of sperm as well. One such active constituent, ferulic acid found in various medicinal herbs has been reported to have a positive effect on the viability, motility and fertilizing ability of sperm by scavenging oxygen free radicals (13). The water extract of

the plant *Astragalus membranaceus* has been found to stimulate sperm motility *in vitro* and its potential for application in assisted reproductive technology is also being explored (14).

## FERTILITY

The influence of medicinal herbs on the reproductive function has never received greater attention until now. As a result of the growing need to control the population of the human race, several plant products are being screened for their anti-fertility properties (15). The most encouraging results have been reported with gossypol, isolated from seed of the cotton plant (16). The extract of *Carica papaya* seeds (17), *Andrographis paniculata* (18), *Tripterygium wilfordii* (19) and *Malvaviscus conzattii* (20) have also been tested with varying degrees of success. Herbs like the St. John's wort have been shown to have spermicidal effects, which destroy the integrity of sperm DNA and disturb the fertilization process (21,22). These preliminary reports indicate the need for additional information to promote effective herbal contraception. In the last two decades, we have witnessed concerted efforts to collect appropriate information and build region wise databases of such plants.

## FEMALE REPRODUCTIVE SYSTEM

Puberty, menstruation, pregnancy, lactation and menopause are the various stages in the life of every woman. Any delay in the onset of these events result in physical and emotional distress. To promote reproductive health and treat related diseases herbs have not only become popular but are also in great demand for modern clinical practice (Table 2).

**Table 2: Action of Herbal extracts on the Female Reproductive system**

### Antifertility / Contraceptive:

<i>Azardiachta indica</i>	Spermicidal by nature; also prevents vaginal and sexually transmitted diseases.
<i>Cassia fistula</i>	Aqueous leaf extract preparation has an antifertility effect
<i>Embelia ribes</i>	Dried berries have traditional reputation of antifertility activity. One of the active component embelin possesses significant anti-implantation activity.
<i>Hibiscus rosa sinensis</i>	Traditional use of the flower for its emmenagougue & contraceptive action
<i>Phyllanthus amarus</i>	Contraceptive effects
<i>Ricinus communis</i>	Seed preparation has antifertility properties

### Abortifacients:

Angelica/ Dong Quai	A uterine stimulant with ability to strengthen and coordinate contraction to help encourage the uterus to expel its contents.
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Black Cohosh	Help in cervix relaxation and opening
Cotton Root Bark	Affects corpus luteum; Interferes with progesterone production and stimulates uterine contraction
<i>Dacuss carota</i>	The seed harvested in the fall is a strong contraceptive if taken orally immediately after coitus. Prevents the implantation of the egg
Evening Primrose	Stimulates the cervix dilation and relaxes the cervix and thus facilitates fetus expulsion
Parsley	Good for starting a late period (when not due to pregnancy); used as a vaginal suppository to prepare the cervix for release
Pennyroyal	One of the most toxic choice abortifacient available
Pineapple (unripe)	Well-known fruit used to end pregnancy. Women are discouraged to take pineapple during menses, as the bleeding will become heavier; women who are pregnant especially at earlier stage are forbidden to take the fruit due to fear of miscarriage.

#### **Menopause/Menstruation/Other disorders:**

Alfalfa	Nutritive, with high mineral and vitamin content including vitamin K and iron, contains phytoestrogene, lowers cholesterol.
Angelica	For strong menstrual cramps with scanty flow
Black Cohosh	Female tonic, relax smooth muscle, relieves nervous irritation and menstrual cramps, reduce joint inflammation in arthritis.
Blue Cohosh	Female tonic, improves uterine tone
Chaste tree (Vitex)	Menstrual regulator, improves circulation and tone of female organs, promotes progesterone production.
Cramp Bark	Antispasmodic for dysmenorrhea and other rhythmic uterine pains, for smooth muscle cramps or spasms, sometimes used for threatened miscarriage
Dong Quai	Menstrual regulator, regulates the hormonal balance and flow
Motherwort	Antispasmodic and female tonic (improves blood flow to the female organs), sedative for hysterical complaints, tachycardia, nervous pulse
Ocotillo	Relieves pelvic lymphatic congestion such as boggy uterus and prostate
Passion flower	Antispasmodic and nerve sedative. Advocated for use in cases of menstrual, tense muscle or dysmenorrhea and hypertension

Red Raspberry	Relieves nausea and improves digestion, improves uterine tone and blood supply, increases milk production
Wild Yam	Antispasmodic, relieve colic, spasm or cramping of smooth muscle of uterus, also contains hormone precursor.

## **PUBERTY**

Puberty is manifested in the development of the secondary sexual characteristics, the most dramatic being the onset of menstruation. The psychology of the human female is to a great extent related to the regularity of her periods. Traditional healing systems have focused on the common conditions in women, such as the premenstrual syndrome (PMS). Both Evening primrose oil and the Chaste tree berry are effective in the treatment of PMS (23). The problem is more acute and emotionally disturbing when periods are irregular or delayed, especially for a woman who is sexually active. Many factors, both within our bodies and in our surroundings could contribute to the delay in menstruation. Herbs like Parsley, Ginger, Yarrow, Sage, Juniper, Rosemary etc., collectively referred to as emmenagogues, have the ability to provoke menstruation, provided that the uterus is ready to bleed. In cases where menstruation is simply late, it is best to support the body with liver cleansing herbs like Dandelion and Burdock root.

## **FERTILITY**

Women have used herbs since the beginning of time to control their fertility. Even today, there are people who strongly believe that traditional herbs could help in the practice of family planning (24). Efforts are being made to identify those plants that could be used as abortifacients or emmenagogues (15,25). The mild herbs are classified as emmenagogues (parsley) and the stronger ones as abortifacients (pennyroyal, tansy), since they have the ability to disrupt pregnancy. In order to streamline the use of these plants, the chemistry of their active components are now being studied systematically, together with their toxicity, so that such preparations could be made commercially available as safe, cheap and socially acceptable remedies.

## **PREGNANCY AND LACTATION**

Morning sickness is often one of the first obvious signs of pregnancy. To counter this, the most commonly cited herbs are Ginger, Chamomile, Peppermint, and Raspberry leaf (26). It is not uncommon for pregnant women to use other medicinal herbs to maintain good health (27,28). These are generally categorized as tonics, herbs for preventing miscarriage and herbs for inducing labor (29,30). Herbs and drugs that are used during pregnancy and to improve lactation have also been described in literature (31).

## **MENOPAUSE:**

The immediate symptoms of menopause include irregular periods, painful sexual intercourse due to vaginal dryness, hot flushes and night sweats. There are indications that

the risk of osteoporosis and cardiovascular diseases are enhanced in these individuals. Hormone therapy, no doubt, helps to alleviate many of these symptoms but also generates side effects like gall bladder diseases, elevated blood pressure, breast tenderness, abnormal bleeding, weight gain, depression and increase the risk of cancer (32). Black cohosh is a unique herb that has been used in treating all sorts of female complaints like PMS, cramps, hormonal imbalances and menopausal symptoms. Scientifically, this herb suppresses the secretion of luteinizing hormone (LH) that leads to menopausal symptoms, which can in turn be controlled (23). Physically and mentally, patients find traditional herbs rich in phytoestrogens, to be soothing (33). However, very little is known about the specifics of these so-called natural hormones (34). In order to be widely accepted as an alternative medicine the safety of these herbs in the treatment of menopausal complaints will have to be established on a scientific basis (35,36).

## HERBS AND SEXUAL ACTIVITY

Faith in herbal preparations in central and southern Africa is so great that herbs and other agents are routinely used to enhance sexual experience (37). More recently, the effect of a unique formulation of *Muiru puama* and *Ginkgo biloba* (Herbal vX) was assessed in healthy women with low sex drive. Based on a self-assessment questionnaire and statistical analysis, it was inferred that there was substantial improvement in the frequency of sexual desires, sexual intercourse, sexual fantasies, satisfaction with sex life and the ability to reach orgasm (38). This anecdotal evidence clearly points to the benefits of herbal vX with regard to the female sex drive. Although the use of herbs may psychologically boost the performance of individuals, it is difficult to assign a specific mode of action, since few scientific investigations have been carried out.

## CONCLUDING REMARKS

Herbalism has long been practiced in underdeveloped / developing countries. Now developed nations are more inclined to lean towards these products as well. Over the last 50 years herbal medicine has been subjected to intensive basic and clinical research. While the concept of herbalism is gaining popularity, we would like to sound a word of caution. There are several herbs and components that are toxic or difficult to identify. Similar looking herbal materials vary greatly in their medicinal properties and market value. It is therefore essential to elucidate scientifically the precise identity of the pharmacological constituents, mechanism of action and clinical value of medicinal herbs. Pharmacists who wish to recommend herbal products for reproductive health must first seek the assistance of scientific databases and worldwide websites in order to evaluate and form their own opinions about appropriate use and safety. Recommendations of dosages will also have to be carefully worked out. It is equally important to lay out guidelines and define those physiological conditions for which a particular herb can or cannot be used. If these precautions are taken then there is no doubt that the next revolution in reproductive biomedicine will be herbalism. Much depends upon the public perception of product safety and reliability.



## REFERENCES

- 1 Trevelyan J (1995). Herbalism: useful remedies. *Nurs Times* **91**: 45-46.
- 2 Elvin-Lewis M (2001). Should we be concerned about herbal remedies? *J Ethnopharmacol* **75**: 141-164.
- 3 Evans M (1987). An ABC of alternative medicine: herbalism. *Health Visit* **60**: 17-18.
- 4 Egan CD (2002). Addressing use of herbal medicine in the primary care setting. *J Am Acad Nurse Pract* **14**: 166-171.
- 5 Brown PS (1985). The vicissitudes of herbalism in late nineteenth and early twentieth century Britain. *Med Hist* **29**: 71-92.
- 6 Frost J (1992). Herbalism: an overview of an ancient art. Origins and development of herbal therapies. *Prof Nurse* **7**: 237-241.
- 7 Chapman-Smith DA (1997). Legislative approaches to the regulation of the chiropractic profession. *Med Law* **16**: 437-449.
- 8 Finlay M (1971). Naturopathy and herbalism. *Manch Med Gaz* **50**: 79-81.
- 9 Stuart MR (1975). Herbalism. *Nurs Times* **71**: 1528-1531.
- 10 Adimoelja A (2000). Phytochemicals and the breakthrough of traditional herbs in the management of sexual dysfunction. *Int J Androl* **22(Suppl 2)**: 82-84.
- 11 Xin ZC, Choi YD, Seong DH and Choi HK (1995). Sensory evoked potential and effect of SS-cream in premature ejaculation. *Yonsei Med J* **36**: 397-401
- 12 Andro MC and Riffaud JP (1995). *Pygeum africanum* extract for the treatment of patients with benign prostatic hyperplasia: a review of 25 years of published experience. *Curr Ther Res* **56**: 62-75.
- 13 Zheng RL and Zhang H (1997) Effect of ferulic acid on fertile and asthenozoospermic infertile human sperm motility, viability, lipid peroxidation and cyclic nucleotides. *Free Radic Biol Med* **22**: 581-586.
- 14 Hong CY, KU J and Wu P (1992). *Astragalus membranaceus* stimulates human sperm motility *in vitro*. *Am J Clin Med* **20**: 289-294.
- 15 Weniger B, Haag-Berrurier M and Anton R (1982). Plants of Haiti used as anti-fertility agents. *J Ethnopharmacol* **6**: 67-84.
- 16 Gu ZP, Mao BY, Wang YX Zhang RA, Tan YZ, Chen ZX, Cao L, You GD and Segal SJ (2000). Low dose gossypol for male contraception. *Asian J Androl* **2**: 283-287.
- 17 Pathak N, Mishra PK, Manivannan, B and Lohiya, NK (2000). Sterility due to inhibition of sperm motility by oral administration of benzene chromatographic fractic of the chloroform extract of the seeds of *Carica papaya* in rats. *Phytomedicine* **7**: 325-333.

- 18 Akbarsha MA and Murugaian P (2000). Aspects of male reproductive toxicity/ male antifertility property of andrographolide in albino rats: effect on the testis and the cauda epididymal spermatozoa. *Phytother Res* **14**: 432-435.
- 19 Ye W, Den Y, Huang Y and Xue S (1994). Antispermatoxic effect of *Tripterygium wilfordii* and tripchlorolide (T4) on rat gametogenesis and spermatozoa. *Clin Med Sci J* **9**: 110-113.
- 20 Verma OP, Joshi BC, Kumar S and Chatterjee SN (1980). Antifertility effect effects of *Malvaviscus conzattii* green flower extract (sc) on male albino rats. *Indian J Exp Biol* **18**: 561-564.
- 21 Ondrizek RR, Chan PJ, Patton, WC and King A (1999a). Inhibition of human sperm motility by specific herbs used in alternative medicine. *J Assist Reprod Genet* **16**: 87-91.
- 22 Ondrizek RR, Chan PJ, Patton, WC and King A (1999b). An alternative medicine study of herbal effects on the penetration of Zona-free hamster oocytes and the integrity of sperm deoxyribonucleic acid. *Fertil Steril* **71**: 517-522.
- 23 Hardy ML (2000). Herbs of special interest to women. *J Am Pharm Assoc (Wash)* **40**: 234-242.
- 24 Obisesan KA, Adeyemo AA, Ohaeri JU, Aramide FA and Okafor, SI (1997). The family planning aspects of the practice of traditional healers in Ibadan, Nigeria. *West Afr J Med* **16**: 184-190.
- 25 Desta B (1994). Ethiopian traditional herbal drugs. Part III. Anti-fertility activity of 70 medicinal plants. *J Ethnopharmacol* **44**: 199-209.
- 26 Wilkinson JM (2000). What do we know about herbal morning sickness treatments? A literature survey. *Midwifery* **16**: 224-228.
- 27 Belew C (1999). Herbs and the childbearing woman. Guidelines for midwives. *J Nurse Midwifery* **44**: 231-252.
- 28 Pinn G (2001). Herbs used in Obstetrics and gynecology. *Aust Fam Physician* **30**: 351-354.
- 29 Stapleton, H (1995). The use of herbal medicine in pregnancy and labor. Part I. An overview of current practice. *Complement Ther Nurs Midwifery* **1**: 148-153.
- 30 Westfall RE (2001). Herbal medicine in pregnancy and childbirth. *Adv Ther* **18**: 47-55.
- 31 Wong HB (1979). Effect of herbs and drugs during pregnancy and lactation. *J Singapore Paediatr. Soc* **21**: 169-178.
- 32 Gardner C (1999). Ease through menopause with homeopathic and herbal medicine. *J Perianesth Nurs* **14**: 139-143.

- 33 Lien LL and Lien EJ (1996). Hormone therapy and phytoestrogens. *J Clin Pharm Ther* **21**: 101-111.
- 34 Roemheld-Hamm B and Dahl NV (2002). Herbs, menopause and dialysis. *Semin Dial* **15**: 53-59.
- 35 Israel D and Youngkin EQ (1997). Herbal therapies for perimenopausal and menopausal complaints. *Pharmacotherapy* **17**: 970-984.
- 36 Amato P, Christophe S and Mellon PL (2002). Estrogenic activity of herbs commonly used as remedies for menopausal symptoms. *Menopause* **9**: 145-150.
- 37 Runganga A, Pitts M and McMaster J (1992). The use of herbal and other agents to enhance sexual experience. *Soc Sci Med* **35**: 1037-1042.
- 38 Waynberg J and Brewer S (2000). Effects of herbal vX on libido and sexual activity in premenopausal and postmenopausal women. *Adv Ther* **17**: 255-262.