

Withered Yang: A Review of Traditional Chinese Medical Treatment of Male Infertility and Erectile Dysfunction

Review

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Infertility is a private, social, and economic problem. Infertility is defined as the inability to conceive a pregnancy within 1 year. Twenty-five percent of couples will seek help for infertility at some point during their relationship (Page, 1989), accounting for over 2 million office visits to health care providers annually (The Endocrine Society, 1998).

Male factor infertility is contributory in at least 50% of infertile couples (Collins, 1989). Currently, the therapy for male factor infertility focuses on microsurgery to correct varicoceles or obstruction of the male reproductive ductal system. Additionally, there has been a strong shift away from evaluating and treating the man and proceeding directly to expensive artificial reproductive technologies.

Prior attempts at medical therapy for male factor infertility have included hormonal therapy (GnRH agonists and antagonists, gonadotropins, anti-estrogens, testosterone, and aromatase inhibitors), antioxidant therapy, antibiotics, corticosteroids, methylxanthines, vitamins, minerals and amino acids (zinc and arginine), and angiotensin-converting enzyme inhibitors. The observation that no medication is approved by the United States Food and Drug Administration for treatment of male infertility confirms the conclusion that adequate controlled studies of potential therapeutic agents are either lacking or failed to elicit a significant improvement in fertility.

Male erectile dysfunction can be defined as the inability of a man to obtain penile rigidity sufficient to permit coitus of adequate duration to satisfy himself and his partner. The personal and private nature of this problem has hindered accurate estimates of the true prevalence in the

general population. Current estimates suggest that 20 to 30 million Americans suffer from erectile dysfunction. Recent advances in medical therapies for erectile dysfunction have raised public awareness of the condition; however, many men shy away from conventional therapies because of concerns about side effects and lack of efficacy. Long-term satisfaction with current therapies ranges from 40% to 70% (Jarow et al, 1996).

Acupuncture may represent an important therapeutic modality for male factor infertility. The purpose of this review is to describe how male erectile dysfunction and infertility are understood from an Eastern medical perspective and to review the available research evaluating the efficacy of acupuncture in the treatment of these disorders.

Acceptance of an Ancient Modality

Alternative or complementary medicine has become an increasingly popular option for many patients (NIH, 1997). This trend is reflected in the 47.3% increase in total visits to alternative medicine practitioners, from 427 million in 1990 to 629 million in 1997 (Eisenberg et al, 1998), a number that exceeds the total visits to all US primary care physicians. During this same period of time, the estimated expenditures for alternative medical professional services increased 45.2%, with an estimated \$21.2 billion spent, including at least \$12.2 billion paid out-of-pocket. Traditional Chinese medicine (TCM) is one of the treatment modalities at the forefront of this trend. Of the techniques employed in TCM, the use of acupuncture for the treatment of pain is the best known. Other techniques—including moxibustion, which is the use of smoldering herbs to warm acupuncture points; herbal medicine; and massage—play integral roles in traditional treatment of a broad spectrum of diseases.

After many years of growing public acceptance, Western scientists and researchers have begun to take an interest in evaluating and employing acupuncture in clinical practice. In 1997, the National Institutes of Health (NIH) released a consensus statement concluding that acupuncture is a promising modality for treating a wide range of conditions and that there was sufficient scientific evidence to support the incorporation of acupuncture therapy into conventional medicine.

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Male infertility and erectile dysfunction appear in the earliest Chinese medical texts. Over thousands of years, TCM theory has evolved a comprehensive framework for diagnosing and effectively treating sexual dysfunction.

A Brief History of Traditional Chinese Medicine

TCM, whose texts date back over 2000 years, is a sophisticated medical philosophy that evolved out of careful observation and critical thinking, reinforced through empirical clinical experience in a process consistent with modern principles of the scientific method (Kaptchuk, 1983). In Eastern cultures, acupuncture and herbal medicine were and still are primary treatment modalities, employed to treat all types of disease from the common cold to life-threatening conditions.

Acupuncture was virtually unknown in the United States until 1972, when China opened its doors to the West. It quickly captured the imagination of the American public, although primarily for its ability to manage pain. Over the years, the other equally important modalities of herbal medicine, moxibustion, and Tui Na massage have gained in popularity, and the realization that TCM is not limited to the treatment of pain has become widespread. National safety, efficacy, and competence guidelines for the practice of acupuncture in the United States were established in 1985, when the National Committee for the Certification of Acupuncture and Oriental medicine administered the first acupuncture certification exam. The positive results emerging from clinical research, the favorable stance the NIH has adopted, and the remarkable increase in demand for alternative medicine in the past decade suggest that acupuncture and TCM will remain major components of the emerging complementary health care system.

Philosophy and Theory of Traditional Chinese Medicine

TCM evolved out of the philosophy that human physiology and health were a reflection of the processes observed in the natural environment. In the language of TCM, natural metaphors are used to explain biological processes. For example, red eyes and a flushed face can be explained in terms of Heat rising from Fire in the body. The treatment strategy in such a condition might involve cooling the Fire by employing techniques to nourish the Water of the body, since water is used to put out a fire in the natural environment.

A fundamental concept in Chinese medicine is that two opposite yet complementary forces underlie all natural phenomena. These forces, Yin and Yang, are used to characterize both events and physical processes. For example, Yin represents cold, consolidation, and the quality of being at rest, while Yang represents heat, expansion, and activity. From a Western perspective, one understanding of Yin and Yang in the body might be the balance be-

tween anabolic and catabolic processes. A state of homeostasis may be regarded as a perfect balance of Yin and Yang. In TCM, disease is viewed as the result of disharmony or imbalance. Although TCM treatments generally operate at a more complex theoretical level, the balance of Yin and Yang in the body is the ultimate therapeutic goal.

In TCM, the active principle underlying physiology and metabolism in the human body is Qi, the vital energy that permeates the universe. Qi, literally "air" or "breath," is responsible for warming the body, protecting it from external pathogens and producing and distributing fluids and blood. Each organ has its own type of Qi that enables it to perform its functions. In some cases, these functions coincide with our modern Western understanding of organ function. From a TCM perspective, however, an organ represents a theoretical construct of physiological patterns that may, from the Western perspective, involve multiple organ systems.

The two organs most commonly involved in the TCM understanding of male infertility and erectile dysfunction are the kidneys and the liver. According to TCM physiology, these two organs are very closely related. The kidney stores the Essence Qi, which roughly corresponds to our modern concept of male and female gametes. The liver stores blood, which is closely related to the reproductive essence. Both Essence Qi and blood are Yin in nature; thus, it is said that the liver and kidney are of the same source. A weakness in one organ is often associated with imbalance in the other. In addition, it is the liver's function to make Qi move smoothly through all the organs, ensuring the proper functioning of all bodily processes. If the liver is unable to promote this free movement, pathology will arise in whichever of the organs are affected.

Pattern Diagnosis and Sexual Dysfunction

Western diagnostic thinking tends to follow a linear process of isolating structural or biochemical causes at the root of a chief complaint. A symptom is often reduced to an organ, an organ reduced to tissue, and a tissue reduced to a pathological biochemical process. The tissue may be excised or a drug prescribed to correct, compensate for, or mask a chemical imbalance. TCM diagnosis revolves around identifying patterns of disharmony, which may involve one or a number of organs. One of the major challenges in formulating a TCM diagnosis is recognizing the relationships among all the organs involved in a disease process. Identifying these relationships and correctly assessing the nature of each organ's involvement in the pathology is crucial to formulating an effective treatment plan.

Tables 1 and 2 give a rough indication of the TCM patterns that may be involved in specific Western diag-

Table 1. *Western diagnosis of erectile dysfunction and traditional Chinese medicine (TCM) patterns that may be involved*

Western Diagnosis	TCM Patterns	Comments
Psychogenic	Fear and fright damaging the kidneys	Kidney functions impaired when sexual activity is associated with fear (concern over sexual performance, risk of pregnancy, contraction of disease); generally no erectile problem outside situations involving sexual contact
	Heart and gall bladder Qi vacuity, binding depression of liver Qi, heart and spleen vacuity	
Organic Hormonal	Debility of the life gate fire, kidney yin vacuity	Yang tends to be in relative repletion, resulting in heat agitation that may manifest as premature ejaculation
	Kidney yang vacuity	Yang component of erectile function is reflected in functional and circulatory activity required, as well as heat and warmth produced; yang vacuity may result in varying degrees of erectile dysfunction
Vascular	Liver channel damp-heat pouring downward	Commonly related to emotional frustration or constraint; fluid may stagnate into dampness and obstruct vessels of the penis, resulting in inability to achieve erection due to a physical obstruction; accumulated dampness engenders heat, signs of which may include scrotal itch and rash, reddish urine, dysuria*
	Phlegm and damp obstructing network vessels, stasis obstructing essence vessel	
Neurogenic Iatrogenic	Kidney yin vacuity, kidney yang vacuity	See above
	Stasis obstructing essence vessel	
Mixed Aging	Debility of the life gate fire, kidney yin vacuity, kidney yang vacuity	See above

* From a Western perspective, prominent signs of heat in the genital region may indicate increased temperature of the testes as a cause of infertility.

noses of erectile dysfunction and infertility. In general, there are no simple correspondences between a Chinese diagnosis and a Western diagnosis. A single Western diagnosis may be explained by a number of TCM patterns. These tables are presented not as tools for diagnosis but as illustrations of the depth and breadth of TCM diagnosis and its applicability to the full range of diagnoses recognized by the Western understanding of erectile dysfunction and infertility.

A complete discussion of the patterns listed in Tables 1 and 2 is beyond the scope of this paper. Even if a patient's condition closely matches a classical pattern, there will be nuances, which can only be properly addressed by a complete diagnosis. Specific patterns are usually part of a larger disharmony. In particular, because the kidney and liver are closely related, sexual dysfunction commonly involves combinations of kidney and liver patterns. Male infertility can be the result of many factors, including pathologies in the motility and formation of sperm as well as obstructions in the genitourinary system. Several

of the patterns considered to be causes of infertility also are associated with the failure to achieve or maintain an erection as well as with premature ejaculation. For example, a vacuity, or absence, of Kidney Yang may be the root pattern for a wide variety of diseases. In general, the treatment of Kidney Yang vacuity diseases will involve the use of some of the same acupuncture point combinations and will use similar techniques, but the treatment of a specific pattern will be tailored to the unique qualities of the specific complaint as well as the patient's constitution. From a TCM perspective, all contributing elements of a pattern must be addressed in order to effect a lasting change in the patient's health.

TCM Treatment Modalities

Over thousands of years, the relationships or correspondences recognized by TCM have given rise to a system of several hundred commonly used acupuncture points, many organized along channels or meridians throughout various regions of the body. Every organ has an associ-

Table 2. Western diagnosis of male infertility and traditional Chinese medicine (TCM) patterns that may be involved

Western Diagnosis	TCM Patterns	Comments
Obstructive		
Congenital	Yin fire effulgence, stasis obstructing essence vessel, kidney essence vacuity	Problems with sperm motility and formation are often associated with kidney vacuity, as the kidneys are viewed as the source of sexual essence; patient will show other signs and symptoms of kidney yang vacuity, e.g., cold phenomena manifesting as facial pallor, fatigue, cold extremities, dizziness, tinnitus, aching low back and knees, aversion to cold
Postinfection	Stasis obstructing network vessel, phlegm and damp obstructing network vessels	
Postsurgical Idiopathic	Stasis obstructing network vessel Many possible patterns	
Non-Obstructive		
Pituitary	Kidney yin vacuity	Sperm formation problems reflect essence vacuity, associated with more yang (heat) signs: subjective sensation of internal heat, possibly with malar flushing, dizziness, tinnitus, weakness of low back and knees; sleep disturbances
Testicular failure Environmental	Kidney essence vacuity Many possible patterns	See above
Anatomic abnormalities		
Varicocele/cryptorchidism	Kidney essence vacuity, kidney yin vacuity, stasis obstructing network vessel, Liver channel damp-heat pouring downward	See above See above Body fluids, including essence or sexual fluids, not moved and transformed normally, resulting in pathology; often associated with emotional upset such as anger or frustration; other signs and symptoms: hypochondriac fullness or pain and digestive problems
Torsion Testis cancer	Stasis obstructing network vessel Stasis obstructing network vessel Phlegm stasis	

ated meridian, linking a series of points on the body. Each point regulates some aspect of the functional activity of its corresponding organ system. Many of these points occur far from their areas of influence.

The health of the body was thought to be the result of a balance between the physiological forces of Yin and Yang as well as the proper flow of Qi through the meridians and their corresponding organ systems. Acupuncture points may be thought of as control points to regulate this flow of Qi by bringing more of it to areas that are vacuous and dispersing excess when too much Qi accumulates and becomes stagnant, disrupting normal function. The flow of Qi is influenced by the insertion and manipulation of fine needles at appropriate acupuncture point locations. Many points also have empirical functions as well, which were recognized over countless years of clinical observation.

An acupuncture treatment may include moxibustion—the burning of the herb mugwort or *Folium artemisiae argyi* over specific points. Moxibustion may be applied in a number of ways, including burning the herb over a

point without making contact with the skin or burnt on the handle of a needle inserted into an acupuncture point. Fine grades of moxa may be formed into cones and applied directly to the surface of the skin over a point. In general, moxibustion has a warming effect, which is thought to tonify or strengthen the Qi dynamics of the system and to promote movement or circulation of Qi and blood.

Herbal formulas constitute an important aspect of TCM treatment. Individual herbs are organized into broad therapeutic TCM categories according to the principal action observed by the administration of herb. Each herb is also understood to have a primary effect on one or more organ systems. Herbs also exhibit specific qualities (such as “bitter” or “aromatic”) and properties of temperature that allow for a great degree of precision and sophistication in prescription. In the majority of cases, herbal formulas are prescribed that may consist of a dozen or more individual ingredients. There has been an effort in recent years to evaluate the pharmacological properties of many herbs, but the understanding of how herbs interact

with each other in the context of complex herbal formulations is unclear from a Western scientific perspective.

Western Models of Acupuncture Function

The role of acupuncture in the reduction of pain is one of the modality's most widely recognized applications (Hu, 1974; Richardson and Vincent, 1986; Vincent and Richardson, 1986). Although there is some general consensus regarding the mechanisms underlying the analgesic effects of acupuncture, there is little conclusive research to suggest how acupuncture might have a regulatory effect on systemic biological processes. If acupuncture can cause the release of substances in the brain to block pain signals, however, as Western investigators have suggested (Pomeranz and Chiu, 1976; Fang and Hayes, 1999; Wang et al, 1999), it is reasonable to speculate that acupuncture may be able to stimulate the release or production of other substances in the body. In recent years, the focus of research has expanded beyond acupuncture analgesia to include the evaluation of other effects induced by needle stimulation. There is significant clinical evidence to suggest that acupuncture has a regulatory effect on the circulatory, endocrine, and nervous systems (Liao et al, 1979; Cheng and Pomeranz, 1980; O'Connor and Bensky, 1981).

A simple and popular hypothesis for these clinical findings is that acupuncture stimulates nerve receptors at point locations, transmitting signals to specific areas of the central nervous system, which initiate physiological changes in the body. The reason certain points have these effects still escapes the modern scientific attempt to understand acupuncture outside of its historic theoretical context. Nevertheless, researchers are confirming the association of physiological changes with stimulation of acupuncture points (Cardini and Weixin, 1998; Dold, 1998). These findings suggest that acupuncture is a promising modality for more than pain management. Current research seems to raise more questions than it answers. Although it may fail to explain how acupuncture works, in many cases it appears to support the validity of the TCM understanding of human physiology.

Male Infertility Studies

Acupuncture Studies—Existing studies on the use of acupuncture in male infertility are limited but promising. These studies have come from both the East and West and range in design from case studies to the more traditional controlled studies. All were performed on human subjects. Table 3 summarizes the design and results of each study.

Zhiyuan (1997) used a combination of acupuncture and moxibustion to treat 54 men with abnormal semen parameters, erectile dysfunction, ejaculatory dysfunction, or azoospermia. Unfortunately, additional descriptive infor-

mation regarding baseline abnormalities was not provided. He reported that 100% of men with abnormal semen parameters demonstrated improvement after 30 acupuncture treatments. However, effectiveness was neither quantified nor stratified according to specific semen abnormalities (motility, density, or morphology). Acupuncture was also stated to be curative or effective in cases of ejaculatory dysfunction (86%) and erectile dysfunction (69%) but had no effect on azoospermia. Pregnancy rates among those trying to conceive were reported to be 68% for men with abnormal semen parameters, 86% for men with ejaculatory dysfunction, and 38% for men with erectile dysfunction.

In a small anecdotal study, Shealy et al (1990) found that 5 out of the 6 patients had improvements in sperm density with an 8–12-week course of acupuncture treatment. Jiasheng (1987) reported that 74% of 248 cases of male infertility responded to a 20-day course of acupuncture. Description of pretreatment semen parameters and criteria for response were not provided. He divided the cases into five different TCM diagnoses. There were four basic points used for each treatment, with the addition of symptomatic points. Subjects were diagnosed with Yang deficiency, Yin deficiency, depression of Liver Qi, or damp-heat. Four core acupuncture points were used in each treatment (Shenshu, Ciliao, Guanyuan, and Qichong), with the addition of symptomatic points (Zusanli, Taixi, Sanyinjiao, Taichong, Mingmen, and Jiaji), depending on the diagnostic group to which the patient was assigned. In patients with Yang deficiency, moxibustion was applied to point Guanyuan for 20 minutes.

Xinyun (1998) randomized 108 males to receive acupuncture and clomiphene (25 mg qD) versus clomiphene monotherapy. Subjects were diagnosed with idiopathic normogonadotrophic oligospermia (<20 million/mL). Treatment duration was designed to be 3 months, to account for the time needed for progression from spermatogonia to ejaculated sperm. Acupuncture treatments were administered every other day, with the addition of electrical stimulation or moxibustion to specific points. Pregnancy or normalization of semen parameters was achieved in 74% of patients receiving acupuncture and clomiphene combination therapy, compared with 52% of those receiving clomiphene monotherapy, a difference that was statistically significant.

Fishl et al (1984) reported statistically significant improvements in semen parameters in 28 infertile males treated with 10 acupuncture sessions over a 3-week period. Results of written psychological testing before and after treatment were unchanged, suggesting that the improvement in sperm quality was not related to a placebo effect.

Gerhard (1992) studied 30 men with male factor infertility and reported mild but statistically significant im-

Table 3. Studies evaluating use of acupuncture to treat male infertility

Authors	n	Duration of Treatment	Number of Points Used	Semen Quality		Study Design	Pregnancy Rate
				Before	After		
Jiasheng 1987	248	20 days	4 basic plus ≥ 5 symptomatic	Not reported			Criteria for response not reported
Fishl et al 1984	28	3 weeks			Statistically significant improvement		
Shealy 1990	6	18–12 weeks	Not reported		Improved sperm density in 5 men	Anecdotal	Not reported
Gerhard et al 1992	30*	10 days	8	Forward-progressive motility 21%; Total motility 42%	Forward-progressive motility 26%; Total motility 50%†	Nonrandomized case controlled	Not reported
Minghua 1993	39	90 days	10	“Low sperm density” defined as $60 \times 10^6/\text{mL}$ ($28 \text{ million}/\text{mL}$)‡ motility 37%	55 million/mL; motility 61%	Nonrandomized case controlled	Not reported; 54% “cure rate” (normalization of semen parameters)
Siterman et al 1997§	16	5 weeks	≥ 12	Sperm viability 52%; Intact axonema 32%; Count $8.5 \times 10^6/\text{mL}$	Sperm viability 65%; Intact axonema 51%; Count $19.3 \times 10^6/\text{mL}$	Nonrandomized case controlled	
Zhiyuan 1997	54		4	Not reported	Not reported		Men with abnormal semen parameters: 68%
Xinyun 1998	108	3 months	13	Idiopathic normogonadotrophic oligospermia ($< 20 \text{ million}/\text{mL}$)		Randomized: acupuncture + clomiphene vs clomiphene	Men with ejaculatory dysfunction: 86% Men with erectile dysfunction: 38% Pregnancy or normalization of semen parameters in 74% for acupuncture + clomiphene, 52% for clomiphene alone

* Young men and nonsmokers responded more favorably. Acupuncture resulted in significant increases in serum testosterone that correlated with improvements in sperm motility.

† Forty percent had varicoceles on physical examination.

‡ This inclusion criterion for low sperm density was much higher than current standards ($20 \times 10^6/\text{mL}$).

§ Incidence of bacterial contamination of seminal fluid in this study was 100%, much higher than that reported in contemporary infertility populations.

|| Forty-six percent had varicoceles; 50% had a history of chronic prostatitis.

provement in sperm motility that was evident up to 10 weeks after completion of a 10-day course of acupuncture and moxibustion. Forty percent of the patients had varicoceles on physical examination. Forward-progressive motility increased from 21% to 26%, and total motility increased from 42% to 50%. Maximal effect was noted 3 weeks after completion of the acupuncture. The rapidity of improvement led the authors to hypothesize that acupuncture may improve sperm maturation in the epididymis. Young men and nonsmokers responded more favorably to therapy. Acupuncture resulted in significant increases in serum testosterone that correlated with improvements in sperm motility.

Siterman et al (1997) conducted a nonrandomized case-controlled study to assess the effectiveness of acupuncture on the sperm quality of males suffering from abnormal semen parameters. Forty-six percent of the patients had varicoceles, and 50% of the patients had a history of chronic prostatitis. In addition, this patient population had a much higher incidence of bacterial contamination (100%) of seminal fluid than that reported in contemporary infertility populations. Specific individualized combinations of acupuncture points were selected for each patient according to the principles of TCM. Patients were treated twice a week for 5 weeks. No more than 12 points were used per session. Postacupuncture semen analyses were performed only 1 month after completion of therapy. The study reported statistical improvements in sperm viability (baseline 52%, postacupuncture 65%) and total motile spermatozoa counts (baseline 8.5 million, postacupuncture 19.3 million). Evaluation of ultramorphological features after acupuncture that used transmission and scanning electron microscopy demonstrated improvements in the percent of sperm with intact axonema (baseline 32%, postacupuncture 51%). The authors hypothesized that improvements in sperm motility and axonemal integrity after acupuncture may be due to a reduction in lipid peroxidation of spermatozoa.

Minghua (1993) reported a significant improvement in sperm density, motility, and forward progression after 1 course of acupuncture in 39 men. However, his inclusion criteria for low sperm density was much higher (60 million/mL) than current standards (20 million/mL), leading to the majority of his subjects having normal sperm densities prior to therapy. Patients were treated every other day for 90 days with the same combination of acupuncture points for each treatment. Acupuncture points were selected to tonify the kidney to improve spermatogenesis, invigorate the spleen to replenish Qi, soothe the liver to regulate Qi circulation, and remove blood stasis and dampness. He reported a cure rate of 54%, defined as normalization of all semen parameters studied. Sperm motility improved from 37% pretreatment to 61% post-treatment.

Table 4. *Ingredients of the Chinese herbal formula Sheng Jing*

Western Name	Chinese Name
Antler gelatin	Lu jiao jiao
Epimedium	Yin yang huo
Curculigo	Xian mao
Cherokee rosa	Jin ying zi
Schizandra	Wu wei zi
Loranthus	Sang Ji Sheng
Rehmannia	Shu di huang
Lycium	Gou qi zi
Cuscuta	Tu si zi
Dendrobium	Shi hu
Morinda	Ba Ji Tian
Rubus	Fu Pen Zi
Achyranthes	Huai niu xi
Scripus	San leng
Zedoaria	E zhu

Although all studies have suggested a positive effect of acupuncture on male infertility, few studies have been adequately controlled. Most studies did not extend posttherapy evaluation up to or beyond the 90-day period needed for the maturation of spermatogonia to ejaculated spermatozoa. The large variation in acupuncture points targeted for therapy of male infertility is an indication of how the complexity of the disease challenges TCM practitioners as it does Western medicine.

Chinese Herbal Studies

As mentioned above, TCM is a multifaceted medical approach that includes the use of herbal medicinals as well as acupuncture and moxibustion. The following section examines studies that have evaluated the use of TCM herbal formulas or single herbal medicinals in treating male infertility.

Chen and Wen (1996) conducted a nonrandomized study on male infertility of 202 patients using *Sheng Jing*, a Chinese herbal formula. Seventy-seven of the patients were diagnosed under the pattern of Kidney-Yang Vacuity (fatigue, chills, pale, and faint pulse). Thirty-three percent of the patients were characterized as Kidney-Yin deficiency (light-headed, tinnitus, dark red tongue, and strong pulse). The formula consisted of 15 medicinals (Table 4) and was administered twice a day for 60 days. They reported significant improvements in sperm density, motility and grade, levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH), and testosterone (T) and reduction in serum anti-sperm antibody titers. Sperm density increased from $16.2 \times 10^6/\text{mL}$ to $56.1 \times 10^6/\text{mL}$. Sperm density in men with severe oligospermia ($2.1 \times 10^6/\text{mL}$) also experienced significant improvements ($17.9 \times 10^6/\text{mL}$). Sperm motility increased from 34% to 46%. They reported a 78% pregnancy rate in the 148 couples available for follow-up.

Hong et al (1992) evaluated the effects of 18 Chinese medicinal herb extracts on the in vitro motility of spermatozoa. One herb, *Astragalus membranaceus*, stimulated a 1.4-fold increase in washed and unwashed sperm motility. Maximal effect was noted at 10 mg/mL. Partition studies demonstrated that the active ingredient is water soluble. Other authors have advocated the use of Ginseng and Astragalus combination (bu zhong yi qi tang), ginseng and ginger combination (ren shen tang), or Rehmannia Eight formula (ba wei di huang wan) to improve sperm density (Hsu, 1974; Li et al, 1990; Liu, 1990).

Male Erectile Dysfunction Studies

Few studies have been conducted to assess the efficacy of acupuncture for the treatment of erectile dysfunction, and there have been no studies using herbal formulas. Table 5 summarizes the design and results of these studies, all of which were performed on human subjects.

Kho et al (1999) conducted a pilot study of 16 patients suffering from erectile dysfunction. Significant organic disease was excluded by a positive response to intracavernosal injection (papaverine 7.5 mg and phentolamine 0.25 mg). The same 8 acupuncture points were used on all patients, treating twice a week for 4 weeks. Low-frequency electrical stimulation was used for 30 minutes on 4 of the acupuncture points during all the treatments. No effects on adrenocorticotrophic hormone, FSH, LH, and T levels were noted. Improvement in quality of erection occurred in 15% of patients, whereas 31% of the patients reported an increase in sexual activity. In the final interview 1 month after completion of therapy, 39% reported durability of improvement in their sexual activity and quality of erection. However, partner reporting failed to confirm improvements in either quality of erection or frequency of sexual activity.

Yaman et al (1994) evaluated the use of acupuncture in treating nonorganic erectile dysfunction. Organic disease was excluded by a combination of nocturnal penile tumescence monitoring and pharmacological-enhanced duplex ultrasonography. Twenty-nine patients with a mean age of 40 years received a series of 10 treatments over a 4-week period. If no improvement was observed, they received a second course of 10 treatments. Mean follow-up was 8 months. Sixty-nine percent of the patients demonstrated successful results, defined as having 2 or more erections per week that were satisfactory for intercourse.

Jingzhong et al (1989) documented the treatment of 100 cases of erectile dysfunction over 15 years. Comorbidities, etiology, and severity of erectile dysfunction were not reported. Acupuncture and moxibustion were administered to all patients every 2–3 days for a series of 10 treatments. They reported that 73% of patients were able to have sexual intercourse at least once per week.

Table 5. Studies evaluating use of acupuncture to treat male erectile dysfunction

Authors	n	Duration of Treatment	Number of Acupuncture Points	Study Design	Response
Kho 1999	16	4 weeks	8	Pilot study	Subjective improvement in sexual activity and quality of erection in 39% (unconfirmed by partners). No effect on ACTH, FSH, LH, or T.*
Yaman 1994	29	4–8 weeks	7	Nonrandomized prospective	Successful results (≥ 2 erections satisfactory for intercourse per week) in 69%.
Jingzhong 1989	100	20–30 days	7	Retrospective case analysis	73% capable of intercourse ≥ 1 time per week; improvement in erection quality and patient/partner satisfaction not reported.
Zhiming and Chenggu 1988					
Psychogenic	Not reported	Not reported	9	Anecdotal	Not reported
Vascular/iatrogenic	Not reported	Not reported	7	Anecdotal	Not reported
Hormonal/neurogenic	Not reported	24 sessions (typical case)	9	Anecdotal	Typical case recovered capacity for erection and a "normal sexual life."

* ACTH denotes adrenocorticotrophic hormone; FSH, follicle-stimulating hormone; LH, luteinizing hormone; and T, testosterone.

Improvement in quality of erection or patient/partner satisfaction was not evaluated.

Zhiming and Chenggu (1988) described 3 treatment approaches based on either a Kidney Deficiency type (hormonal or neurogenic organic dysfunction), pathogenic downward flow of damp and heat (vascular or iatrogenic organic dysfunction), or a Heart and Spleen Deficiency and Kidney Fright type (psychogenic dysfunction). Acupuncture points for hormonal or neurogenic dysfunction were targeted to tonify the kidney and strengthen the Yang Qi. Acupuncture points for vascular or iatrogenic dysfunction were selected to regulate Kidney Qi and to clear Wetness and Heat from the liver and bladder. Acupuncture points for psychogenic dysfunction were selected to tonify the heart and spleen and invigorate the Yang. In their report, these authors focus on descriptions of their techniques of treating erectile dysfunction and do not elaborate on their results.

Conclusion

To further evaluate the effects and clinical applications of acupuncture in male factor infertility and erectile dysfunction, well-designed prospective randomized studies are needed. A consensus regarding TCM diagnoses, technique of acupuncture, targeted acupuncture sites and utilization of moxibustion, electrostimulation, and herbal formulations would be helpful. Such study designs should not limit the practitioner's ability to individualize and modify therapy on the basis of traditional methods of evaluating patterns of disharmony, however. The effectiveness of acupuncture would best be established with a randomized placebo-point study. However, because the use of placebo acupuncture (needle application distant to accepted acupuncture loci) may be questionable on ethical grounds, a case-controlled crossover design using accepted therapies such as nutritional supplementation with L-carnitine and acetylcarnitine (Prox-eed) may be a useful approach to future investigation in male infertility. The utility of acupuncture as an adjunct or replacement to oral sildenafil also should be investigated. Overall, collaboration between Western medicine and TCM should be fostered, to promote the advancement of knowledge and patient care.

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