



# The use of acupuncture in the treatment of erectile dysfunction

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The efficacy of acupuncture as a mono-therapy was evaluated in a pilot study of 16 patients suffering from erectile dysfunction (ED). In nine patients no organic co-morbidity was encountered. In a period of four weeks, acupuncture treatment was performed twice a week for a total of eight sessions. Each treatment session consisted of puncture of the same eight acupoints, four of which were connected to a Swiss made constant current Doltron ESA 600 stimulator. Low frequency electrical stimulation (5 Hz and 10 mA) was applied to these four acupoints, whereas no stimulation was applied to the other four points. After 30 min, the electrical stimulation was terminated and all needles removed. Blood samples were drawn according to a fixed time schedule, to study the profile of a number of stress hormones, for example, adrenocorticotrophic hormone, antidiuretic hormone and cortisol, the gonadotrophins follicle stimulating hormone and leutinizing hormone, and the sex steroid testosterone and its binding globulin, within the treatment period. Based on a diary of both patient and partner, and an interview one month after the end of treatment, the changes of sexual activity were evaluated over a period of 12 weeks, starting from the four weeks prior to the treatment, the four weeks during the treatment period and the four weeks after the treatment. An improvement of the quality of erection was experienced by 15% of patients, while 31% reported an increase in their sexual activity. No changes in the profiles of hormones were detected. The use of acupuncture as a mono-therapeutic modality in ED, did not influence the profile of the stress and sex hormones, but did improve the quality of erection and restored the sexual activity with an overall effect of 39%. No definite conclusions can be drawn from this pilot study. A controlled and blinded study including more patients will be needed before any definitive conclusion can be reached.

**Keywords:** erectile dysfunction; acupuncture; hormones

## Introduction

Nowadays more patients are seeking help for sexual dysfunction (SDS). This suggests that the incidence of SDS is increasing and/or that sexual issues are more easily discussed.<sup>1</sup> In recent years, several therapeutic modalities for patients suffering from erectile dysfunction (ED) have become available. The treatment for psychogenic ED is sex-therapy. For organic ED, which accounts for more than 50% of cases, the clinical guideline panel of the American Urological Association recommends three alternatives, that is, vacuum constriction devices, injection of vasoactive drugs and/or implantation of a penile prosthesis. The majority of patients discontinue non-surgical treatment because of sexual and relational determinants or dissatisfaction with the method. The long-term

success rates of these therapies are disappointing.<sup>2</sup> Other treatments, including oral drugs, are in the experimental stage.<sup>3</sup> Therefore, an ideal solution for ED has not yet been achieved.

Traditional medicine (TM) as an alternative approach to the modern health care system is increasing in popularity. Each year, fully one third of all US residents seek service from TM for disorders which may not respond to modern medicine.<sup>4</sup> In 1991, the WHO adopted resolution WHA44.34. It urged member states to intensify cooperation between TM and modern health care, especially concerning the effectiveness and safety of approved treatment methods of TM. The aim of this resolution was to reduce the national budget of drugs.<sup>5</sup>

Acupuncture has been practised for many centuries and is one of the most important branches of traditional Chinese medicine (TCM). Modern medicine understands the Yin – Yang balance because in a healthy body as an equilibrium of the autonomic nervous system (ANS) i.e. sympathetic and parasympathetic nervous systems. Based on the homeostatic influence of the ANS, acupuncture may have a

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Received 29 January 1998; accepted in revised form 1 October 1998.

positive influence on the pathophysiology of ED. Several studies indicate a high success rate after TCM treatment, including acupuncture, in patients suffering from psychogenic ED.<sup>6-10</sup> Increasing evidence demonstrates that a number of neuropeptides are involved in the mechanisms of pain relief after acupuncture.<sup>11</sup> Neuropeptides have also been recognized as important substrates in the central control of male sexual behaviour.<sup>12-14</sup> This present study was designed to evaluate the effect of acupuncture as a mono-therapy in patients with ED. The results are discussed against the background of literature data of the well-known therapies of ED. In addition, the profiles of a stress and pituitary and gonadal sex hormones were studied within the treatment sessions.

## Patients and methods

The protocol was approved by the hospital Ethics Committee. Between September 1995 and March 1996, 16 consecutive patients suffering from ED were included in the study.

### Inclusion criteria

To enter the study: written informed consent; age between 18 and 75 y, Diagnostic and Statistic Manual of mental disorders (DSM-III-R) diagnosis of ED,<sup>15</sup> inability to obtain or maintain erection sufficient for penetration including intravaginal orgasm in more than 50% of coitus attempts; complaints not exclusively related to depression, a positive erectile response following administration of 0.5 ml of Androskat<sup>R</sup> (7.5 mg of papaverine and 0.25 mg of phentolamine) intracavernously;<sup>15</sup> a stable sexual relationship that has been sexually functional within this relationship; patient and partner willing and able to have intercourse at least three times a month during the study period. In this study, the definitions are confined to partner-related sexual activity.

### Exclusion criteria

The only exclusion criterium was if the patient did not fulfil the inclusion criteria.

### Study design

At the first visit all patients included in the study underwent an extensive sexual history and medical examination, including Penile Pharmaco Duplex Ultrasonography. After informed consent was obtained from the patient and partner, they were instructed to fill in diaries, with the patient on a daily basis and his partner on weekly basis continuously for a period of 12 weeks, starting from four weeks prior to the treatment. This diary contained questions on the frequency of sexual intercourse and the quality of erection during intercourse according to a four point scale. A month after the end of the study period a final interview was arranged for all patients, in which attention was focused on items as sexual fantasy, libido, sexual arousal, penile erection, orgasm and ejaculation.

### Acupuncture treatment procedure

Following the 'run-in' period of four weeks, acupuncture treatment was performed twice a week over a period of four weeks for a total of eight sessions. Each treatment session consisted of puncture of the same eight acupoints (Guanyuan, Bahui, left and right Sanyinjiao, Taixi and Shenmen). The correct placement of the needle was confirmed by the characteristic but subjective needle sensation 'deqi'. It is described as a sudden feeling of numbness, soreness, distension or heaviness in the deep tissue experienced when the inserted needle has reached a certain depth. Four of the inserted needles at the acupoints Guanyuan, Bahui and left and right Sanyinjiao were connected to a Swiss made constant current Doltron ESA 600 stimulator.

Table 1 Location of acupoints used in the study

Acupoint	Anatomical location
Guanyuan <sup>a</sup> (ren 4)	Three cuns below the umbilicus, in the midline
Bahui <sup>a</sup> (du 20)	Seven cuns above the posterior hairline, midway on a line connecting the apex of both ears.
Sanyinjiao <sup>a,b</sup> (spleen 6)	Three cuns above the tip of the medial malleolus just posterior to tibial border
Taixi <sup>b</sup> (kidney 3)	Midway between the tip of medial malleolus and tendo calcaneus
Shenmen <sup>b</sup> (heart 7)	On the ulnar side of the wrist, on the posterior border of the pisiform bone, in the depression at the radial side of the tendon of musculus flexor carpi ulnaris

cun = the distance between two creases marking the joints of the distal and the middle phalanges of the middle finger.

<sup>a</sup>Indicates the electrical stimulated acupoint.

<sup>b</sup>Indicates the symmetrical location of the points, and at the right and left side of the body resp.

Low frequency electrical stimulation (5 Hz and up to 10 mA) was applied to these four acupoints. No stimulation was applied to the other four points. The anatomical location of the acupoints is depicted in Table 1. After 30 min, the electrical stimulation was terminated and all needles removed.

### Measurement of hormones

Venous blood was collected in pre-chilled K3-EDTA tubes between 2 pm and 4 pm following the schedule presented in Table 2.

Samples were then centrifuged for 10 min at 1500 g (4°C) within one hour. The plasma obtained was aliquoted in polystyrene tubes containing 250 KIU/ml of plasma Trasylol<sup>R</sup> (aprotonine, Bayer), frozen and stored at -20°C until measurement. This was carried out within two months.

Adrenocorticotrophic hormone (ACTH) in plasma was measured by an immunoradiometric assay (IRMA) based on two polyclonal antibodies (Euro-Diagnostics, Arnhem, The Netherlands). The catching antibody is directed against the C-terminal part of the ACTH molecule, and coupled via a sheep anti-rabbit antibody to a polystyrene tube. The detecting antibody is directed against the N-terminal part of ACTH and radioiodinated. Standard curves were prepared by spiking ACTH-free plasma with ACTH (1-39) (MRC 74/555). The assay was performed as follows. Two hundred microliters of sample standard (0-220 pmol/l) was added to the coated tubes and subsequently iodinated ACTH antiserum (250 dpm/200 µl) was added. The mixture

was incubated for 24 h at room temperature. The supernatant was decanted and the tubes washed two times with 0.9% NaCl. Radioactivity in the tubes was counted using an automatic gamma-counter (1470 Wizard<sup>TM</sup> Wallac). The sensitivity of the assay was 0.5 pmol/l, and the within- and between-assay coefficients of variation of the IRMA procedure were 4.4% and 7.2% respectively. All sample measurements were duplicated. The IRMA specifically detects ACTH (1-39). Crossreactivity with ACTH (1-24), CLIP and beta-endorphin was <0.1%.

Table 3 shows the characteristics of the assay methods for the anti-diuretic hormone (ADH), cortisol, follicle stimulating hormone (FSH), luteinizing hormone (LH), prolactin (PRL), sex-hormone binding globulin (SHBG) and testosterone.

### Data evaluation

Variables measured at admission or before the first treatment were used as control. Data are presented as mean ± s.e.m. and analyzed by repeated measurement analysis of variance (SPSS, Statistical analysis package, version 6.1.3, SPSS Benelux Bv Gorinchem, The Netherlands). *P* < 0.05 was the threshold of significance.

## Results

Sixteen patients entered the study. For three of them the study could not be finished. After the first treatment session, two patients decided not to continue the therapy and one patient could not fill the diary due to the absence of a partner shortly after he entered the study. The data of these patients were excluded. Table 4 shows the clinical data of the 13 patients completing the study. In four patients, an organic factor contributing to the ED was present, the remaining nine patients were classified as psychogenic ED.

After treatment was completed, two patients had a better erection (15%) and four patients had an

**Table 2** Time schedule for drawing blood samples

Code	Time	Description
T1	30 min	Before the first acupuncture treatment
T2	30 min	Before the third acupuncture treatment
T3	30 min	Before the fifth acupuncture treatment
T4	30 min	Before the seventh acupuncture treatment
T5	30 min	After the last (eight) acupuncture treatment

**Table 3** The assay methods for determinants of hormones, their intra- and interassay coefficients of variation (%), sensitivity (sens), the reference values (ref) in the non-stressed state, units and literature (lit)

Variable	Method	Intra	Inter	Sens	Ref	Unit	Lit
ACTH	IRMA	3.6	8.3	0.8	1.3-9.2	pmol.l <sup>-1</sup>	text
ADH	RIA	< 8.0	< 8.0	0.8	1.2-3.7	pmol.l <sup>-1</sup>	16
Cortisol	RIA	5.0	5.8	0.005	0.19-0.55 (8 am) 0.06-0.38 (5 pm)	µmol.l <sup>-1</sup> µmol.l <sup>-1</sup>	17 17
FSH	IRMA	3.6	8.2	0.6	2.0-7.5	IU.l <sup>-1</sup>	18
LH	IRMA	5.5	7.6	0.5	1.8-9.5	IU.l <sup>-1</sup>	18
Prolactine	IRMA	3.6	5.7	20	100-700	mIU.l <sup>-1</sup>	18
SHBG	IRMA	2.9	4.6	0.5	30-90	nmol.l <sup>-1</sup>	16
Testosterone	RIA	5.6	5.8	0.04	11-45	nmol.l <sup>-1</sup>	16

increase in sexual activity (31%). The final interview also revealed that five patients, two months after the first treatment, still experienced improvement of their sex life in terms of activity and global quality of erection (39%). The overall improvement rate was 54% (7 out of 13 patients). None of the partners, however, reported any difference. Table 5 shows the results of the measurement of plasma levels of the pituitary hormones ACTH, ADH, FSH, LH and PRL and the steroid hormones cortisol and testosterone as well as SHBG.

No significant changes in the levels of these hormones during and after the treatment sessions were detected.

## Discussion

### Clinic

The present pilot study was conducted to determine the effect of acupuncture as a mono-therapy in patients suffering from ED. The results show that it has an effect in 54% of patients. It is remarkable that none of the partners reported any improvement of

erection or activity. Presumably, partners were less focused on performance related sexual domains such as erection and activity. Moreover, they may not have been involved sufficiently in the study. Though limited to a small number of patients, our study was unable to confirm the reported high success rate of acupuncture treatment in ED of at least 70% in other studies.<sup>6-9</sup> A number of factors are thought to have affected the results. Firstly, the choice of acupoints used in our study was identical in each treatment session and for all patients, rather than an individual approach as reported by others. After all, TCM considers a patient in his totality with a wide aetiological spectrum, and takes into account that illness, health and disease are brought about by imbalance in human beings. According to TCM, ED is caused by a strengthened inhibition to erection in the cerebral cortex or a functional disorder of the spinal cord. The disease is related to such organs as the kidney, heart, spleen and liver. The majority of ED may result from insufficiency of kidney energy Qi (functional activities of the kidney) and of roaring fire at the vital portal caused by emission, spermatorrhea, excessive worries or from injured kidney Qi due to sudden panic weakness of the genitalia but the downward flow of damp and heat.<sup>19</sup> TCM treats the body, mind and social relationship, and determines

**Table 4** Outcome of 13 included patients: diary, interview and partner's diary

Pt	Age	Aetiology	Patient		Interview Patient	Interview partner	
			Erection	Activity		Erection	Activity
1	43	psychogenic	un	Increased	un	un	un
2	46	DM type 1	un	un	un	un	un
3	47	psychogenic	un	un	Improved	un	un
4	47	psychogenic	un	un	Improved	un	un
5	48	psychogenic	un	un	un	un	un
6	53	psychogenic	un	un	un	un	un
7	53	psychogenic	Improved	Increased	un	un	un
8	53	Med	un	Increased	Improved	un	un
9	54	psychogenic	un	un	un	un	un
10	59	HT, <sup>a</sup> Med <sup>b</sup>	un	un	un	un	un
11	61	psychogenic	Improved	Increased	Improved	un	un
12	62	psychogenic	un	un	Improved	un	un
13	65	Art, <sup>c</sup> HT, Med	un	un	un	un	un

<sup>a</sup>Hypertension.

<sup>b</sup>Medication with impact on erectile function.

<sup>c</sup>Arteriogenic factor as demonstrated by duplexscanning.

un = unchanged.

**Table 5** Mean (s.e.m.) values of plasma peptide hormone levels at different time schedules

Hormones	Unit	T1	T2	T3	T4	T5
ACTH	pmol.l <sup>-1</sup>	4.49 (0.75)	3.16 (0.35)	4.23 (0.55)	4.35 (0.61)	4.83 (0.66)
ADH	pmol.l <sup>-1</sup>	1.27 (0.16)	1.41 (0.25)	1.53 (0.15)	1.54 (0.16)	1.83 (0.20)
Cortisol	µmol.l <sup>-1</sup>	0.33 (0.02)	0.25 (0.02)	0.26 (0.03)	0.27 (0.02)	0.30 (0.03)
FSH	IU.l <sup>-1</sup>	4.55 (0.45)	4.56 (0.43)	4.68 (0.46)	4.51 (0.53)	5.07 (0.60)
LH	IU.l <sup>-1</sup>	3.40 (0.28)	3.18 (0.44)	3.33 (0.40)	3.01 (0.26)	3.32 (0.53)
Prolactine	mIU.l <sup>-1</sup>	156 (15)	158 (15)	154 (16)	182 (16)	167 (17)
SHBG	nmol.l <sup>-1</sup>	30.8 (3.1)	31.8 (3.6)	32.8 (3.9)	31.4 (3.3)	33.7 (3.8)
Testosterone	nmol.l <sup>-1</sup>	13.1 (1.4)	12.8 (1.6)	11.7 (1.0)	14.1 (1.8)	12.3 (1.6)

the choice of acupoints accordingly in every treatment session.

Secondly, the present study evaluated the effect of acupuncture performed as a mono-therapeutic modality in ED patients. The high response by others was in fact a result of the TCM approach in which acupuncture was only a part of the treatment procedures.

Thirdly, not all of the patients included in this study suffered from psychogenic ED, whereas only psychogenic ED has been included in other studies. Four of them had ED due to organic disease; if they are not taken into account, the overall effect of 63% (5 out of 8) approached the success of other studies. It is noteworthy that one patient labelled to have a contributing organic factor reported increased sexual activity and improvement of sexual quality following treatment.

Fourthly, cultural background of the patient populations. As acupuncture has been practised for many centuries in China, the method has been accepted as a treatment modality for different complaints and disorders. This might have influenced the higher response reported in the Chinese studies on the one hand, and the moderate response in this study.

### *Stress and sex hormones*

It is widely accepted that a number of peripheral hormones are also found in the central nervous system and act there in the regulation of behavioural processes,<sup>14,20,21</sup> including sexual behaviour. The pituitary neuropeptide oxytocin for instance, is thought to be important in a variety of positive social behaviours, while vasopressin is associated with enhanced arousal, attention and retrieval of information.<sup>22,23</sup> In addition, a significant increase in the level of circulating, and thus pituitary-derived, oxytocin has been reported to correlate with multiorgasmic women.<sup>14</sup> In this study we measured the activity of the pituitary-adrenal axis (ACTH, ADH and cortisol levels) and that of the pituitary-gonadal axis (LH, FSH and testosterone levels) to evaluate whether there is any correlation between these peripheral stress and sex hormones with the changes in the patients' sexual behaviour during the treatment course. The results show that although the use of acupuncture was associated with a moderate improvement of 54% clinically, no correlation existed between the clinical sexual performance and the profiles of the peripheral hormones during the treatment period. It should be realised, however, that an action of neurohormones on the central control of sexual behaviour is not necessarily reflected in changes in the levels of the corresponding circulating pituitary and gonadal sex hormones. Moreover, the release of pain modulating

substances by acupuncture could inhibit the release of sex behaviour affecting hormones.<sup>12</sup>

## Conclusion

This pilot study demonstrated a modulating positive effect of acupuncture as a monotherapy on psychogenic and non-psychogenic ED, whereas no accompanying changes in circulating sex and stress hormones are observed. A large control study is needed before any definite conclusion can be made.

## Acknowledgements

The study was made possible by a grant from the Royal Dutch Academy of Sciences in view of a bilateral exchange between Chinese and Dutch scientists, and was supported by Schwa-Medico of The Netherlands and Foundation for the scientific study of Chinese medicine (SAPOC) of Nijmegen, The Netherlands. We thank GJ Pesman for hormone measurement, Caris CTM and WPJ Witjes for critical comments and EN Robertson FRCA for correcting the manuscript.

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