

## Review Article

# Improvement in Mechanical Energy of Sperm with Acupuncture

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**Abstract**

Over the past few years, computer-assisted sperm analysis (CASA) has allowed determination of a male's potential for natural conception based on indices of the mechanical energy of sperm. The sperm energy index (SEI) and mean sperm energy index (MEI) are indices of sperm energy. The SEI indicates the mechanical energy of all sperm in a given field while the MEI indicates the average energy of a single sperm. An M/S ratio (MEI/SEI) < 2 is an essential prerequisite for natural conception. When the M/S ratio < 2, then a larger SEI indicates a greater potential for natural conception.

Recently, pain free acupuncture therapy using needles with guide tube with only slight tapping at acupoints uniquely selected was reported to improve menstrual cramps. This therapy was executed for 18 patients with oligospermia/asthenospermia.

Among patients who had an M/S ratio of 2 or greater, 71.43% had an improved M/S ratio after acupuncture. Fifty percent had an improved M/S ratio of less than 2. For patients overall, the response rate in terms of the concentration of sperm, the percent motility, the concentration of motile sperm, and the SEI was 55.56%, 72.22%, 77.78%, and 66.67% respectively. For patients overall, the increasing rate in the concentration of sperm, the percent motility, the concentration of motile sperm, and the SEI was 1.81, 3.39, 4.37, and 4.51 respectively. Statistically significant differences in the concentration of sperm, percent motility, and concentration of motile sperm were noted before and after acupuncture.

For patients with oligospermia/asthenospermia who wish to conceive naturally, acupuncture is a promising therapy that may increase the mechanical energy of sperm.

**Keywords:** Asthenospermia; Oligospermia; CASA; Acupuncture; Sperm Energy

**Introduction**

Oligospermia and asthenospermia are causes of male infertility. According to the World Health Organization's criteria on sperm, a concentration of sperm below  $40 \times 10^6/\text{ml}$  is classified as oligospermia and a percent motility below 50% is classified as asthenospermia. In routine practice, sperm are often counted with the naked eye using a Makler counting chamber. Recently, the law of sperm motion [1] and the law of sperm curvature [2] have been published, and a study using computer-assisted sperm analysis (CASA), has allowed determination of the potential to conceive naturally based on indices of the mechanical energy of the sperm [3]. The sperm energy index (SEI) and mean sperm energy index (MEI) are indices of sperm energy. The SEI indicates the mechanical energy of all sperm in a given field while the MEI indicates the average mechanical energy of a sperm. An M/S ratio (MEI/SEI) < 2 is an essential prerequisite for natural conception. When the M/S ratio < 2, then a larger SEI indicates a greater potential for natural conception. Couples including a male partner with oligospermia or asthenospermia who wish to conceive often undergo artificial insemination or in vitro fertilization, but a number of couples wish to conceive naturally. Men in such couples

may be given Chinese herbal medicines and Acupuncture. Taking Hochu-ekki-to (*Bu-zhong-yi-qi-tang* in Chinese) [4,5], Hachimi-jio-gan (*Ba-wei-di-huang-wan* in Chinese) [6], Goshajinkigan (*Niu-che-shen-qi-wan* in Chinese) [7,8], or Ninjin-yoei-to (*Ren-shen-yang-rong-tang* in Chinese) [9] for 3–5 months is reported to improve the concentration of sperm 15–67%, and improve the percent motility 21–63%. A significant effect of acupuncture on the percentage of total motile sperm in male patients with severe oligoasthenozoospermia has been reported [10]. Acupuncture treatment has been reported to elevate pregnancy rate of the patients who undergo assisted reproduction [11]. It has been reported by author recently that pain free acupuncture therapy using needles with guide tube with only slight tapping at acupoints uniquely selected ameliorated menstrual cramps [12]. It is hypothesized that author's therapy for patients with oligospermia and/or asthenospermia in accordance with acupoints for menstrual cramps may increase mechanical energy of sperm and improve semen quality.

**Subjects and Methods**

Potential subjects were patients seen by this Center from May 2011 to January 2014 who had their sperm analyzed using CASA.

Subjects were 18 patients who underwent acupuncture to improve the quality of their semen. Acupuncture was done using disposable needles (2-gauge, dia. 0.18 × length 40 mm, Seirin Corporation) with a guide tube. Pre-determined acupuncture points (acupoints) are shown in Table 1. Needles were inserted only slightly and tapped into place at acupoints in accordance with Table 1. Needles were left in place for 15 min. in all patients. In principle, 6 acupuncture sessions were performed, with 1 session taking place each week. One month after the 6 acupuncture sessions concluded, patients had their semen analyzed again using CASA. The concentration of sperm, percent motility, and concentration of motile sperm, SEI, and M/S ratio were compared. Sperm were analyzed using a Makler counting chamber. Sperm were continuously analyzed in 5 fields (the 4 corners and center) to avoid human error. The reason for the 1-month interval between the conclusion of the acupuncture sessions and the second semen analysis was because acupuncture was assumed to take some time to have an effect on sperm production. The concentration of sperm, percent motility, concentration of motile sperm, and SEI prior to treatment and following treatment were compared using a t-test with a significance level of .05. The reason for using 6 sessions of acupuncture treatment was because previous studies had noted that conditions with symptoms such as headaches, dizziness, neck/shoulder stiffness, lower back pain improved as a result of an average of 6 acupuncture sessions [13]. Subjects of the current study were provided informed consent for use of their semen data in this study. Patient data were carefully retained at this Center without

**Table 1:** Pre-determined acupuncture points (acupoints). Needles were inserted only slightly and tapped into place at acupoints pre-determined.

Meridian	Selected Acupoints
SP(Spleen)	Sanyinjiao, SP6
	Diji, SP8
	Yinlingquan, SP9
	Xuehai, SP10
CV(Conception Vessel)	Guanyuan, CV4
	Qihai, CV6
	Zhongwan, CV12
ST(Stomach)	Tianshu, ST25
	Daju, ST27
	Zusanli, ST36
BL(Bladder)	Shenshu, BL23
	Ciliao, BL32
	Zhishi, BL52
LR(Liver)	Xingjian, LR2
	Zhongdu, LR6
KI(Kidney)	Taixi, KI3
	Fuliu, KI7
GV(Gover Vessel)	Yaoyangguan, GV3
	Baihui, GV20
PC(Pericardium)	Neiguan, PC6
LI(Large Intestine )	Hegu, LI4
GB(Gallbladder)	Guangming, GB37

information that could identify individuals in order to protect private information.

## Results

Changes in the M/S ratio, concentration of sperm, percent motility, and concentration of motile sperm, and SEI before and after acupuncture are shown in Table 2. The response rate and degree of improvement in the concentration of sperm, percent motility, and concentration of motile sperm, and SEI before and after acupuncture are shown in Table 3. When the M/S ratio is 2 or greater, a patient is deemed to have difficulty conceiving naturally. Accordingly, patients with an M/S ratio of 2 or greater prior to treatment were deemed to have a poor likelihood of conceiving naturally (the “Poor group”) while patients with an M/S ratio of less than 2 were deemed to have a normal likelihood of conceiving naturally (the “Normal group”).

Patients were deemed to have responded to therapy if improvement was noted after acupuncture. For the Poor group, the response rate in terms of the concentration of sperm, the percent motility, the concentration of motile sperm, and the SEI was 50% (7/14), 71.43% (10/14), 71.43% (10/14), and 71.43% (10/14) respectively. For patients overall, the response rate in terms of the concentration of sperm, the percent motility, the concentration of motile sperm, and the SEI was 55.56% (10/18), 72.22% (13/18), 77.78% (14/18), and 66.67% (12/18) respectively.

The increasing rate before/after acupuncture treatment was used to signify degree of improvement. For the Poor group, the increasing rate in the concentration of sperm, the percent motility, the concentration of motile sperm, and the SEI was 1.67, 3.94, 4.58, and 5.09 respectively. For the Normal group, the increasing rate in the concentration of sperm, the percent motility, the concentration of motile sperm, and the SEI was 2.3, 1.48, 3.61, and 2.48 respectively. For patients overall, the increasing rate in the concentration of sperm, the percent motility, the concentration of motile sperm, and the SEI was 1.81, 3.39, 4.37, and 4.51.

The concentration of sperm, percent motility, concentration of motile sperm, and SEI of patients overall before and after acupuncture were subjected to a paired t-test. Test results indicated a p value of 0.0063 for the concentration of sperm, a p value of 0.010 for the percent motility, a p value of 0.014 for the concentration of motile sperm, and a p value of 0.12 for the SEI. Statistically significant differences in the concentration of sperm, percent motility, and concentration of motile sperm were noted before and after acupuncture.

## Discussion

As shown in Table 2, 71.43% (10/14) of patients in the Poor group (patients with an M/S ratio of 2 or greater) had an improved M/S ratio after acupuncture. Fifty percent (7/14) had an improved M/S ratio of less than 2. As shown in Table 3, the increasing rate in SEI was 5.09 for the Poor group and 4.51 for patients overall. The increasing rate in SEI for patients who had an improved M/S ratio of less than 2 was 7.58. These findings indicate that 50% of the sperm who were unlikely to conceive naturally became able to conceive naturally as a result of acupuncture. The mechanical energy of sperm was found to increase about 5-fold (about 8-fold in patients with an improved M/S ratio of less than 2) as a result of acupuncture. As shown in Table 2, all

**Table 2:** Changes in sperm parameters before and after acupuncture. When the M/S ratio is 2 or greater prior, a patient is deemed to have difficulty conceiving naturally. Accordingly, patients with an M/S ratio of 2 or greater prior to treatment were deemed to have a poor likelihood of conceiving naturally (the "Poor group") while patients with an M/S ratio of less than 2 were deemed to have a normal likelihood of conceiving naturally (the "Normal group"). 71.43%(10/14) of patients in the Poor group had an improved M/S ratio after acupuncture. Fifty percent (7/14) had an improved M/S ratio of less than 2. These findings indicate that 50% of the sperm who were unlikely to conceive naturally became able to conceive naturally as a result of acupuncture. All of the patients with an M/S ratio of 2 or greater had a concentration of motile sperm below  $20 \times 10^6/\text{ml}$ .

	Patient No	Age	Before Acupuncture					After Acupuncture				
			M/S ratio	Concentration ( $\times 10^6/\text{ml}$ )	Motility (%)	Motile sperm con ( $\times 10^6/\text{ml}$ )	SEI	M/S ratio	Concentration ( $\times 10^6/\text{ml}$ )	Motility (%)	Motile sperm con ( $\times 10^6/\text{ml}$ )	SEI
Poor Group	1	31	2.35	50	32	16	0.76	0.7	75.7	69.8	52.84	1.08
	2	36	3.45	33.46	13	4.35	0.078	1.95	53	39	20.67	0.13
	3	39	71.4	50	1.56	0.78	0.041	1.9	38.9	54.26	21.11	1.53
	4	33	2.07	44.66	43.88	19.6	1.07	1.27	72.92	47.5	34.64	0.22
	5	35	11.91	15.56	20.92	3.26	0.402	1.82	104	29.66	30.85	0.24
	6	30	5.68	35.29	18.08	6.38	0.32	1.06	69.6	50.98	35.48	0.65
	7	33	2.54	70.38	20.63	14.52	0.057	0.59	158.01	41.37	65.37	0.56
	8	43	7.35	31.12	17.36	5.4	0.16	3.62	29.88	34.42	10.28	0.47
	9	38	18.52	26	10.86	2.82	0.046	6.94	25.8	25.4	6.55	0.47
	10	33	9.62	18.16	21.51	3.91	0.055	9.26	16.7	23.05	3.85	0.076
	11	34	3.31	41.21	29.07	11.98	0.49	6.33	39.58	17.43	6.9	0.14
	12	36	2.62	61.07	24.41	14.91	0.073	4.43	81.84	11.85	9.7	0.1
	13	32	2.43	21.5	69.8	15.01	0.93	8.33	11.6	39.1	4.54	0.4
	14	35	2.94	34.4	35.54	12.23	0.23	3.01	44.14	27.73	12.24	0.36
Normal Group	15	33	1.71	68.23	32.54	22.2	0.5	1.4	64.13	42.23	27.08	0.197
	16	36	0.7	148	40.38	59.76	0.24	0.19	270.38	82.35	222.66	1.15
	17	33	1.76	40	53.5	21.4	0.22	0.22	205.47	85.17	174.99	0.92
	18	37	1.74	61.33	35.14	21.55	0.42	1.33	80.27	35.12	28.19	0.24

**Table 3:** The response rate and the increasing rate in sperm parameters before and after acupuncture. The increasing rate before/after acupuncture treatment was used to signify degree of improvement. The increasing rate in SEI was 5.09 for the Poor group and 4.51 for patients overall. The increasing rate in SEI for patients who had an improved M/S ratio of less than 2 was 7.58. Based on the increasing rate in patients overall, the concentration of sperm increased about 1.8-fold, the percent motility increased about 3.4-fold, and the concentration of motile sperm increased about 4.4-fold as a result of acupuncture; all of these increases were statistically significant.

		Concentration ( $\times 10^6/\text{ml}$ )	Motility (%)	Motile sperm con ( $\times 10^6/\text{ml}$ )	SEI
Response Rate	Total	55.56% (10/18)	72.22% (13/18)	77.78% (14/18)	77.78% (14/18)
	Poor Group	50% (7/14)	71.43% (10/14)	71.43% (10/14)	71.43% (10/14)
	Normal Group	75% (3/4)	75% (3/4)	100% (4/4)	50% (2/4)
Increasing Rate	Total	1.81	3.39	4.37	4.51
	Poor Group	1.67	3.94	4.58	5.09
	Normal Group	2.31	1.48	3.61	2.48

of the patients with an M/S ratio of 2 or greater had a concentration of motile sperm below  $20 \times 10^6/\text{ml}$ . This finding indicates that a concentration of motile sperm  $> 20 \times 10^6/\text{ml}$  is an essential prerequisite for natural conception. As shown in Table 3, the response rate for patients overall in terms of the concentration of sperm, the percent motility, and the concentration of motile sperm was about 56%, about 72%, and about 78%. Acupuncture was found to be as or more effective than Chinese herbal medicine. Chinese herbal medicine has

to be taken for at least 3 months for semen quality to improve, while acupuncture was administered in the current study in 6 sessions once a week. Accordingly, the effects of acupuncture were apparent sooner than those of Chinese herbal medicine. Based on the increasing rate in patients overall, the concentration of sperm increased about 1.8-fold, the percent motility increased about 3.4-fold, and the concentration of motile sperm increased about 4.4-fold as a result of acupuncture; all of these increases were statistically significant. The quality of semen from even the same patient differs on different dates and at different times, so results of the current study include an element of chance. Nonetheless, this study revealed that acupuncture is likely to increase the concentration of sperm, percent motility, and mechanical energy of sperm.

According to the medicine of acupuncture, meridians pass throughout the body. The twelve regular meridians are said to run just below the skin along the surface of the body, linking the bowels and viscera. *Qi* is thought to flow along these meridians and accumulate at certain points. Inserting a needle at these points, known as acupoints, is believed to improve the flow of *qi* and thus help restore the functioning of the bowels and viscera. Meridians are large channels that branch out into collaterals. These collaterals run from acupoints. Due to differences in collaterals, inserting needles at certain acupoints can result in differing action even if those points lie along the same meridian. Acupoints used to treat menstrual irregularity in women were assumed to improve semen quality in men. The pattern of needle placement used in the current study included several sets of

acupoints. One set is Sanyinjiao (SP 6), Qihai (CV 6), Guanyuan (CV 4), Tianshu (ST 25), Diji (SP 8), Zhongdu (LR 6), Taixi (KI 3), Xingjian (LR 2), Xuehai (SP 10), Ciliao (BL 32), Zhishi (BL 52), Shenshu (BL 23), and Yaoyangguan (GV 3), all of which are acupoints that have long been thought to alleviate menstrual irregularity. With the exception of Ciliao (BL 32), Zhishi (BL 52), Shenshu (BL 23), and Yaoyangguan (GV 3), all of these acupoints can be manipulated while the patient is in a supine position. A second set of acupoints is Baihui (GV 20) and Zusanli (ST 36), which are acupoints that are believed to regulate the entire body. A third set of acupoints is Neiguan (PC 6), Daju (ST 27), Zhongwan (CV 12), Hegu (LI 4), and Yinlingquan (SP 9), which are commonly used acupoints that are also manipulated while the patient is supine. A final set of acupoints is Guangming (GB 37) and Fuliu (KI 7), which are acupoints that have long been thought to alleviate erectile dysfunction. According to Chinese philosophy, *yangqi* [positive vital energy] is increased at Baihui (GV 20) and Qihai (CV 6), innate vital energy is augmented at Guanyuan (CV 4), *shenjing* [kidney essence, or innate essence that is responsible for the body's activity and that is stored in the kidneys] is augmented at Taixi (KI 3), and *zhengqi* [lit. proper *qi*, the body's ability to resist disease as opposed to *xieqi*, or aberrant *qi* that causes disease] is augmented by improving the functioning of the spleen (a key organ involved in digestion according to traditional Chinese medicine) at Zusanli (ST 36), Sanyinjiao (SP 6), Yinlingquan (SP 9), and Zhongwan (CV 12). According to Chinese philosophy, bodily fluids are regulated at Diji (SP 8), Yinlingquan (SP 9), and Daju (ST 27) while the flow of *qi* is improved at Hegu (LI 4), Tianshu (ST 25), and Neiguan (PC 6). Similarly, stagnation and sluggishness of hepatic *qi* is alleviated at Zhongdu (LR 6) while the mind is made more tranquil at Xingjian (LR 2). Inserting needles at the aforementioned acupoints may cause the described actions via meridians and thus improve semen quality in patients with oligospermia/asthenospermia.

Acupuncture by means of slight insertion of needles in a pattern carries no risk of causing complications such as pneumothorax and can be performed by a practitioner easily in a short amount of time as part of outpatient care. This form of treatment is practical, pain-free, and readily accepted by patients. This treatment does not require acquisition of theories of traditional Chinese medicine and it does not require complicated needle insertion techniques, so it can easily be performed by practitioners outside of countries using Chinese characters.

## Conclusion

For patients with oligospermia/asthenospermia who wish to conceive naturally, acupuncture is a promising therapy that may increase the mechanical energy of sperm.

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