

## Short Communication

# Does Relaxation Massage Increase Total Motile Sperm Count for Intrauterine Insemination?

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## Abstract

**Objective:** To determine if head and shoulder relaxation massage given immediately before collecting a semen sample will result in an increased total motile sperm count or improved semen parameters for intrauterine insemination (IUI).

**Design:** Prospective randomized study

**Setting:** Academic fertility center

**Patients:** Forty men undergoing clomiphene IUI therapy with their partners

**Interventions:** Massage consisted of a typical 30 minute session of a standard Swedish neck and shoulder massage offered by a licensed massage therapist. The massage was performed immediately before semen sample collection for IUI.

**Main Outcome Measured:** The primary outcome variable is total motile sperm count which is determined based on secondary outcome variables which include semen volume, concentration, and motility.

**Results:** Overall, 11 men (27.5%) had a low total sperm concentration, and 29 men (72.5%) had a normal sperm concentration. In both massage and non-massage randomization groups, self-measured stress levels were significantly higher in men who had a low initial semen concentration compared to those who had a normal concentration (5.0 vs. 3.4 respectively;  $p=0.0385$ ). However, there was no significant measurable improvement in any semen parameter for men in the relaxation massage group compared to controls. Furthermore, there was no significant improvement in semen characteristics in either group compared to their initial baseline semen analysis.

**Conclusions:** Stress has a detrimental effect on male fertility, and we confirmed that self-perceived stress and semen concentrations have an inverse relationship: higher stress is associated with lower counts. Even though relaxation massage was a welcome intervention for our subjects, relaxation neck and shoulder massage performed before semen collection had no measurable impact on semen parameters.

## INTRODUCTION

## Capsule

Despite the correlation between stress and male infertility, relaxation neck and shoulder massage performed before semen collection had no measurable impact on semen parameters.

Stress is one of the most common psychological complaints, and the numerous and far-reaching physiologic effects of stress on general health and well-being have been publicized. Stress has been found to affect many body systems including endocrine, gastrointestinal, immune, cardiovascular, and psychiatric systems [1]. Stress is also believed to have detrimental effects on fertility. Emotional stress has been demonstrated to negatively impact erection, ejaculation, semen volume, and overall fertility [2]. Stress has also been found to reduce semen volume, total number of sperm, and normal sperm without nuclear or morphologic changes [3-7]. The classic stress response involves

the autonomic nervous system and the adrenal hormones. The release of these stress hormones is hypothesized to affect the reproductive system by decreasing gonadal steroids, including testosterone, and thus interfering with spermatogenesis [8,9].

Although a great deal of research in reproduction has revealed that problems in male and female fertility may be due to harmful environmental influences, pollutants, and stress, little data is available on the effects of specific stress-reducing methods. Massage is the application of soft-tissue manipulation techniques to the body, generally intended to reduce stress and fatigue while improving circulation [10]. Swedish massage is the most commonly used massage method in the United States, and it uses a system of long, gliding strokes, kneading, and percussion and tapping techniques on the more superficial layers of muscles [11]. This technique results in generalized relaxation, as well as decreased salivary cortisol, a stress response hormone [12]. Massage therapy has proven beneficial for many conditions

including anxiety, painful muscle conditions, sleep disorders, pain, osteoarthritis, epilepsy, hypertension, postural instability, infertility, and diabetes [11,13].

The intrauterine insemination procedure consists of processing an ejaculated semen specimen to remove prostaglandins, concentrating sperm in a small volume of culture media, and injecting the sperm suspension directly into the uterine cavity using a small catheter placed through the cervix. This allows a higher concentration of motile sperm to bypass the cervix and shortens the distance to the fallopian tubes for fertilization. The pregnancy rates for IUI with clomiphene citrate for couples with relatively unexplained infertility have been found to be 7.6% (for women 21-39 years old with up to 3 cycles of IUI with clomiphene) [14].

In this prospective, randomized study, we hypothesized that neck and shoulder massage performed within 15 minutes of semen sample collection would increase the semen volume, and therefore increase the total motile sperm available for insemination as a result of decreased acute stress.

## MATERIALS AND METHODS

Forty couples initiating clomiphene IUI therapy for relatively unexplained infertility were recruited for the study. Once IRB approval was obtained and informed consent was signed, the forty male partners were randomized to either of the two arms of the study - massage or no massage. A baseline semen analysis was obtained within 3 months of enrolling in the study. In our program, subjects are eligible for IUI if we expect to recover at least 1 million total motile sperm available after preparation for IUI. Prior to the massage and the semen collection, both groups of men rated their subjected stress level on a 1-10 scale. Twenty men assigned to massage therapy underwent a 30 minute head and shoulder massage immediately before collecting a semen sample for IUI. Twenty men assigned to the control group collected the semen sample for IUI without receiving a massage.

Massage consisted of a typical 30 minute session of a standard Swedish massage offered by a licensed massage therapist, and involved a neck and shoulder massage. The massage was performed within 15 minutes before semen sample collection for IUI.

Semen samples were collected in collection rooms by masturbation and analyzed by the Andrology Laboratory staff at Carolinas Medical Center as is standard practice for all IUI patients. The total motile count was compared for massage and no massage. The main outcome, total motile sperm count, was analyzed by paired t-tests, or signed rank tests for non-normally distributed data. Additionally, in order to fit a random effects model, proc mixed was used. A standard of statistical significance (alpha) of 0.05 was used in all cases. The SAS System (SAS Institute, Cary, NC) was used for all analyses.

Treatment of the female partner with clomiphene, monitoring, and IUI procedure was performed as per the routine protocol and was the same for both study groups.

## RESULTS

Baseline sperm parameters found that out of the 40 male study participants, 11 men(27.5%) had a low sperm concentration

(less than  $30 \times 10^6$  sperm/mL), and 29 men (72.5%) had a normal sperm concentration [greater than  $30 \times 10^6$  sperm/mL] (Table 1). In both groups, self-measured stress levels were significantly higher in men who had a low initial semen concentration compared to those who had a normal concentration (5.0 vs. 3.4 respectively;  $p=0.0385$ ) (Table 2).

Baseline measurements of semen parameters showed no significant differences in these parameters between the two randomization groups (Table 3).

There was no significant improvement in any semen parameter for men in the relaxation massage group compared to controls - including total motile sperm count, semen volume, concentration, or motility (Table 4,5). Furthermore, there was no improvement in semen characteristics in either group compared to their initial "baseline" semen analysis. Although no significant differences in semen parameters were demonstrated between the massage and non-massage groups, of the ten parameters measures, 7 were increased in the massage group after intervention whereas only 4 were increased from baseline in the non-massage group (Table 4,5).

## DISCUSSION

To our knowledge, this is the first study that addresses the impact of massage on male factor infertility and semen parameters. Despite the well-documented negative impacts of stress on semen parameters [2-7], we were surprised to find that relaxation neck and shoulder massage performed before semen collection had no significant impact on any measured semen parameters. We hypothesized that because stress increases stress hormones, including cortisol, and because massage has been found to decrease stress as well as salivary cortisol levels, massage would at least increase the semen volume, and therefore increase the total motile sperm available for insemination as a result of decreased acute stress. However, there was no significant difference between the semen parameters of the men in the massage group compared to the non-massage group.

We did confirm that self-perceived stress and semen concentrations have an inverse relationship: higher stress is associated with lower sperm counts. However this finding could be the reverse: lower sperm counts could be associated with increased stress. In our clinic, many couples with infertility have

**Table 1: Baseline Total Motile Sperm Count.**

Total Motile Sperm Count (sperm/mL)*	Number of Participants	Frequency
<30 x10 <sup>6</sup>	11	27.50%
≥30 x10 <sup>6</sup>	29	72.50%

\*baseline pre-wash sperm concentration or density

**Table 2: Sperm Characteristics Sub-Stratified by Baseline Pre-Wash Density.**

	Baseline Pre-Wash Density < 30x10 <sup>6</sup> /ml	Baseline Pre-Wash Density ≥ 30x10 <sup>6</sup> /ml	P-Value
	(n=11)	(n=29)	
Stress (Scale 1-10)	5	3.4	<b>0.0385</b>

**Table 3:** Baseline Parameters for Randomization Groups.

	Massage (mean)	No Massage (mean)	S.D.	Total	Range	P-Value
	N=20	N=20		(median)		
Male age (yrs)	35.3	37	4	35.8	28-44	0.2
Baseline Stress (Scale 1-10)	4.2	3.6	2.2	4	8-Jan	0.33
Years Infertile	3	2.5	3	2	18-Jan	0.45
Ejaculatory Abstinence (days)	2.2	3.2	5.3	3	0-30	0.35
Sample Volume (mL)	2.8	2.6	1.9	2.9	0.7-10.0	0.56
Concentration (M/mL)	66	55	51.8	48	10.3-194.0	0.44
Motility	65.8	63.5	14.9	67.5	21.0-84.4	0.78
Rapid Progression (%)	25.7	27.3	13.6	22.8	0-62.2	0.74
Total Motile Pre-Wash (x10 <sup>6</sup> )	115	86.4	126	87	7.2-552.6	0.25
Total Motile Post-Wash (x10 <sup>6</sup> )	26.5	19.3	24	17.9	0.4-108.5	0.39
WBC per 100 Sperm	1.2	3.4	9.8	0	0-61.0	0.87

**Table 4:** Differences in Mean Semen Parameters after Intervention.

	MESSAGE GROUP			NON-MESSAGE GROUP		
	Mean Baseline n=20	Mean Follow-Up n=20	P-Value	Mean Baseline n=20	Mean Follow-Up n=20	P-Value
	2.8	2.2	0.08	5.4	3.2	0.34
pH	7.6	7.7	0.24	7.6	7.7	0.19
Sample Volume	2.8 mL	2.8 mL	0.28	3.4 mL	2.6 mL	0.01
Pre-Wash Motile Concen	56.9 x10 <sup>6</sup> /mL	46.4 x10 <sup>6</sup> /mL	0.28	34.5 x10 <sup>6</sup> /mL	36.6 x10 <sup>6</sup> /mL	0.69
Post-Wash Motile Concen	46.6 x10 <sup>6</sup> /mL	53.0 x10 <sup>6</sup> /mL	0.19	49.6 x10 <sup>6</sup> /mL	38.6 x10 <sup>6</sup> /mL	0.45
Pre-Wash Motile Sp Ct	144.4 x10 <sup>6</sup>	115.0 x10 <sup>6</sup>	0.41	108.4 x10 <sup>6</sup>	86.4 x10 <sup>6</sup>	0.06
Post-Wash Motile Sp Ct	23.3 x10 <sup>6</sup>	26.5 x10 <sup>6</sup>	0.19	24.8 x10 <sup>6</sup>	19.3 x10 <sup>6</sup>	0.45
Pre-Wash Motility: 3-4+	27.9 %	25.7 %	0.51	25.5%	27.3%	0.72
Overall Pre-Wash Mot	64.7 %	65.8 %	0.52	63.4 %	63.5 %	0.92
Overall Post-Wash Mot	86.6 %	89.8 %	0.28	89.4 %	90.1 %	0.89
No. of WBCs / 100 sp	0.2	1.2	0.19	0.2	3.4	0.27

**Table 5:** Comparison of Differences from Baseline between Intervention Groups.

	MESSAGE GROUP Δ	NON-MESSAGE GROUP Δ	P-Value
	-0.65	-2.7	0.83
pH	+0.08	+0.1	0.72
Sample Volume	+0.05	-0.7	0.14
Pre-Wash Motile Concen	-10.4	-1.3	0.36
Post-Wash Motile Concen	+13.2	-8.2	0.21
Pre-Wash Motile Sp Ct	-29.3	-31.9	0.94
Post-Wash Motile Sp Ct	+6.6	-4.1	0.21
Pre-Wash Motility: 3-4+	-2.2%	+1.7%	0.49
Overall Pre-Wash Mot	+1.1%	-0.6%	0.75
Overall Post-Wash Mot	+2.2%	+0.9%	0.64
No. of WBCs / 100 sp	+0.90	+3.4	0.84

a semen analysis as part of an infertility workup prior to IUI. Perhaps, if male patients knew of their low sperm counts before the start of this study, their subjective stress could be a reflection of their low counts.

The mechanism of the impact of stress on decreased semen quality is hypothesized to be related to increased stress hormones and decreased gonotrophic hormones, but this mechanism is not completely clear. More studies should be performed to elucidate the association between stress and reduced semen parameters.

Like Swedish massage, other forms of complementary alternative medicine have shown a decrease in cortisol, including yoga and acupuncture [15,16]. However, studies involving yoga and acupuncture measure serum cortisol as compared to salivary cortisol measured in the Swedish massage study [12,15,16]. Because of the diurnal nature of cortisol, serum levels of morning cortisol have been found to be a better measure of the stress response than salivary cortisol [17]. Additional studies should be performed which compare serum morning cortisol with patients' subjective stress ratings to determine how cortisol is related to subjective stress as well as to determine how cortisol is affected by massage, yoga, acupuncture, and other forms of complementary alternative medicine.

Limitations of this study include the massage being performed only one time with semen parameters measured directly after the massage. Because spermatogenesis takes about three months, the effects of stress reduction on cortisol, testosterone, and semen parameters would not be expected to manifest until sperm production was complete three months later. Stress is usually caused by mental or psychological issues, and it is possible that massage performed on one occasion improves relaxation but doesn't alter stress. Additionally, the massage was performed only one time; perhaps long-term stress reduction would be achieved with multiple massage treatments. 3. To demonstrate the effect of massage in the alleviation of stress, it would be helpful to measure self-reported stress test, and gonadotropin, cortisol, and testosterone levels before and after massage in the future. Finally, as there are no comparable studies, we chose a sample size of convenience; a future study would benefit from a power calculation to determine an appropriate sample size.

Even though relaxation massage was a welcome intervention for our subjects, there is no evidence that this could improve semen quality or enhance pregnancy rates because it did not improve total sperm count in this study.

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