Comparison of semen parameters in samples collected by masturbation at a clinic and at home

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Objective: To investigate differences in semen quality between samples collected by masturbation at a clinic and at home.
Design: Cross-sectional study.
Setting: Fertility center.
Patient(s): Three hundred seventy-nine men assessed for infertility.
Intervention(s): None.
Main Outcome Measure(s): Semen was analyzed according to World Health Organization guidelines. Seminal markers of epididymal (neutral α-glucosidase), prostatic (prostate-specific antigen and zinc), and seminal vesicle (fructose) function were measured. Two patient groups were defined according to sample collection location: at a clinic (n = 273) or at home (n = 106).
Result(s): Compared with clinic-collected semen, home-collected samples had statistically significantly higher values for sperm concentration, total sperm count, rapid progressive motility, and total count of progressive motility. Semen volume, proportion of normal sperm morphology, neutral α-glucosidase, prostate-specific antigen, zinc, and fructose did not differ significantly between groups. An abnormal sperm concentration ($<20 \times 10^6$/mL) was seen in statistically significantly fewer of the samples obtained at home (19/106, 18%) than at the clinic (81/273, 30%), and the same applied to proportions of samples with abnormal (< 25%) rapid progressive motility (68/106 [64%] and 205/273 [75%], respectively).
Conclusion(s): The present results demonstrate superior semen quality in samples collected by masturbation at home compared with at a clinic. This should be taken into consideration in infertility investigations. (Fertil Steril® 2008;89:1718–22. ©2008 by American Society for Reproductive Medicine.)

Key Words: Fertility, infertility, reproduction, semen collection, spermatozoa

Semen analysis is the cornerstone of male infertility workup, and prediction of the fertility potential of an individual is based on several semen parameters, primarily the concentration, motility, and morphology of the spermatozoa (1, 2). However, the context in which a semen sample is obtained is also important, which is exemplified by the findings that ejaculates produced during intercourse are associated with higher semen volume, sperm count, and sperm motility than those obtained by masturbation. It has been postulated that that difference may be explained by the greater intensity and duration of sexual arousal that typically precedes copulatory ejaculation (3).

According to the World Health Organization, semen samples to be used for infertility assessment should be obtained by masturbation in a private room near the clinical laboratory (4). The purpose of this recommendation is to allow more efficient evaluation of liquefaction of the ejaculate and to prevent it from being exposed to extreme temperatures. However, some patients prefer to collect semen specimens at home rather than at a clinic.

Little knowledge has been accumulated about the effect of the location of semen collection on the quality of the samples. Nonetheless, Padova et al. (5) have reported that they could not find significant differences in semen volume between samples obtained in clinics and those collected at home. Therefore, our aim was to investigate the effect of the location of semen collection by masturbation (clinic vs. home) in a group of men being assessed for infertility.

MATERIALS AND METHODS

Subjects

Semen samples were obtained from 379 consecutive nonazoospermic men (median age, 34 y; range, 20–58 y) undergoing infertility assessment at the Fertility Centre, Malmö University Hospital, between April 2004 and January 2007. Of the 379 samples, 273 were collected at the clinical laboratory, and 106, at home. Serum levels of FSH, LH, T, and inhibin B were available for 90 of the 379 men, and both sperm concentration and motility were found to be significantly lower in that subgroup than in the remaining subjects. Among those 90 men, there was no difference in the levels of any of the reproductive hormones between samples obtained at the clinic and those collected at home.

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Semen Samples

The ejaculates were obtained by masturbation after 1–30 days (median, 4 d) of sexual abstinence, and only complete samples were included. For men delivering more than one sample during the study period, only the first ejaculate was used in the investigation.

Semen Analysis

After liquefaction at 37°C (within 1 h of ejaculation), the samples were analyzed for semen volume and for sperm concentration, motility, and morphology. The motility was graded as follows: a = rapid progressive motility, b = slow progressive motility, c = local motility, and d = immotility. All semen tests were performed according to the World Health Organization recommendations (4). Semen volume was measured by weighing the collection receptacle with and without semen on a Sartorius balance (Tillquist Analysis AB, Stockholm, Sweden). For each specimen, 450 μL of the ejaculate remaining after the analyses already described in this paragraph was removed with an ordinary air-displacement pipette and then mixed with 50 μL of benzamidine (0.1 M) to stop the biochemical processes involved in liquefaction. The mixture was processed by centrifuge for 20 minutes at 4,500 × *g*, and the seminal plasma was decanted and stored at –20°C until analyzed for the activity of neutral α-glucosidase and the concentrations of prostate-specific antigen, zinc, and fructose (see next subsection).

Biochemical Analysis

Biochemical markers of function were assessed for the epididymis (neutral α-glucosidase; NAG), prostate (prostate-specific antigen and zinc), and seminal vesicles (fructose), as described elsewhere (6). Neutral α-glucosidase was analyzed by first measuring total α-glucosidase activity by using an Episcreen kit (Fertipro, Beernem, Belgium) according to the instructions of the manufacturer and subsequently estimating the NAG activity by using the table included in the kit. The concentrations of prostate-specific antigen (PSA), zinc, and fructose in seminal plasma were determined by using, respectively, a PROSTATUS kit (Wallac Oy, Turku, Finland); a colorimetric method (7); and a spectrophotographic technique, essentially as described elsewhere (8). After subtracting the volume of semen required for routine analysis, only 255 of the neat samples contained a sufficient amount of semen for analysis of biochemical markers. Moreover, the biomarkers of prostate-specific antigen, zinc, and fructose were analyzed first, and thereafter, only 160 of the 379 samples contained enough semen for analysis of NAG.

Statistical Methods

Statistical analysis was performed by using SPSS 12.0 software (SPSS Inc., Chicago, IL). The samples were divided into two groups according to whether they were collected at the clinic or at home. The Mann-Whitney *U* test was used to compare variation in semen parameters between the two groups. According to the World Health Organization recommendations, Fischer's exact test was applied to compare the proportions of men with abnormal sperm concentration ($<20 \times 10^6$/mL) and abnormal (<25%) rapid progressive motility. *P* values of $<.05$ were considered statistically significant.

RESULTS

A total of 379 semen samples were used in the present study, 273 of which were collected at the clinical laboratory, and 106, at home. The age and length of sexual abstinence did not differ significantly between the men who provided samples at the two locations ($P>.05$). The collection-to-analysis time was significantly greater for the samples obtained at home than for those collected at the clinic ($P<.001$; Table 1).

Semen Volume, Sperm Number, Motility, and Morphology

Sperm concentration and total sperm count were significantly higher in semen samples collected at home than in those provided at the clinic ($P=.01$ and $P=.02$, respectively). Furthermore, rapid progressive motility (grade a) was observed in a significantly larger proportion of the home-collected samples compared with those obtained at the clinic ($P=.02$). The same trend was found regarding total count of progressive motility ($P=.046$). However, the samples in the home-collection and the clinic-collection group did not differ significantly ($P>.05$) with respect to semen volume, proportions showing slow progressive (b); progressive (a+b); or local (c) motility; immotility (d); or normal morphology (Table 1).

Epididymal and Accessory Sex Gland Function

Seminal markers of epididymal (NAG), prostatic (PSA and zinc), and seminal vesicle (fructose) function did not differ significantly between the two groups ($P>.05$; Table 2).

Finally, the proportion of samples with abnormal sperm concentration ($<20 \times 10^6$/mL) was significantly lower among those collected at home (19/106 [18%]) than in those obtained at the clinic (81/273, 30%; $P=.02$). The same trend was found regarding the number of home-collected and clinic-collected samples exhibiting abnormal (<25%) rapid progressive motility: 68/106 (64%) and 205/273 (75%), respectively ($P=.03$; Fig. 1).

DISCUSSION

The main conclusion of the present study is that semen collection by masturbation is superior when performed at home as compared with at a clinical laboratory when considering sperm count and motility. On the other hand, samples obtained at the two locations do not differ with regard to semen volume, sperm morphology, or markers of epididymal and accessory sex gland function.

After the process of spermatogenesis, which entails sperm production in the testis and maturation in the epididymis, the

TABLE 1

Age, length of sexual abstinence, time to analysis, and semen parameters in relation to place of semen sample collection in 379 men undergoing infertility assessment.

	Semen samples collected at clinic (n = 273)		Semen samples collected at home (n = 106)	
Variables	**Median**	**Range**	**Median**	**Range**
Age (y)	34	21–58	34	20–56
Length of sexual abstinence (d)	4.0	1.0–30	4.0	2.0–30
Time to analysis (min)	35[a]	20–60	45[a]	25–60
Semen volume (mL)	4.0	1.0–11	4.5	1.0–15
Sperm concentration ($\times 10^6$/mL)	41[a]	0.2–372	64[a]	1.0–373
Total sperm count ($\times 10^6$ per ejaculate)	175[a]	1.0–1,733	270[a]	2.0–1,564
Motility (%)				
a	12[a]	0–64	18[a]	0–72
b	30	0–68	30	0–60
a+b	48	0–84	52	0–92
c	19	2.0–58	17	2.0–56
d	31	2.0–97	26	1.0–94
Total a+b ($\times 10^6$ per ejaculate)	82[a]	0–1,002	135[a]	0–1,283
Normal morphology (%)	4.0	0–18	5.0	0–14

Note: Statistical analysis was performed by using the nonparametric Mann-Whitney test; a+b = progressively motile spermatozoa.

[a] $P<.05$.

Elzanaty. Collection location and semen quality. Fertil Steril 2008.

spermatozoa are stored in the cauda epididymis and vas deferens until the time of ejaculation. During ejaculation, the spermatozoa are expelled from the cauda epididymis and vas deferens by short, powerful, and peristaltic contractions of the muscular walls of those ducts and thereby are transferred into the posterior urethra (9–13). The muscle contractions involved in this discharge are under the control of the autonomic nervous system (14).

It has been suggested that participation in IVF programs imposes stress on some men, which appears to be associated with a certain degree of reduction in the quality of their semen, shown as a statistically significant decrease in the sperm count, sperm motility, and fertility index (15–17). Considering animals, a study has shown that marmoset monkeys subjected to uncomfortable housing and stressed conditions, as compared with those kept under normal,

TABLE 2

Levels of biochemical markers of epididymal (NAG), prostatic (PSA and zinc), and seminal vesicle (fructose) function in relation to location.

	Semen samples collected at clinic (n = 172)		Semen samples collected at home (n = 83)	
Variables	**Median**	**Range**	**Median**	**Range**
NAG (mU per ejaculate)[a]	26	7.0–106	24	9.0–118
PSA (μg per ejaculate)	4,000	480–19,800	3,700	320–11,200
Zinc (μmol per ejaculate)	8.0	1.0–40	8.0	1.0–22
Fructose (μmol per ejaculate)	62	1.0–230	60	5.0–180

Note: Samples were collected from a total of 255 men undergoing infertility assessment. Statistical analysis was performed by using the nonparametric Mann-Whitney test. NAG = neutral α-glucosidase; PSA = prostate-specific antigen.

[a] One hundred sixty semen samples were analyzed for this group: 128 collected at the clinic, and 32, at home.

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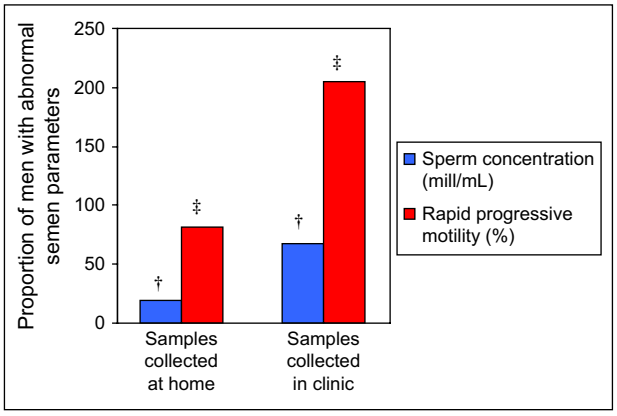
FIGURE 1

The proportion of men with abnormal semen values as defined by the World Health Organization guidelines: sperm concentration ($<20 \times 10^6$/mL) and rapid progressive motility (<25%) in relation to place of sample collection. †,‡Significant differences in sperm concentration and rapid progressive motility, respectively.



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comfortable, and unstressed conditions, had decreased semen quality in terms of significantly lower semen volume and sperm count, although there was no deterioration in the motility or morphology of the spermatozoa (18). Those findings can be compared with our observation of significantly higher sperm counts and motility in semen samples collected at home than in those obtained at a clinic.

It is logical to assume that the mentioned decreases in semen quality are at least partly a result of the acute psychological stress that is experienced by the patients who are requested to supply a semen sample at a clinic. The mechanisms by which acute psychological stress may affect sperm count are unclear. However, it appears likely that some hormonal and neural factors are involved in hampering both sperm production and the transport of spermatozoa through the male genital ducts during acute stress that is associated with semen collection. In that context, stress has been shown to decrease LH and T concentrations in the male rhesus monkey via a pathway involving endogenous opioid peptides (19, 20). The cited investigators suggested that the reduction in these hormones was responsible for subsequent disruption of the spermatozoa in the monkeys. Various clinical observations also have provided evidence that androgens play a role in maintaining optimal autonomic nervous control of the male genital ducts (2–23). Perhaps changes in LH and T affect such nervous regulation of contractions of the smooth muscle surrounding the caudal epididymis and vas deferens, resulting in incomplete emission of the stored spermatozoa in the epididymis and vas deferens.

Sperm motility is the result of a multitude of factors, including the length of sexual abstinence (24, 25), the age of the male (26–30), functioning of the epididymides and accessory sex glands (6, 31), and sperm morphology (32, 33). In our study, these factors did not differ significantly in relation to the place of semen collection, and hence further research is needed to clarify the effect of acute stress on sperm motility.

Our investigation was cross-sectional in nature and not based on the characteristics of the men who contributed semen. Thus, we cannot exclude the possibility that those individuals differed significantly with regard to fertility potential. Nonetheless, we did have access to the hormonal profile of approximately 25% of the subjects, but that subgroup did not appear to be representative of the study group, at least with respect to sperm concentration and motility. Furthermore, among those men, there was no significant difference in the serum levels of reproductive hormones between those who delivered samples at the clinic and those who collected samples at home. In addition, we did not measure the type and degree of psychological stress that may have affected the men in our study. By comparison, Clarke et al. (17) observed that the degree of anxiety and stress during collection of semen samples was positively correlated with environmental distractions inherent to the sample collection process, such as the presence of others, location of the collection room, noise, hospital atmosphere, space limitation, and absence of wife, and it was negatively correlated with the quality of the semen.

Our results may have some clinical implications. For example, it is known that sperm concentration and motility are positively correlated with the fertilizing ability of the ejaculated spermatozoa, and we found that these parameters were significantly better in semen samples collected at home as compared with those obtained at the clinic. That observation suggests that it may be more suitable to conduct semen collection at home when the samples are to be used in assisted reproduction programs. On the other hand, it probably is not recommendable to obtain samples at that location if the objective is to assess infertility. In any case, the place in which semen samples are obtained should be taken into consideration when interpreting the results of analyses.

In conclusion, we found a significant reduction in semen quality in samples collected at a clinic as compared with those obtained at home. The decreased quality was seen as lower sperm concentration and motility. This deterioration may be at least partly a result of the psychological stress experienced in the clinical environment, but further studies are needed to confirm that assumption.

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