Relationship between the duration of sexual abstinence and semen quality: analysis of 9,489 semen samples

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Objective: To evaluate the relationship between duration of sexual abstinence and various characteristics of normal and subnormal semen.
Design: A retrospective study based on computerized data.
Setting: Fertility and IVF unit at a university medical center.
Patient(s): Nine thousand, four hundred eighty-nine semen samples from 6,008 patients were analyzed according to the World Health Organization (WHO) manual and grouped according to sperm concentration (10^6/mL) into severe ($0.2–4 \times 10^6$), moderate ($>4–10 \times 10^6$), and mild ($>10–19.99 \times 10^6$) oligozoospermia, and normozoospermia ($\geq 20–250 \times 10^6$) groups.
Main Outcome Measure(s): In each group mean values of semen volume, sperm concentration, percentage of motile sperm and of normal morphology (according to WHO or Kruger criteria), total sperm count, and total motile sperm count per ejaculate were related to duration of abstinence.
Result(s): Among the 3,506 oligozoospermic samples, the peak mean sperm motility of 30.3% was observed after 1 day of abstinence. Similarly, the mean percentage of normal morphology among mild–moderate oligozoospermic samples (n = 2,260) reached peak values of 7.4%–8.6% between 0–2 days of abstinence. The 5,983 normozoospermic samples showed a significant decrease in the percentage of sperm motility and normal morphology to mean values of 33.1% and 7.0%, respectively, on days 11–14 of sexual abstinence.
Conclusion(s): Our data challenge the role of abstinence in male infertility treatments and suggest that to present the best possible semen samples, patients with male factor infertility should collect the semen after just 1 day of sexual abstinence. Patients presenting normal sperm analysis or sperm donors for cryopreservation purposes should be advised not to exceed 10 days of sexual abstinence. (Fertil Steril® 2005;83:1680–6. ©2005 by American Society for Reproductive Medicine.)

Key Words: Sexual abstinence, sperm quality, oligozoospermia

The duration of sexual abstinence before fertility treatments that is needed to provide maximum sperm quality is one of the issues commonly discussed between physicians and patients. We assume, regardless of the initial sperm quality, most fertility clinics follow the World Health Organization (WHO) guidelines (1) recommending abstinence for 2–7 days before semen collection for evaluation of infertility.

A wide range of infertility treatments is available, but it is important to obtain the desired pregnancy using a technique that is cost effective and has a minimal complication rate. Very often, and for many different infertility causes, it will be recommended that couples have timed intercourse or intrauterine sperm insemination with or without ovulation induction (2, 3), or IVF with or without micromanipulation (4). Whichever fertility treatment is intended, sperm quality is of paramount importance.

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The purpose of this study was to examine, on a large scale, the relationship between duration of abstinence and sperm quality, and to evaluate whether the recommendation for an arbitrary duration of abstinence, regardless of the quality of previous samples, yields the best possible semen.

MATERIALS AND METHODS

This retrospective study was based on 9,489 semen samples obtained from 6,008 patients during the period from January 1995 to September 2003.

All patients were undergoing testing for infertility and the samples were collected for routine examinations or with the intent to perform an IUI. After the approval of the Institutional Review Board at the Faculty of Health Sciences, Ben-Gurion University of the Negev, the results of the semen samples were retrieved from the computerized database of the Male Fertility Laboratory at Soroka University Medical Center.

Semen samples were analyzed using a Makler counting chamber (Sefi-Medical Instruments, Haifa, Israel) within 1.5 hours of collection. The analyses were performed by two

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experienced biologists, one performing sperm counts and motility, and the other one examining the sperm morphology. The Male Fertility Laboratory at Soroka University Medical Center is constantly under external quality assessment by UK NEQAS, Sub-Fertility Laboratory, Saint Mary's Hospital, Manchester, UK, starting July 1999.

According to the WHO criteria, 3,506 samples with sperm concentration below 20×10^6/mL were defined as oligozoospermic and further subdivided into the following groups: group 1, severe oligozoospermia ($0.2–4 \times 10^6$)—1,246 samples; group 2, moderate oligozoospermia ($>4–10 \times 10^6$)—1,107 samples; and group 3, mild oligozoospermia ($>10–19.99 \times 10^6$)—1,153 samples. The 5,983 semen samples with counts of $\geq 20–250 \times 10^6$/mL were categorized as normozoospermic and were included in group 4. Comparison of data with sperm concentrations of $>0–0.2 \times 10^6$/mL and $>250 \times 10^6$/mL was not included into the study because of the low number of samples unable to reach statistical significance. We also have not included information regarding round cells and debris, as it is not part of our database.

Among each group of samples, the mean values of volume of ejaculate, sperm concentration (10^6/mL), and percentage of motile sperms were determined according to WHO criteria, as well as the percentage of normal morphology for the group 1 samples. Morphology is investigated among 100 sperms using a magnification of 400 according to WHO criteria and a magnification of 1,000 according to Kruger criteria (5), therefore and to avoid technical difficulties in cases with severe oligozoospermia (slides containing few sperms), our standard of care is to use the WHO criteria. The normal morphology in groups 2, 3, and 4 was determined according to Kruger criteria.

Total sperm count per ejaculate was calculated by multiplying the sperm concentration by the volume of semen in each sample, and the count of total motile sperms (motile density) was obtained by multiplying the total sperm count by the percent motility.

The samples within each group were divided in relation to abstinence duration: 0 (<1 day of abstinence), 1, 2 , 3, 4, 5, 6, 7, 8–10, and 11–14 days. Because the number of samples from days 8 through 14 was relatively low, we combined them into two groups: 8–10 and 11–14.

Statistical analyses were performed using Statistical Programs for the Social Sciences (SPSS Inc., version 11.0; Chicago, IL) software programs. Wilcoxon matched-pairs signed-ranks test, χ^2, and one-way ANOVA tests were used when appropriate. The level of statistical significance was assumed as $P<.05$.

RESULTS

The mean age of the 2,495 oligozoospermic and the 3,513 normozoospermic patients included in the study was 31.1 ± 6.9 years and 32.2 ± 7.2 years, respectively.

As shown in Table 1, the impact of the duration of sexual abstinence on all parameters (except morphology) among the three groups of oligozoospermic semen samples (n = 3,506) was found to be similar. Therefore, except for sperm morphology, the three oligozoospermic groups were combined and examined as one with the intention of increasing statistical power.

Semen Volume

The mean semen volume per ejaculate in the oligozoospermic and the normozoospermic samples increased gradually in relation to sexual abstinence (Table 2). In particular, a significant ($P<.001$) increase in the average semen volume was noticed between values of 2.3 ± 1.4 mL on days 0–1 and 3.9 ± 2.0 mL on days 8–14 of sexual abstinence.

Although the peak mean volume was observed on days 8–10 and 11–14 for oligozoospermic and normozoospermic samples, respectively, the observed additional increase after day 4 of abstinence was statistically insignificant for the oligozoospermic samples, whereas the increase in semen volume between days 5 to 8–14 of abstinence for the normozoospermic samples reached statistical significance ($P<.001$).

Sperm Concentration

The sperm concentration (Table 2) among 3,506 oligozoospermic samples ranged from 0.2 to 19.99×10^6/mL. Peak mean sperm concentration was observed after 1 day of abstinence among 140 semen samples with an average sperm concentration of $8.4 \pm 5.2 \times 10^6$/mL, a mild and nonsignificant reduction was recorded on succeeding days of abstinence. Despite a significant decrease on day 5 of abstinence, no further decline in the mean sperm concentration during the following days was observed.

Among the 5,983 normozoospermic samples, the sperm concentration ranged from 20 to 250×10^6/mL. A nonsignificant decrease of the mean sperm concentration was observed from day 0 to 2 days of abstinence, followed by a gradual and statistically significant ($P<.001$) increase starting on day 3 of abstinence with values of $61.1 \pm 37.5 \times 10^6$ continuing up to day 6 with values of $72.3 \pm 46.0 \times 10^6$. Although the peak mean sperm count was observed on abstinence day 7, the increase in values between days 6 and 7 did not reach statistical significance.

Total Sperm Count

Among oligozoospermic samples (Table 2), the mean total sperm count per ejaculate was found to increase significantly ($P<.001$) from day 2 to day 3 and from day 3 to day 4 of abstinence due to an increase in semen volume. A decline observed between the peak mean value of $30.1 \pm 28.3 \times 10^6$ on day 4 and $26.5 \pm 27.6 \times 10^6$ on day 5 of sexual abstinence was related to a reduction of sperm concentration. Further variations were not found to be statistically relevant.

Normozoospermic samples showed a relatively low and very similar mean total sperm count for the first days of