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# Relationship between Semen Parameters in Samples Obtained from Sub-fertile Patients

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## Abstract

**Objective:** The aim of this study was to investigate the possible relationship between semen parameters collected from sub-fertile patients, and to define the parameters correlated. The relationship between these parameters, if any, would help us understand the mechanisms involved in subfertility or infertility.

**Material and Methods:** A total of 1404, who have admitted our infertility clinics due to failure of conception between February 2012 and October 2016, were included in the study. Semen parameters analyzed included sperm concentration (millions/ml), total motility rate (%), progressive motility rate (%) and normal sperm morphology rate (%).

**Results:** Mean sperm concentration (millions/ml), mean total motility rate, mean progressive forward motility rate and mean normal sperm morphology rate were found to be 78.67 ± 81.39, 66.1% ± 19.85, 11.45% ± 13.55 and 2.3% ± 2.46, respectively. A statistically significant correlation was observed between all parameters ($p<0.0001$).

**Conclusion:** As a conclusion, a strong correlation was observed between the sperm parameters in the semen samples of sub-fertile patients. This finding may help us understand the mechanisms that control these parameters.

**Keywords** Sperm parameters; Fertility; Assisted reproduction

## Introducton

Sperm parameters play a key role in the etiology of infertility. Sperm parameters are known to directly related to the fertilization process. Fertility is negatively affected if these parameters reduce to a level below a predictive level [1-3]. Therefore seminal analysis is the basic fertility research in assisted reproduction treatments. Among the infertile cases, 40% has poor sperm parameters. Investigation for the cause of infertility includes semen analysis as the first step. Analysis of semen parameters included the volume of the semen sample obtained, pH, sperm count and motility, round cell count, leucocyte count, and morphologic analysis. Among all, sperm concentration, motility and morphology have the highest impact on infertility. If these are observed to be below the pre-defined value, assisted reproductive techniques such as intrauterine insemination (IUI), in-vitro fertilization (IVF) or intracytoplasmic sperm injection (ICSI) are performed. Outcomes of assisted reproductive treatments including fertilization rates, embryo development rate, embryo quality, pregnancy rates and implantation rates are also affected strongly by these parameters [4-7]. Although it has been known that poor seminal parameters resulting in functional importance affect fertility and ART outcomes negatively, there is no data in the literature investigating the relationship between these parameters themselves. The aim of this study was to determine whether these parameters were correlated to each other, and to determine the parameters that behave in a different or similar manner. Examining the correlation between these parameters may help us understand the mechanism that controls these parameters.

## Materials and Method

### Study design

A total of 1404 patients, who have admitted our fertility clinics between February 2012 and October 2016, were included in the study, regardless of the ethiology of infertility. Written informed consents were obtained from the participants. Institutional ethical committee approval was obtained from Istanbul Medipol University (Date: 07.10.2016, no:10840098-604.01-E.19063). Correlation between four basic sperm parameters (concentration (millions/ml, total motility (%), progressive motility (%) and normal sperm morphology (%) were evaluated.

### Semen analysis

Semen analysis was performed according to the criteria of WHO (WHO, 2000). Specimens were collected by masturbation after 3–7 days of sexual abstinence. Analysis was performed following liquefaction, under a phase contrast (Olympus, CX40) microscope. Liquefaction time, appearance, volume, pH and viscosity of the semen samples were recorded. Samples were analysed for sperm concentration, progressive sperm motility and total motility rate prior to and after semen preparation. At least 100 spermatozoa were scored with 40X objective for motility evaluation and classified as A, B, C or D motility, which referred to progressive, slow and poor motility, and D immotility, respectively. Total motility rate was calculated by the addition of A%, B% and C%. Sperm slides were stained with Diff-3 staining kit and a minimum of 100 spermatozoa were scored under 100X objective for morphologic evaluation.

## Statistics

Correlation between four basic sperm parameters (concentration (millions/ml, total motility (%), progressive motility (%) and normal sperm morphology (%) were evaluated. The values were given as mean ±SD. The relation between the values was evaluated by Pearson correlation analysis. SPSS for Windows 17.0 software package was used for the statistical analysis. The results were evaluated in 95% confidence interval and the statistical significance was defined as $p<0.05$.

## Results

A total of 1404 patients, who have admitted our fertility clinics due to failure for infertility investigation, are included in the study regardless of the etiology of the infertility. Mean age of the population was 37.2 ± 6.5. Among all cases, 398 (28.3%) were those with oligoasthenoteratozoospermia (OAT) which meant a poor value for all three parameters, according to the criteria of WHO.

The rate of patients with two parameters affceted was found to be 34.8%, where number of cases with oligoastenozoospermia (OA), oligoteratozoospermia (OT) and astenoteratozoospermia (AT) were 132 (9.4%), 175 (12.4%) and 183 (13%), respectively. The rate of patients with only one parameter affected was found to be 36.8%, where the number of patients with astenozoopermia (A), oligozoospermia (O) and teratozoospermia (T) were 186 (13.4%), 201 (14.3%) and 128 (9.1%), respectively (Figure 1).

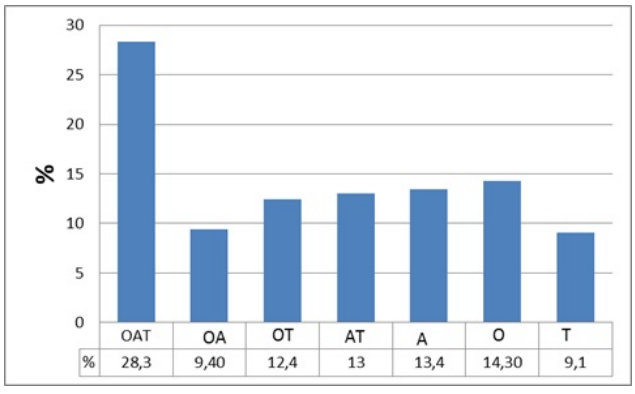


**Figure 1:** Subpopulation rates (%) of the patients according to the normal sperm parameters including concentration (mil/ml), motility (%), and normal morphology (%) rates. Oligoasthenoteratozoospermia (OAT), oligoastenozoospermia (OA), oligoteratozoospermia (OT), astenoteratozoospermia (AT), astenozoopermia (A) oligozoospermia (O), teratozoospermia (T).

Mean sperm concentration (millions/ml), mean total motility rate, mean progressive forward motility rate and mean normal sperm morphology rate were found to be 78.67 ± 81.39, 66.1% ± 19.85, 11.45% ± 13.55 and 2.3% ± 2.46, respectively. Sperm concentration (millions/ml), total motility rate (%), progressive motility rate (%) and normal sperm morphology rate (%) were compared with each other. Sperm concentration was strongly correlated to the total and progressive motility rates and normal sperm morphology rate. Total motility rate was strongly correlated to progressive motility and normal sperm morphology rates, and progressive motility rate was strongly correlated to normal sperm morphology rate. As a summary, a statistically significant correlation was observed between each of the compared semen parameter pairs (Table 1). The p values observed for these parameters and the coefficient of correlations are shown in Table 1.

| | Concentration (mil/ml) | | % Total motility | | % Progressive motility | | % Normal morphology | |
|---|---|---|---|---|---|---|---|---|
| Concentration (mil/ml) | | | r=0.35 | p<0.0001 | r=0.58 | p<0.0001 | r=0.35 | p<0.0001 |
| % Total motility | r=0.35 | p<0.0001 | | | r=0.51 | p<0.0001 | r=0.26 | p<0.0001 |
| % A motility | r=0.58 | p<0.0001 | r=0.51 | p<0.0001 | | | r=0.35 | p<0.0001 |
| % Normal morphology | r=0.35 | p<0.0001 | r=0.26 | p<0.0001 | r=0.35 | p<0.0001 | | |

**Table 1:** The correlation coefficient and p values of the semen parameters including concentration (mil/ml), total motility (%), progressive motility (%), and normal morphology (%) rates with each other.

We also observed that that if one or two parameters were below the normal value described by WHO and the remaining were not, normal parameters seemed to approximate the lower limit of the normal value.

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