

# Abnormal Semen Parameters and Association with Natural Conception

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## Abstract

**Objective:** To evaluate the frequency of abnormal semen parameters in sub fertile subjects and association between semen parameters and spontaneous conception.

**Methodology:** This Cross-sectional study was conducted in Gynecology department of Nishtar Hospital, Multan from July 2019 to July 2020. Infertile couples from at least 12 months were selected for study. A team of gynecologist, andrologist and endocrinologist were assessed the couples. In male partner general physical examination, endocrine factor, genetic assessment, accessory gland infection, testicular dysfunction was evaluated. At the interval of two months semen analysis was taken and assessed according to WHO guidelines.

**Results:** Among the non-pregnant patients, the distribution of semen parameters was as follows: 9 (19.1%) had azoospermia, 6 (12.8%) had oligozoospermia, 6 (12.8%) had asthenozoospermia, and 2 (4.3%) had aspermia. Normospermia was observed in 21 (44.6%) of the non-pregnant patients. In contrast, among the spontaneously pregnant patients, 6 (26.1%) had azoospermia, 6 (26.1%) had oligozoospermia, 2 (8.7%) had asthenozoospermia, 7 (30.5%) had teratozoospermia, and 1 (4.3%) had aspermia. Only one patient (4.3%) in the spontaneously pregnant group had normospermia.

**Conclusion:** There is possibility of spontaneous conception even with semen parameters below WHO recommended cut off values. Our findings support the discussion about redefining reference values on healthy fertile men.

**Keywords:** Subfertility, Semen analysis, Subnormal parameters, Azoospermia, Spontaneous conception.

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## Introduction

Recent evidence has raised doubts about the clinical significance of traditional semen analysis parameters, such as density and motility, prompting a reevaluation of the World Health Organization's criteria and suggesting a need for laboratories to establish individualized reference ranges for accurate assessment of fertility potential. A common clinical problem in male is subfertility that affects about 15% of couples in world.<sup>1</sup> Furthermore, subfertility is taken as serious public problem because of its association with many domestic issues.<sup>2</sup> Beyond the couples' life subfertility also affects the social life of a person and its surroundings. Male subfertility factor is responsible for 20% infertile couples and contributory in more 40% of lives every year.<sup>3</sup> A subfertile male always means an

abnormal or subnormal semen analysis. Most probably clinicians rely on semen analysis to label or diagnose status of a male fertility.<sup>4</sup>

In clinical practice semen analysis and measurement of semen parameters is a surrogate measure for assessment of fertility.<sup>5</sup> There is not too much consensus that which parameter of analysis is better predictor of fertility. In previous studies a close correlation was reported between sperm count and pregnancy with evidence of sperm count values before and after conception. Sperm count Moreover sperm morphology and motility is also considered as male fertility predictors.<sup>6</sup>

Since WHO recommended reference values for semen parameters it become evident that semen analysis is

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sufficient to label male fertility status.<sup>7</sup> Previous WHO values were recommended for healthy men or normal population not for population of fertile men. Some serious concerns have been raised because of possibility of conceiving with below cutoff values recommended by WHO. It is a challenge for clinicians to determine which semen parameter of test has ability to predict male fertility or subfertility.<sup>8</sup>

This difficult situation leads to the inappropriate diagnosis, inaccurate treatment and depression for patients.<sup>9</sup> Accurate diagnosis of subfertility could reduce the assisted reproduction in community. Some additional sperm tests such as eosin/ swelling test are not sufficient to provide information to label fertility status.<sup>10</sup> This study is conducted to evaluate the frequency of subfertility in subnormal semen parameters.

## Methodology

This cross-sectional study was conducted in Gynecology department of Nistar Hospital, Multan from July 2019 to July 2020 in one year duration. Study was started after obtaining ethical approval from hospital ethical board and written informed consent was taken from subjects. Non probability consecutive sampling technique was used. Infertile couples from at least 12 months were selected for study.

A team of gynecologist, andrologist and endocrinologist were assessed the couples. General physical examination, cervical and vaginal infection screening, hormonal assessment of ovulatory morphology, tubal patency evaluation, transvaginal sonogram and assessment of genetics were carried for female partner. In male partner general physical examination, endocrine factor, genetic assessment, accessory gland infection, testicular dysfunction was evaluated. At the interval of two months semen analysis was taken and assessed according to WHO guidelines. Men with identified infertility were treated etiologically but subfertile patients were treated empirically (antioxidants, gonadotropins, aspartic acid and carnitine).

Semen analysis was obtained before conception (60 days before cycle) and then at the time of conception. Semen analysis was assessed according to WHO guidelines and cutoff values. Patients were classified with reference to sperm count, morphology and sperm motility. Patients were also classified according to predictor value of pregnancies such as

asthenospermia, oligospermia, teratospermia and oligoasthenoteratospermia. Classification of sperm count was also done mild 15–20 mil/mL, moderate 5–15 mil/mL and severe <5 mil/mL oligospermia. To define subfertility sperm parameters were also evaluated.

SPSS version 23 was used for data analysis. Mean  $\pm$  SD was calculated and presented for numerical variables like age, age of female partner, duration since marriage and frequency and percentages were calculated and presented for categorical variables like abnormal semen parameters. Tests of significant t test and chi square test were applied to see association among variables. P value  $\leq 0.05$  was taken as significant.

## Results

Out of 70 couples, 47 (67.1%) were non-pregnant, while 23 (32.9%) were spontaneously pregnant. The age, body mass index, duration of marriage, and area of living were almost equally distributed between the non-pregnant and spontaneously pregnant couples, with no significant differences ( $p > 0.050$ ) as shown in Table I.

**Table I: Patients' demographic characteristics.**

Characteristic	Non-pregnant	Spontaneously pregnant	p-value
	Mean $\pm$ SD		
Age of male (years)	38.62 $\pm$ 7.39	40.00 $\pm$ 6.40	0.446
Age of female (years)	33.89 $\pm$ 7.17	33.91 $\pm$ 7.92	0.992
BMI of male (kg/m <sup>2</sup> )	24.45 $\pm$ 1.84	25.31 $\pm$ 1.98	0.076
BMI of female (kg/m <sup>2</sup> )	25.68 $\pm$ 1.45	25.53 $\pm$ 1.50	0.702
Duration of marriage (years)	6.02 $\pm$ 1.95	6.78 $\pm$ 1.78	0.120
Area of living			
Urban n(%)	8 (17.0)	3 (13.0)	0.668
Rural n(%)	39 (83.0)	20 (87.0)	

Among the non-pregnant patients, the distribution of semen parameters was as follows: 9 (19.1%) had azoospermia, 6 (12.8%) had oligozoospermia, 6 (12.8%) had asthenozoospermia, and 2 (4.3%) had aspermia. Normospermia was observed in 21 (44.6%) of the non-pregnant patients. In contrast, among the spontaneously pregnant patients, 6 (26.1%) had azoospermia, 6 (26.1%) had oligozoospermia, 2 (8.7%) had asthenozoospermia, 7 (30.5%) had teratozoospermia, and 1 (4.3%) had aspermia. Only

**Table II: Patients' semen parameters**

Parameter	Non-pregnant n(%)	Spontaneously pregnant n(%)	Test of sig.
Normospermia	21 (44.6)	1 (4.3)	$\chi^2=18.4, (p=0.002)$ d.f=5
Azoospermia	9 (19.1)	6 (26.1)	
Oilgozoospermia	6 (12.8)	6 (26.1)	
Asthenozoospermia	6 (12.8)	2 (8.7)	
Teratozoospermia	2 (4.3)	7 (30.5)	
Aspermia	3 (6.4)	1 (4.3)	

one patient (4.3%) in the spontaneously pregnant group had normospermia. The difference in semen parameters between the two groups was statistically significant ( $p=0.002$ ), as depicted in Table II.

## Discussion

Approximately 15% of couples worldwide experience subfertility, with male factors contributing to 50% of these cases.<sup>11</sup> Recent interventions and analyses have cast doubt on the WHO-recommended values for semen analysis in predicting fertility. In a 2012 study by Milardi et al<sup>12</sup> it was found that 65% of cases achieved spontaneous conception despite having semen analysis parameters below WHO reference values. Among these cases, 26% had reduced sperm count, and 27% exhibited oligospermia.

Zinaman et al<sup>13</sup> conducted a study on the topic, which mirrored findings consistent with WHO reference values regarding spontaneous conception among couples with oligospermic conditions. Their research, involving 210 reproductive couples who were unaware of their low semen quality yet maintained successful fertility, underscored the significance of these reference values in predicting fertility outcomes. Furthermore, Guzick et al<sup>14</sup> corroborated these observations in their own study, highlighting the utility of sperm morphology, motility, and concentration in categorizing male fertility as sub-fertile, indeterminate, or fertile. Importantly, they emphasized that infertility cannot be solely attributed to sperm parameters, suggesting a multifaceted approach to understanding reproductive health beyond sperm quality alone.

In contrast to previous studies, Ombelet et al<sup>15</sup> found a strong correlation between abnormal or subnormal seminal parameters and male subfertility, noting a shift towards subnormal seminal statistics in affected males, with 5% displaying abnormal sperm morphology and 28% exhibiting impaired sperm motility. However, Bonde et al<sup>16</sup> observed instances where males displayed semen parameters above WHO cut-off values yet were still subfertile patients, suggesting that subfertility may not always be directly associated with seminal parameters.

In the realm of literature, it is evident that subfertility or infertility predominantly arises from male infections, which can lead to asthenospermia, a condition characterized by reduced sperm motility. However, it has been established that teratospermia, a condition marked by abnormal sperm morphology, does not significantly impede spontaneous conception. Studies have shown that even in fertile men, there can be a reduction in sperm morphology, indicating that only moderate predictive value for spontaneous conception is necessary.<sup>17</sup> A study conducted by Zaini et al<sup>18</sup> has concluded that while sperm morphology may not hold significant importance or utility in predicting infertility in subfertile males, a sperm count of at least 5 million per milliliter and good sperm motility are crucial predictors in cases of oligospermic males.

Pasqualotto et al<sup>19</sup> and Hirsh et al<sup>20</sup>, in their studies, have suggested that the WHO cutoff values for semen parameters to predict subfertility should be reconsidered. They found that abnormalities in sperm morphology, a strong predictor of fertilizing capacity, may be influenced by factors such as excessive intercourse or infections in the male genital tract. Additionally, they noted that endocrine deficiencies can also contribute to male subfertility, albeit as a rare cause.

In their study on subfertile males, van der Merwe et al<sup>21</sup> found that sperm motility below 30%, morphology below 5%, and concentration below  $15 \times 10^6/\text{ml}$  should be recommended thresholds to identify subfertility. They emphasized the significance of semen parameters in clinical settings. Additionally, Günalp et al<sup>22</sup> determined a lower threshold of 5% as a positive predictive value for indicating subfertility in the male population.

## Conclusion

In couples experiencing subfertility, assessments of sperm motility and morphology often offer limited predictive value regarding the likelihood of spontaneous conception. Despite being commonly utilized parameters in assessing male fertility, their ability to accurately forecast natural conception

outcomes within subfertile couples is constrained. This suggests that while sperm motility and morphology are important factors in fertility evaluation, other aspects such as sperm DNA integrity, seminal fluid quality, and the overall health of both partners may play significant roles in determining the likelihood of spontaneous conception in such cases.

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