Original Article

The Effect of Suboptimal Semen Parameters on Male Partner's Ability to Conceive. Is He Really Subfertile Because the Test Says So?

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Abstract

Context: In many developing countries, subfertility treatment is not covered by government-funded institutions. It is observed that healthcare providers incriminate male factor for subfertility even when only a slight deviation from presumed normal criteria is observed. **Aim:** This study aims to provide scientific evidence that pregnancies are possible at semen parameters that are below the generally accepted lower limits of normal. **Setting and Design:** This was a retrospective cohort study conducted from January 2014 to December 2018. **Materials and Methods:** During the study period, couples who conceived without any treatment of male partner were included. The World Health Organization (WHO) reference values for semen analysis were utilized to assess the reports. The primary outcome measure was conception despite abnormal semen parameters. **Statistical Analysis Used:** Data were analyzed using the SPSS software program, version 15.0 (IBM, Armonk, USA). **Results:** Of the 332 couples included, 233 (70.1%) couples conceived despite suboptimal semen parameters, The most common criterion not satisfied was rapid linear motility –200 (85.8%), 87 (37.3%) men were oligozoospermic, 94 (40.3%) were asthenozoospermic, and 21 (9%) were teratozoospermic. The abnormalities were more common in men having primary subfertility (71.7% vs. 28.3%, $P = 0.002$). The abnormalities were most common in the age group 40–44 years ($n = 91$, 39.1%) and those who were overweight ($n = 110$, 47%). **Conclusions:** A consensus for defining poor semen criteria is the need of the hour so that these males can be counseled satisfactorily. WHO criteria are a standard commonly employed, but they do not necessarily predict the fertility potential.

Keywords: *Male subfertility, semen parameters, World Health Organization semen analysis criteria*

Introduction

Subfertility is a common problem. One in every four couples in developing countries had been found to be affected by subfertility.[1] Basic investigations for subfertility include assessment of ovulation status in female and semen analysis in male. A significant proportion of men with normal conventional criteria of semen quality will be infertile because of defects in sperm function while a significant number of men with abnormal semen quality will have normal sperm function.[2]

Parameters measured in a semen analysis are sperm count, motility, morphology, volume, fructose level, and pH. Over 15 million sperm/ml is considered normal, according to the World Health Organization (WHO) in 2010.[3] Older definitions state 20 million as lower limit of normal.[4]

When sperm count below 15 million, motility below 40% and normal morphology below 4 is found,

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patients are generally referred for assisted reproduction, i.e., intrauterine insemination, *in vitro* fertilization, or intracytoplasmic sperm injection. According to NICE guidelines 2013, men with idiopathic semen abnormalities should not be offered antiestrogens, gonadotropins, androgens, bromocriptine, or kinin-enhancing drugs because they have not been shown to be effective. Medicines prescribed to improve semen quality are usually multivitamins and herbal nutritional supplements. These are costly and have no clinically proven value.[5]

In many countries, subfertility treatment is not covered by government-funded institutions or by insurance. Interventions such as assisted reproduction cause great financial burden, and many couples presume they are barren and abandon treatment.[6]

It is observed that there is a tendency in healthcare providers to incriminate male factor for subfertility even when only a slight deviation from presumed normal criteria is observed in semen results. This behavior reduces male partner's respect in his family and results in low self-esteem. Psychological stress results in erectile dysfunctions, severely affecting the quality of life.[7]

There is a dictum that a man cannot be declared infertile unless he had died without procreating. Semen analysis is a poor test with poor predictability. Its results vary considerably from time to time.[8]

This aim of this study is to provide scientific evidence that pregnancies are possible at semen parameters that are below the generally accepted lower limits of normal. We want to establish that at semen parameters lower than those suggested by laboratories, pregnancies can be achieved by removing hindering factors in other partner.

Materials and Methods

Case records of couples with subfertility where the male partner did not receive any treatment and who conceived during the study period were compiled and analyzed.

Subfertility was defined as failure to conceive despite 12 months of regular unprotected sexual intercourse. Males with history of acute illness within last 6 months of semen analysis or taking treatment for male subfertility other than multivitamins or those referred for assisted reproduction techniques were excluded. Furthermore, case files where semen analysis report was missing were excluded.

For the purpose of consistency, all semen analyses were performed at the reference laboratory after 3 days of abstinence, by a single andrologist. The WHO reference values (5th edition, 2010) for semen analysis were utilized to assess the reports. The values are as follows: semen volume, 1.5 ml (1.4–1.7); total sperm number, 39 million per ejaculate (33–46); sperm concentration, 15 million/ml (12–16); vitality, 58% live (55–63); progressive motility, 32% (31–34); total (progressive þ nonprogressive) motility, 40% (38–42); and morphologically normal forms, 4.0% (3.0–4.0). In case of an abnormal initial test, the test was repeated within 3 months, and the final report was included in the analysis. The initial report was not included in the analysis in such cases.

The females received ovulation induction with clomiphene citrate starting from a dose of 50 milligrams per day on day 2 of the cycle. The maximum dose used was 150 mg. The cycles were monitored by ultrasound and controlled stimulation was ensured. When the dominant follicle reached a size of 18 mm, human chorionic gonadotrophin 5000 i.u. was given intramuscularly, and sexual contact was advised. Women who received any other treatment were excluded. Also, women who needed ovulation induction with any other medication were excluded to ensure comparison.

A pro forma was used to collect the data. The demographic data included patient age, height, and weight. Past history regarding infertility duration and type was also analyzed.

There is no formal ethical review committee in the hospital. Therefore, instead of a formal ethics committee, the principles of the Declaration of Helsinki were followed. Data were coded and confidentiality was ensured.

Data were entered and analyzed using SPSS version 15 (SPSS Inc., Chicago, IL, USA). Shapiro–Wilk test was used to assess normality of data distribution. Categorical variables of count (normal/abnormal), morphology (normal/abnormal), and motility (normal/abnormal) were presented as percentages (%).

Variables such as height and weight were used to calculate the body mass index (BMI). Variables such as BMI and age were recoded into BMI range and age range. The BMI ranges were as follows: <18.5 (underweight), 18.5–24.5 (normal weight), 25–29.5 (overweight), and >30 (obese). Age ranges were as follows: <24 years, 25–29 years, 30–34 years, 35–39 years, and >40 years. Frequency and percentages were calculated for qualitative variables such as age range, BMI range, and type of infertility. Effect modifiers were controlled through stratification of men's age and BMI range to identify their effects on the outcome variables. Poststratification Chi-square

test was used with $P \leq 0.05$ considered statistically significant.

Results

During the study period, 343 couples conceived without any treatment of male partner. Of these 343, 11 were not taken into account because of missing semen analysis report.

Of the 332 included, 233 (70.1%) couples conceived despite suboptimal semen parameters. The most common criterion that was not satisfied was rapid linear motility 200 (85.8%), 87 (37.3%) men were oligozoospermic, 94 (40.3%) were asthenozoospermic and 21 (9%) were teratozoospermic [Table 1].

The abnormalities were more common in men having primary subfertility (71.7% versus 28.3%, $P = 0.002$). The abnormalities were more common in the age group 40–44 years ($n = 91$, 39.1%) and those who were overweight ($n = 110$, 47%) [Table 2].

Discussion

Main findings

The present study evaluates the utility of semen analysis criteria by WHO for screening males in couples presenting with subfertility. Our study shows that males with poor semen criteria are not subfertile and can initiate conception without any treatment.

The criteria labeled 87 (37.3%) men oligozoospermic, 94 (40.3%) asthenozoospermic, and 21 (9%) teratozoospermic.

Rapid linear motility criterion was not satisfied by 85.8% of the men.

Strength and limitations

Our study is the first to assess the standard criteria recommended for screening males with subfertility and their subsequent ability to father a child without any treatment.

The major limitation is that we included couples with subfertile females; hence, the effect of sole male factor subfertility could not be ascertained. In the absence of the specific definition and criteria to label a male subfertile, we used WHO semen parameters.

Interpretation

Subfertility continues to be a distressing entity for both patients and clinicians. Male subfertility is an even bigger menace in conservative societies of the region, due to the emotional stigma attached to the condition. Males shun their better halves from seeking treatment because inability to conceive is considered a blow to the manhood.[9]

However, the male's parameters are not reliable and many a times are not reflective of his ability to conceive. Thus, semen analysis alone comes across as a test that may not help but rather hinder the treatment of subfertility in such cases.[7]

Treatment options for males with subfertility are very limited. The measures include lifestyle advice, and in worse case scenarios, artificial reproductive techniques that are not only expensive but have an extremely low success rate. The couple is drained both financially and emotionally in the process.

Male parameters fluctuate and are subject to many other factors such as ejaculatory frequency and time and method of collection. In our study, 40% of males had decreased motility and 37% had decreased number of sperms. This is in agreement with the study of Iwamoto *et al*. who reported abnormal sperm parameters in fertile men from Japan.[10] Thus, cementing the reality that semen analysis cannot be considered a proof of normality.

The sperm parameters also fluctuate seasonally; Turkish study showed that the concentration was affected by season and that "this" variation of semen parameters may be important in diagnosis and treatment decisions.[11] Similarly, samples collected in afternoon are more likely to show increased number of sperms than those collected in morning.[12] Such wide variations from a single test for an individual raises questions of reliability. However, another semen analysis or a second test is not commonly accepted.[13] Even after following the recommendation for abstinence and transport, the semen analysis fails to satisfy the criteria for a reliable test.

Nevertheless, in the absence of any other criteria to assess male partner, semen analysis criteria by WHO are

Table 1: Semen characteristics for individuals with subfertility problems and parameter values falling below World Health Organization reference value

	WHO reference values	Proportion of individuals with results below WHO reference values, *n* (%)
Total number of spermatozoa (*n*)	15	87 (37.3)
Sperm progressive motility (%)	32	94 (40.3)
Normal sperm morphology (%)	4	21 (9.0)
RLP (%)	25	200 (85.8)

WHO=World Health Organization, RLP=Rapid linear progression

Table 2: Comparison of men with abnormalities and those without abnormalities

Characteristics	Semen abnormalities		*P*
	None (*n*=99), *n* (%)	Yes (*n*=233), *n* (%)	
Type of infertility			
Primary	58 (59.3)	167 (71.7)	0.002
Secondary	41 (40.7)	66 (28.3)	
Age range (years)			
<24	11 (11.1)	28 (12.07)	0.705
25-29	27 (27.2)	67 (28.3)	
30-34	8 (7.8)	11 (5.0)	
35-39	13 (13.1)	36 (15)	
>40	40 (40.4)	91 (39.1)	
BMI ranges			
<18.5	9 (9.1)	13 (5.4)	0.169
18.5-24.9	42 (42.4)	93 (40.1)	
25-29.9	42 (42.4)	110 (47.0)	
>30	6 (6.0)	17 (7.4)	

BMI=Body mass index

commonly utilized. The criteria do not take into account the female partner. A young female has better chances of conception even with suboptimal semen.[14] The impact of female factor comes to light in cases where the male seeks a younger mate and is able to father a child with her. This is a commonly observed scenario in the South Asian region where relative subfertility of the male is compensated by the younger female partner.

Thus, semen analysis on its own is an imperfect tool for assessing the male partner and may deprive a male of an opportunity to father a child. If the female partner is treated, the chances of conception may increase. In our study, the females were undergoing treatment for subfertility, and improvement in their subfertility led to successful conception.

The WHO criteria for labeling semen suboptimal have certain implications on the treatment strategies subsequently adopted by physicians. Our analysis also shows that 9% of males with teratozoospermia conceived. Thus, if an absolute value of 4% normality would have been used, these couples would have been referred for artificial reproductive techniques. These techniques do not guarantee a child and are not available in government setups. Even when privately funded, they have a low success rate and bring an emotional turmoil in the lives of these couples.[15]

The threshold used to define sperm parameters have come under strict scrutiny. Fertility experts now advocate that a single semen analysis in the absence of azoospermia or necrospermia does not predict the outcome of fertility treatment received by the couple.[16] In our analysis, such males were excluded because conception in these extreme scenarios is not possible without advanced reproductive techniques. These conditions are an area where the utility of a grossly abnormal semen analysis would continue to be of significant importance.

The semen analysis is a crude measure of a male's ability to conceive. There are certain other aspects that need to be considered before counseling a male about his fertility potential. Our study results are in agreement with this finding. The female partners were treated, and despite poor semen parameters, the couple conceived.

A likely plus point for utilizing semen analysis is that it can easily be incorporated into workup for couples presenting with subfertility. It can help to counsel them regarding their gross fertility status and serve the true purpose of a screening strategy but not treatment strategy.[17]

Another point that merits discussion is that couples should receive counseling before all tests and implications of testing should be explained in detail. Subfertility is a trying condition for any couple, and the emotional distress that comes with it can be compounded by inaccurate assumptions. Such perceived hindrances may negatively affect further treatment-seeking behavior.

Conclusions

A consensus for defining poor semen criteria is the need of the hour so that these males can be counseled satisfactorily. WHO criteria are a standard commonly employed but they do not necessarily predict the fertility potential. Our work shows that although semen parameters may still not be within normal limits, the couple can conceive if other accompanying contributors are removed. We propose adoption of lower percentiles for semen parameters and utilization of this test as a screen and not a predictor of subfertility.

In couples with subfertility, men may have poor semen parameters irrespective of their potential to conceive. Semen analysis is not the sole marker of subfertility in couples, and counseling and simultaneous treatment of other factors can facilitate conception in these couples.

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Conflicts of interest

There are no conflicts of interest.

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