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Impact of Sexual Abstinence Period on Lipid Profiles and Dna Fragmentation Index for Oligozoospermia Patients

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Abstract

Background: Oligozoospermia is a common cause of male infertility, and although the duration of sexual abstinence is known to impact the quality of semen, its correlation with biochemical indicators such DNA fragmentation and lipid levels is still being investigated.

Objective: This study examines the effects of different durations of sexual abstinence on sperm DNA fragmentation index, lipid profile markers, and important semen features in men with oligozoospermia.

Methods: Forty-four men who were infertile and had aberrant semen profiles were divided into two groups according to how long they had been abstinent: two to three days (n = 21) and four to seven. Standard procedures were followed to quantify the characteristics of semen, and blood tests were performed to measure DNA fragmentation index (DFI), low-density lipoprotein (LDL), triglycerides (TG), and total cholesterol (CHO).

Results: Higher round cell count (P=0.017) and significantly superior sperm morphology (36.38% vs. 31.13%, P=0.013) were linked to shorter abstinence (2–3 days). There was an increase in semen volume with longer abstinence (4–7 days) (P=0.035). There were no discernible variations between the groups in terms of DNA fragmentation, lipid markers (TG, CHO, LDL), sperm concentration, or motility (P>0.05).

Conclusion: In oligozoospermic men, the length of sexual abstinence does not seem to substantially change lipid metabolism or sperm DNA integrity, while it does have a detectable effect on certain semen properties, such as morphology and volume.

Keywords: DNA integrity, sperm morphology, oligozoospermia, and sexual abstention

INTRODUCTION

Oligospermia is a major cause of male infertility. This term refers to a condition characterized by low sperm concentration in the semen, reducing the chances of natural fertilization.

The failure to ejaculate causes changes in semen quality which depends on how long one goes without ejaculating. The supposed duration affects multiple semen parameters including counting sperm cells and measuring their movement while inspecting their structure as well as determining DNA damage and semen fat profiles[1].

Seminal element reactions depend on how long a male maintains sexual abstinence. Medical research reveals that sperm cells become more mobile and acquire better shape during two to three days of abstinence when compared to extended abstinent durations [2].

Some scientific evidence indicates prolonged abstinence durations between four to seven days might lead to enhanced semen volume together with higher sperm counts. Oxidative stress together with free radicals create harmful conditions for sperm genes and motility quality during extensive storage time [3].

Sperm fertility depends strongly on semen lipid profiles since lipids function as critical elements for sperm well-being. Recently discovered research shows that blood triglyceride and LDL cholesterol levels above normal cause oxidative stress in the male reproductive organs which results in broken sperm DNA and reduced fertility potential [4].

Elevated lipid materials can damage reproductive cells through oxidative stress and this process leads to sperm DNA damage that reduces fertilization potential 5.

Importance exists between DNA fragmentations in sperm cells and a reduction in fertility capabilities. The outcome from increased DNA fragmentation produces negative effects that reduce natural fertilization chances and decrease pregnancy rates and decrease embryo development quality. An excessive amount of oxidative stress exists between multiple elements including abnormal lipid levels [6] and this research evaluates how abstaining affects semen parameters DNA fragmentation and lipid profiles in patients with oligospermia. Studies of this link may reveal the best abstinence period for male fertility improvements in such cases. The evaluation of sperm DNA provides vital information about male fertility because elevated DNA fragmentation results in diminished chances of pregnancy [7] .

The length of abstinence period influences semen quality measurements and attributes primarily when patient suffers from oligospermia [8].

Research shows that modifications in lipid profile levels including elevated LDL lipids together with triglycerides results in elevated oxidative stress that damages sperm DNA integrity [9].

The research measured the connection between abstinence span and molecular and lipid damage signs in males who struggled with oligospermia.

METHODOLOGY

The experimental design was as follows. remaining samples were centrifuged to extract the seminal plasma from the semen samples, and the semen samples were examined in accordance with the 2010 and 2021 WHO criteria for semen parameters. For biochemical testing, the seminal plasma was moved to an Eppendorf tube and chilled to -20°C. In both groups (normal semen), the association between lipid markers, semen parameters, and abstinence duration was statistically examined. Data (men's age, length of infertility, body mass index, type of infertility, smoking status, and abstinence period), semen analysis results (all semen parameters and sperm), and biochemical tests (total lipid markers, triglycerides, cholesterol, and LDL) were all recorded in this cross-sectional study design. Research was conducted on semen liquefaction time using dry, clean containers that were kept in 37°C incubators for 30 to 1 hour. Semen samples and anomalous semen were tested following the completion of the semen liquefaction time.

Diagnosis of oligospermia is based on identifying one of the most common causes of male infertility. It is diagnosed when the sperm concentration is less than 15 million/ml. This condition is associated with poor fertility and a reduced chance of natural conception. Its causes include hormonal disorders, genetic factors, and unhealthy lifestyles. Diagnosing the exact cause is an essential step in developing an effective treatment plan to improve fertility.

Collection of samples was performed as Patients and controls masturbated in a quiet room next to the seminal fluid analysis laboratory for three to five days after which their semen specimens were immediately collected in a sterile, dry, and clean disposable container. The patient information including name along with age and current sexual abstinence status accompanied the container's label. The conducted specimens received 37ºC temperature incubation for thirty minutes until they reached liquefied state. The researcher microscopically inspected the mixed samples shortly after liquefaction. In order to quantify the seminal fluid results, infertile patients were analyzed and categorized.

Statistical analysis was preceded by verifying whether the data were normally distributed. Before applying statistical analysis and determining the most appropriate statistical method for current data set, it is important to

know whether the data are normally distributed. Normality of distribution was verified using the Shapiro-Wilk test.

The research variables were analyzed with Statistical Package of Social Sciences (SPSS) Version 27 software program (SPSS Inc., Chicago, Illinois, United States) to check for differences. The two independent sample T test established the differences between these groups. The appropriate method to analyze differences between three or more group means is one-way analysis of variance (ANOVA).

The research groups analyzed their data through Pearson's correlation coefficient to determine the relationship between their variables. MedCalc program version 19.1.2 (MedCalc Software Ltd, Belgium) enabled the creation of all Correlation graphs (Statistical software package for the biomedical Sciences). The research determined that statistical significance levels operated under P values lower than 0.05 and 0.01 leading to confirmed statistical significance for differences with less than 5% to 1% probability.

RESULTS AND DISCUSSION

Results showed that Semen characteristics in the abnormal semen group based on durations of sexual abstinence

According to the study's findings, the abnormal semen group's semen parameters varied statistically significantly ($P < 0.05$) between the two periods of sexual abstinence (2–3 days and 4–7 days). Semen volume (2.95 ± 1.39 ml vs. 3.95 ± 1.63 ml, P = 0.035), round cell count (2.95 ± 0.93 million/ml vs. 2.17 ± 0.80 million/ml, P = 0.017), and normal sperm morphology (36.38 ± 7.03% vs. 31.13 ± 6.38%, P = 0.013) varied significantly between the two times.

Sperm concentration (25.00 ± 12.45 million/ml vs. 23.30 ± 11.66 million/ml, P = 0.642) and progressive motility (19.24 ± 4.03% vs. 21.39 ± 4.65%, P = 0.110) did not vary statistically significantly. as displayed in the table.

Table 1. Semen parameter variations based on abstinence duration (2–3 vs. 4–7 days)

semen parameters	2-3 days n=21	4-7 days n=23	P value	Shapiro-Wilk test for Normal distribution
Sperm concentration (Million/ml)	25.00±12.45	23.30±11.66	0.642ns	W=0.9622, accept Normality (P=0.0521)
Progressive motility (%)	19.24±4.03	21.39±4.65	0.110ns	W=0.9775, accept Normality (P=0.5357)
Normal sperm morphology (%)	36.38±7.03	31.13±6.38	0.013*	W=0.9583, accept Normality (P=0.1126)
Semen volume (ml)	2.95±1.39	3.95±1.63	0.035*	W=0.9585, accept Normality (P=0.1145)
Round cell (Million/ml)	2.95±0.93	2.17±0.80	0.017	W=0.9472, accept Normality (P=0.1231)

In the aberrant semen group, lipid profile levels and DNA fragmentation index are correlated with durations of sexual abstinence.

According to the study's findings, there were no statistically significant variations ($P > 0.05$) in the aberrant semen group's lipid profile levels and DNA fragmentation index between the two periods of sexual abstinence (2–3 days and 4–7 days). The results for low-density lipoprotein (LDL) (6.39 ± 4.46 vs. 6.37 ± 3.87, P = 0.989), total cholesterol (CHO) (18.79 ± 8.56 vs. 22.85 ± 9.59, P = 0.147), triglycerides (TG) (19.86 ± 5.57 vs. 18.83 ± 5.69,

P = 0.551), and DNA fragmentation index (32.90 ± 14.93 vs. 30.52 ± 17.44, P = 0.631) did not significantly differ between the two abstinence periods.

The findings from this study demonstrate abstinence period affects particular semen parameters within male patients who experience reproductive problems. Short-term abstinence (2–3 days) was significantly associated with a higher percentage of normal sperm morphology (P=0.013), indicating an improvement in morphological quality.

This is consistent with previous studies showing that short-term abstinence may improve sperm morphology due to reduced exposure to oxidative stress in the reproductive tract [10].

The results also showed that longer abstinence (4–7 days) led to a significant increase in semen volume (P=0.035), which is consistent with what Agarwal et al. [11] showed, which indicated that longer abstinence was associated with an increase in ejaculate volume, but it may be accompanied by a decrease in the quality of some other parameters such as shape or movement. It is also noteworthy in this study that the number of round cells was significantly higher in the short abstinence group (P=0.017), which may indicate the presence of inflammatory activity or immature cells within the sample, and requires further evaluation for clinical interpretation [12].

The research findings indicated comparable sperm concentration and progressive motility values between groups because these characteristics seem unaffected by abstinence duration when sperm count is low [13].

Accordingly, it can be said that reducing the duration of sexual abstinence to 2–3 days may improve some qualitative characteristics of semen, particularly normal morphology, without negatively affecting volume or concentration, which may be beneficial in improving fertility chances in men with oligospermia. The results of the current study showed no significant differences in blood lipid levels (triglycerides (TG), cholesterol (CHO), and low-density lipoprotein (LDL)) among men with oligospermia based on the duration of sexual abstinence. The values remained close and no statistically significant differences were recorded (P>0.05). These results are consistent with what González-Marín et al [14] indicated, that blood lipids are primarily influenced by lifestyle, diet, and hormonal status rather than by the duration of sexual abstinence. Regarding the DNA fragmentation index (DFI), the data showed that values remained within a non-significant range between the two groups (32.90±14.93 vs. 30.52±17.44, P=0.631).

This suggests that the length of abstinence does not have a significant impact on sperm DNA integrity in this patient group, which is consistent with the study by Ribas-Maynou et al. [15] which demonstrated that DNA fragmentation is more affected by oxidative stress and chronic diseases than by abstinence.

It is thought that short abstinence periods may shorten the time sperm are exposed to free radicals without changing the biochemical parameters in the circulation, and that compensatory mechanisms in the prostate and epididymis that maintain a stable oxidative environment within the reproductive system may be the reason why DFI levels remain stable despite fluctuating abstinence periods [16] .

The results of this research validate the hypothesis which states that oligospermic men experience no substantial changes in their blood lipid composition or genetic integrity markers during periods of sexual abstinence. Therefore, scientists should prioritize other factors for better fertility outcomes.

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CONCLUSION

The research findings demonstrate that the period of celibacy in men with disabilities might influence identical semen factors although these elements failed to establish meaningful connections with control and integrity and efficacy metrics. Furthermore, shorter abstinence duration (2–3 days) was associated with improved morphology in normal females and increased sperm count, while longer abstinence duration (4–7 days) was associated with improved semen volume. However, there were no statistically significant differences between the two groups in terms of partners, motility, quantitative markers (TG, CHO, LDL), and the dilutional fractionation index (DFI).

These findings suggest that although semen quality may be partially determined by the duration of primary abstinence, the chemical and genomic integrity of the partner also partially determines the difference. In order to enhance particular semen properties without adversely affecting DNA integrity or lipid metabolism, enhancing abstinence time may be taken into consideration in therapeutic fertility settings.

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