

RESEARCH ARTICLE

Correlation between seminal fructose level and sperm motility in infertile male in southern part of Rajasthan – A cross-sectional study

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ABSTRACT

Background: Fructose is the major carbohydrate source of energy for the sperm motility. **Aim and Objective:** This study was designed to reevaluate the correlation between sperm motility and semen fructose level in male infertile subjects due to non-obstructive causes. **Materials and Methods:** It was a cross-sectional study. As the study sample population, 150 male subjects, with age (mean \pm SD) 29.02 ± 5.86 years, were randomly selected from the referred cases from different infertile clinics of Udaipur. Sperm count, sperm motility, and qualitative and quantitative analysis of semen fructose were done. On the basis of sperm count, the sample population was divided into following three groups – Group A (azoospermic), Group B (oligozoospermic), and Group C (normozoospermic). One-way ANOVA was done to compare the sperm count and seminal fructose levels among A, B, and C groups. Kruskal–Wallis test was done to compare the sperm motility. Statistical analysis of result was performed using SPSS-17. $P < 0.05$ was considered to be statistically significant. **Results:** There was a significant difference in the sperm concentration among three groups ($P < 0.001$). Groups were significantly differing in seminal fructose level ($P < 0.001$). **Conclusion:** This study showed a significant negative correlation between seminal fructose level and sperm motility.

KEY WORDS: Male Infertility; Seminal Fructose; Sperm Motility

INTRODUCTION


Infertility is defined as a clinical condition when a couple fail to conceive after 1 year of sufficiently regular unprotected intercourse.^[1-3] It lays an immense emotional and social stress. In case of male infertility, semen analysis is an important investigation. Semen is a composite solution consisting of sperms suspended in seminal plasma. Fructose is secreted by the seminal vesicles. It is the major carbohydrate source and acts as a donor of energy for the spermatozoa.^[4,5]

Many studies pointed toward a negative correlation between semen levels of fructose and sperm motility.^[5-7] Patel *et al.* study results showed a positive correlation between percentage of motility of sperm and fructose in normozoospermia.^[8]

This study was designed to reevaluate the correlation between sperm motility and semen fructose level in male infertile subjects due to non-obstructive causes.

MATERIALS AND METHODS

This was a cross-sectional study designed to demonstrate the relationship between fructose concentration and sperm motility as no such study has been done in the southern part of Rajasthan. We also intended to see whether semen fructose concentration detected in routine semen analysis gives information of clinical significance, especially in infertile males with asthenozoospermia. This study was

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carried out in the Department of Physiology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan. Ethical approval was taken from the Institutional Ethical Committee. As the study sample population, 150 male subjects, with age (mean \pm SD) 29.02 ± 5.86 years, were randomly selected from the referred cases of different infertile clinics of Udaipur. Subjects with a history of hernia repair, hormonal imbalance, and cases of obstructive azoospermia were excluded from the study. All subjects were briefed regarding the objectives and their queries were answered. Written consent was taken.

Before starting of the study, all subjects underwent a general physical examination. Information regarding family and medical history, dietary habits, smoking, and alcohol consumption was collected with the help of questionnaire.

Subjects were instructed regarding precautions of semen sample collection. The following instructions were given:

- The sample should be collected after a minimum period of 3 days but no longer than 7 days of sexual abstinence
- Semen should be obtained by masturbation
- Semen should be collected into a clean and sterile container
- The following information should be filled on a pro forma.
 - Name of the person
 - Date and time of sample collection
 - Period of abstinence.

Laboratory investigations – Sperm count, sperm motility, and qualitative and quantitative analysis of semen fructose were done according to the WHO guidelines of 5th edition 2010.^[9]

Classification of sample population – On the basis of sperm count, the sample population was divided into following three groups – Group A (azoospermic), Group B (oligozoospermic), and Group C (normozoospermic).

One-way ANOVA was done to compare the sperm count and seminal fructose levels among A, B, and C groups. Kruskal–Wallis test was done to compare the sperm motility. Statistical analysis of result was performed using SPSS-17. $P < 0.05$ was considered to be statistically significant.

RESULTS

Table 1 shows that there was a significant difference in the sperm concentration among three groups [$F(2,147) = 1157.37, P < 0.001$]. There was a significant difference in seminal fructose level [$F(2,147) = 256.87, P < 0.001$]. Table 2 indicates that there was a significant difference in sperm motility between different groups ($P < 0.001$). Pearson's correlation test showed significant negative correlation between seminal fructose and sperm motility ($R = -0.581; P < 0.001$).

DISCUSSION

It has been widely accepted that sperm motility is one of the important indicators in determining the fertility of the person.^[10] The results of this study showed a significant negative correlation between sperm motility and semen fructose concentration. Fructose is the main source of energy for the sperm motility. The degree of fructose utilization is directly proportional to the sperm motility. It could be the cause of negative correlation between sperm motility and semen fructose level.

The study goes way back when Mann put forth the utilization and non-utilization hypothesis in 1948.^[11] He was the first to discover the presence of fructose in the semen and he demonstrated the relationship between seminal fructose levels, sperm count, and the metabolic activities of the sperm including sperm motility in his hypothesis.^[11]

Since then, various studies have been done to evaluate this hypothesis. Biswas *et al.* demonstrated low values of fructose in normozoospermic man due to utilization of fructose by the motile sperms.^[5] Rajalakshmi *et al.* reported that fructose concentration in seminal plasma is one of the important markers of seminal vesicular function and if the seminal vesicular function is decreased, then semen coagulation, sperm motility, stability of sperm chromatin, and semen immune protection are affected.^[6] However, Patel *et al.* demonstrated a positive correlation between seminal fructose concentration and percentage of sperm motility.^[8]

Table 1: One-way ANOVA comparing sperm motility and sperm fructose level among Groups A, B, and C

Variable	Group	Mean	SD	F	P-value
Sperm concentration (Million/ml)	A	0.00	0.00	1157.37	<0.001
	B	10.63	2.44		
	C	75.60	14.53		
Seminal fructose level (mg/dl)	A	357.76	25.98	256.87	<0.001
	B	316.44	34.74		
	C	232.14	24.36		

Table 2: Kruskal–Wallis test results for comparison of sperm motility among Groups A, B, and C

Group	Mean rank	Chi-square	df	P-value
A	25.50	107.064	2	<0.001
B	92.67			
C	108.33			

CONCLUSION

Fructose is a source of energy for the sperm motility. This study showed a significant negative correlation between seminal fructose level and sperm motility. This could be helpful in the diagnosis of male infertility due to non-obstructive causes.

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