

FRUCTOSE CONTENT AND SEMINOGRAM — A COMPARATIVE STUDY

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SUMMARY

Seminal fructose levels were estimated in 150 young subjects between the age group 22-47 years who visited the Reproductive Biology Unit of Department of Physiology. No significant relationship between spermatozoa density and fructose concentration of semen was observed but inverse ratio between percentage of motile spermatozoa and fructose concentration was noted.

Introduction

In species where fructose is a normal constituent of seminal plasma, anaerobic fructolysis is the metabolic process which enables the spermatozoa to survive without oxygen. Many workers noted that fructose content of semen was inversely related to sperm count. (Davis and McCune, 1950; Schirren, 1955) while other observers failed to observe such inverse relations (Tyler, 1955, Sheth and Rao 1955).

Phadke et al (1973) on the basis of testicular biopsies concluded that level of fructose in semen varies inversely with the germinal cell activity. Gregoire and Moran (1973), Biswas et al (1978) found a significant negative correlation between

the motility and the fructose concentration in normospermic group.

This study was undertaken to clarify the dispute regarding the fructose content and sperm density and motility.

Material and Method

Semen samples were obtained from male patients of infertile couples attending the Reproductive Biology Unit in the Department of Physiology of Mahatma Gandhi Institute of Medical Sciences, Sevagram. The subjects were asked to observe an absolute abstinence of 3 days and semen collected on the fourth day in a dry wide mouthed sterile container by masturbation. Samples were analysed immediately after liquifaction of semen for volume, pH, sperm density, sperm motility and morphology.

A - Sperm density and sperm motility was determined by Hotchkiss (1970)

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method.

B - Morphology of sperm was determined by method of Amelar (1966).

C - On the basis of sperm density and sperm motility the ejaculates were classified into the following groups:

1. *Normospermic* -

Sperm count, more than 20×10^6 /ml of semen with normal morphology and motility.

2. *Oligospermic* -

Sperm count less than 20×10^6 /ml but with normal sperm motility and morphology.

3. *Asthenospermic* -

Sperm count more than 20×10^6 /ml but with motility less than ++

4. *Oligoasthenospermic* -

Sperm count less than 20×10^6 /ml and motility less than ++

5. *Azoospermic* -

Absence of spermatozoa in the semen.

D - Seminal fructose content was determined by technique described by Mann (1964).

Observations

TABLE - I
SEMINAL FRUCTOSE CONTENT IN VARIOUS GROUPS

Group	Fructose Content (mg/100 ml of semen) (Mean \pm SD)
Normospermic (60)	201 \pm 96.55
Oligospermic (20)	249 \pm 135.48
Asthenospermic (20)	339 \pm 141.55*
Oligoasthenospermic (25)	271 \pm 128.43*
Azoospermic (25)	240 \pm 128.82

Values are mean \pm S.D. (*p < 0.01) versus group I
Numbers in parenthesis indicates number of cases.

TABLE - II
RELATIONSHIP BETWEEN SPERMATOZOA DENSITY AND FRUCTOSE CONCENTRATION

Mean sperm count (Millions/ml) (Mean \pm SD)	Fructose concentration (mg/100 ml of semen) (Mean \pm S.D.)
9.40 \pm 6.15	249.25 \pm 135.48
36.80 \pm 5.05	175.00 \pm 84.86
55.40 \pm 6.10	183.00 \pm 113.65
71.80 \pm 5.90	172.00 \pm 63.44
93.25 \pm 6.00	244.00 \pm 117.40
108.00 \pm 2.80	175.00 \pm 83.83
137.20 \pm 1.60	247.60 \pm 43.09
148.60 \pm 6.50	246.60 \pm 41.09

TABLE - III
RELATIONSHIP BETWEEN MEAN PERCENTAGE OF MOTILE SPERMATOZOA AND FRUCTOSE CONTENT OF SEMEN

Mean percentage of motile sperm count	Mean fructose cone (mg/100 ml of semen) (Mean \pm SD)
55.5	287.5 \pm 136.3
65.5	226.5 \pm 82.5
75.5	163.0 \pm 55.1
85.5	230.7 \pm 101.9
95.5	84.4 \pm 60.2

Results

Mean fructose content of semen in all groups was found to vary between 200-350 mg/100 ml of semen. Fructose content of semen in asthenospermic and oligoasthenospermic group was found to be significantly higher than normospermic group (Table I). Inverse ratio between sperm concentration and fructose level was not observed at all levels (Table II).

Discussion

Inverse ratio between sperm count and fructose content of semen was noted by several authors which was explained on the following four basis :

(a) Low values for seminal fructose in normospermic could result from the utilization of fructose by spermatozoa (Utilization hypothesis) Davis and McCune, 1950).

(b) Tyler (1955) and Macleod and Freund (1958) suggested that in semen with higher concentration of sperm, an appreciable volume of ejaculate is occupied by spermatozoa and hence the content per ml. is proportionally low.

(c) According to Sheth and Rao (1962) higher values for seminal fructose in azoospermics could be due to another reducing substance namely Tryptophan in semen.

(d) Schirren (1963) held the view that the presence of oestrogen like substances in seminal plasma could be responsible for lower values of seminal fructose in normospermic men. These oestrogen like substances may suppress pituitary interstitial cell stimulating hormone secretion which in turn might be responsible for the diminished Leydig cell activity reflected by lower seminal fructose content.

However, on the basis of low fructose values found in obstructive azoospermic and necrospermic Phadke et al (1975) refuted the utilization hypothesis.

Values obtained for seminal fructose

in different groups in this study do not vary much from those quoted by Phadke et al (1973). The higher values of fructose observed in oligospermic and azoospermic groups partly support the view of Phadke et al (1973) that fructose level is inversely related to germinal cell activity but this inverse relation was not maintained at all levels of sperm count. The inverse ratio observed between percentage of motile spermatozoa and fructose content of semen strongly agrees with the findings of Biswas et al (1978) and Gregoire and Moran (1973).

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