# A STUDY OF FRUCTOSE CONTENTS IN THE SEMINAL PLASMA OF INFERTILE, FERTILE AND MEN OF UNKNOWN FERTILITY

by

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*Introduction*

In male, evaluation of infertility is usually done by sperm counts, viability, morphology and mobility of spermatozoa, but such studies can not assess the role of seminal plasma in reduced fertility potential. The human seminal plasma consists of inorganic and organic constituents. Amongs organic, fructose is absolutely essential for spermatozoal activity i.e. mobility, viability and metabolism (Mann, 1948). Fructose is anaerobically metabolized to lactic acid and this process provides energy for the motility of the spermatozoa. Therefore, the present study has been undertaken to evaluate the fructose level in infertile, fertile and unknown fertility men.

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Moreover, Mann and Parsons (1947) showed that a definite relationship existed between seminal fructose and testosterone production, and the androgenic activity is accompanied by an increased level of fructose in the seminal fluid.

Fructose is mainly derived from the seminal vesicles (Mann, 1948). Yet an additional amount of this seminal sugar comes from the glands of the ampulla.

*Material and Methods*

Specimens of seminal fluid were collected from (i) men whose wives had not conceived after 3 years of married life (infertile group), (ii) men who were married and had children (fertile group), (iii) men who were unmarried and their fertility status was unknown but otherwise they were healthy normal adults (unknown fertility).

Specimens were taken usually after 5 days of abstinence. In most of the cases the specimens were collected by masturbation in clean petri dishes, but in a few cases the specimens were collected in 'nirodh' (condom) during coitus.

Fructose level were estimated by calorimetric method (Mann, 1948).

The results of the present study are shown in Tables 2, 3, and 4.

TABLE 1
*Material*

| Group No. | Name of group | No. of cases | Age (yrs.) | |
|---|---|---|---|---|
| | | | Range | Average |
| I. | Infertile group | 150 | 23-40 | 29 |
| II. | Fertile group | 150 | 24-36 | 28 |
| III. | Unknown fertility group | 150 | 18-26 | 22 |

TABLE II
*Fructose Value in Seminal Fluid.*

| Group | No. of cases | Fructose value per 100 ml of semen | | | Fructose value per ejaculate of semen | | |
|---|---|---|---|---|---|---|---|
| | | Range mg/100 ml | Average mg/100 ml | SD | Range mg/100 ml | Average mg/100 ml | SD |
| Infertile | 150 | 160-500 | 330.4 | 4.8336 | 3.5-20.4 | 11.5 | 2.3 |
| Fertile | 150 | 210-510 | 387.4 | 4.3764 | 7.1-21.9 | 13.4 | 2.9 |
| Unknown fertility | 150 | 210-510 | 382.5 | 4.4662 | 6.4-24.5 | 13.3 | 2.7 |

TABLE III
*Fructose Value in Infertile Group.*

| S. No. | Semen quantity | No. of cases | Fructose mg/100 ml | | Fructose mg/ejaculated | |
|---|---|---|---|---|---|---|
| | | | Range | Average | Range | Average |
| 1. | Azoospermia | 20 | 240-50 | 354 | 3.5-20 | 14.4 |
| 2. | Oligospermia (Less than 20 millions | 30 | 272-450 | 290 | 7.4-14.4 | 12.5 |
| 3. | Count less than 60 millions | 40 | 180-432 | 283 | 3.3-13.0 | 10.5 |
| 4. | Count more than 60 millions | 60 | 160-240 | 203 | 3.5-10.2 | 7.6 |

TABLE IV
*Difference of Mean Values Amongst Three Groups*

| S. No, | Group | Fructose value per 100 ml of semen | | Fructose value per ejaculate of serum | |
|---|---|---|---|---|---|
| | | t | p | t | p |
| 1. | Infertile Vs Fertile | 8.793 | $<.05$ | 6.325 | $<.05$ |
| 2. | Infertile Vs Unknown fertility | 7.963 | $<.05$ | 6.2521 | $<.05$ |
| 3. | Fertile Vs Unknown fertility | 0.788 | $>.05$ | 0.311 | $>.05$ |

$<$ = Significant. $>$ = Insignificant

In the present study an attempt has been made to determine the fructose of human seminal plasma in fertile, infertile and unknown fertility men and compared with the values reported by either workers.

The normal fructose values found by different by various workers is given in Table V. Our value (487.4 mg/ml) is higher than that reported by other workers. The difference may be because the method used by us is different from other workers.

lation between the two groups. Our results depicts that there is significant difference of mean values of fructose among infertile versus fertile group and infertile versus unknown fertility group but insignificant among fertile versus unknown fertility group (Table 4).

It has been shown by Harvey (1951), Tyler (1955), Vaishwanar (1958) and Maclead and Freund (1958) that in human semen an inverse relationship exists between the initial fructose level and the sperm count, while Sheth and Rao

TABLE V

*Fructose Values of Human Semen According to Various Workers*

| S. No. | Investigators | No. of semen samples used | Method used | Average mg fructose per 100 ml serum |
|---|---|---|---|---|
| 1. | Huggins & Johnson | 6 | Hiller, Linder and Vanslyke | 282 |
| 2. | Hotchkiss et al | 64 | Folin & Wu as modified by Benedict | 306 |
| 3. | Macleod & Hotchkiss | 114 | Benedict | 256 |
| 4. | Pryde | 3 | Skatole | 351 |
| 5. | Harvey | 725 | Resorcinol | 278 |
| 6. | Tyler | 82 | Resorcinol | 328 |
| 7. | Vaishwanar | 125 | Resorcinol | 311 |
| 8. | Macleod & Freund | 110 | Resorcinol | 296 |
| 9. | Vasterling | 400 | Resorcinol | 289 |
| 10. | Sheth & Rao | 200 | Chromatographic | 225 |
| 11. | Present study | 150 | Calorometric | 387.4 |

The normal fructose value in fertile also differ in different age group. Sheth and Rao (1962) in 80 samples taken from the age group of 20 to 29 years found to be 251 mg/100 ml. Our study does not corroborate this at the average as of 28 years of fertile group, the value was 387.4 mg/100 ml showing the higher value.

Fructose values in the semen of fertile and infertile men have been done by Sheth and Rao (1962). They found average fructose value to be 225 mg/100 ml of semen. They have not shown any correlation between the two groups. Our results depicts that there is significant difference of mean values of fructose among infertile versus fertile group and infertile versus unknown fertility group but insignificant among fertile versus unknown fertility group (Table 4).

It has been shown by Harvey (1951), Tyler (1955), Vaishwanar (1958) and Maclead and Freund (1958) that in human semen an inverse relationship exists between the initial fructose level and the sperm count, while Sheth and Rao (1962) have shown that there is no appreciable difference in the fructose levels of azoospermic semen samples and those with high count. Our results as shown in Table III depict that there is a definite inverse relationship existing between the fructose level and sperm count. The value of fructose level in azoospermic was 354 mg/100 ml while semen having count more than 60 millions was 203 mg/100 ml.

Thus the present study concludes that:

(1) the estimation of fructose level is an important parameter for semen quality

*Evaluation of Simplified Techniques of Tubectomy—Kumar et al. pp.* 235-237

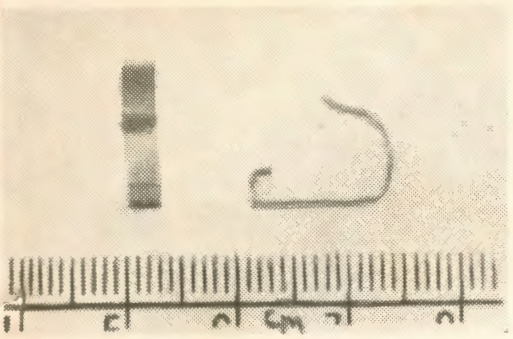

Fig. 1
The Filshia Clip (Mark — IV)
View—I: Showing that only 3 mm of tubal length is occupied.
View—II: Showing that clip is 12 mm long.

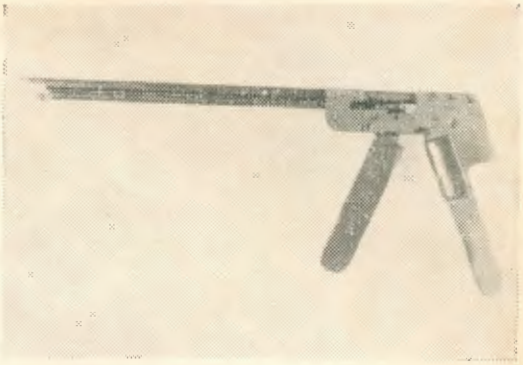

Fig. 2
The Filshe Clip Applicator.

*A Comparative Study of Creatinine Level—Sinha and Anmola Sinha pp.* 261-266

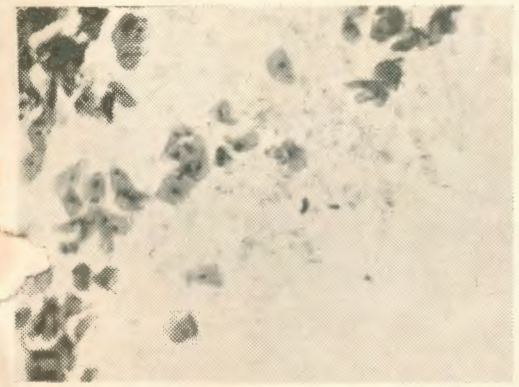

Fig. 1
Photomicrograph showing discrete type of vaginal smear (50 X)

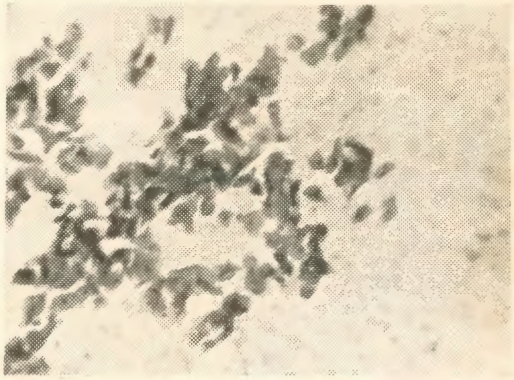

Fig. 2
Photomicrograph showing clump type of vaginal smear (50 X).

Fig. 1
Laparotomy view showing uterus at left of the lower end of incision with both fallopian tubes held in Babcock's forceps and intact gestation sac with placenta anteriory situated.

Fig. 2
Macerated term fetus delivered out. Placenta on right side of uterus with attachment to right broad ligament.

*Classical Caesarean Section in Obstetric Practice —Goswami et al. pp.* 252-255

Fig. 1
Diagram showing the pelvic inlet of an osteomalacic pelvis. She was para 1 + 0 and had classical section, under local anaesthesia.

*Primary Ovarian Pregnancy and Intrauterine— Aggarwal et al. pp.* 335-336

Fig. 1
Photomicrograph shows villi of first trimester with a central core of connective tissue and peripheral lining of cyto-syncyto trophoblasts (Haematoxylin and eosin; X10th the figure in the rt hand corner shows the CuT removed from the uterus of the patient.

Fig. 1
Specimen of bilateral ovarian tumour with uterus and tubes.

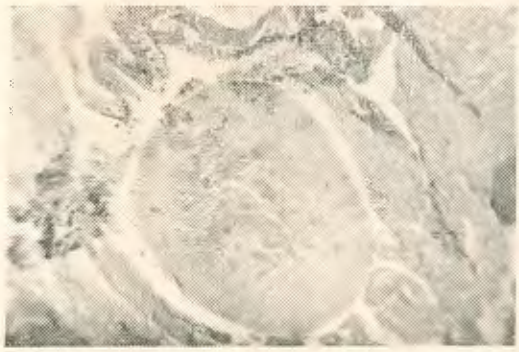

Fig. 2
Photomicrograph showing a circumseribed carcinomatous mass occupying the lumen of fallopian tube (H&E x 60).

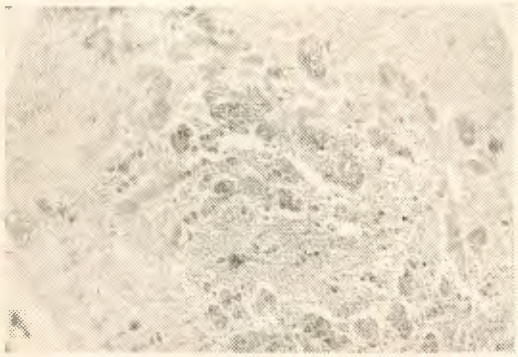

Fig. 3
Photomicrograph showing magnified view of Fig. 2 with psammoma bodies (H&E x 100).

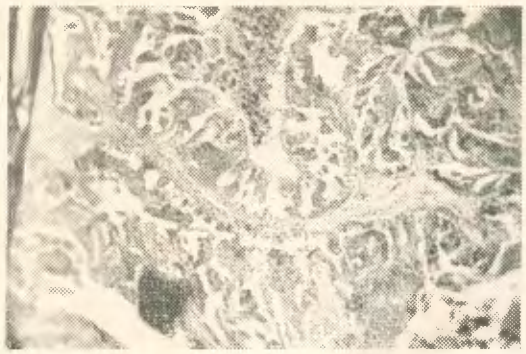

Fig. 4
Photomicrograph showing papillary serous cystadenc-carcinoma of ovary (H&E x 100).

*Bilateral Primary Ovarian Carcinoma—Vyas et al. pp.* 341-342

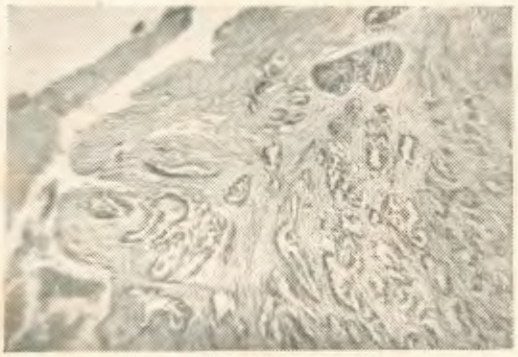

Fig. 5
Photomicrograph from sections of myometrium showing subserosel lymphatic channels studded with tumour emboli (H&E x 60).

*Pelvic Haemangiopericytoma—Shukla et al. pp.* 354-355

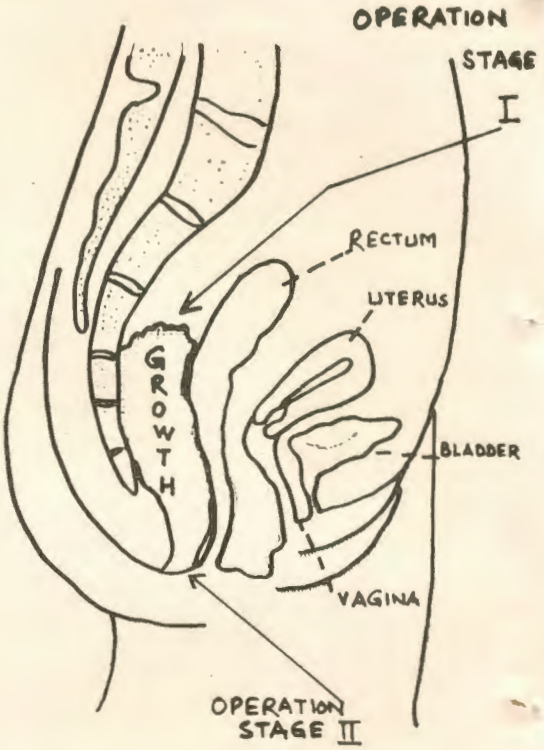


Fig. 1
Diagram showing exact location of tumour and operative approaches.

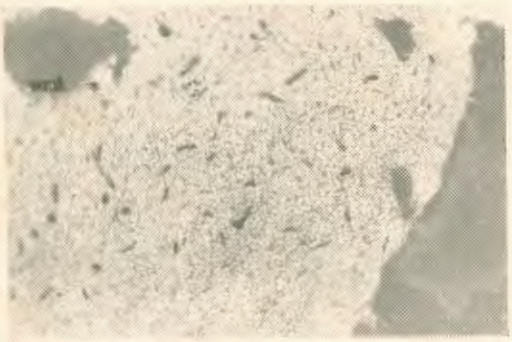

Fig. 2
Microphotograph under low-power magnification.

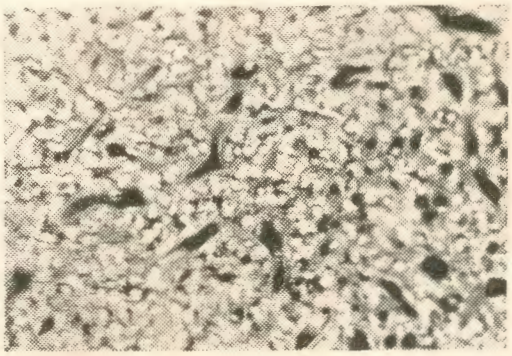

Fig. 3
Microphotograph under high magnification.

*Androblastoma of Ovary—Hayatnagarkar et al. pp.* 343-344

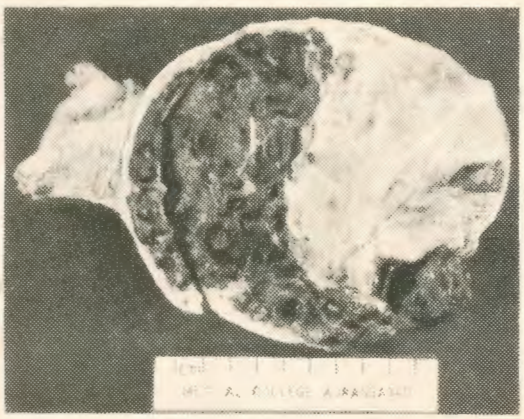

Fig. 1
Photograph showing the cut surface of Androblastoma of Ovary on gross section. The congested area and cysts are seen.

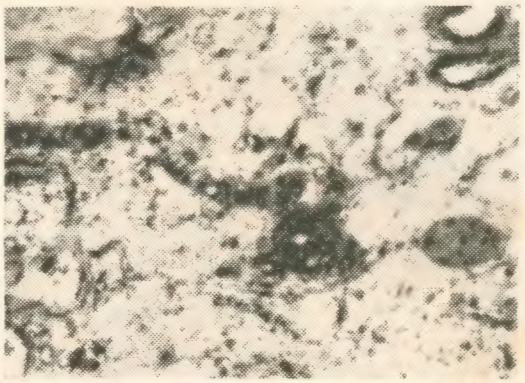

Fig. 2
Photomicrograph of ovary showing the features of Sertoli-leydig Cell Tumour of intermediate differentiation. Leydig—Cells are seen prominently. H E x 100.

*Broad Ligament Fibroid—Goswami et al. pp.* 352-353

Fig. 1
Classified broad ligament myoma enucleated from right side in case 1.

Fig. 2
Left sided broad ligament fibroid along with uterus, ovaries and tubes. Cervix removed after subtotal hysterectomy is stitched up in position (Case 2).

among fertile, infertile and unknown fertility men.

(2) There is significant difference in the mean values of fructose among infertile versus fertile and infertile versus unknown fertility group.

(3) There is definite inverse relationship exists between the fructose level and sperm count.

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