THE MALE FACTOR IN FERTILITY AND INFERTILITY

By

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(Received on September 2, 1959)

It is only in recent years that the fertility of the husband has been given due consideration in the study and treatment of the infertile couple. There has been an emphasis to evaluate the male factor in sterility due to increasing knowledge of the physiology and biochemistry of semen.

The clinical studies on infertility have also shown that the assessment of the physiological and biochemical aspect of semen is of prime diagnostic value. Vaishwanar (1958) has suggested that the rate of fructolysis in human semen affords a measure to evaluate the quality of the semen as the fructose utilisation has been found to correlate closely with cell count and the motility of the sperm.

Farris (1950) has originated the method of semen analysis which is an easy and accurate procedure in determining the potential degree of the fertility of the male, where the number of the active sperms per cubic centimeter of semen are counted on the theory that only the active sperms are capable of reaching and fertilizing the ovum. McCormick (1958) has emphasized further that the potential degree of fertility in man can be judged conveniently by the presence of active motile sperms in the ejaculate rather than the total count (active and inactive) of the sperms.

The present investigation therefore has been carried out to evaluate the male factor in fertility and infertility where a study of the quality of semen has been undertaken in 500 consecutive unselected men whose wives complained of at least one year's infertility.

METHOD AND PROCEDURE

Husbands whose wives had not yet produced a child or else had failed to give birth to a second child were directed for examination from the gynaecological out-patients department of the Medical College, Nagpur. These men were subjected to examination after at least three days abstinence from intercourse.

The husband collected his total ejaculate in a sterile wide mouthed bottle, having produced it either manually or by coitus interruptus without the use of condom. In order to allow liquefaction to occur the specimen was not examined until 1 to 2 hours of the collection.

The analysis of semen was performed by a standardised technique during the four year period from 1953 to 1957. The repeat analyses were excluded and seminal findings of the first analysis in 500 consecutive men have been presented.

The counting of the active sperms was done by the method of Farris (1950). A few drops of well mixed semen were diluted 1 : 10 or 1 : 20 with Locke's solution in a white blood counting pipette. The moving cells were counted upon a red cell counting chamber using a high power objective. The number of active sperms per cubic centimeter of the semen was thus known and then the number of active sperms in the entire ejaculate was computed. The resulting figure, which has been referred to as absolute motility and expressed in millions of active sperms, is employed as the measure or index of individual's degree of fertility.

RESULTS AND COMMENT

TABLE I

Percentages of different fertility groups.

Group	Estimated degree of fertility	Active sperms in millions	No. of analyses	Percentage
A	Highly fertile	185 or more	257	51.4
B	Relatively fertile	80-184	75	15.0
C	Subfertile	1-80	126	25.2
D_1	Sterile	Necrospermatic	5	1.0
D_2	Sterile	Azoospermatic	37	7.4
All groups			500	100.0

Five hundred independent semen analyses are distributed in Table I according to the degree of fertility. A highly fertile male is one who has a total of 185,000,000 or more active sperms; a relatively fertile male 80,000,000 to 184,000,000; a subfertile male less than 80,000,000 and a sterile male one whose specimen is either necrospermatic or azoospermatic. It has been observed that 332, or 66 per cent, of these men had an absolute motility of 80,000,000 or more sperm and were potentially fertile, whereas 168, or 34 per cent, were potentially subfertile and sterile.

Based on the work of Farris (1950) a man is highly fertile if he has a total count of 185,000,000 or more active sperms per ejaculate, as he will not have to be too accurate in timing his relations at his wife's fertile period.

In the present study 51 per cent of the men fell into this category (Table II); whereas it is seen that 49 per cent of the men were either a contributory or an absolute factor for the sterile unions. As far as an absolute factor is concerned, 8 per cent of these men were clinically sterile, being either necrospermatic or azoospermatic.

TABLE II

Averages with S. D. and S. E. for 500 independent semen analyses.

Semen Character	Group A				Group B				Group C				Group D1				Group D2			
	No. of analyses	Average	S.D.	S. E.	No. of analyses	Average	S.D.	S. E.	No. of analyses	Average	S.D.	S. E.	No. of analyses	Average	S.D.	S.E.	No. of analyses	Average	S.D.	S.F.
Volume in c.c.	257	4.12	0.95	0.006	75	3.10	0.58	0.065	126	1.90	0.61	0.054	5	1.20	0.84	0.374	37	1.48	0.78	0.128
Count per c.c.	,,	168.43	33.00	2.058	,,	85.50	19.48	2.178	,,	36.75	18.13	1.615	,,	4.8	3.55	1.586	—	—	—	—
Count in ejaculate	,,	651.80	241.20	15.046	,,	267.65	70.75	7.910	,,	79.25	49.15	4.379	,,	8.1	10.05	4.495	—	—	—	—
Active sperms per c.c.	,,	96.04	23.40	1.460	,,	47.13	9.97	1.115	,,	22.36	11.80	1.051	—	—	—	—	—	—	—	—
Absolute motility (million)	,,	383.60	179.20	11.178	,,	130.10	29.85	3.337	,,	37.94	21.86	1.947	—	—	—	—	—	—	—	—
Percentage motile drive	,,	58.76	7.30	0.455	,,	50.37	8.05	0.900	,,	49.64	15.02	1.338	...	..	..	..	—	—	—	—
Speed per sec.	,,	1.26	0.47	0.029	,,	1.49	0.52	0.058	,,	6.86	2.26	0.201	..	...	...	...	—	—	—	—
Percentage oval	,,	70.77	6.27	0.391	,,	68.20	6.33	0.708	,,	57.46	11.03	0.983	5	36.0	8.94	4.000	—	—	—	—

Table II gives averages with standard deviations and standard errors of the different factors of semen of the different groups. It is seen that all averages (except speed drive) decrease as one passes from column A to column D. As expected the same is noticed for the speed drive in reverse order.

TABLE III

Correlation coefficient

Between	Coefficient of correlation	S. E.	Ratio	Remark
(1) Count and volume	0.673	0.0256	26.3	Significant
(2) Active sperm and count	0.928	0.0065	142.8	Significant
(3) Percentage oval and speed drive	- 0.691	0.0244	28.3	Significant

The correlations between count and volume and between active sperm and count are high and positive and the maximum value is seen between active sperm and count whereas the correlation between percentage oval and speed drive is high and negative (Table III).

TABLE IV

Test of significance (Volume c.c.)

Difference (assumed to be one c.c.) between means of the groups	Inverse of the standard error of the difference in means	D.F.	Remarks
Gr. A and Gr. B	9.37	495	Significant
Gr. B and Gr. C	8.41	,,	Significant
Gr. C and Gr. D_1	2.68	,,	Significant

The changes in the average values of the semen between the different groups are characteristically significant. The average volume of the ejaculate decreases by about 1 cubic centimeter in order from the highly fertile to sterile group [as confirmed by statistical analysis (Table IV)].

TABLE V

Test of Significance (*Active sperm*)

Between Groups	Difference between higher mean and twice the lower mean	Standard error of the difference	D.F.	Ratio	Remarks
C and B	2.41	4.045	455	< 1	Not significant
A and B	1.78	4.563	,,	< 1	,,

The statistical analysis shown in Table V gives out that the sequence of average of active sperm arranged according to the potential degree of fertility constitutes a geometric series with common ratio '$\frac{1}{2}$', or in other words the active sperm per cubic centimeter in the relatively fertile group is $\frac{1}{2}$ of the highly fertile group and again the average value in the subfertile group is $\frac{1}{2}$ of the relatively fertile group.

TABLE VI

Test of significance (*Speed of sperm*)

Between groups	Difference in means	Standard error of the difference	D.F.	Ratio	Remarks
A and B	0.23	0.165	455	1.39	Not significant
A and C	5.60	0.137	,,	4.09	Significant
B and C	5.37	0.184	,,	2.93	Significant

The differences between averages of speed drive of highly fertile and relatively fertile is, however, not significant even though the average values in either group is significantly higher than the subfertile group (Table VI).

TABLE VII

Test of significance (*Percentage oval*)

Between groups	Difference in means	Standard error of the difference	D.F.	Ratio	Remarks
A and B	2.57	1.086	495	2.37	Significant
B and C	10.74	1.206	495	8.91	Significant
C and D_1	21.46	3.776	495	5 69	Significant

The average values of percentage of oval forms differ as much as the degree of fertility diverges between the groups (Table VII).

SUMMARY

(1) Using Farris technique the results have been given of semen analyses in 500 consecutive unselected men whose wives complained of at least one year's fertility.

(2) It has been found that 49 per cent of these men were wholly or partially responsible for sterile unions.

(3) It has been shown that 8 per cent of the patients were clinically sterile, viz., 1 per cent necrospermatic and 7 per cent azoospermatic.

(4) The average volume of ejaculate showed a decrease by about 1 cubic centimeter in order from highly fertile to sterile group.

(5) It has been revealed that the active sperm per cubic centimeter decreases in a geometrical progression as one passes from highly fertile group to subfertile group.

(6) The average value of speed drive in highly fertile and relatively fertile group has been found significantly higher than that of subfertile group.

(7) The morphology of the sperm has been found to vary closely with the degree of potential fertility.

ACKNOWLEDGEMENTS

We thank Dr. (Mrs.) P.K. Devi, M.S., F.R.C.S. and Dr. R. Anjaneyulu, M.D., Department of Obstetrics and Gynaecology, for directing male individuals whose wives complained of infertility, for examination. Our thanks are also due to Mr. P. Singha for statistical analysis.

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