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In clinical terms, the cervical factor is assessed by an appraisal of its physical properties in relation to other criteria of ovarian function such as basal temperature charts and hormonal assays.

In my work, the study was done on 60 patients of age group 19-30 years i.e. the reproductive age group. Patients were of known L.M.P. and regular menstrual cycle of 30 days. Day 15 was taken as the day of ovulation. Samples were collected during the ovulatory mid-cycle i.e. 15 + 2 days. Only 16 patients were such who could be studied in the pre-ovulatory, ovulatory as well as post-ovulatory phase. Regular follow up of the patients was done and the relationship of the sialic acid content of the mucus to the various physical properties of the mucus was studied. 10 patients were kept on hormonal treatment to detect the effect of oestrogens on the quality and quantity and sperm penetration of the cervical mucus.

The study of the cervical mucus and its sialic acid content has been done by a very few authors in several cycle of the same patient and for several days of the same menstrual cycle.

Daily measurements of sialic acid content and sperm penetration was done in one ovulatory cycle in 6 regularly menstruating women by Carlberg, L.; Johansson, B. and Gemzell, C. in 1969.

Mac Donals, R. and Lumley I. in 1970 made a preliminary study of 105 samples before, during and after ovulation.

Iacobelli, 1971, Carces, N. and Angeloni, C. made a comparative analysis of the cervical secretion from pre-ovulatory, post ovulatory and pregnancy periods of 20 healthy ovulating women with regular menstrual interval of 28-30 days.

Malik, Dhar and Dhar 1974 analysed the samples obtained routinely from all cases on 8th (post-menstrual), 13th (pre-ovulatory), 17th (post-ovulatory) and 23rd (pre-menstrual) days of the cycle considering 14th day as the day of ovulation.

Kamran, A. Moghiani and Frank, N. Syner in 1976 selected 5 normal ovulatory women between the ages of 19 and 23 and studied the cervical mucus daily in mid-cycle from day 10 to 20 and every 2 days during the rest of the cycle.
SIALIC ACID AND AMOUNT OF CERVICAL MUCUS

The amount and sialic acid concentration of the cervical mucus was determined and their relationship to each other was studied. The cervical mucus quantity was measured in terms of ml (0.1 ml or less as scanty, 0.2-0.3 ml as moderate and 0.4 ml or more as copious). I found that 10% of fertile females had 0.4 ml or more and the sialic acid was 23.60 ug/ml. 90% females had 0.2-0.3 ml i.e. moderate quantity of mucus at ovulation and the sialic acid was 25.35 ug/ml of wet mucus. Among the 50 infertile patients of the experimental group, 38% had 0.1 ml with a sialic acid of 48.68 ug/ml, 62% had 0.2-03 ml with a sialic acid of 47.39 ug/ml. No patient had 0.3 ml or more of the quantity. There was least no reduction in the sialic acid of ovulatory mucus in the infertile females.

The quantity was graded as copious, moderate, scanty and nil by Malik, Dhar and Dhar. They studied 140 fertile menstruating women between the ages 17-40 years from June 1972 to April 1974 and observed that 63.12% cases had a scanty, 12.25% had moderate and 22.59% had copious secretion.

The findings of my study group correlate well with the findings of Moghissi, S. and Symer, F.R., 1976 who measured the amount as mg of wet mucus and sialic acid
as mg/ml of wet mucus. They found that the amount varied from subject to subject and ranged between 16.4 - 373.7 mg in follicular phase (S.A. = 0.72 - 1.31 mg/ml), 56.3 - 571.2 mg in mid-cycle (S.A. = 0.42 - 0.54 mg/ml) and 4.5 - 239.3 mg during the luteal phase. (S.A. = 0.65 - 4.21 mg/ml). The ovulatory fall of the sialic acid as seen in the above study was not found in my study in the 16 infertile females instead they had almost the same high content of the sialic acid with only a minor increase in the quantity at mid-cycle from 0.1 ml to 0.15 - 0.2 ml at ovulation. This absence of the mid-cycle fall of sialic acid could be responsible for the infertility.

SIALIC ACID AND VISCOSITY OF MUCUS:

An increased sialic acid increases the viscosity of the mucus which in turn hampers sperm penetration. This association has been seen in my study. Among the 10 control patients, 70% had a low viscosity and a low sialic acid of 29.81 μg/ml and 30% had a moderate viscosity and a little higher sialic acid of 30.0 μg/ml.

Among the 50 infertile patients 5% had a high viscosity with a high sialic acid (50 μg/ml) and 42% had a moderate viscosity with sialic acid 47.03 μg/ml and 48% had a low viscosity with a relatively low sialic acid 46.82 μg/ml but it was almost the double of the fertile group.
A direct association between viscosity (measured by consistometer and sperm penetration (measured by haemocytometer) was demonstrated by Viergiver and Pomeranke, 1946, the very thin mucus at mid-cycle corresponded exactly to the maximum rate of sperm penetration and a lowering of sialic acid.

The change of viscosity is due to the functional role played by the sialic acid. This was proved by Gibbons and Kattner in 1967.

The relationship of viscosity to sperm penetration was further confirmed by Mac Donald and Lumley in 1970 on 105 patients who found that the thicker samples of mucus which were impenetrable to sperms showed a reverse pattern when saline was added to the sample and viscosity reduced. The sperm penetration increases with a reduction in viscosity which in turn is due to a reduction in the sialic acid.

**SIALIC ACID AND SPINABILITY OF CERVICAL MUCUS**

80% of the fertile patients of my study had a high spinbarkeit i.e. 7-10 cms and a simultaneous low sialic acid i.e. 22.47 ug/ml and 20% had a spinability of 7-10 cms with a sialic acid a little higher i.e. 31.0 ug/ml but among the infertile patients this pattern was absent.

60% patients with a poor spinability had a sialic acid of 45.42 ug/ml and 60% patients with a slightly better
spinability had a still higher sialic acid equal to 48.23 ug/ml. Only 2% patients were in accord with the findings of Carlborg et al., 1968, Carlborg, Mc Cormick Gemzell, 1969 and Moghissi and Marks, 1971.

**SIALIC ACID AND FERN PATTERN OF CERVICAL MUCUS**

The degree of ferning in this study was graded as 1+ to 4+. Extent of ferning has a direct relationship to viscosity and spinnbarkeit and sperm receptivity. The sialic acid were determined in relation to the above properties and it was found that 38% of infertile patients had a scanty mucus and a high sialic acid i.e. 48.68 ug/ml. 6% had a poor spinnbarkeit and a high sialic acid i.e. 45.43 ug/ml and minimum ferning with high sialic acid i.e. 49.15 ug/ml. This relationship of sialic acid to fern phenomenon has only been stated by Carlborg, Mc Cormick and Gemzell, 1968 and Moghissi and Marks in 1971, but a relationship between fern and spinnbarkeit was studied by Jain et al., 1973 and Malik, Dhar and Dhar, 1974. They found that 35.54% had a positive fern and 35.88% a positive spinnbarkeit, that is the two properties go hand in hand and are maximal at the time of ovulation.

**SIALIC ACID AND pH OF CERVICAL MUCUS**

No relationship between the sialic acid and pH was found in the present work. 70% of fertile patients with
a pH 7.0 had a low sialic acid i.e. 25.04 µg/ml and 76% of infertile females also had a pH 7.0 but a higher sialic acid of 55.23 µg/ml. 24% patients with an acidic pH of mucus also had a high sialic acid (51.03 µg/ml). Thus sialic acid is not related to the pH of the cervical mucus and vice versa and no relationship had been mentioned in literature too. Patients with a pH of 7.0 or less were given alkaline precoital douches.

**SIALIC ACID CONTENT OF CERVICAL MUCUS**

Sialic acid was estimated by the method of Aminoff given in 1959 for the quantitative estimation of N-acetyl neuraminic acid in sialomucoids. NANA from E.Coli, Sigma 98 % crystalline, Anhydrous Mol. wt 3093 (M/S Sigma Chemicals, U.S.A.) was used as standard, obtained from the Biochemistry department of the All India Institute of Medical Sciences, New Delhi.

The mean sialic acid was found to be 25.67 µg/ml of wet mucus at ovulation in fertile females and highly significant rise to 47.32 µg/ml of wet mucus was found among the infertile females.

The first study on the content of sialic acid in the cervical mucus was done by Gibbons, R.A. in 1959. Sialic acid was determined by him also according to the method of
Aminoff after hydrolysis of the sample in 0.1 N sulphuric acid for 30 min. N-acetyl neuraminic acid (Sigma Chemicals Co., St. Louis, Mo.) was used as standard. The sialic acid concentration was found to be $30 \pm 2.8$ ug/ml in pre-ovulatory to $46 \pm 4$ and $49 \pm 5.5$ ug/mg of dry mucus in post-ovulatory and pregnancy samples.

Carlborg, L., Johansson, D.B. and Gemzell, C. in 1969 determined the sialic acid to an average of 21 ug/ml of dry mucus (range 12-31 ug/ml) at mid-cycle and it increased in the luteal, that is the post-ovulatory phase. The method used was the Direct Ehrlich method (Werner & Odin, 1952).

Carlborg, Mc Cormick and Gemzell again in 1969 determined sialic acid to be at its lowest value i.e. 20-25 ug/mg of dry mucus on day 16, followed by a rapid increase.

Jacobelli et al, 1971, found the average sialic acid to 30.0 ug/mg of dry mucus at ovulation. Kamran, S., Moghissi, and Frank, T. Syner, 1976 analysed the ovulatory samples of mucus and found it to range between 0.42 to 0.54 mg/ml of wet mucus. The method used was that of Warren, L. (The Thiobarbituric acid assay of sialic acid).

Estimation of sialic acid was also done by Khutata et al, 1985 by the principle of Tryptophane perchloric acid reaction by Sibbert et al (1984) and the average detected was $39.4 \pm 3.85$ ug/mg at ovulatory period in fertile females and $46.6 \pm 10.1$ ug/mg of dry mucus in infertile females.
SIALIC ACID AND POST-COITAL TEST

Mid-cycle fall of sialic acid is associated with an increased sperm penetration. This observation was noted in my study. A study on 10 fertile females in this work showed a low mid-cycle sialic acid amounting to 25.67 μg/ml and a satisfactory PCT. 64% of the infertile females had a sialic acid of 52.43 μg/ml with a negative PCT, 30% with sialic acid equal to 40.30 μg/ml had an unsatisfactory PCT and 6% with a low sialic acid i.e. 27.66 μg/ml had a satisfactory PCT.

Carlborg et al in 1968 studied the cyclic changes of sialic acid. He found that in 19 out of 25 cycles, cyclic changes in the sialic acid were found together with a positive sperm receptivity and the patients if treated with combination therapy, no cyclic changes in sialic and concentration and no sperm receptivity was seen.

In a second experiment in 1969, a similar observation was noted, that is all the 6 patients with a low sialic acid i.e. 12 - 31 μg/ml at ovulation, showed a peak sperm penetration.