

CERVICAL FACTORS IN WOMEN USING Cu-T INTRA-UTERINE DEVICE

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In a very short span of time IUCDs have been recognised as an effective, efficient, economic and simple method of family planning. Among intra-uterine contraceptive devices (I.U.C.Ds), copper-T (Cu-T) has been the most popular with minimal complications. Its effects on sperm transport, tubal motility, endometrial changes, ovulation, fertilization and zygote implantation have been studied well but sparse literature is available on its effect on cervical mucus.

The present study has been aimed to observe various cervical mucus changes in women using Cu-T and its possible correlation with mechanism of action.

Material and Methods

The present study was carried out in the Department of Obstetrics & Gynaecology, in collaboration with the Postgraduate Deptt. of Pathology and Bacteriology and department of Social & Preventive Medicine, S.N. Medical College, Agra. Two

hundred women wearing copper-T IUCD were selected (study group) and were compared with 50 cases with regular menstrual cycle and not using any family planning method. A detailed clinical history, general and systemic examination, local examination and vaginum examination were done. All patients were asked to maintain their bascal body temperature to find out approximate time of ovulation. They were again examined in post-menstrual phase (P.M.P.), supposed ovulatory phase (S.O.P.) and premenstrual phase (P.P.). The cervical mucus was aspirated from upper cervical canal with the help of graduated suction canula. The quantity, colour, pH and consistency of cervical mucus were recorded. Special investigations including presence of leucocytes, R.B.C., Spinnbarkeit formation, fern leaf pattern and post coital test were also done, adopting slight modification by Haganveldt and Johansson (1972). Criteria for post coital test were based on number of sperms/high power field and motility. If no sperm seen, test is negative (0), 1-5 sperms with minimal activity, test is poor (+), 6-10 sperms with sluggish hephazard movement, test is fair (++) and 11-15 sperms with slow migratory activity, test is good (+++)

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and 16-20 sperms with rapid migratory action, test is excellent (++++)).

Observations and Discussion

On comparison of the results in control and study groups, age, occupation, socio-economic status, parity, last child birth, did not show any significant variations. The menorrhagia in first 2 months of insertion, was 17% in study group as compared to 2% in control group. This 17% was further reduced to 3.5% within 5 months. The similar observations were recorded by Guillebaud and Bonner (1978). The colour of the cervical mucus was dirty white in most of the cases in all phases of menstrual cycles of study group as compared to control group which had clear or a whitish tinge. Oster (1972) found that cervical mucus, after being incubated with copper foils, is rendered cloudy.

Viscosity: As evident from Table I, viscosity of cervical mucus in different phases of menstrual cycle in study group is not undergoing characteristic cyclic variation as in control group. 88% cases had (+) viscosity while 10% cases retained (++) viscosity and 2% cases even retained (+++) viscosity in supposed ovulatory phase (S.O.P.). Oster, 1972;

Hagenfeld and Johannison 1972 and Tejuja *et al* (1974) have shown that viscosity is minimum at ovulation in normal fertile females. Thus, 10% cases with ++ and 2% cases with +++ viscosity in study group during S.O.P. in study group indicate poor sperm penetration.

Volume: As evident from Table 2, the volume of cervical mucus in the three phases of menstrual cycle in control group was maximum in S.O.P. as normally expected (Marcus and Marcus, 1963). In the study group, the volume was maximum in P.M.P. and P.P. but less in S.O.P. as compared to control group and the difference is statistically significant. Furthermore, the increase in the volume of cervical mucus in the S.O.P. was less in study group as compared to the increase in control group. As a large quantity of cervical mucus is necessary to allow the sperm to swim forward in their upward accent, the decreased volume in study group as compared to control group may explain the contraceptive effect of Cu-T. However, Malkhani (1971) found that overall volume of cervical mucus increases after the use of IUCD.

pH: In a normal female pH of cervical mucus is usually alkaline in all the phases of menstrual cycle (Moghissi *et al* 1966,

TABLE I
Viscosity of Cervical Mucus in Various Phases of Menstrual Cycle in Two Groups

Phase of the Cycle	Viscosity	Study Group		Control Group	
		No. of Cases	%	No. of Cases	%
5-10 (P.M.P.)	+	8	4.00	—	—
	++	100	50.00	21	42.00
	+++	92	46.00	29	58.00
11-15 (S.O.P.)	+	176	88.00	49	98.00
	++	20	10.00	1	2.00
	+++	4	2.00	—	—
20-25 (P.P.)	+	—	—	—	—
	++	369	18.00	5	10.00
	+++	164	82.00	45	90.00

TABLE II
Variation of Volume of Cervical Mucus in Various Phases of Menstrual Cycle

Phase of the Cycle P.M.T.	Study Group			Control Group			t	p	Significance
	Range	Mean	S.D.	Range	Mean	S.D.			
P.M.P.	0.05-.30	.141	.105	0.05-.20	.087	.0327	3.600	<.001	H.S.
S.O.P.	0.05-.50	.317	.294	0.25-.60	.433	.316	2.231	<.05	Sig.
P.P.	0.05-.20	.147	.59	0.05-.105	.105	.046	4.421	<.001	H.S.

Variations in the Amount of Cervical Mucus are Similar in Both Groups

Between	Study Group		Significant
	t	p	
P.M.P. V/S S.O.P.	2.237	<.05	Significant
P.M.P. V/S P.P.	0.375	<.05	Significant
S.O.P. V/S P.P.	5.669	<.001	Highly significant

TABLE III
Showing pH of Cervical Mucus in Various Phases of Menstrual Cycle

Phase of Cycle	Study Group			Control Group			t	p	Significance
	Mean	S.D.	Range	Mean	S.D.	Range			
P.M.P.	8.23	.678	7-10.5	7.93	.614	7-9.5	2.652	<.001	H.S.
S.O.P.	8.52	.746	7-10.5	8.21	.398	7-9.5	2.743	<.001	H.S.
P.P.	8.16	.694	7-10.5	7.85	.566	7-9.5	2.743	<.001	H.S.

		Study Group		t	p	Significance
	V/S	S.O.P.	P.P.			
P.M.P.	V/S	S.O.P.	P.P.	2.877	<.01	H.S.
P.M.P.	V/S	P.P.	P.P.	0.722	<.05	Insig.
S.O.P.	V/S	P.P.	P.P.	3.529	<.001	H.S.

H.S. = Highly significant

Insig. = Insignificant

1970) more so in S.O.P. In our study the pH was more alkaline in the study group as compared to controls in all the phases of menstrual cycle, more so in S.O.P. This raised pH can be explained on the basis of bacterial invasion and enzyme action which is again an important factor interfering with sperm penetration. Malkhani (1971) and Zavos and Cohen (1980) also reported that the increased pH facilitates sperm penetration while acidic pH reduces it.

Sprin-barkeit Formation: As evident from Table IV, Spinnbarkeit values in

control group showed normal cyclic variation as reported earlier (Cohen and Kay 1952; Cleft, 1945; Moghissi, 1966; Kremer, 1968). However, in study group Spinnbarkeit was quite low statistically ($p < .001$), in ovulatory phase as compared to control. This may be responsible for interference with sperm penetration. Contrast to our study, Pokroshi and Ray (1969) and Malkhani (1971) found an increased Spinnbarkeit in IUCD group. Elstein and Ferrer (1973) in *in-vitro* experiments found reduced Spinnbarkeit in cervical mucus incubated with Cu-T IUCD.

TABLE IV

Showing Spinnbarkeit of Cervical Mucus in Different Phases of Menstrual Cycle

Phase of Cycle	Study Group			Control Group			t	p	Significance
	Range	Mean	S.D.	Range	Mean	S.D.			
P.M.P.	0-4	2.545	.860	0.4	2.262	1.015	1.803	<.05	H.S.
S.O.P.	0-20	7.3	3.458	5-20	11.7	4.095	6.929	<.001	H.S.
P.P.	0-3	1.515	.781	0.3	1.288	.785	1.669	<.05	H.S.

STUDY GROUP

P.M.P.	V/S	S.O.P.	13.356	<.001	H.S.
P.M.P.	V/S	S.P.P.	8.879	<.001	H.S.
S.O.P.	V/S	S.P.P.	16.296	<.001	H.S.

Fern-pattern: In our control cases, cervical mucus showed typical fern pattern in different phases of menstrual cycle i.e. maximum ferning in ovulatory phase as observed earlier (Moghissi, 1966 and Alwani *et al* 1978). However, in the study group, 19% cases had + ferning, 21% cases ++ ferning and 60% cases had +++ ferning. Failure of optimal ferning to appear in ovulatory phase may also be responsible for the poor receptivity of cervical mucus to sperm. Pokrashi and Ray (1969), Malkhani (1971) and Kesseru and Camacho (1971) also found variable ferning in different phases of menstrual cycle in women using IUCD attributable to IUCD induced hyper-oestrogenism or local irritation.

In all phases of menstrual cycle in study group, R.B.C. content was increased compared to study group indicating

continuous microscopic haemorrhage because of mechanical trauma to cervix. In all phases number of leucocytes per high power field were more in study group compared to control group. Statistically ($p < .001$), this increase may be because of mobilisation of leucocytes in uterine cavity (Zipper *et al* 1975) or local infection. Leucocytes also reduce sperm receptivity of cervical mucus (Soberero and MacLead, 1970).

Post-Coital Test: Only 50 cases in study group turned up for post-coital test during ovulatory phase. It is clearly evident from Table VI that sperm penetration is definitely altered in women using IUCD though the number of cases studied was low (Moghissi *et al* 1970; Zavos and Cohen, 1980). However, variable results were reported by Kesserukoos and Esteben (1971).

TABLE V

Showing Relation of Ferning of Cervical Mucous in Different Phases of Menstrual Cycle

Phase of Cycle		Study Group				Control Group			
		Nil	+	++	+++	Nil	+	++	+++
P.M.P.	No.	128	60	12	—	33	17	—	—
	%	64	30	6	—	66	34	—	—
S.O.P.	No.	—	33	42	127	—	—	8	42
	%	—	19	21	60	—	—	16	84
P.P.	No.	144	48	8	—	47	3	—	—
	%	72	24	4	—	94	6	—	—

TABLE VI
Post-coital Test During the Ovulatory Phase of the Cycle

Group		0	+	++	+++	++++
		Negative	Poor	Fair	Good	Excellent
Study	No.	4	4	6	10	26
	%	8	8	12	20	52
Control	No.	-	-	4	6	40
	%	-	-	8	12	80

Summary and Conclusions

IUCDs have been reported to effect sperm transport, tubal motility, endometrial changes, ovulation and fertilization, but cervical mucus changes rarely had been considered. In the present study it has been clearly shown that women using Cu-T IUCDs are not undergoing characteristic cycle variation with

respect to viscosity, volume, pH, Spinnbarket formation and fern pattern of cervical mucus as compared to normal ovulating women in the supposed ovulatory phase. Further, post-coital test clearly indicates poor sperm penetration in women using Cu-T. This suggests as Cu-T IUCD effect by inducing changes in cervical mucus.