

ORIGINAL ARTICLE

Effects of Intrauterine Contraceptive Device (IUCD) on Lumina Diameter, Wall Thickness and Number of Ciliated Cells of Fallopian Tubes in Bangladeshi WomenSaifun Naher¹, M H Mullick², Jesmine Ara³**Abstract:**

A study on histological changes in the fallopian tubes of young and healthy nonpregnant women was done. Among these subjects, 11 were taken as control who did not adopt any of the contraceptive method and compared with remaining 10 subjects who used intrauterine contraceptive device (IUCD) in the form of copper T. About 1.5 cm of each fallopian tube were collected during the process of tubectomy by Pomeroy's method. These tissue samples were processed for H/E staining as a histological procedure and microscopic observations were done. The luminal diameter, wall thickness and number of ciliated cells were recorded and statistical analysis was done by student 't' test. Luminal diameter reduced significantly ($P < 0.05$) in case of IUCD user group in comparison to control group. The number of ciliated cells also reduced significantly ($P < 0.05$) in case of IUCD user group.

Introduction:

Fallopian tube is a muscular tube that makes anatomical and functional communication between uterus and ovary. It functions in fertilization, transport of ovum and zygote, and providing nutrition to zygote. Ciliary action of the lining cells, diameter of the lumen and peristalsis of muscles of its wall are important for its transport function. Its development and functional integrity very much depend on the female sex hormones. In dogs¹, cats² and humans³, the oviductal epithelium undergoes a sequence of distinct morphological changes that is correlated with the ovarian cycle. It is reported that in rats the oviduct is more susceptible to hormonal changes on exogenous administration than the uterus.

Many studies had been carried out to disclose the side effects of different types of contraceptives (oral pill, IUCD) on different organs including the fallopian tube. Results of these experimental works suggested that percentage of ciliated cells^{4,5} peristaltic movement of tubal muscles⁶ all were affected by exogenously administered steroid female sex hormones. The intrauterine contraceptive device (IUCD) is the second most common temporary physician associated contraceptive method employed today. The IUCD is the foreign body placed in the uterus to prevent pregnancy. Clinical researches had been concentrated to investigate the relationship between the tubal inflammatory changes and the use of IUCDs. Almost all the workers demonstrated a positive association between the incidence of tubal inflammation and the use of IUCD on histological examination^{7,8,9}. About 90% to 99% of all ectopic pregnancies were tubal and there was an increased incidence of ectopic pregnancy in women using IUCD¹⁰.

1. Associate Professor and Head of the Department of Anatomy, Holy Family Red Crescent Medical College, Dhaka.
2. Ex-Professor of Anatomy, Bangabandhu Sheikh Mujib Medical University, Dhaka.
3. Associate Professor of Physiology, Ibrahim Medical College, Dhaka.

So, it would really be a matter of great regret if the wanted conception occurs at ectopic position in case when a woman expects a child after a considerable duration of contraceptive use. Variability in the results of histological causes in the fallopian tube after use of IUCD could result from a number of factors including race, sexual partner, socio-economic status¹¹ and on the parity¹². If we can clarify the effect of IUCD on luminal diameter, wall thickness and number of ciliary cells of the human fallopian tube, we can expect these may help us to search for a better and side-effect free contraceptive which will be more popular and thus contribute more extensively in population control programme. Because the sexual behaviour and partner, socio-economic status and standard of living, race and even parity of the subjects of the previous researchers were completely different from those in women of this country. In this paper, some of the findings that may help to understand the effect of IUCD on fallopian tube histology of Bangladeshi women are reported.

Materials and method:

Subjects:

Fallopian tubes collected from a total of 21 subjects after tubectomy in different family planning clinics (Azimpur Maternity, Mohammadpur Fertility Centre and Dhaka Metropolitan Family Planning Clinic) were studied. The selection criteria of the women were so that either they were under contraceptive control for at least three months before appearing for sterilization or without use of any such devices. Among these 21 subjects 11 were taken as control, who did not adopt any of the contraceptive methods, rest 10 used IUCDs.

Collection of sample:

About 1.5 cm of each fallopian tube was collected during the process of tubectomy by Pomeroy's method. These tissue samples were immediately cleaned by washing with normal saline and were preserved in appropriately labeled containers filled with 10% normal saline. The specimens were brought to the Department of Anatomy of Bangabandhu Sheikh Mujib Medical University. Here these were kept at room temperature.

Grouping of the samples (Table-I) :

According to the contraceptive methods used by the subjects prior to undergoing sterilization, the samples were grouped into two, namely:

Group A (control) : Samples collected from subjects who did not use any of the contraceptive methods.

Group B (IUCD users) : Samples collected from subjects who used IUCD.

Parameters studied:

The following parameters were taken into consideration:

- i) Luminal diameter;
- ii) Total thickness of the wall of tube;
- iii) Number of ciliated cells.

Microscopic measurements:

Measurements of microscopic structures were done by means of an ocular micrometer which was previously adjusted with the help of a stage micrometer with respect to different magnifications required for different structures.

Table-I : Showing the grouping of subjects and samples

Group	Method used by the subjects prior (at least 3 months) to sterilization	Number of subjects and samples
Group A(Control)	None	11
Group B	IUCD	10

Results:*Luminal diameter (m μ):*

Mean luminal diameter was 1.51 ± 0.1 in case of group A and 1.22 ± 0.07 in case of group B. The luminal diameter was significantly reduced ($p < 0.05$) in case of IUCD users in comparison to non-users (Table-II).

Thickness of the layers of the tube (m μ):

Mean thickness of the layers of the tube was 0.34 ± 0.03 in group A and 0.48 ± 0.17 in

group B. The thickness of the layers of the tube was increased significantly in IUCD users (group B) in comparison to non-users (group A) (Table-II, Fig-1).

Number of ciliated cells (n/100 μ):

Mean number of ciliated cells was 2.3 ± 0.22 in group A and 1.75 ± 0.13 in group B. There was a significant reduction ($p < 0.05$) of ciliated cells in case of IUCD users in comparison to non-users (Table-II, Figs-2, 3).

Table-II: Showing comparison of ($m \pm SE$) different histological parameters of fallopian tubes between non-users (group A, control) and IUCD users (group B)

Parameters studied	Non-users (Group A) n=11 (mean \pm SE)	IUCD users (Group B) n=10 (mean \pm SE)	Value of t
1. Luminal diameter (in m μ)	1.51 ± 0.01	1.22 ± 0.07	2.41*
2. Thickness of the layers of tube (in m μ)	0.34 ± 0.03	0.48 ± 0.17	0.77 ^{NS}
3. Number of ciliated cells (in n/100 and in percent)	2.3 ± 0.22 (25.55%)	1.75 ± 0.3 (20.5%)	2.2*

* $p < 0.05$ significant difference

NS = Not significant.

n= number of subjects.

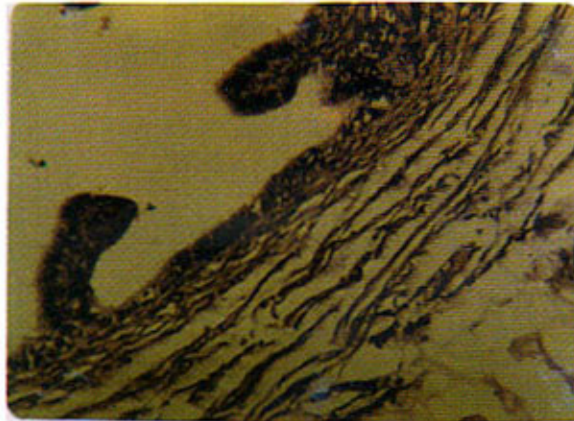


Figure-1: Photomicrograph showing thickness of the layers of fallopian tube in control group x 10 (H & E stain).



Figure- 2: Photomicrograph showing ciliated cells of fallopian tube in non-user group x 40 (H & E stain).

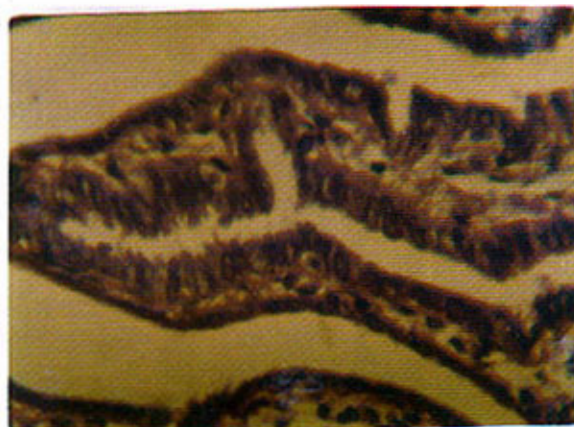


Figure: 3: Photomicrograph showing ciliated cells of fallopian tube in IUCD user group x 40 (H & E stain).

Discussion:

The luminal diameter of fallopian tube was reduced significantly ($p < 0.05$) in IUCD user group as compared to the control group. A cytotoxic environment is produced by the insertion of IUCD in uterus¹³. This effect is extended to the fallopian tube resulting in tissue reaction and submucosal oedema. This oedema pushes the basement membrane inwards reducing the diameter.

Thickness of the layers of tube increased significantly ($p < 0.05$) in IUCD user group as compared to the control group. IUCD produces oedema as a side effect and also as they invade some inflammatory cells, local infiltration and reaction might be produced causing submucosal oedema and fibrosis. So, the results of this study may be explained by the fact that thickness of the layers of the tube increased in case of IUCD user group due to increased aggregated collagen fibres which might be due to local irritation and fibrosis. The thickness of the layers of the tube was increased in case of IUCD users as compared to the control group but the increase was statistically not significant.

The number of ciliated cells of 100 micron length of tubal epithelium decreased significantly in the IUCD user group than in control group. On the percentage basis, the ciliated cells were 20.5% in IUCD users group. Similar results had been reported by Fredicsson and Bjorkman¹⁴ and Swayer et al⁵. So, significant result in case of IUCD user could be explained by the substitution of ciliated cells by secretory cells as a consequence of such subclinical infection¹⁰.

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