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Age Related Change of Inner Diameter of Ampulla of Fallopian Tube in Bangladeshi Female Cadaver

Hasna Hena[1], Shamim Ara[2], Rubina Qasim[3], Dilruba Siddiqua[4], Fatema Johora[5], Hosna Ara Perven[6]

[1]Associate Professor, Department of Anatomy, East West Medical College, Dhaka, Bangladesh; [2]Professor & Head, Department of Anatomy, Holy Family Medical College, Dhaka, Bangladesh; [3]Associate Professor, Department of Anatomy, East West Medical College, Dhaka, Bangladesh; [4]Associate Professor, Department of Anatomy, IBN Sina Medical College, Dhaka, Bangladesh; [5]Associate Professor, Department of Anatomy, Sir Salimullah Medical College, Dhaka, Bangladesh; [6]Assistant Professor, Department of Anatomy, Medical College for Women and Hospital, Dhaka, Bangladesh

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Abstract

Background: The fallopian tubes act as conduit for spermatozoa to reach the oocyte and to convey the fertilized (egg) to enter the uterine cavity following fertilization. Problems with the fallopian tubes can lead to infertility. Detailed morphological and histological knowledge is essential for the diagnosis and management of fallopian tube disease. **Objective:** The purpose of the present study was to identify the inner diameter of ampulla of the fallopian tube and its changes with advancing age. **Methodology:** This descriptive cross-sectional study was conducted in the Department of Anatomy at Dhaka Medical College, Dhaka, Bangladesh from July 2008 to June 2009 for a period of one (01) year. This present study was performed on post mortem fallopian tubes of Bangladeshi female. Among them lowest age was 12 years and highest age was 50 years. Samples were divided into three differential age groups named asgroup A (10 to 13 years), group B (14 to 45 years), and group C (46 to 50 years). All samples were studied morphologically and histologically. **Results:** The mean inner diameter of the ampulla of the right and left fallopian tubes ranged from 1.99±0.08 to 3.24±0.27 mm. The difference between all the groups were statistically significant ($p < 0.001$). **Conclusion:** The mean difference of the inner diameter of the ampulla of the right and left fallopian tubesbetween groupA and groupB and groupB and groupC were statistically significant; however, there was no significant difference between right and left fallopian tube. *[Journal of National Institute of Neurosciences Bangladesh, 2018;4(2): 137-140]*

Keywords: Fallopian tube;inner diameter; ampulla of fallopian tubes

Correspondence: Dr. Hasna Hena, Associate Professor, Department of Anatomy, East West Medical College, Dhaka, Bangladesh; Email: smilezonedental@yahoo.com; Cell no.:+8801912048555

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Introduction

The fallopian tube is divided into four parts, among them, the ampulla, the longest segment which is half of the tube and also wider[1]. The fertilization takes place in the ampullary part of the fallopian tube near its junction with the isthmus[2]. It is generally here, within the fallopian tube that the primary function of the human sexual reproduction occurs; recombination of the genetic information from both parents in the first cell of the offspring[3].

In the oviduct, the embryo lives for 5 days, feeding on nutrients in the oviductal fluid, taking oxygen from it and secrets waste products into it[4]. During its passage through the tube, the pre-embryo divides and develops, before it is transported into the uterine cavity hatch and implant[5]. The fallopian tubes are relatively short and wide until puberty[6]. After the menopause or following oophorectomy, the uterine tubes gradually involute[7] or atrophied due to lack of estrogen produced by the ovaries[8]. Before puberty and after menopause, the tube is functionally quiet[9].

Inflammation of the tubes (salphingitis) may readily

spread to become inflammation of the peritoneum (peritonitis), a serious condition[3]. Tubal disease is accountable for 30-40% of cases of female infertility[10,1]. One attack of salphingitis is estimated to cause infertility in 10% of patients, two attacks will render about 25.0% of women infertile, and three or more attacks will cause infertility in a least 60.0% of sufferers[1]. About half of the infertility problems are caused by problems in the female and among this about 14.0% of those are caused by impaired function of the fallopian tubes[9].

In those areas where tubal infection is common, the incidence of ectopic pregnancy is high. The delay in ovum transport is the cause of tubal pregnancy which may result from decreased tubal motility or distorted tubal anatomy[10-12]. Ectopic pregnancy occur 80.0% in ampulla, 12.0% in isthmus, 5.0% in fimbria, 2.0% in interstitial segment of uterine tube[11].

In assisted reproductive technologies (ART) the fallopian tubes are utilized by infertile couples to conceive. Methods of ART into the fallopian tubes are gamete intra fallopian transfer and zygote intra fallopian transfer. A clear conception of the anatomy of the fallopian tube is a pre-requisite for the diagnosis and treatment of fallopian tube disease. In treatment of infertility and in ART, the knowledge of anatomy of the fallopian tube is necessary. Therefore this present study was undertaken to identify the inner diameter of ampulla of the fallopian tube and its changes with advancing age.

Methodology

This descriptive cross-sectional study was conducted in the Department of Anatomy at Dhaka Medical College, Dhaka, Bangladesh from July 2008 to June 2009 for a period of one (01) year. Samples of human fallopian tube were collected from unclaimed dead bodies that were under examination in the morgue of Forensic Medicine department of Dhaka Medical College, Dhaka. After legal formalities, the samples were collected from medico legal cases. During collection, appropriate age and cause of death were noted from morgue's record. The samples were brought to the Department of Anatomy at Dhaka Medical College, Dhaka, Banglades. The samples were immediately tagged with a code number for subsequent identifications. Soon after collection, each sample was gently washed in tap water on a dissection tray. Blood and blood clots were removed as far as possible. Then the samples were fixed in 10.0% formol saline solution. The collected samples were divided into three groups[9].Group A was pre-menarche age group; group B was reproductive age and group C was post-menopausal age group.

Table 1 Grouping of the Sample of the Present Study (n = 120)

Group	Age limit in years	Number of samples	
		Right	Left
GroupA	10 to 13 years	5	5
GroupB	14 to 45 years	45	45
GroupC	46 to 50 years	10	10

Measurement of the inner diameter (luminal diameter) of the ampulla of the fallopian tube: Four thin sections from the most dilated part of the ampulla of both right and left fallopian tubes were taken. A scale printed on the transparent sheet (where one small division was equal to 0.1mm) was placed upon the stage of the dissecting microscope. Then, under a dissecting microscope, internal diameter of ampulla of the fallopian tube were measured one by one (Figure I).

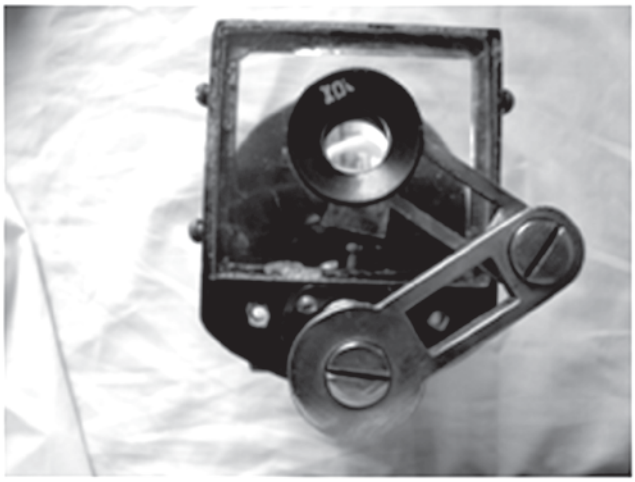

Figure I: Photograph of measurement of inner diameter of the ampulla of the Fallopian tube by using dissecting microscope

As the lumen of each part of the fallopian tube is irregular rather than rounded which was somewhat difficult to measure the actual diameter. To overcome such drawback, the numbers of transparent sheet divisions were read out from near to remote margins of the lumen of each section of the fallopian tube. The measurements were taken twice for each section, one was the maximum transverse diameter and another at the right angle to the first one (Figure I, II). Then the mean value was recorded[12-13]. The inner diameter of ampulla of both of the tubes were measured in the same manner. As the sections were examined under the

eyepiece X10, the total magnification of 10 was maintained by multiplying the measurement of the inner diameters by 10.

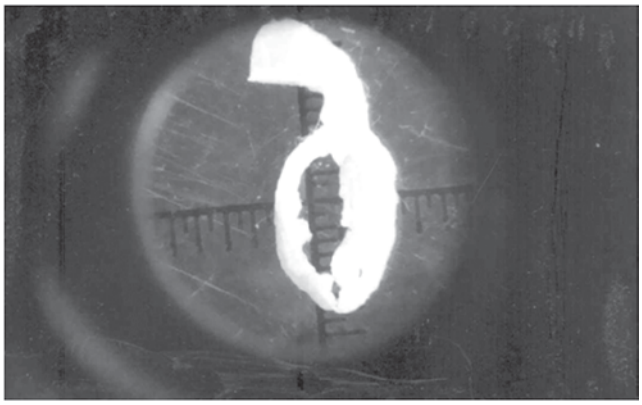

Figure II: Photograph of measurement of inner diameter of the ampulla of the Fallopian tube by using dissecting microscope maximum vertical diameter is being measured

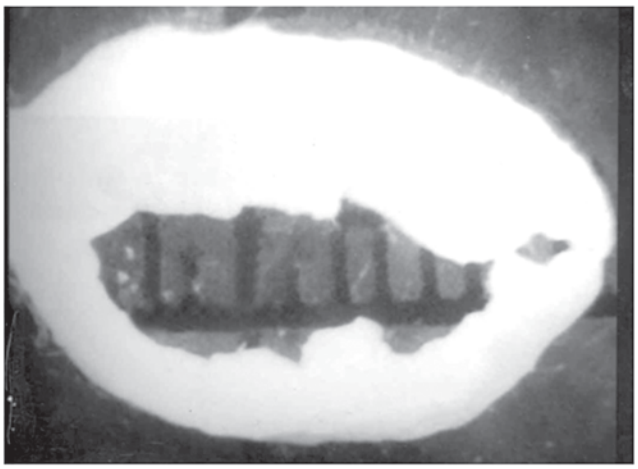

Figure III: Photograph of measurement of inner diameter of the ampulla of the Fallopian tube by using dissecting microscope (maximum transverse diameter is being measured)

Results

In present study, the mean ±SD inner diameter of the ampulla of right and left Fallopian tubes were 2.70±0.14 mm & 2.65±0.14 mm in Group-A, 3.24 ± 0.27 mm & 3.19 ± 0.27 mm in Group-B and 2.04 ± 0.08 mm & 1.99 ± 0.08 mm in Group-C respectively.The mean difference in inner diameter of the ampulla of right and left Fallopian tubes was not statistically significant. The highest mean diameter was found in group B and lowest mean diameter was in group C. The difference in mean inner diameter of the ampulla between Group-A & Group-B and Group-B & Group-C and Group-A and Group-C were statistically significant (P< 0.001) (Table2; Figure IV).

Table 2: Inner diameter of the ampulla of right and left Fallopian tubes in different age group (Mean±SD)

	Inner diameter (mm)		
Age Group	**Right**	**Left**	**P Value**
GroupA	2.70±0.14	2.65±0.14	
(n=5)	(2.50 2.80)	(2.45 2.75)	>0.50ns
GroupB	3.24±0.27	3.19±0.27	
(n=45)	(2.80 4.00)	(2.75 3.95)	>0.10ns
GroupC	2.04±0.08	1.99±0.08	
(n=10)	(2.00 2.20)	(1.95 2.15)	>0.10ns

Comparison between right and left side done by unpaired Student's 't' test; ns = not significant, Group A: Age 10 13 years, Group B: Age 14 45 years, Group C: Age 46 50 years

Table 3: Comparison among the Groups

Group	P value	P value
A vs B	<0.001***	<0.001***
A vs C	<0.001***	<0.001***
B vs C	<0.001***	<0.001***

*** = significant. Group A: Age 10 13 years, Group B: Age 14 45 years, Group C: Age 46 50 years

Discussion

Thomas stated that the inner diameter of ampulla of fallopian tubes is 1 cm. which is much higher than the present study. The reason behind is that the ampulla is the most dilated and convoluted part, so measurement of the inner diameter depend on the site from where the section was taken.

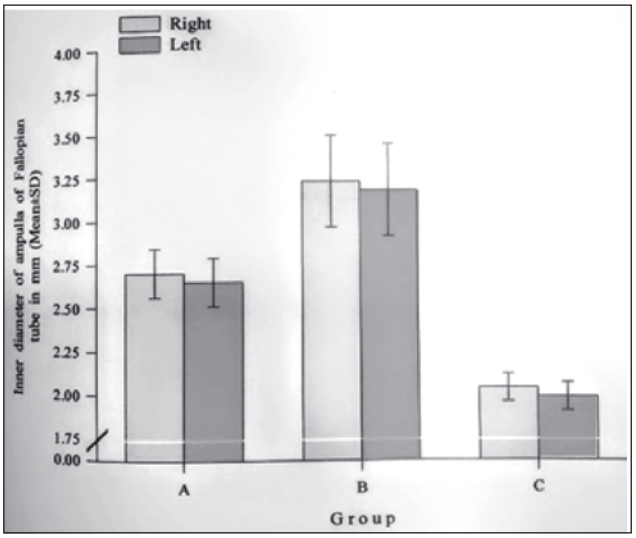

Figure IV: Inner diameter of the ampulla of right and left Fallopian tubes in different age group. Group A: Age 10 13 years, Group B: Age 14 45 years, Group C: Age 46 50 years

Saridogan (2003) stated that in ampulla the lumen becomes progressively wider and more complex, there are 6 to 8 primary folds which comprise numerous complex secondary and tertiary folds. May be the findings of the present study becomes lower than other study due to presence of these folds.

Conclusion

The morphological and histological parameters of the fallopian tube changes with advancing age. The growth of the fallopian tube as evidenced by length, outer diameter and inner diameter increase until the menopause and after menopause there was gradual decrease in the parameters. The proportion of ciliated cell increases gradually from proximal to distal segment and non-ciliated cell proportion increases from distal to proximal segment of the fallopian tube. In present study all parameter found somewhat less in Bangladeshi people than those described by Euro-American authors. The smaller size of the fallopian tube is most likely due to racial variation and also somewhat shrinkage due to fixation.

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