

Original Articles

Histological Study on the Diameter of the Lymphoid Follicle of Vermiform Appendix in Bangladeshi People

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Abstract

Context: The vermiform appendix is an abdominal organ performing the immunological function. Histological characteristics of this organ show its specialized immunological function. Vermiform appendix is involved in different disease processes such as appendicitis, carcinoma and diverticulitis. Appendicitis is the most important clinical condition. An appropriate anatomical knowledge about vermiform appendix is important for surgeons, pathologists and other physicians for proper diagnosis and management of appendicitis and carcinoma.

Study design: Descriptive type of study.

Place and period of the study: Department of Anatomy, Sir Salimullah Medical College, Dhaka from January 2006 to June 2007.

Materials: Sixty (60) human postmortem vermiform appendix, age ranging from 0 to 65 years. Samples were collected from unclaimed dead bodies within 24 hours of death from the morgue of Sir Salimullah Medical College and Dhaka Medical College, Dhaka.

Method: The samples were divided into five (5) different age groups.

Result: Diameter of lymphoid follicles reduced with the advancing age and showed negative correlation with age which was highly significant ($P < 0.001$).

Key words: Lymphoid follicle, vermiform appendix.

Introduction:

Vermiform appendix is a part of the large intestine having immunological importance. The lymphoid follicles within it are present in the lamina propria extending up to the submucosa¹. Vermiform appendix acts like abdominal tonsil because it

protects the small intestine from bacteria present in the large intestine². The appendix is an important organ of the gut associated lympho-epithelial tissue. In the lymphoid tissue mass, B and T lymphocytes and antigen presenting cells are present. B lymphocytes are present in the centre and cluster of T lymphocytes and other antigen presenting cells are situated in the periphery. M cells are present in the epithelial lining of the vermiform appendix¹. T lymphocytes are constant and that of B lymphocytes increase³.

Solitary and aggregated lymphoid follicles are most prominent or more pronounced around the age of puberty. Thereafter, they diminish in number and size, although they may persist in old age. As the size of the lymphoid follicle decreases gradually, the immunity is less in old age.

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Materials:

The present study was performed on sixty (60) human postmortem vermiform appendix of Bangladeshi people. The collected samples were divided into five age groups. Group-A (0-20 years), Group-B (21-30 years), Group-C (31-40 years), Group-D (41-50 years) and Group-E (above 50 years). The study was carried out during the period of January, 2006 to June, 2007.

Table-I

Age distribution of different groups of the present study (from Glover 1988)²

Groups	Age in years	Number (n=60) of samples	Percentage (%)
A	0-20	10	16.67
B	21-30	17	28.33
C	31-40	15	25.00
D	41-50	11	18.33
E	Above 50	7	11.67

Methods:

The vermiform appendix was preserved in 10% formal saline. From each group, six (6) fresh samples were selected for histological study. The vermiform appendix was placed flat on a metallic tray. A longitudinal incision was made by a sharp knife along the whole diameter of the appendix. Then three pieces of tissues were taken from base, middle piece and near the tip of the appendix. Pieces of tissue measured 1 cm in length into whole of the diameter of the appendix. Three slides were prepared from three regions of each sample. Thus, a total of 3x6=18 histological slides were made from each age group. Finally, 18x5=90 slides were prepared from five age groups. Staining of the histological section was done by Hematoxylin and Eosin.

Parameter studied

The diameter of lymphoid follicles

Procedure for measurement of the diameter of the lymphoid follicle (Fig. 1 and 2)

To measure the diameter of the lymphoid follicles, the numbers of ocular micrometer divisions were seen from near to remote margins of lymphoid

follicle, and measurements were taken twice for each follicle. One was taken among the maximum transverse diameter and another at perpendicular to the first one. Then the number of micrometer divisions were multiplied by the correlation factor derived earlier keeping the magnification constant at 10 x 10. Measurement of the lymphoid follicle was taken by using a computer generated photographically produced equal size of areas over a transparent plastic sheet by drawing three lines which radiated towards the periphery through 2 o'clock, 6 o'clock and 10 o'clock from the centre. The sheet was fixed on the top of the cover slip by adhesive tape. From each division, one lymphoid follicle having rounded or seemed to be rounded in appearance was taken for the measurement. So, three follicles were measured from each slide. Diameter of the lymphoid follicle was calculated as follows:

$$\text{Diameter of lymphoid follicle} = \frac{\text{Maximum transverse diameter} + \text{perpendicular diameter}}{2}$$

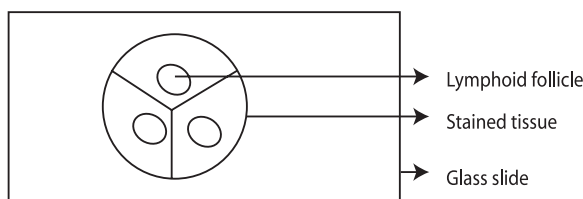


Fig.-1 showing the microscopic fields for the measurement of the diameter of the lymphoid follicle⁵

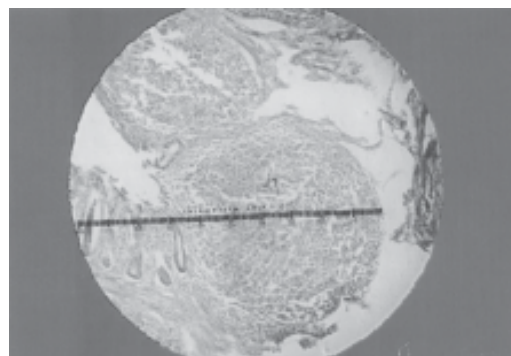


Fig.-2: Photomicrograph showing the measurement of the diameter of the lymphoid follicle of the vermiform appendix by ocular micrometer

Measurement was done by how many number of ocular micrometer divisions corresponded to the diameter of the lymphoid follicle. The average diameter was then converted to μm value multiplying by 12.5. As $1000 \mu\text{m} = 1 \text{mm}$, so average diameter of lymphoid follicle was expressed in mm, dividing the μm values by 1000.

Result:

Table II show that the average diameter of lymphoid follicle per histological section of vermiform appendix:

In group A (0-20 years), the average diameter of lymphoid follicle was at the base was $0.63 \pm 0.07 \text{ mm}$, at the middle was $0.60 \pm 0.08 \text{ mm}$, at the tip was $0.59 \pm 0.06 \text{ mm}$ and the average diameter was $0.60 \pm 0.06 \text{ mm}$. In group B (21-30 years), the average diameter of lymphoid follicle was at the base $0.41 \pm 0.06 \text{ mm}$, at the middle $0.38 \pm 0.07 \text{ mm}$, at the tip $0.37 \pm 0.06 \text{ mm}$ and the average diameter was $0.39 \pm 0.06 \text{ mm}$. In group C (31-40 years), the average diameter of lymphoid follicle was at the base $0.39 \pm 0.04 \text{ mm}$, at the middle $0.37 \pm 0.05 \text{ mm}$, at the tip $0.35 \pm 0.06 \text{ mm}$ and the average diameter of lymphoid follicle was $0.37 \pm 0.05 \text{ mm}$. In group D (41-50 years), the average diameter of lymphoid follicle was at the base $0.35 \pm 0.02 \text{ mm}$, at the middle $0.31 \pm 0.02 \text{ mm}$, at the tip $0.32 \pm 0.02 \text{ mm}$ and the average diameter was $0.33 \pm 0.01 \text{ mm}$. In group E (above 50 years), the average diameter of lymphoid follicle was at the base $0.30 \pm 0.01 \text{ mm}$, at the middle $0.30 \pm 0.02 \text{ mm}$, at the tip $0.29 \pm 0.02 \text{ mm}$ and the average diameter was $0.29 \pm 0.01 \text{ mm}$.

The average diameter of lymphoid follicle per histological section of vermiform appendix was highly significant between group A and B at the base, at the middle, at the tip and average value ($P < 0.001$), between A and C at the base, at the middle, at the tip and average value ($P < 0.001$), between A and D at the base, at the middle, at the tip and average value ($P < 0.001$), between A and E at the base, at the middle, at the tip and average value ($P < 0.001$). The average diameter of lymphoid follicle per histological section of vermiform appendix was highly significant ($P < 0.001$) between

B and E at the base and in average value, but significant ($P < 0.01$) at the middle and tip. Between C and E it was highly significant ($P < 0.001$) at the base, significant ($P < 0.01$) at average value and also significant ($P < 0.05$) at the middle and tip. Between B and D, P value ($P < 0.05$) was significant at the base, middle and at average value, but at the tip it was not significant. Between C and D, P value ($P < 0.05$) was significant at the middle but not significant at the base, tip and average value. Between D and E, P value ($P < 0.05$) was significant at the base but not significant at the middle, at tip and average value, but other difference was not significant.

Figure 3 shows the correlation between age and average diameter of lymphoid follicle. The regression line shows negative correlation between age and average number of lymphoid follicle, which reached the level of significance ($P < 0.001$).

Fig.-4 & 5 shows the photomicrograph of lymphoid follicle present within the vermiform appendix

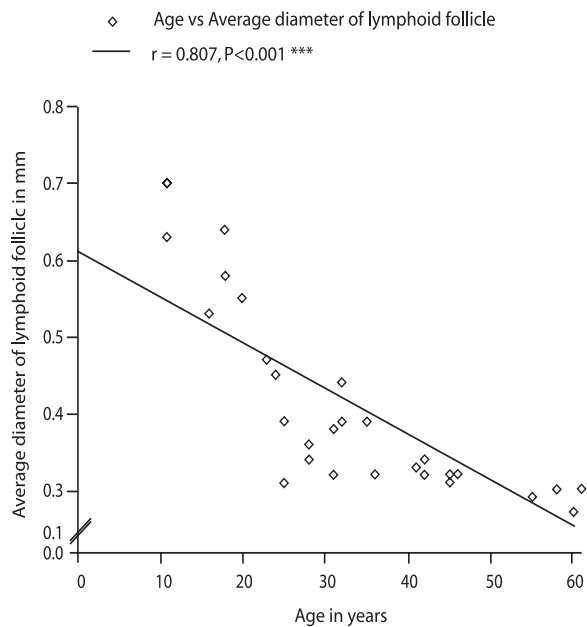


Fig.-3: Relationship between age and average diameter of lymphoid follicle

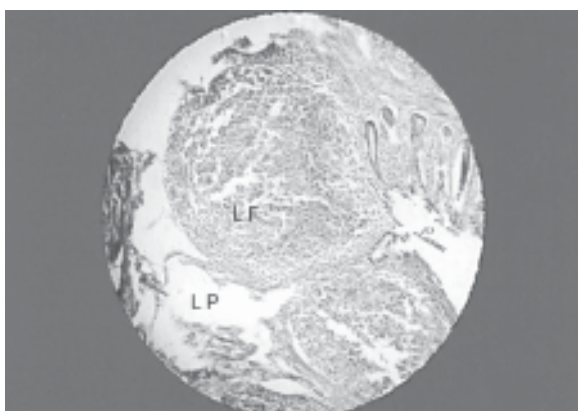


Fig. 4: A low power (10X objective) photomicrograph of a section of vermiform appendix showing the large size lymphoid follicle (LF) of vermiform appendix present in the lamina propria (LP)

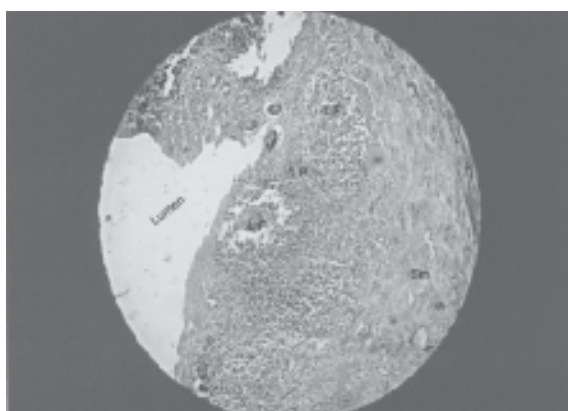


Fig.5: A low power (10X objective) photomicrograph of a section of vermiform appendix showing the multiple numbers of lymphoid follicles (LF) of vermiform appendix present in the lamina propria (LP)

Table-II

Diameter of the lymphoid follicle at the base, middle and tip of the vermiform appendix in different study groups

Groups	n	Diameter of the lymphoid follicle in mm			
		Base Mean±SD	Middle Mean±SD	Tip Mean±SD	Average Mean±SD
A	6	0.63±0.07 (0.54-0.72)	0.60±0.08 (0.50-0.70)	0.59±0.06 (0.51-0.67)	0.60±0.06 (0.53-0.70)
B	6	0.41±0.06 (0.34-0.49)	0.38±0.07 (0.31-0.48)	0.37±0.06 (0.29-0.44)	0.39±0.06 (0.31-0.47)
C	6	0.39±0.04 (0.35-0.46)	0.37±0.05 (0.33-0.45)	0.35±0.06 (0.28-0.41)	0.37±0.05 (0.32-0.44)
D	6	0.35±0.02 (0.33-0.38)	0.31±0.02 (0.28-0.33)	0.32±0.02 (0.30-0.34)	0.33±0.01 (0.31-0.34)
E	6	0.30±0.01 (0.28-0.31)	0.30±0.02 (0.26-0.32)	0.29±0.02 (0.27-0.32)	0.29±0.01 (0.27-0.30)

Groups	Diameter of lymphoid follicle			
	Base P value	Middle P value	Tip P value	Average P value
A vs B	<0.001 ^{***}	<0.001 ^{***}	<0.001 ^{***}	<0.001 ^{***}
A vs C	<0.001 ^{***}	<0.001 ^{***}	<0.001 ^{***}	<0.001 ^{***}
A vs D	<0.001 ^{***}	<0.001 ^{***}	<0.001 ^{***}	<0.001 ^{***}
A vs E	<0.001 ^{***}	<0.001 ^{***}	<0.001 ^{***}	<0.001 ^{***}
B vs C	>0.10 ^{ns}	>0.50 ^{ns}	>0.50 ^{ns}	>0.50 ^{ns}
B vs D	<0.05 [*]	<0.05 [*]	>0.05 ^{ns}	<0.05 [*]
B vs E	<0.001 ^{***}	<0.01 ^{**}	<0.01 ^{**}	<0.001 ^{***}
C vs D	>0.10 ^{ns}	<0.05 [*]	>0.10 ^{ns}	>0.05 ^{ns}
C vs E	<0.001 ^{***}	<0.05 [*]	<0.05 [*]	<0.01 ^{**}
D vs E	<0.05 [*]	>0.50 ^{ns}	>0.10 ^{ns}	>0.10 ^{ns}

Discussion:

In the present study, highest average diameter of lymphoid follicle was found to be 0.60 ± 0.06 mm in group A (0-20 years), whereas the lowest average diameter was found to be 0.29 ± 0.01 mm in group E (above 50 years).

The average diameters of lymphoid follicle in this study were highly significant ($P < 0.001$) when group A was compared with group B, C, D and E, and group B was compared with group E.

This study agreed with Borley¹, Bockman⁶ and Arey⁷.

The diameter of the lymphoid follicle showed negative correlation with age ($r = -0.807$) which was highly significant ($P < 0.001$).

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