

Variation of Length of Spleen in Different Age & Sex Groups of Bangladeshi Cadaver

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Abstract:

Spleen is a haemo-lymph organ and belongs to the reticuloendothelial system of human body develops from mesodermal proliferation between the two leaves of dorsal mesogastrium.^{1,2} It consists of a large encapsulated mass comprising of lymphoid and vascular tissues. Spleen is highly vascular, friable and elastic. It is purple in colour and moves with respiration. Spleen filters blood by taking out worn erythrocytes and many microbial antigens from the circulation. The spleen plays a central role in the pathophysiology of several potentially severe diseases such as inherited red cell membrane disorders, hemolytic anaemias and malaria.³ In each of these disorders, the spleen undergoes enlargement and require medical and surgical intervention. Increasing application of sophisticated procedures in radiology and surgery requires a profound knowledge of the gross and histomorphological aspects of the human spleen and also its vascular pattern. In our country, we depend on foreign data which came from the subjects of different races and from the individuals under different geographic conditions. So the present study was carried out to minimize the dependency on foreign standards and to identify the morphological and histological changes of the spleen with different age and sex of the individuals with a view to establish a data related to spleen of Bangladeshi people. To fulfill this aim, different incidence and parameters were studied. A cross sectional descriptive study was performed on 65 postmortem human spleen (34 male and 31 female) to find out the differences in length of spleen of Bangladeshi people in relation to age and sex by purposive sampling technique. All the specimens were grouped into three categories: Group A (up to 20 years), Group B (21 to 40 years), Group C (41 to 60 years). Dissection was performed according to standard autopsy techniques. Length of spleen was measured with the help of slide caliper. For statistical analysis, differences between age groups were analyzed by using unpaired student 't' test⁴. The mean (\pm SD) length of spleen was 8.42 \pm 1.14 cm in group A, 9.06 \pm 1.87 cm in group B, 7.98 \pm 0.98 cm in group C. The mean differences of length of spleen between groups A & B and C & A were statistically non significant, differences between B & C was significant.

Key words: Spleen, length, Cadaver, Age.

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Introduction:

The spleen is an organ found virtually in all vertebrates. In human, it is the largest lymphatic organ. It consists of a large encapsulated mass of lymphoid and vascular tissues. Spleen is highly vascular, friable and elastic, purple in colour and moving with

respiration⁵. Spleen filters blood by taking out worn erythrocytes. It is situated in the left hypochondrium and partly in the epigastrium between the fundus of the stomach and the diaphragm. The shape of the spleen varies from slightly curved wedge to a domed tetrahedron⁶. The axis of spleen is oblique and it is directed

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downward, forward and laterally coinciding with the left tenth rib. The size and weight of the spleen vary with age and sex. In adults, it is usually 12 cm long^{7,8,9}. Size increases in many disease process, such as idiopathic thrombocytopenic purpura, called splenomegally. Hypersplenism also cause splenic enlargement¹⁰. The spleen plays important roles in regard to red blood cells and the immune system. It removes old red blood cells and holds a reserve of blood which can be valuable in case of hemorrhagic shock and also recycles iron. As a part of mononuclear phagocyte system, it metabolizes haemoglobin removed from senescent erythrocytes. The globin portion of haemoglobin is degraded to its constitutive amino acids and the haem portion is metabolized to bilirubin which is removed by the liver. The spleen synthesizes antibodies in its white pulp and removes antibody coated bacteria and antibody coated blood cells by the way of blood and lymph circulation. A study found that the pulp of the spleen forms a reservoir that contains over half of the body's monocytes. These monocytes, upon moving to injured tissue, turn into dendritic cells and macrophages while promoting tissue healing. The tissue is a centre of activity of the mononuclear phagocytic system and can be considered analogous to a large lymph node parasites. During the second half of foetal life, the spleen forms red blood corpuscles. After birth, other sites take this responsibility of producing RBC. But sometimes, even in adults, spleen starts to produce RBC when there is anaemia due to destruction of bone marrow. For these reasons, the spleen demands constant attention from the anatomical, immunological and clinical point of view. The finding of the present study will be of fundamental importance to the physicians during the routine clinical examinations of the abdomen, to the surgeons while they perform surgical procedures which are related to the spleen, to the radiologists for their diagnostic procedures and of course, this knowledge is very important for anatomists during routine classroom dissection. With the above rationale in mind, aim of the present study was to find out the anatomical variations of spleen occurring in Bangladeshi people for particular locality.

Materials and Methods:

Spleens were collected from Bangladeshi cadaver of both sexes, age ranging from 6 to 60 years from autopsy laboratory of the Department of Forensic Medicine of Mymensingh Medical College, Mymensingh, Bangladesh. All the collected specimens were from medico-legal cases. Samples were collected within 12 hours of death that showed no sign of putrefaction. Gross and fine dissection was carried out to study the different morphological parameters and fixed in 10% formol-saline for 24 hours for proper fixation. For convenience of differentiating the changes of length of spleen in relation to age, collected specimens were divided into three groups: group A (upto 20 years), group B (21 to 40 years), group C (41 to 60 years). The present study was done with these fixed specimens in spite of some hardening and shrinking brought about by fixation.

The length of the spleen was measured from midpoint of anterior pole to midpoint of posterior pole with the help of slide caliper along the long axis of the spleen and expressed in cm.

All data collected from specimens of each cadaver were recorded in the pre designed data sheet, analysis by SPSS program & compared with the findings of other national and international studies and standard text books.

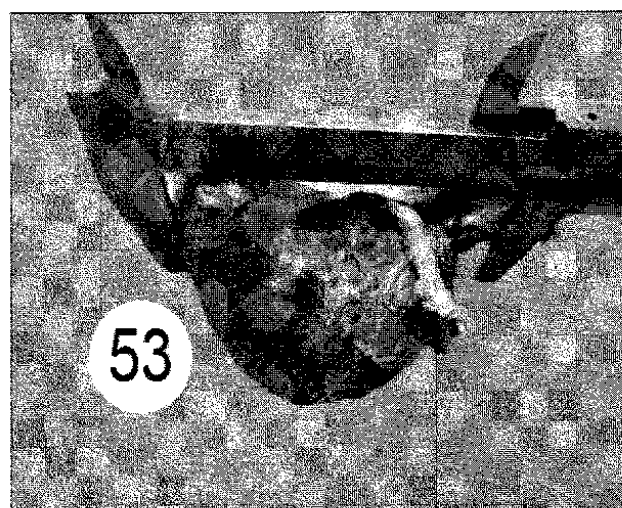


Fig.-1: Photograph Showing Procedure of Measurement of Length of Spleen

Results:

The mean (\pm SD) length of spleen was 8.42 ± 1.14 cm, 9.06 ± 1.87 cm, 7.98 ± 0.98 cm in group A, B, C respectively. It was observed that the mean length of spleen increased upto 40 years of age then gradually decreased as age advanced. The maximum mean length of

spleen was 10.53 cm in group A and the minimum was 9.72 cm in group D. The mean differences of length of spleen between groups A and C, A and D were statistically highly significant at $p < .001$ but differences between A and B, B and D were statistically significant at $p < .05$, differences between B and C, D and C were non significant at $p > .05$.

Table-I
Length of Spleen in Different Age Groups

Age Groups	Number of specimen (n=65)	Mean \pm SD in cm (Minimum-Maximum)
A(upto 20 years)	12	$8.42\pm 1.14(6.5-9.8)$
B(21 to 40 years)	40	$9.06\pm 1.87(4.9-14.4)$
C(41 to 60 years)	13	$7.98\pm 0.98(6.7-9.5)$

Comparison of length of spleen among different age groups

Comparison between age groups	Mean Difference	Std. Error Difference	t	P	Level of significance
A&B	-0.64	0.57	-1.13	0.27	Non Significant
B&C	1.08	0.54	2.00	0.05	Significant
C&A	-0.44	0.42	-1.04	0.31	Non Significant

Table-II
Length of Spleen in Different Sexes

Age Groups	Sex	No of specimens (n=65)	Length in cm Mean \pm SD
A (up to 20 years)	Male	6	7.98 ± 1.41
	Female	6	8.85 ± 0.63
B (21 to 40 years)	Male	18	8.91 ± 2.01
	Female	22	9.19 ± 1.78
C (41 to 60 years)	Male	10	8.02 ± 0.91
	Female	3	7.83 ± 1.40

Comparison of mean length of spleen between different sexes

Comparison between sexes within age groups	Mean Difference	Std. Error Difference	t	P	Level of significance
A	-0.87	0.63	-1.37	0.20	Non Significant
B	-0.28	0.60	-0.47	0.64	Non Significant
C	0.19	0.67	0.28	0.79	Non Significant

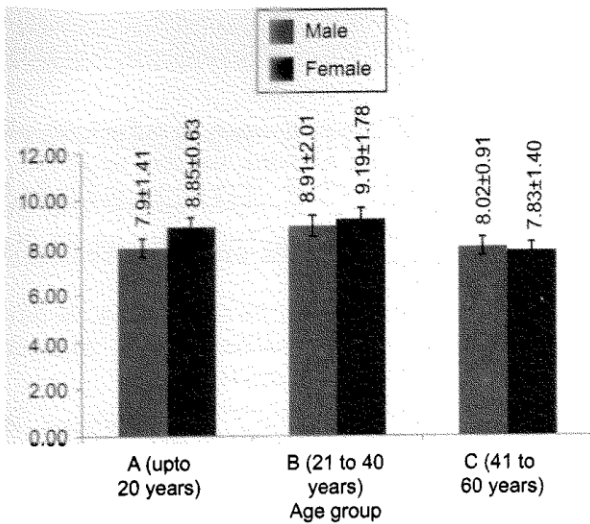


Fig.-2: Bar Diagram Representing the Length of Spleen in Different Age and Sex Groups

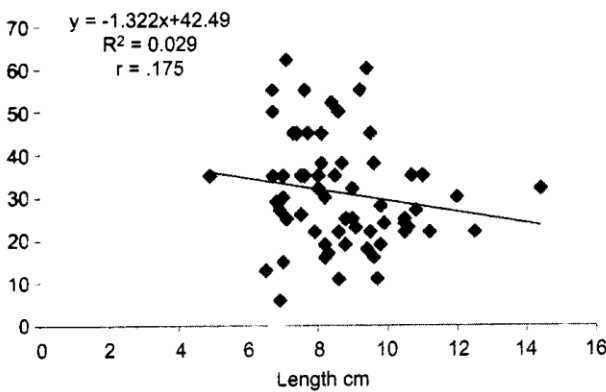


Fig.-3: Scatter Diagram Showing Correlation between Length of Spleen and Age of the Individual

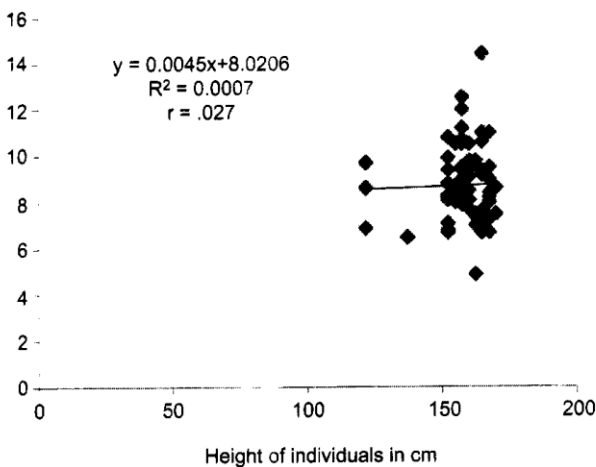


Fig.-4: Scatter Diagram Showing Correlation between Length of Spleen and Height of the Individual

Discussion:

The length of the spleen ranged from 4.90 to 14.40 cm. The mean (±SD) length of the spleen

was 8.42±1.14 cm, 9.06±1.87 cm and 7.98±0.98 cm in group A, B and C respectively. The mean length of spleen was maximum in group B 9.06 cm and minimum in group C 7.98 cm. The mean difference of length of the spleen was statistically non significant between groups A and B, group B and C and group C and A at p >0.05 level. In the present study, the correlation between the length of the spleen and different age groups of the individuals were tested. It was observed that length of the spleen increases up to 40 years and thereafter decreases with the increase of age of the individual. The regression line showed negative correlation between age of the individual and length of the spleen (where, r= -0.067). From the findings of present study, it was observed that the mean (±SD) length of spleen was higher in female than male, in group A and B, where in group A 7.98±1.41 cm in male and 8.85±0.63 cm in female, in group B 8.91±2.01 cm in male and 9.219±1.78 cm in female but in group C male was higher than female where 8.02±0.91 cm in male and 7.83±1.40 cm in female was found. Statistically there was no significant difference in mean length of spleen between male and female among the age groups. Length of the spleen is 12 cm which was in the range of the present study^{2,5,7,8,9}. All the above authors did not mention the age of their study population. In the present study size of spleen was about 9-14 cm long which was similar to some study⁶. Findings of the present study nearly similar with the study of Asian countries authors^{11,12} but lower than study of foreign countries authors¹³.

Conclusion:

The finding of the present study will be of fundamental importance to the physicians during the routine clinical examinations of the abdomen, to the surgeons while they perform surgical procedures which are related to the spleen, to the radiologists for their diagnostic procedures and of course, this knowledge is very important for anatomists during routine classroom dissection. From the present study, it was concluded that maximum length of spleen was in group B 9.06 cm and minimum in group C 7.98 cm. It was observed that the mean length

of spleen gradually decreased with increases of age. In the present study, showed significant positive correlation with height of the individuals but significant negative correlation with age of the individuals.

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