

Assessment of Splenic Width by Ultrasonography in Adult Population of Gwalior and its Correlation with Age and Gender

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Abstract

Aims and objectives: To assess correlation of splenic width with age and gender of adult population of Gwalior region. **Material and methods:** Present cross sectional study was done at Gajra Raja Medical College Gwalior M.P. with 160 adults of Gwalior– 80 males and 80 females. By Pearson's correlation coefficients, the relation of spleen width to age was evaluated. One way ANOVA test was applied. **Results:** Mean splenic width and mean age of the participants were 6.67±1.07 cm and 40.98±12.53 years respectively. There was a significant negative correlation between the splenic width and Age ($p < 0.05$) but gender wise there was no significant correlation. **Conclusion:** Spleen width was significantly higher among the males as compared with females. The study noted that the splenic width increases upto the age of 45 years then start declining.

Key Words: Age; Correlation; Females; Males.

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Introduction

In Ultra- sonography, spleen is crescent shape with smooth outer convexity. Splenomegaly is an indicator of varieties of inflammatory, infectious (malaria and kala-azar), infiltrative, metabolic, neoplastic, hematopoietic disease and the other diseases like portal hypertension, glycogen storage disorder, leukemia lymphoma, melanoma, celiac disease etc[1,2]. Important functions of spleen are Phagocytosis, haemopoiesis, immune response and storage of RBCs[3]. Splenic Width (SW) is defined as the maximum distance between the medial and lateral border of the spleen. It is measured in a plane perpendicular to the length[4]. Spleen widths are also used in the formula for calculation of splenic volume. This study was framed with the objectives:

1. To re- establish guidelines for normal splenic width in adults (age 20 to 60 years) by using sonographic method.
2. To compare and measure splenic width with adult age and sex in Gwalior region.

Material and Methods

The Present cross-sectional study was conducted at Department of Anatomy, Gajra Raja Medical College Gwalior and Department of Radiodiagnosis, Gajra Raja Medical College Gwalior between the periods of December 2017 to December 2018. The study was carried out on 160 subjects (80 males and 80 females, age 20 to 60 years) after obtaining the consent from them. The patients selected for the study will be evaluated with Ultrasonography for abdominal and/or pelvic problem unrelated to the spleen, mostly because of UTI or abdominal pain and no GIT, hematologic, oncologic or traumatic conditions.

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For ultrasound examination of spleen, first the patients will be placed in supine position and coupling gel will be applied on abdominal wall in the left hypochondriac region in order to assure optimal transmission of energy between the patient and the probe. Now the subject was asked to lie in the right lateral position with the left side elevated. Splenic measurement will be taken during deep inspiration, to minimize masking by the lung. To estimate the dimension of the spleen, ultrasonography was done with a model Aloka-pro sound alpha-6 ultrasonographic machine with convex probe 3.5-5 MHz. The complete information regarding age, sex and splenic width was recorded in the proforma. From these measurement Means, Standard deviation (SD), Minimum and Maximum values and Confidence interval (CI) were calculated. Statistical test like independent t test, One way ANOVA and Pearson's correlation test were applied and the p value were calculated at 5 % level of significance. Data entry were done in Microsoft excel software and analysis were performed on the SPSS-16 software.

Ethical Clearance

Ethical clearance was obtained from Institutional Ethical Committee. Informed consent was obtained from each participant at the time of data collection.

Results

In the present study average age of the participants were 40.98±12.53 years with range 21 years-60 years and average spleen width was observed as 6.67±1.07 cm with range 3.10 cm- 9.00 c.m. Average splenic width among the females participants (6.45 c.m) were significantly lower as compared with males (6.88 cm) . Average age among the females and males were statistically same (Table1). Age sex distribution of the participants was shown in figure 1.

Table 1: Comparison table for age and width among males and females:

Descriptive for Variables	Female Mean± s.d.	Male Mean± s.d.	Independent t test	P value	95 % CI of the mean difference	
					Lower	Upper
Age	40.67±12.42	41.29±12.71	t=-0.31	0.758	-4.54	3.31
width	6.45±0.92	6.88±1.16	t=-2.59	0.011	-0.76	-0.10

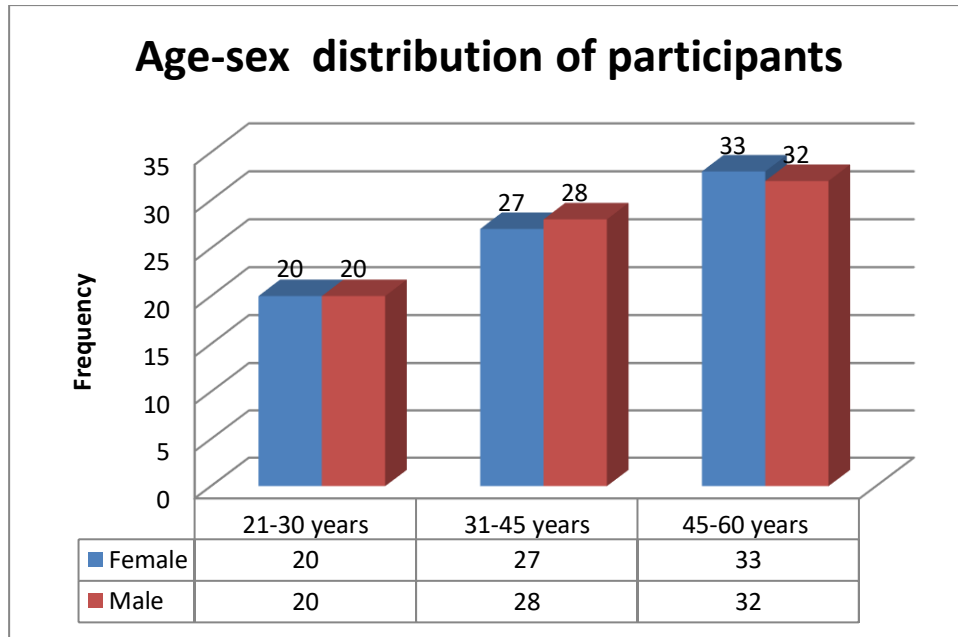


Fig 1: Frequency distribution of participants for their Age and sex:

There was significant negative correlation was observed between age and splenic width for all participants considering together but separately for males and females correlation was statistically insignificant. (Fig 2 and Table 2).

Table 2: Correlation table between age and spleen width:

Correlation between Age and width	Female		Male		Total	
	r	p	r	p	r	p
	-0.215	0.056	-0.219	0.051	-0.206**	.009

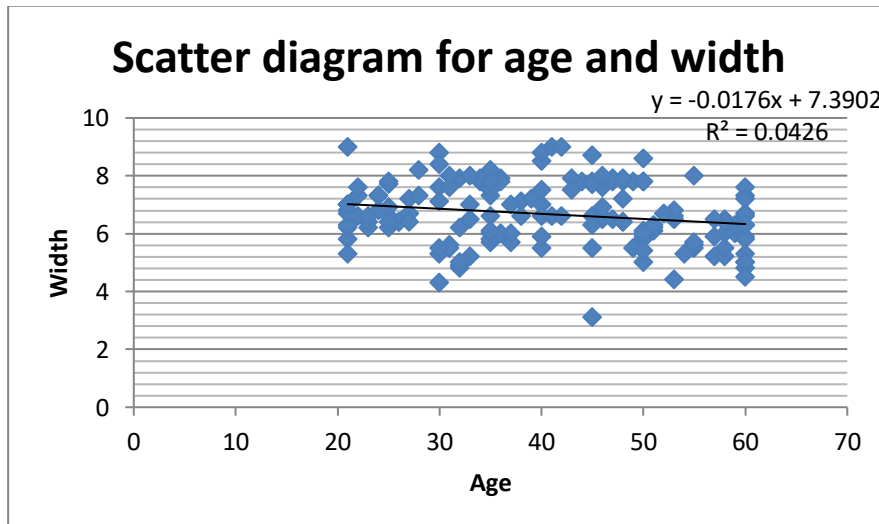


Fig 2: Scatter diagram for overall Correlation of spleen width with age

In case of all participants (Table 3); the mean splenic width in the first age group i.e. 21-30 years was 6.83±0.93 cm, in the second age group i.e. 31-45 years was 6.87 ± 1.22 cm, in third age group i.e. 46-60 years was 6.40±0.97 cm. There was first increase in mean splenic width with advancing age then significant decrease is seen in advanced age group considering all participants.

Table 3: Overall Splenic Width in different age groups

Age (years)	Numbers	Mean (cm)±SD	Range (cm)	F test/ p value
21-30	40	6.83±0.93	4.30-9.0	3.59
31-45	55	6.87±1.22	3.10-9.0	/
46-60	65	6.40±0.97	4.40-8.60	0.03

In case of the mean splenic width in male (Table 4), in the first age group i.e. 21-30 years was 7.17±0.97 cm, in the second age group i.e. 31-45 years was 6.93±1.43 cm, in third age group i.e. 46-60 years was observed to be 6.65±0.99 cm.

Table 4: Splenic Width in different age groups in Male

Age (years)	Numbers	Mean (cm)±SD	Range (cm)	F ratio/ p value
21-30	20	7.17±0.97	5.30-9.00	1.313
31-45	28	6.93±1.43	3.10-9.00	/
46-60	32	6.65±0.99	4.40-8.00	0.275

In case of the mean splenic width in female (Table 5) in the first age group i.e. 21-30 years was 6.48±0.75 cm, in the second age group i.e. 31-45 years was 6.80 ± 0.98 cm, in third age group i.e. 46-60 years was 6.15±0.90 cm. There was first increase in mean splenic width in females with advancing age then significant decrease were seen in advanced age group. Overall our results show that the splenic width in males was greater than females at each age group.

Table 5: Splenic Width in different age groups in Female

Age (years)	Numbers	Mean (cm)±SD	Range (cm)	F ratio/ p value
21-30	20	6.48±0.75	4.30-7.60	3.840
31-45	27	6.80±0.98	4.80-8.70	/
46-60	33	6.15±0.900	4.80-8.60	0.026

Discussion

This study was conducted with the aim to measure the variations in spleen width according to age and sex by ultrasonography and to find out possible correlations with the age and gender distribution with this. In our study at Gwalior region of India, the mean Splenic Width was 6.45±0.93 cm and 6.88±1.16 cm in females and males respectively. In another study of India done by Kankraj K et al among the south Indian population the splenic width was 8.5cm and 7.9cm in males and females[5]. In Ehimwenma and Tagbo study, the width was 7.8cm and 7.1cm in males and females respectively[6]. In the study done by Okoye IJ et al. the mean values of width were 7.5 cm in males and 6 cm in females respectively[7]. Hosey et al in his study found that mean width was 5.16 (1.21) cm (range 2.83 to 12.81) among all the collegiate athletes and Men's (5.54 cm) had significantly ($p<0.05$) wider spleens than women (4.74 cm)[8]. Çeliktas M et al in their study reported that among the females splenic width was 7.58±1.56 cm while among the males it was 8.75±1.84 [9]. These all studies supported our findings that mean splenic width was lower in females as compared with the males. Another study conducted to establish normal size of spleen found that median spleen width among the participants was 6.5 cm (with 5th –95th percentile range: 4.1–8.9 cm)[10]. Arora et al[11] (2010) used ultrasonography to examine 160 subjects (1:1 male female ratio) and finds that the splenic width decreases with the increase in age in both male and female and it was greater in males than in females. Our study finds there was a negative correlation between age of subjects and splenic width; similar findings was also reported in the studies conducted by Tekle et al[4] and Ehimwenma et al[6]. The present study was an attempt to determine the normal range of the spleen width which will be useful for reference value of spleen width in Gwalior region.

Conclusion

Our result shows that in both male and female splenic width firstly slightly increased and finally decreased at older age group. It was found that the splenic width was greater in males than in females in the each age group. It can be concluded that the basic knowledge of splenic width by ultrasonography may be essential for providing the guideline and reference value to the radiologists and clinicians for splenic diseases in Gwalior region.

Conflict of Interest: Nil

Source of support: Nil

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