ORIGINAL RESEARCH PAPER

Volume - 12 | Issue - 07 | July - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

DETERMINING TESTICULAR STIFFNESS VALUES USING SHEAR WAVE ELASTOGRAPHY IN 36 HEALTHY INDIVIDUALS -A CROSS SECTIONAL STUDY.

Radio Diagnosis

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ABSTRACT

As a relatively new sonographic technique, tissue elastography has emerged as a qualitative and potentially quantitative adjunctive tool to provide additional information on tissue stiffness, aiming to further improve diagnostic confidence in discriminating benign from malignant focal testicular lesions. **Aim and objective:** To establish normal range of Shear Wave Elastography values of different regions of testes measured in terms of kilopascals (kPa) in 36 healthy individuals and to compare Shear wave velocity differences at these various regions of testes. **Methodology:** A total of 36 subjects were divided according to their age into three groups (20-30, 30-40 and >41 years), all the subjects underwent examination of bilateral testes (72 testes in total) using Grey Scale Ultrasonography followed by Shear wave elastography and shear wave velocity of different regions of testes (Upper, Mid, Lower poles, Upper periphery and Lower periphery) measured in terms of kilo pascals (kPa). **Result:** On Right, the Mean Shear Wave Elastography (kPa) values at the Lower periphery (Group A) and Lower pole (Group B) and Group C (Consisting of Upper pole, Mid pole and Upper periphery) were significantly different and On Left, the Mean Shear Wave Elastography (kPa) values at the Lower periphery (Group A) was significantly different from Group B (Consisting of Upper pole, Mid pole, Lower pole and Upper periphery). **Conclusion:** Incorporating use of Strain or shear wave elastography techniques along with Grey scale ultrasonography and Color doppler in the evaluation of testes serves as part of a multiparametric ultrasound examination which is indispensable for increasing diagnostic accuracy in testicular pathology. Hence knowledge of normal shear wave velocity values at different regions of testes is important before interpreting the pathological conditions in order to void potential pitfalls.

KEYWORDS

Shear Wave Elastography, testes, Ultrasonography, tissue elastography

INTRODUCTION

Ultrasonography (US) is the preferred and widely accepted first choice imaging modality for the evaluation of testicular abnormalities (1). Traditionally, assessment of the testis with B-mode and color Doppler ultrasonography (US) has been the main workhorse for identifying and characterising focal testicular lesions owing to its excellent spatial resolution of anatomical details and the superficial location of the testis. B-mode US accurately identifies the size, shape, location (intra- or extra-testicular), and pattern of echogenicity of lesion. B-mode US has a very high sensitivity when investigating the scrotum. Furthermore, new additions to B-mode US such as color Doppler, contrast-enhanced ultrasound, and recently elastography have been developed over time (2). Elastography is a noninvasive method to evaluate tissue stiffness (3), which can be assessed by either strain or shear wave. Strain elastography uses external transducer compression and continuously compresses the tissue of interest (4), whereas shear wave is a quantitative method (5–7). Since lesions in testicles are superficial, both elastography methods could be used.

Elastography is used in various organs (7–10)and also in the testicles for investigating testicular torsion (11,12), testicular cancer, infarction , epidermoid cysts, undescended testes, infertility in men , hemodialysis patients , testicular microlithiasis, and other lesions. It can be challenging to distinguish hard tumors in soft tissue using only B-mode ultrasound(13–17). Therefore, elastography is instrumental in differentiating normal from pathological tissue (5)

Shear wave elastography differs from strain elastography, as it is a quantitative method of assessing tissue elasticity by measuring the speed of acoustic radiation force impulse-induced shear waves traveling in the tissue of interest . Shear waves are a type of mechanical waves whose propagation speed within the soft tissue can be measured. Shear wave velocities are measured by the scanner in m/sec, and they can be converted to the Young modulus of elasticity (kPa) using the simple equation $E=3\rho c^2$ (E=the Young modulus, ρ =tissue density, c=shear wave speed). Today, almost all commercial scanners provide values both in m/sec and kPa. However, it is preferable to report values in m/sec because it is the quantity directly measured by the machine and the above simple conversion to the Young modulus (E) is accurate only if several assumptions are true.

MATERIALS AND METHODS:

This study was conducted from June 2022-December 2022, study included those patients referred for an ultrasound abdomen for various reasons who had no inguino scrotal complaints and who gave consent for the study, with age ranged 20-60 years. Patients with abnormal findings on inguino scrotal ultrasound, known systemic illness (like leprosy, tuberculosis etc) and previous history of trauma to/surgery of Inguino-scrotal region were excluded from the study.

A total of 36 subjects were divided according to their age into three groups (20-30, 30-40 and >41 years), all the subjects underwent examination of bilateral testes (72 testes in total) using Grey Scale Ultrasonography followed by Shear wave elastography.

Initially Grey scale ultrasound was performed to look for testes size, shape, and echotexture to rule out abnormal testicular findings. Later shear wave elastography was performed with colour coded map superimposed on grey scale image showing relative stiffness of testes in terms of colour coded areas(qualitative assessment) and shear wave velocity of testes was measured in terms of kilo pascals (kPa) at upper pole, mid-pole, lower pole, upper periphery, and lower periphery of both testes.

Normal testes show uniform green areas in the center of the parenchyma with blue areas in the periphery due to the presence of tunica albuginea.

Relative stiffness according to colour-coded maps are as follows:
Blue, Green and Red colored areas - Indicating relatively hard, intermediate and soft areas respectively.

RESULTS AND ANALYSIS:

Table 1 indicates an age-wise comparison of Shear Wave Elastography (kPa) at the various regions of Right testes measured in kilopascals (kpa) among 36 healthy individuals. At the upper pole region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 2.16 (±0.25) kpa, 2.25 (±0.27) kpa and 2.08 (±0.30) kpa respectively. The results are also shown in Figure 1. At the mid pole region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 2.29 (±0.33) kpa, 2.13 (±0.24) kpa and 2.24 (±0.11) kpa respectively. The results are also shown in Figure 2. At the lower pole region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 3.13 (±1.38) kpa, 3.07 (±0.48) kpa and 2.84 (±0.21) kpa respectively. The results are also shown in Figure 3. At the upper periphery region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 2.28 (±0.45) kpa, 2.27 (±0.29) kpa and 2.34 (±0.34) kpa respectively. The results are also shown in Figure 4. At the lower periphery region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 8.83 (±2.72) kpa, 6.98 (±1.24) kpa and 7.18 (±0.64) kpa respectively. The results are also shown in Figure 5.

Table 1. Descriptive Statistics for Shear Wave Elastography (kPa) (Right side)

Shear Wave Elastography (kPa)	Age	N	Mean	SD	SEM	95% CI for Mean		Min	Max
						LL	UL		
Upper pole	20-30	16	2.16	0.25	0.06	2.02	2.29	1.80	2.70
	31-40	15	2.25	0.27	0.07	2.11	2.40	1.80	2.70
	>40	5	2.08	0.30	0.14	1.70	2.46	1.70	2.50
	Total	36	2.19	0.26	0.04	2.10	2.28	1.70	2.70
Mid pole	20-30	16	2.29	0.33	0.08	2.11	2.46	1.70	2.70
	31-40	15	2.13	0.24	0.06	2.00	2.27	1.80	2.60
	>40	5	2.24	0.11	0.05	2.10	2.38	2.10	2.40
	Total	36	2.22	0.28	0.05	2.12	2.31	1.70	2.70
Lower pole	20-30	16	3.13	1.38	0.34	2.40	3.86	1.70	6.30
	31-40	15	3.07	0.48	0.12	2.81	3.34	2.20	4.00
	>40	5	2.84	0.21	0.09	2.58	3.10	2.60	3.10
	Total	36	3.07	0.96	0.16	2.74	3.39	1.70	6.30
Upper periphery	20-30	16	2.28	0.45	0.11	2.04	2.51	1.60	3.50
	31-40	15	2.27	0.29	0.07	2.11	2.43	1.80	2.70
	>40	5	2.34	0.34	0.15	1.91	2.77	2.00	2.80
	Total	36	2.28	0.37	0.06	2.16	2.41	1.60	3.50
Lower periphery	20-30	16	8.83	2.72	0.68	7.38	10.28	4.60	13.60
	31-40	15	6.98	1.24	0.32	6.30	7.66	4.60	9.20
	>40	5	7.18	0.64	0.29	6.38	7.98	6.40	8.10
	Total	36	7.83	2.16	0.36	7.10	8.56	4.60	13.60

Figure 1. Shear Wave Elastography (kPa)- Upper pole- Right side

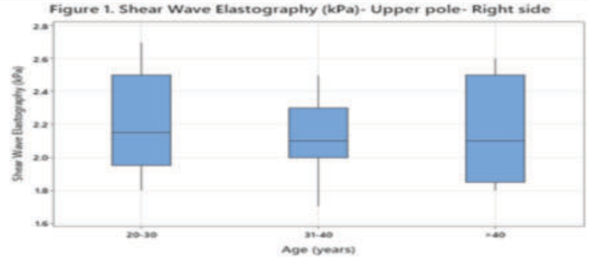

Figure 2. Shear Wave Elastography (kPa)- Mid pole- Right side

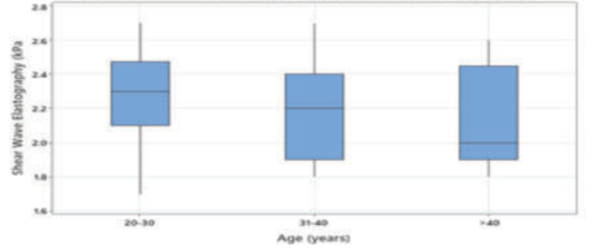

Figure 3. Shear Wave Elastography (kPa)- Lower pole- Right side

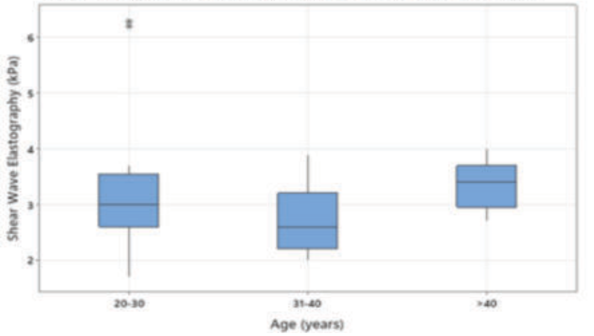

Figure 4. Shear Wave Elastography (kPa)- Upper periphery- Right side

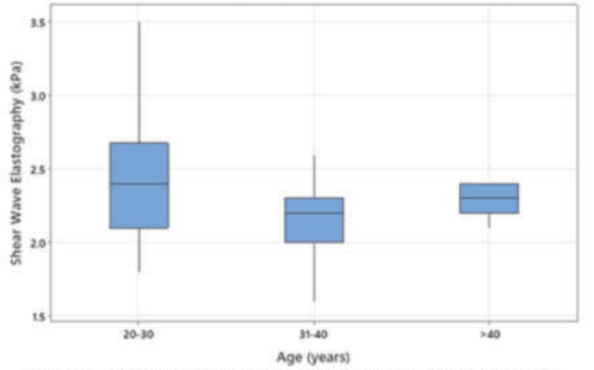

Figure 5. Shear Wave Elastography (kPa)- Lower periphery- Right side

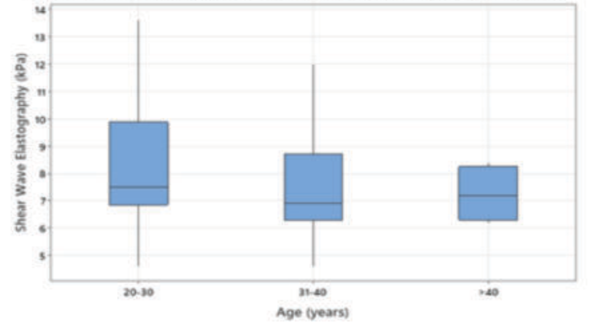

Table 2 indicates an age-wise comparison of Shear Wave Elastography (kPa) at the various regions of Left testes measured in kilopascals (kpa) among 36 healthy individuals. At the upper pole region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 2.22 (±0.29) kpa, 2.17 (±0.28) kpa and 2.14 (±0.21) kpa respectively. The results are also shown in Figure 6. At the mid-pole region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 2.27 (±0.29) kpa, 2.14 (±0.36) kpa and 2.24 (±0.26) kpa respectively. The results are also shown in Figure 7. At the lower pole region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 2.54 (±0.66) kpa, 3.33 (±0.33) kpa and 3.14 (±0.30) kpa respectively. The results are also shown in Figure 8. At the upper periphery region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 2.26 (±0.26) kpa, 2.19 (±0.31) kpa and 2.04 (±0.21) kpa respectively. The results are also shown in Figure 9. At the lower periphery region of the testes, the average Shear Wave Elastography values among the healthy males in the age group (20-30), (31-40), and (>41) years were 8.41 (±3.57) kpa, 7.57 (±1.29) kpa and 7.10 (±0.57) kpa respectively. The results are also shown in Figure 10.

Descriptive Statistics for Shear Wave Elastography (kPa) (Left side)

Shear Wave Elastography (kPa)	Age	N	Mean	SD	SEM	95% CI for Mean		Min	Max
						LL	UL		
Upper pole	20-30	16	2.22	0.29	0.07	2.06	2.37	1.60	2.60
	31-40	15	2.17	0.28	0.07	2.01	2.32	1.70	2.60
	>40	5	2.14	0.21	0.09	1.88	2.40	1.90	2.40
	Total	36	2.19	0.27	0.05	2.09	2.28	1.60	2.60

Mid pole	20-30	16	2.27	0.29	0.07	2.11	2.43	1.80	2.90
	31-40	15	2.14	0.36	0.09	1.94	2.34	1.70	3.20
	>40	5	2.24	0.26	0.12	1.92	2.56	2.00	2.60
	Total	36	2.21	0.32	0.05	2.10	2.32	1.70	3.20
Lower pole	20-30	16	2.54	0.66	0.16	2.19	2.89	1.90	4.60
	31-40	15	3.33	0.33	0.08	3.15	3.51	2.80	3.80
	>40	5	3.14	0.30	0.14	2.76	3.52	2.80	3.50
	Total	36	2.95	0.62	0.10	2.74	3.16	1.90	4.60
Upper periphery	20-30	16	2.26	0.26	0.07	2.12	2.40	1.90	2.80
	31-40	15	2.19	0.31	0.08	2.02	2.36	1.70	2.60
	>40	5	2.04	0.21	0.09	1.78	2.30	1.80	2.30
	Total	36	2.20	0.28	0.05	2.11	2.30	1.70	2.80
Lower periphery	20-30	16	8.41	3.57	0.89	6.51	10.32	3.70	14.80
	31-40	15	7.57	1.29	0.33	6.85	8.28	5.80	10.50
	>40	5	7.10	0.57	0.25	6.39	7.81	6.70	8.10
	Total	36	7.88	2.53	0.42	7.02	8.74	3.70	14.80

Figure 6. Shear Wave Elastography (kPa)- Upper pole- Left side

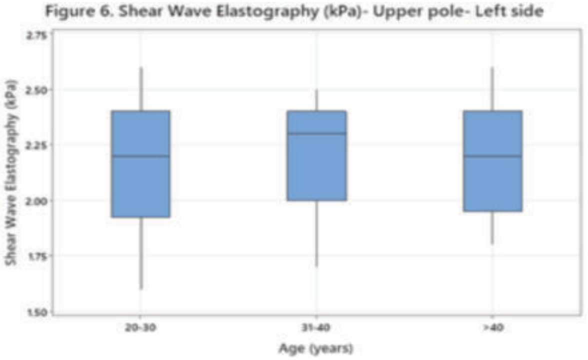

Figure 7. Shear Wave Elastography (kPa)- Mid pole- Left side

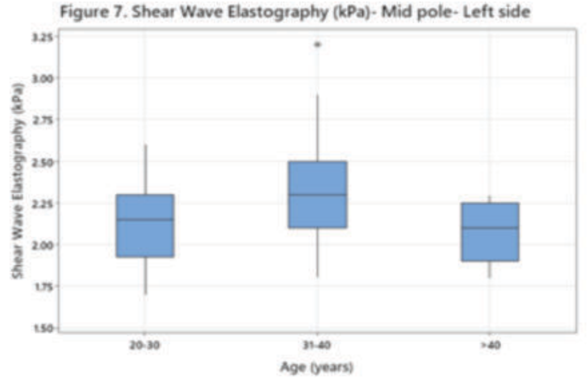

Figure 8. Shear Wave Elastography (kPa)- Lower pole- Left side

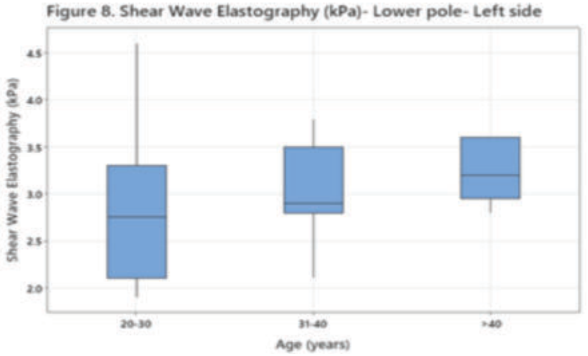

Figure 9. Shear Wave Elastography (kPa)- Upper periphery- Left side

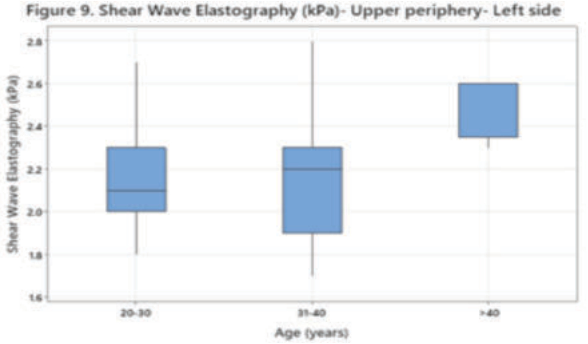

Figure 10. Shear Wave Elastography (kPa)- Lower periphery- Left side

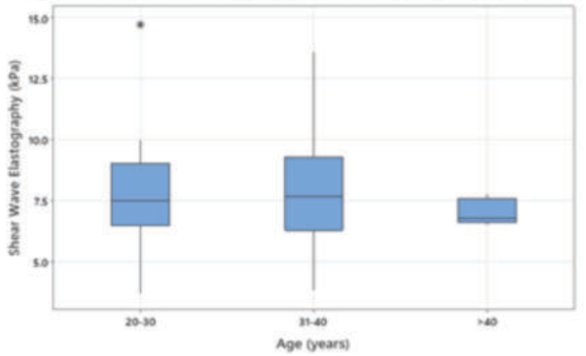

Table 3 indicates a comparison of region-wise Mean Shear Wave Elastography (kPa) on the right side. The average Shear Wave Elastography (kPa) at the upper pole was 2.186 (±0.2631) with a 95% CI (1.8299, 2.5423), at the mid pole it was 2.2167 (± 0.2772) with a 95% CI (1.8604, 2.5729), at the lower pole it was 3.067 (±0.958) with a 95% CI (2.710, 3.423), at Upper periphery it was 2.2833 (±0.3653) with a 95% CI (1.9271, 2.6396) and at Lower Periphery it was 7.831 (± 2.16) with a 95% CI (7.474, 8.187). The result of one-way ANOVA indicates that there is a significant difference in the mean Shear Wave Elastography (kPa) according to the region of testes (F=149.62, p<.001). The results are shown in Figure 11.

Table 3. Mean Shear Wave Elastography (kPa) (Right side)

Factor	N	Mean	SD	95% CI	p-value
Upper pole	36	2.1861	0.2631	(1.8299, 2.5423)	<.001
Mid pole	36	2.2167	0.2772	(1.8604, 2.5729)	
Lower pole	36	3.067	0.958	(2.710, 3.423)	
Upper periphery	36	2.2833	0.3653	(1.9271, 2.6396)	
Lower Periphery	36	7.831	2.16	(7.474, 8.187)	

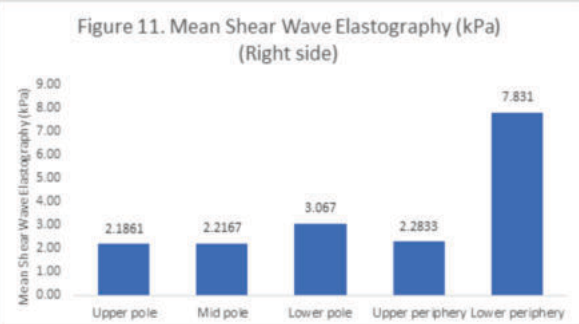

Table 4 indicates the grouping Information Using the Tukey Method and 95% Confidence (Right side). The results of the Tuckey method indicate that the Mean Shear Wave Elastography (kPa) at the Upper pole, Mid-pole and Upper periphery are homogeneous (Group C). The Mean Shear Wave Elastography (kPa) at the lower periphery (Group A) and lower pole (Group B) and Group C are significantly different.

Table 4. Grouping Information Using the Tukey Method and 95% Confidence (Right side)

Factor	N	Mean	Grouping		
Lower periphery	36	7.831	A		
Lower pole	36	3.067		B	
Upper periphery	36	2.2833			C
Mid pole	36	2.2167			C
Upper pole	36	2.1861			C
Means that do not share a letter are significantly different.					

Table 5 indicates a comparison of region-wise Mean Shear Wave Elastography (kPa) on the left side. The average Shear Wave Elastography (kPa) at the upper pole was 2.1861 (±0.2706) with a 95% CI (1.7953, 2.5769), at the mid pole it was 2.2111 (±0.3187) with a 95% CI (1.8203, 2.6019), at the lower pole it was 2.953 (±0.616) with a 95% CI (2.562, 3.344), at Upper periphery it was 2.2028 (±0.2772) with a 95% CI (1.8120, 2.5935) and at Lower Periphery it was 7.878 (±2.535) with a 95% CI (7.487, 8.269). The result of one-way ANOVA indicates that there is a significant difference in the mean Shear Wave Elastography (kPa) (left side) according to the region of testes (F=149.62, p<.001). The results are also shown in Figure12.

 PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

Table 5. Mean Shear Wave Elastography (kPa) (Left side)

Factor	N	Mean	SD	95% CI	p-value
Upper pole	36	2.1861	0.2706	(1.7953, 2.5769)	<.001
Mid pole	36	2.2111	0.3187	(1.8203, 2.6019)	
Lower pole	36	2.953	0.616	(2.562, 3.344)	
Upper periphery	36	2.2028	0.2772	(1.8120, 2.5935)	
Lower periphery	36	7.878	2.535	(7.487, 8.269)	

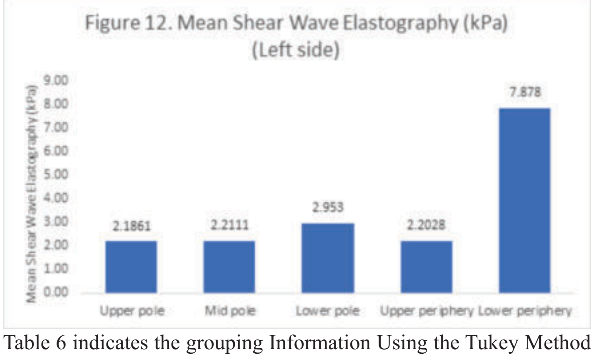

Table 6 indicates the grouping Information Using the Tukey Method and 95% Confidence (Left side). The results of the Tuckey method indicate the Mean Shear Wave Elastography (kPa) at the Upper, Mid, Lower poles and Upper periphery are homogenous (Group B). The Mean Shear Wave Elastography (kPa) at the lower periphery (Group A) is significantly different from Group B.

Table 6. Grouping Information Using the Tukey Method and 95% Confidence (Left side)

Factor	N	Mean	Grouping	
Lower periphery	36	7.878	A	
Lower pole	36	2.953		B
Mid pole	36	2.2111		B
Upper periphery	36	2.2028		B
Upper pole	36	2.1861		B
Means that do not share a letter are significantly different.				

DISCUSSION

The testes undergo age-related changes. With advancing age in men, testicular size, sperm quality, and numbers of all germ cell types, including Sertoli cells and Leydig cells will decrease. Histomorphological examinations showed that the volume occupied by the seminiferous tubules decreases, whereas tissue occupied by the testicular interstitium remains constant (18) In our study, the average Shear Wave Elastography for the right side among the healthy males in the age group (20-30), (31-40), and (>41) years at the upper pole region of the testes was 2.16 (±0.25) kpa, 2.25 (±0.27) kpa and 2.08 (±0.30) kpa respectively, at the mid pole region of the testes was 2.29 (±0.33) kpa, 2.13 (±0.24) kpa and 2.24 (±0.11) kpa respectively, At the lower pole region of the testes was 3.13 (±1.38) kpa, 3.07 (±0.48) kpa and 2.84 (±0.21) kpa respectively. At the upper periphery region of the testes was 2.28 (±0.45) kpa, 2.27 (±0.29) kpa and 2.34 (±0.34) kpa respectively and at the lower periphery region of the testes was 8.83 (±2.72) kpa, 6.98 (±1.24) kpa and 7.18 (±0.64) kpa respectively. Also, average Shear Wave Elastography for the left side among the healthy males in the age group (20-30), (31-40), and (>41) years at the upper pole region of the testes was 2.22 (±0.29) kpa, 2.17 (±0.28) kpa and 2.14 (±0.21) kpa respectively, at the mid pole region of the testes was 2.27 (±0.29) kpa, 2.14 (±0.36) kpa and 2.24 (±0.26) kpa respectively, At the lower pole region of the testes was 2.54 (±0.66) kpa, 3.33 (±0.33) kpa and 3.14 (±0.30) kpa respectively. At the upper periphery region of the testes was 2.26 (±0.26) kpa, 2.19 (±0.31) kpa and 2.04 (±0.21) kpa respectively and at the lower periphery region of the testes was 8.41 (±3.57) kpa, 7.57 (±1.29) kpa and 7.10 (±0.57) kpa respectively. we found a significant difference in the mean Shear Wave Elastography (kPa) according to the region of testes for both left and right side.

Similarly, a study by Pedersen et al (19) of 248 patients including 130 with normal testicular tissue, 99 with microlithiasis, and 19 with testicular cancer showed that the mean shear wave velocity from three measurements taken from the centre, upper pole, and lower pole of the testis or testicular lesion was significantly higher in patients with testicular cancer (mean velocity, 1.92 m/sec) than in those with normal testicular tissue (0.76 m/sec) or testicular microlithiasis (0.79 m/sec). Trottmann et al. (20) investigated seven patients with germ cell tumors and five with seminoma using virtual touch imaging quantification (VTIQ), and the results were a mean shear wave velocity of 1.94 m/s in germ cell tumors and 2.42 m/s in seminoma

The results of the Tuckey method indicate that the Mean Shear Wave Elastography (kPa) for right side at the Upper pole, Mid-pole and Upper periphery are homogenous (Group C). The Mean Shear Wave Elastography (kPa) at the Lower periphery (Group A) and Lower pole (Group B) and Group C are significantly different. While, the results of the Tuckey method indicate the Mean Shear Wave Elastography (kPa) for left side at the Upper, Mid, Lower poles and Upper periphery are homogenous (Group B). The Mean Shear Wave Elastography (kPa) at the lower periphery (Group A) is significantly different from Group B.

Shin et al. (21) compared shear wave velocities between different ultrasound machines and transducers in a phantom and found the difference in mean shear wave velocities between three machines to be statistically significant (p≤0.002). This implies that caution is needed when using absolute cut-off values in the comparison of measurements from different ultrasound machines or transducers.

CONCLUSION

The indispensable role of High frequency Grey scale ultrasonography in evaluating scrotal pathologies have already been established and is used routinely in clinically suspected testicular lesions. Incorporating use of Strain or shear wave elastography techniques along with Grey scale ultrasonography and Color doppler in the evaluation of testes serves as part of a multiparametric ultrasound evaluation while increasing diagnostic accuracy and confidence when placing an indeterminate lesion under surveillance or subjecting the patient to surgery. Hence knowledge of normal shear wave velocity values at different regions of testes is important before interpreting the pathological conditions in order to void potential pitfalls.

Image Gallery:

Following are the representative images of normal values of shear wave velocities (in kPa) in various regions of bilateral testes taken in longitudinal plane.

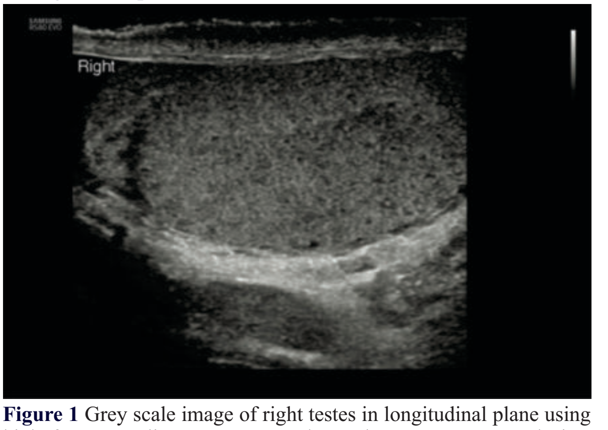

Figure 1 Grey scale image of right testes in longitudinal plane using high frequency linear array transducer demonstrates normal size, shape and echotexture of the testes.

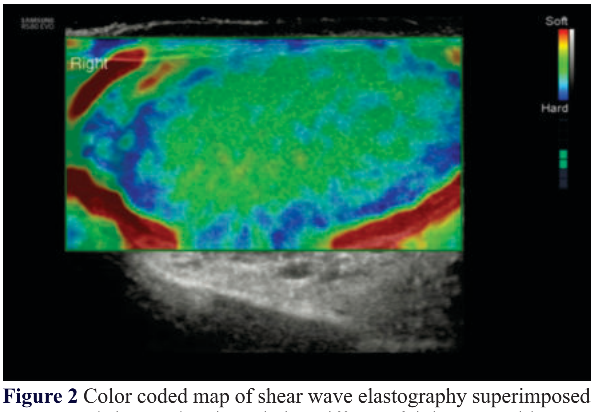

Figure 2 Color coded map of shear wave elastography superimposed on grey scale image showing relative stiffness of right testes with green colored areas occupying most of the testes and with dark blue colored areas in the periphery due to the presence of tunica albuginea.

PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

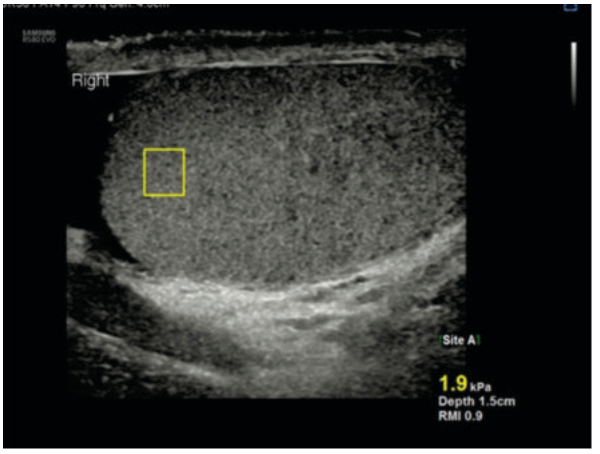

Figure 3 Shear wave velocity measured at upper pole of right testes with region of interest (ROI) within the square colored in yellow is 1.9 kPa, at a depth of 1.5 cm from the transducer-surface interface with reliability measurement index (RMI) of 0.9.

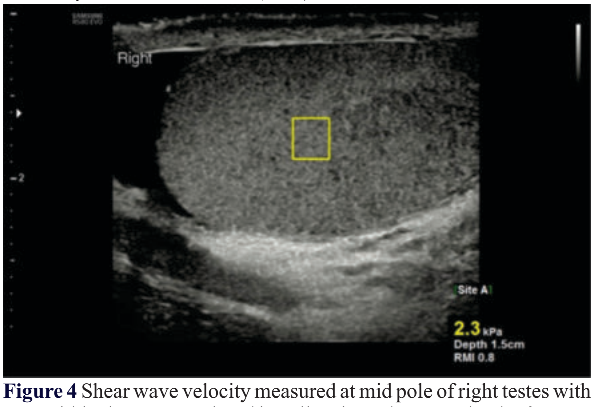

Figure 4 Shear wave velocity measured at mid pole of right testes with ROI within the square colored in yellow is 2.3 kPa, at a depth of 1.5 cm from the transducer-surface interface with RMI of 0.8.

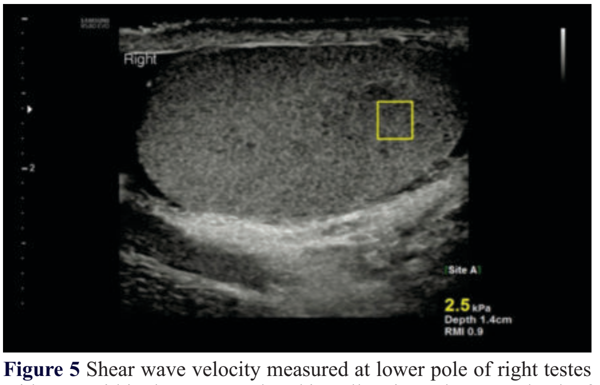

Figure 5 Shear wave velocity measured at lower pole of right testes with ROI within the square colored in yellow is 2.5 kPa, at a depth of 1.4 cm from the transducer-surface interface with RMI of 0.9.

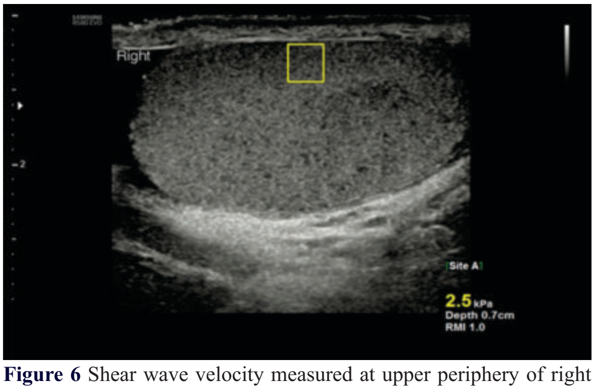

Figure 6 Shear wave velocity measured at upper periphery of right testes with ROI within the square colored in yellow is 2.5 kPa, at a depth of 0.7 cm from the transducer-surface interface with RMI of 1.0.

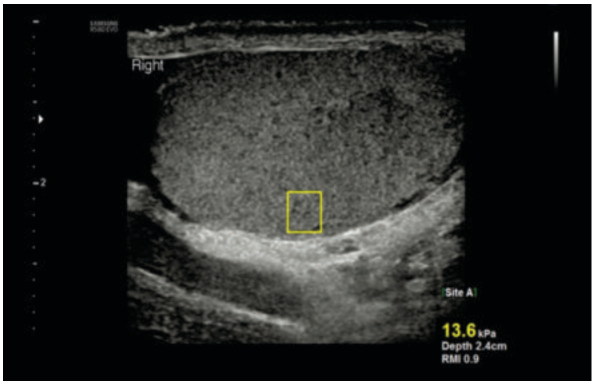

Figure 7 Shear wave velocity measured at lower periphery of right testes with ROI within the square colored in yellow is 13.6 kPa, at a depth of 2.4 cm from the transducer-surface interface with RMI of 0.9.

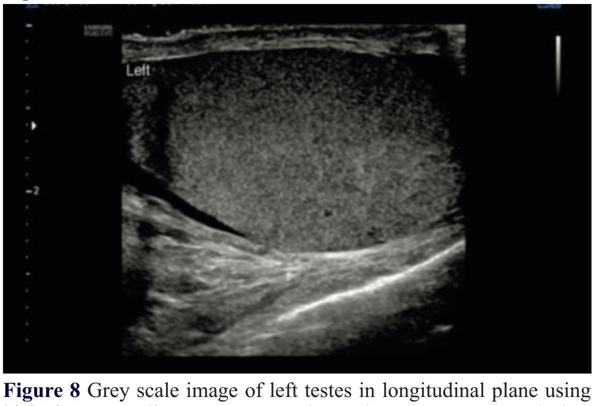

Figure 8 Grey scale image of left testes in longitudinal plane using high frequency linear array transducer demonstrates normal size, shape and echotexture of the testes.

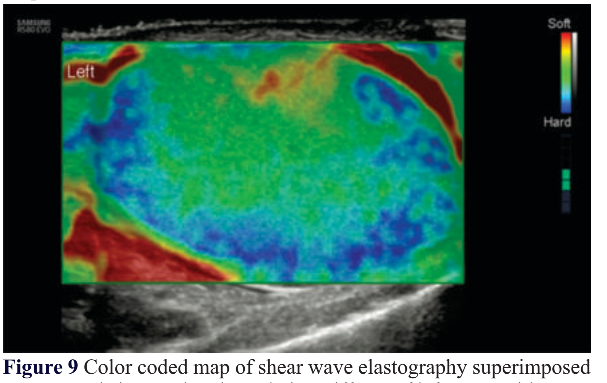

Figure 9 Color coded map of shear wave elastography superimposed on grey scale image showing relative stiffness of left testes with green colored areas occupying most of the testes and with dark blue colored areas in the periphery due to the presence of tunica albuginea.

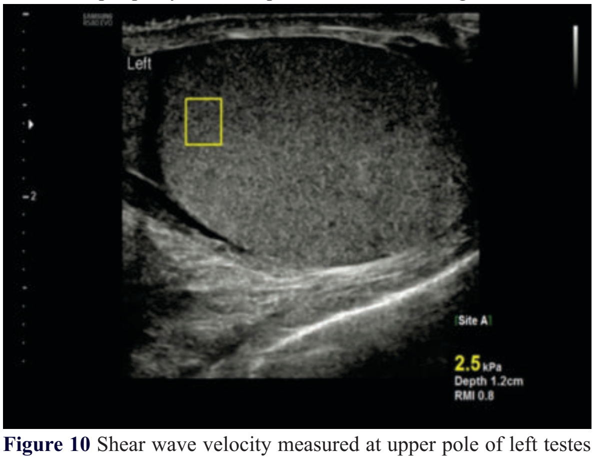

Figure 10 Shear wave velocity measured at upper pole of left testes with ROI within the square colored in yellow is 2.5 kPa, at a depth of 1.2 cm from the transducer-surface interface with RMI of 0.8.

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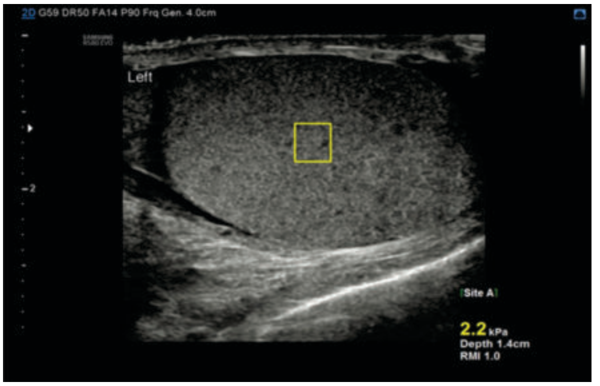

Figure 11 Shear wave velocity measured at mid pole of left testes with ROI within the square colored in yellow is 2.2 kPa, at a depth of 1.4 cm from the transducer-surface interface with RMI of 1.0.

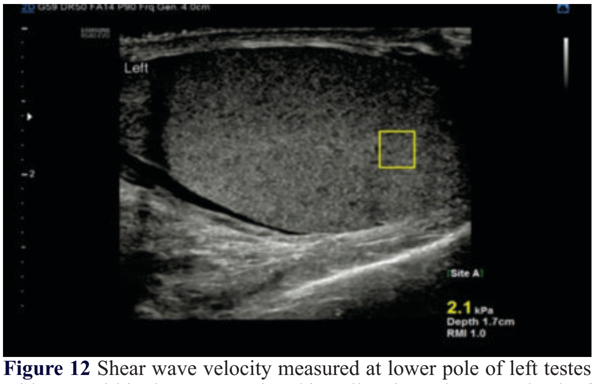

Figure 12 Shear wave velocity measured at lower pole of left testes with ROI within the square colored in yellow is 2.1 kPa, at a depth of 1.7 cm from the transducer-surface interface with RMI of 1.0.

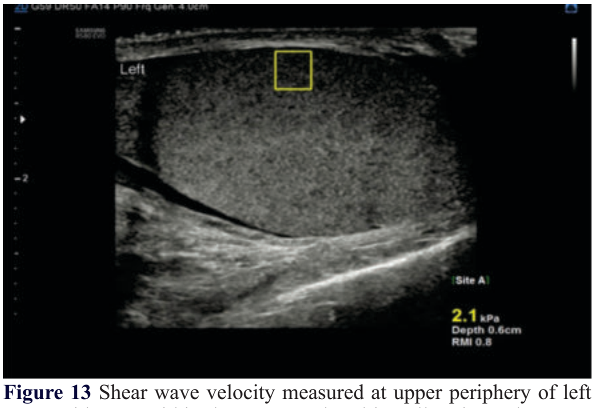

Figure 13 Shear wave velocity measured at upper periphery of left testes with ROI within the square colored in yellow is 2.1 kPa, at a depth of 0.6 cm from the transducer-surface interface with RMI of 0.8.

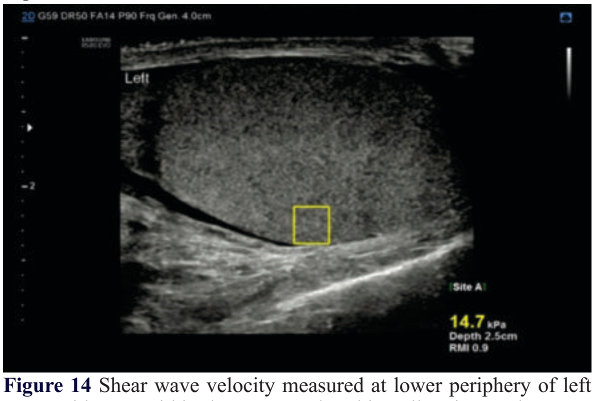

Figure 14 Shear wave velocity measured at lower periphery of left testes with ROI within the square colored in yellow is 14.7 kPa, at a depth of 2.5 cm from the transducer-surface interface with RMI of 0.9.

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