

## Sonographic Measurement of Normal Acromio- Clavicular Joint Width in Sudan

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### Original Research Article

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**Abstract:** The Acromio- clavicular joint (AC J) is a synovial joint consisting of an intrinsic fibrocartilaginous disk between the opposing articular surfaces which degenerates and usually disintegrates by the age of 40 years. The aim of the study was to measure the normal Acromio- clavicular Joint width sonographically among Sudanese population. The study was conducted on a seventy seven Sudanese population includes 63.6% of males and 36.4% of females of the sample, scanned by ultrasound machine with the participant sitting on a rotating stool and the forearm or hand resting in a supinated position on the thigh, palm up, Begin the examination by facing the participant then place the transducer in the coronal plane over the shoulder to examine the AC J.. There was a correlation between AC J space and volunteer's sex and age; where there was no significant correlation between AC J and the volunteer's body weight and height. The best correlation was between the ACJ and volunteer's age followed by the ACJ and volunteer's sex. The mean standard of AC J was 4.9, therefore we should take the AC J measurement in addition to the essential Rotator cuff measurements.

**Keywords:** ACJ, width, measurement and Ultrasound.

### INTRODUCTION

Musculoskeletal ultrasound has expanded opportunities in the field of diagnostic ultrasound. The modality is readily available, economical and portable. Its real time capability helps render clinical correlation of the site of pain and aids in comparison with the contra lateral side. Movement of tendons and joints can be directly visualized with dynamic ultrasound scanning.

Unlike other applications musculoskeletal ultrasound is usually not affected by body habitus, motion artifacts, or intervening structures such as bowel gasses. Structures such as tendons are better visualized with ultrasound than MRI. Tendons appear as signal void on MRI but show a characteristic internal architecture on ultrasound [1].

Shoulder ultrasound has been the most prominent application of musculoskeletal imaging, as it has been used to evaluate the rotator cuff since the mid 80s.during the early days, lower frequency transducers of 7.5 MHz were used. Combined with limited experience, this was probably the reason for the low reported sensitivity of around 70% advances in transducer technology with frequencies reaching 13 to 15 MHz have improved the near- field resolution considerably and given shoulder and musculoskeletal ultrasound a much needed boost[1].

Imaging of the muscular system is not limited to the muscles themselves, but also includes the tendons, nerves, ligaments, and bursa. Other areas of MS imaging include the joints, pediatric imaging, bone, skin, many disease processes, foreign bodies and postoperative scanning. Add the joint-specific scanning of shoulder, knee, ankle, elbow and wrist, and you begin to understand that MSUS imaging is a significant area that we have just begun to explore [2]. The normal mean width of the joint space is 4.1 - 0.9 mm in 21 to 32year olds (figure 1) decreasing to 3.5 - 0.9 mm in 37 to 81year olds[3].

### OBJECTIVES

The aim of this study was to measure the normal Acromio- clavicular Joint sonographically among Sudanese population.

### MATERIALS AND METHODS

This is a cross sectional study dealing with normal Sudanese volunteers, during the period between

June 2016 and June 2018. A seventy seven of normal volunteers were selected randomly by the technique of simple random sample. The primary data was collected from data collection sheets by using different types of ultrasound machine i.e- Snoace x4, Mindary DP 1100 Plus, and Toshiba, Xario200 with electronic 7.5MHZ lineararray probe, ultrasonic gel, height meter, and measuring instrument. Shoulder ultrasound was performed for the volunteers that came to ultrasound departments by themselves and the scans were done every Monday and Wednesday per week [4].

The examination was performed with the participant sitting on a rotating stool and the forearm or hand resting in a supinated position on the thigh, palm up, Begin the examination by facing the participant then place the transducer in the coronal plane over the shoulder to examine the acromioclavicular joint [5].

**RESULTS AND DISCUSSION**

The study was done on normal volunteers, 49 females and 28 males. The mean age was 24.2, the maximum limit of volunteer’s height was 186 cm and the minimum limit was 131 cm, and the maximum limit of volunteers weight was 94 kg and the minimum limit was 40 kg. In the study the mean measurement for ACJ width was 4.96± 0.73 mm. (Table 1). The study revealed that there was no significance difference of mean ACJ width in different age group the mean for

16-26 years was 4.98± 0.74mm, for 27-37 years was 4.85± 0.79mm and for 38-48 years was 5.02 ±0.42 mm respectively (p value >0.05) (Table 2). These results are disagree with study done by Alasaarela E, *et al.* J Rheumatol and found that the ACJ width decreasing with age[6].

From this study mean of ACJ width for male is slightly greater than female which was 5.05± 0.66mm and 4.9± 0.77mm respectively. Also for left is slightly increased than right which was 4.97±0.74mm versus 4.95± 0.72 mm respectively (Tables 3, 4). There was no significant correlation between participants age, weight and height with ACJ width (p value >0.05). No significant difference in ACJ in male and female (p value >0.05), for male 5.05 ±0.66 and for female 4.91±0.77 mm (Table 5).

Independent sample t- test was done to compare mean measurement of AC joint width in different gender and state that at df (152) t = (1.16) (P value 0. 274) by 95 % confidence interval. Since (P value > 0.01) accept the null hypothesis of Levine's test and concluded that there was no significant difference in AC joint width for male and female. Based on results there was no significant difference in mean ACJ measurement between male and female (t 129.97 = 1.16, p>0.05), the average ACJ for male more than average ACJ for female by 0.137 mm (Table 6).

**Table-1: Shows the Minimum, Maximum and Mean of volunteer’s age, weight, height and ACJ width**

|                    | N   | Minimum | Maximum | Mean   | Std. Deviation |
|--------------------|-----|---------|---------|--------|----------------|
| Age                | 154 | 16      | 45      | 24.23  | 6.661          |
| Weight             | 154 | 40      | 94      | 60.36  | 11.812         |
| Height             | 154 | 131     | 186     | 165.14 | 9.382          |
| ACJ width          | 154 | 3.20    | 6.80    | 4.9662 | .73602         |
| Valid N (listwise) | 154 |         |         |        |                |

**Table -2: Shows Mean and Stander Deviation of ACJ width in different age groups**

| Age         | Mean   | N   | Std. Deviation | Minimum | Maximum |
|-------------|--------|-----|----------------|---------|---------|
| 16-26 years | 4.9886 | 114 | .74771         | 3.20    | 6.80    |
| 27-37 years | 4.8500 | 28  | .79884         | 3.60    | 6.70    |
| 38-45 years | 5.0250 | 12  | .42667         | 4.40    | 5.70    |
| Total       | 4.9662 | 154 | .73602         | 3.20    | 6.80    |

P value =0.647

**Table-3: Shows Mean and Stander Deviation of ACJ width in males and females**

| ACJ    | Mean   | N   | Std. Deviation | Minimum | Maximum |
|--------|--------|-----|----------------|---------|---------|
| sex    |        |     |                |         |         |
| Male   | 5.0536 | 56  | .66029         | 3.40    | 6.70    |
| Female | 4.9163 | 98  | .77482         | 3.20    | 6.80    |
| Total  | 4.9662 | 154 | .73602         | 3.20    | 6.80    |

P value =0.267

**Table-4: Shows Mean and Stander Deviation of ACJ width in right and left sides**

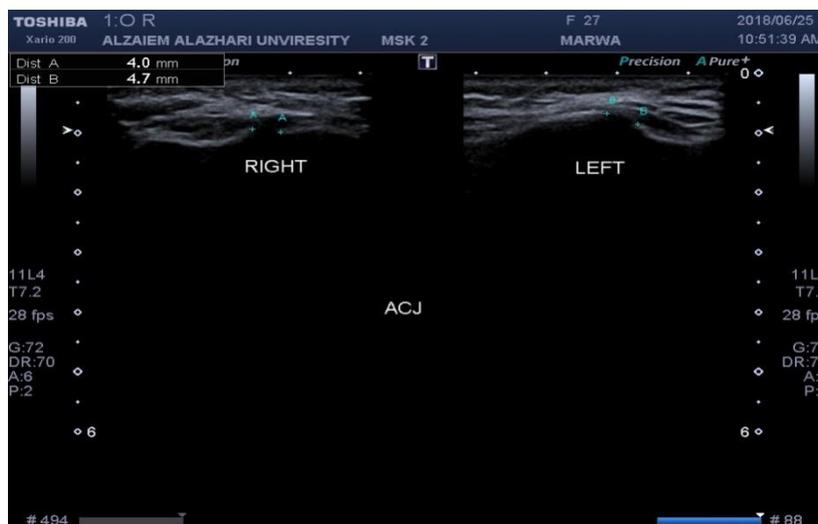
| ACJ   | Mean   | N   | Std. Deviation | Minimum | Maximum |
|-------|--------|-----|----------------|---------|---------|
| side  |        |     |                |         |         |
| Right | 4.9571 | 77  | .72682         | 3.20    | 6.80    |
| Left  | 4.9753 | 77  | .74976         | 3.40    | 6.70    |
| Total | 4.9662 | 154 | .73602         | 3.20    | 6.80    |

**Table-5: Shows the correlation between the ACJ width and volunteer’s age, weight and Height**

|     |                     | age    | weight | height | ACJ |
|-----|---------------------|--------|--------|--------|-----|
| ACJ | Pearson Correlation | -.054- | .007   | -.025- | 1   |
|     | Sig. (2-tailed)     | .508   | .934   | .761   |     |
|     | N                   | 154    | 154    | 154    | 154 |

**Table -6: Shows Levine's test (independent sample t- test)**

|     | t-test for Equality of Means |         |                 |                 |                       |   |        |
|-----|------------------------------|---------|-----------------|-----------------|-----------------------|---|--------|
|     | t                            | df      | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |        |
|     |                              |         |                 |                 |                       | Lower                                     | Upper  |
| ACJ | 1.114                        | 152     | .267            | .13724          | .12320                | -.10616-                                  | .38065 |
|     | 1.164                        | 129.977 | .247            | .13724          | .11795                | -.09610-                                  | .37059 |



**Image -1: U/S image of 27 years female shows the width of AC Joint**

**CONCLUSION**

From this study the mean of ACJ width for male is slightly greater than female which was  $5.05 \pm 0.66$ mm and  $4.9 \pm 0.77$ mm respectively. Also for left side is slightly increase than right side which was  $4.97 \pm 0.74$ mm versus  $4.95 \pm 0.72$  mm respectively. There was no significant correlation between participants age, weight and height with ACJ width (p value >0.05). No significant difference in ACJ in male and female (p value >0.05).

**RECOMMENDATION**

We should take the ACJ measurement in addition to the essential Rotator cuff measurements.

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