**Discussion**

The present study dealt with the normal morphometric measurements of the scapula in the dried bones and among the different age groups on radiographs as well. Also this study evaluated the rule of scapular morphometry in the management of different shoulder pathologies and in rehabilitation of shoulder injuries.

In the present study, regarding the dried bones, we had recorded the findings of **Maximum Scapular Length(MSL)**, **Maximum Scapular width (MSW), Superior-Inferior glenoid diameter, Ant-Post glenoid diameter,Acromion Maximum Length(AML), Acromion Maximum Breadth(AMB), length of the Coracoid Process(LCP),projection length of Scapular Spine,The Acromi-Coracoid distance,The Acromio-Glenoidal distance,Supra-Scapular notch Superior Transverse diameter,Supra Scapular notch Maximal Depth,Gleno-Polar angle and Glenoid inclination Angle**. We also compared the results between the right and left sides to determine the differences.

As regards the side difference, **the Glenopolar angle(GPA)**was 42.10°, 42.33°on the right and left sides respectively. These results were nearly similar to that of **Tucek et al.,(2014)** who studied among the people of Czech Republic and it was41.0° ,41.3° on the right and left sides respectively but differed from those of **Lingamdenne and Marapaka.(2016)** on Indians which was 34.34°on the right and left sides**.**

**The Glenoid Inclination angle** was 12.7° ,12.8°on the right and left sides respectively,These results were nearly similar to that of **Lingamdenne and Marapaka. (2016)**on Indians which was 11.58°.

Regarding the linear measurements, this study had recorded the mean **Maximum Scapular Length(MSL)**to be 150.47, 150.59 mm on the right and left sides. These results were nearly similar to that of **Wael Amin etal.,(2015)**who studied among Egyptians and it was 151.05 ,151.20mm. but differed from that of **Lingamdenne and Marapaka.(2016)**on Indians whicht was141.49 mm and also differed from another study on Indians by**Polguj et al,. (2011)** which was 155mm.Also differed from another study in Indians which was 145.1mm by **kavita et al., (2013).**And differed from results of **Paraskevas et al., (2008)** among Greeks which was147.6 mm.The lawest value of 131.1 mm was reported among Thias by **Sitha et al.,(2004**).

**The Maximum Scapular width (MSW)**

The mean Maximum Scapular width (MSW) was106.07, 106.27 mm on the right and left sides respectively. This result was nearly similar to that of **Wael Amin et al.,(2015)**who studied among Egyptians and it was107.43,107.01mm on the right and left sides, It was also nearly similar to that of **Kavita et al.,(2013)**who studied among Indians and it was 105.5 mm.but differed from those of **Lingamdenne and Marapaka.(2016).**Who also studied among Indians and it was 98.69mm.**Paraskevas et al., (2008)** recorded 101.9mm among Greeks.The lawest value of 95.7mm was reported among Thias by **Sitha et al.,(2004**).

**The Superior-Inferior glenoid diameter**

The mean Superior-Inferior glenoid diameterwas 38.39,38.73 mm on the right and left sides. This result was nearly similar to that of **Wael Amin et al.,(2015).**who studied among Egyptians and it was 38.88,39.01mm on the right and left sides respectively**.**And also nearly similar to that of **Lingamdenne and Marapaka.(2016).**Who studied among Indians and it was 36.85mm.**Kavita et al.,(2013)**who studied among Indians recorded 35mm.Another study on Indians done by **Mamatha et al.,(2011)**reported values of 33.67mm on the right side and 33.92mm on the left side on Indians .The lawest value of 33.6mm was reported among Thias by **Sitha et al.,(2004**).

**The Anterior-Posterior glenoid diameter**

The meanAnterior-Posterior glenoid diameter was 28.49mm,28.42mm on the right and left sides respectively this result was nearly similar to that of **Wael Amin etal.,(2015).**who studied among Egyptians and it was 28.31mm ,27.99 mm on the right and left sides respectively.And also nearly similar to that of**Kavita et al.,(2013).**Who studied among Indians and it was 26.6mm.**Lingamdenne and Marapaka.(2016).**Who also studied among Indians recorded a nearly similar result of 25.07mm.But the result differed from that of **Mamatha et al.,(2011)**which was 20.1mm on the right side and 19.6mm on the left side on Indians. Also differed from results of **Sitha et al.,(2004**). Which was 25.6mm among Thias.**Coskun et al.,(2006)** recorded avalue of 24.6mm among Turks.

**The Acromion Maximum Length(AML)**

The mean Acromion Maximum Length was 51.67mm,52.36mm on the right and left sides respectively this result was nearly similar to that of **Wael Amin etal.,(2015).**who studied among Egyptians and it was 52.33mm ,53.28 mm on the right and left sides. But this result differs greatly from **Lingamdenne and Marapaka.(2016).**Who studied among Indians recorded avalue of 43.22mm.Also **singh et al.,(2013)**recorded a value of 46.1mm the same as reported by **Paraskevas et al.,(2008**) among Greeks.The shortest value of 40mm was observed among Thias by **Sitha et al.,(2004**).

**The Acromion Maximum Breadth(AMB)**

The mean Acromion Maximum Breadth(AMB) was 31.75mm,31.94mm on the right and left sides respectively.This result was nearly similar to that of**Wael Amin etal.,(2015).**who studied among Egyptians and it was 32.09mm ,32.01mm on the right and left sides respectively.But differed greatly from the results of **Lingamdenne and Marapaka.(2016)** among Indians which was 24.64mm.And differed also from the result of **singh et al.,(2013)**who recorded a result of 23.2mm among Greeks. And **Paraskevas et al.,(2008)** recorded avalue of 22.3mm among Greeks.**Sitha et al.,(2004**). Reported avalue of 23.9mm among Thias.

**The Coracoid Length(CL)**

The mean Coracoid Length(CL) was 42.21mm,42.69mm on the right and left sides respectively. This result was nearly similar to that of **Kavita et al.,(2013)** who studied among Indians and it was 41mm.**Lingamdenne and Marapaka.(2016)** among Indians recorded a value of39.04mm.But our result differed from that of **Sitha et al.,(2004**). Among Thias which was 37.8mm. The lowest value was recorded among Turks and it was 19.4mm.

**The Projection Length of scapular spine**

The mean Projection Length of scapular spinewas 129.15mm,129.35mm on the right and left sides respectively.this result was nearly similar to that of **Polguj et al.,(2011).**among Indians which was 132mm,134mm on the right and left sides respectively.but differed from another study by **Lingamdenne and Marapaka.(2016)** among Indians that reported a value of 123.35mm.

**The Acromio coracoid distance**

The mean Acromio coracoid distance was 31.02mm,31.57mm on the right and left sides respectively,this result was similar to that of **Wael Amin etal.,(2015).**who studied among Egyptians and it was 31.10 mm,31.58 mm on the right and left sides . And also is similar to the result of **Lingamdenne and Marapaka.(2016)** among Indians that reported a value of 31.85mm. But this result differes from that of **singh et al.,(2013)**whorecorded a result of 28.5mm among Greeks,and from that of **Sitha et al.,(2004**) Among Thias which was 14.8 mm.

**The Acromio glenoid distance**

The mean Acromio glenoid distance was 27,12mm,27.86mm on the right and left sides respectively,this result was similar to that of **Wael Amin etal.,(2015).**who studied among Egyptians and it was 27.11mm,27.67 mm. And also similar to the result of **singh et al.,(2013)**who recorded a result of 27.0mm among Greeks. But differes from the results of **Sitha et al.,(2004**) Among Thias which was 18.1 mm. and from results of **Paraskevas et al.,(2008)**among Greeks which was 17.7mm

**The Suprascapular Notch Superior transverse diameter**

The meanSuprascapular Notch Superior transverse diameter was 9.24mm,9.57mm on the right and left sides respectively,was similar to that of **Lingamdenne and Marapaka.(2016)** among Indians that reported a value of 9.07mm

**The Suprascapular Notch Maximal depth**

The mean Suprascapular Notch Maximal depth was 6.09mm,6.2mm on the right and left sides respectively,this result was nearly similar to that o**Lingamdenne and Marapaka.(2016)** among Indians that reported a value of 5.47mm

Regarding the radiological cases we had recorded the findings of **Maximum Scapular Length(MSL), Maximum Scapular width (MSW), Superior-Inferior glenoid diameter and Ant-Post glenoid diameter**,among two age groups. We also compared the results between males and females,and between right and left sides to determine the differences.the results were compared with previous studies using computed tomography.

***As regards to age groups***

**The Maximum Scapular Length(MSL)**:

In our study the mean of Maximum scapular length (MSL)was 148.12mm for subjects of the first age group(20-<40)years and 145.5mm for the second age group(40-<60)years showing no statistical significance between the two age groups in agreement with **Giurazza et al.,(2013)** who studied among Italians and stated that scapula does not udergo significant morphological changes during life after growth is complete.also in agreement with **Paulis and Abu Samra,(2015)** who studied among Egyptians and **El Morsi et al .,(2017)** who also studied among Egyptians recording no significant difference between subjects regarding age after scapular growth is complete.

 **The Maximum Scapular Width(MSW)** :

In our study the mean of Maximum scapular width (MSW)was 103.7mm for subjects of the first age group(20-<40)years and102.88mm for the second age group(40-<60)years showing no statistical significance between the two age groups in agreement with **Giurazza et al.,(2013)** who studied among Italians and stated that scapula does not udergo significant morphological changes during life after growth is complete.also in agreement with **Paulis and Abu Samra,(2015)** who studied among Egyptians and **El Morsi et al .,(2017)** who also studied among Egyptians recording no significant difference between subjects regarding age after scapular growth is complete.

**The Superior Inferior glenoid diameter**

In our study the mean Superior Inferior glenoid diameter was 38.2 mm for subjects of the first age group(20-<40)years and 38.13 mm for the second age group(40-<60)years showing no statistical significance between the two age groups in agreement with **El Morsi et al .,(2017)** who also studied among Egyptians recording no significant difference between subjects regarding age after scapular growth is complete

**The Anterior Posterior glenoid diameter**

In our study the meanAnterior Posterior glenoid diameter was 28.42 mm for subjects of the first age group(20-<40)years and 27.97 mm for the second age group(40-<60)years showing no statistical significance between the two age groups in agreement with **El Morsi et al .,(2017)** who also studied among Egyptians recording no significant difference between subjects regarding age after scapular growth is complete

***Comparison of scapular measurements as regards to the sex***

**The Maximum Scapular Length(MSL)**:

In our study the mean of Maximum scapular length (MSL) in males was 150.15 mm in right side in males and 142.84mm in right side for females.and it was 150.88mm in the left side in males and 143.37mm in the left side in females., these results were in agreement with the results of **El Morsi et al .,(2017)** who studied among Egyptians and it was 159 mm in right side in males and 138.7mm in right side for females.and it was 157.9mm in the left side in males and 139.4mm in the left side in females.also agreed with the results of **Torimitsu et al.,(2016)** who studied among Japanese and it was158.43 mm in the right side in males and 137.76mm in the right side for females,and it was 159.20mm in the left side in males and 137.67 in the left side in females. also agreed with the results of **Giurazza et al.,(2013)** who studied among Italians and it was 162 mm in males and 142 mm in females. Also agreed with the results of  **Papaioannou et al.,(2012**) who studied among Greeks and was 159.17mm in males and 138.40mm in females.But our results differed from the results of **Paulis and Abu Samra,(2015)** who studied among Egyptians and it was 177.9 mm in males and 157.8 mm in females.also differed from results of **Zhang et al.,(2016)** who studied among Chineseand it was 104.3 mm in males and 95.2 mm in females.

**The Maximum Scapular Width(MSW) :**

In our study the mean Maximum Scapular Width(MSW)was105.31 mm in right side in males and 101.23mm in right side for females.and it was 104.95mm in the left side in males and 101.66mm in the left side in females., these results were in agreement with the results of **El Morsi et al .,(2017)** who studied among Egyptians and it was 107.0 mm in right side in males and 97.8mm in right side for females.and it was 107.3mm in the left side in males and 98.3mm in the left side in females.also agreed with the results of **Papaioannou et al.,(2012**) who studied among Greeks and was 105.55 mm in males and 94.20mm in females.also agreed with results of **Giurazza et al.,(2013)** who studied among Italians and it was 96mm in males and 92 mm in females. and the results of **Paulis and Abu Samra,(2015)** who studied among Egyptians and it was 114.3 mm in males and 101.3mm in females.also agreed with results of **Zhang et al.,(2016)** who studied among Chineseand it was 111.2 mm in males and 101.6mm in females. **Torimitsu et al.,(2016)** who studied among Japanese recorded the results of 114.03mm in the right side in males and 102.27mm in the right side for females,and 114.11mm in the left side in males and 102.53in the left side in females.

**The Superior Inferior glenoid diameter**

In our study the meanSuperior Inferior glenoid diameter in males was 38.88mm and in females was 37.45 mm these results were in agreement with the results of **El Morsi et al .,(2017)** who studied among Egyptians and it was 38.5 mm in the right side in males and 34.3 mm in right side in females,and was 38.7mm in the left side in males and 35.0mm in left side in females.also agreed with results of **Papaioannou et al.,(2012**) who studied among Greeks and was 38.11mm in males and 33.52 mm in females. **Torimitsu et al.,(2016)** who studied among Japanese recorded the smallest results, it was 33.73mm in the right side in males and 30.65mm in the right side in females,and was 33.35mm in the left side in males and 30.43mm in the left side in females.

**The Anterior Posterior glenoid diameter**

In our study the meanAnterior Posterior glenoid diameter in males was 28.67mm and in females was 27.72 mm these results were in agreement with the results of **El Morsi et al .,(2017)** who studied among Egyptians and it was 29.1mm in right side in males and 25.6mm in right side in females,and was 29.7mm in the left side in males and was 26.1mm in the left side in females.also agreed with results of **Papaioannou et al.,(2012**) who studied among Greeks and was 29.01mm in males and 24.64mm in females.also agreed with the results of **Torimitsu et al.,(2016)** who studied among Japanese and were 30.03mm in the right side in males and 25.87mm in the right side in females,in the left side were 29.49mm in males and 25.1mm in females.

Therefore the results of our study state that males have bigger diameters than females indicating sexual dimorphism of scapula.

***Comparison of scapular measurements as regards to the side***

**The Maximum Scapular Length(MSL):**

In our study the mean of Maximum scapular length (MSL) in right side was 150.15mm and 150.88mm in left side in males,while in females it was 142.84mm in the right side and 143.37mm in the left side. these results were in agreement with the results of **El Morsi et al .,(2017)** who studied among Egyptians and it was 159mm in right side and 157.9mm in left side for males.and for females it was 138.7mm in the right and 139.4mm in the left side.also agreed with the results of **Torimitsu et al.,(2016)** who studied among Japanese and it was158.43mm in the right side and 159.20mm in the left side for males.in females it was 137.76mm in right side and 137.67 in left side.

**The Maximum Scapular Width(MSW)**

In our study the mean Maximum Scapular Width(MSW) in right side was105.31 mm and 104.95mm in left side in males,while in females it was101.23 mm in the right side and 101.66mm in left side. these results were in agreement with the results of of **El Morsi et al .,(2017)** who studied among Egyptians and it was 107mm in right side and 107.3mm in left side for males.and for females it was 97.8 mm in the right and 98.3mm in the left side.also agreed with the results of **Torimitsu et al.,(2016)** who studied among Japanese and it was114.03mm in the right side and 114.11mm in the left side for males.in females it was 102.27mm in right side and 102.53in left side.

**The Superior Inferior glenoid diameter**

In our study the meanSuperior Inferior glenoid diameter in males was 37.95mm in right side and it was 38.21 mm in left side ,and for females it was 37.04 mm in the right side and38.27 mm in the left side.these results were in agreement with the results of **El Morsi et al .,(2017)** who studied among Egyptians and it was38.5mm in right side and 38.7mm in left side for males and for females it was 34.3mm in the right and 35 mm in the left side. **Torimitsu et al.,(2016)** who studied among Japanese recorded the smallest values and it was 33.73mm in the right side and 33.35mm in the left side for males.in females it was 30.65mm in right side and 30.43in left side.

**The Anterior Posterior glenoid diameter**

In our study the meanAnterior Posterior glenoid diameter was 28.08 mm in the right side and 28.12 mm in the left side for males ,in females it was27.53 mm in the right side and 27.9 mm in the left side . these results were in agreement with the results of **El Morsi et al .,(2017)** who studied among Egyptians it was 29.1mm in right side and 29.7mm in left side for males and for females it was 25.6mm in the right and 26.1 mm in the left side. also agreed with the results of **Torimitsu et al.,(2016)** who studied among Japanese and it was 30.3mm in the right side and 33.35mm in the left side for males.in females it was 25.8mm in right side and 25.40in left side.

Therefore the results of our study also demonstrated that the scapula is bilaterally symmetrical.

Knowledge of the normal osteometric values and variations of scapula is important to understand, treat different shoulder joint disorders, and help in designing implants for the shoulder joint and rehabilitation of players who sustained Scapular sports injuries. **Lingamdenne and Marapaka.(2016)**