Discussion

In This study we used a radiological technique to establish the normal reference value of radiographic knee JSW among adults Egyptian individuals These radiographic values was found to be useful in the evaluation of knee cartilage abnormalities particularly early knee cartilage degeneration, that detected by decreasing the cartilage thickness which is the early signs of osteoarthritis (OA) This is important because OA is a painful and disabling disease.

In this study we found that JSW of both medial and lateral compartment on right and left sides are nearly similar. the mean values were(RMS= 4.72±0.61.mm,RLS= 5.58±0.71 mm ,LMS =4.74±0.61mm and LLS= 5.62±0.73mm) this result is in agreement with the findings of ***Mehta; etal., 2017*** they recorded that each compartments in both right and left knee joint nearly equal (RMS=3.64±0.95mm and LMS=3.56±0.87 mm) and (RLS=5.86±1.01mm and LLS=5.81±0.85mm), his study based on comparison of two ways in measurement of mean knee JSW in healthy *individuals* .also ***Anas;etal .,2013*** documented nearly the same results his *values* were (RMS=4.74±0.75mm and RLS=5.63 ± 0.86mm)on the right side and (LMS=4.74 ±0.76 mm and LLS=5.66± 0.87mm) on the left one .according to our results we may use the values of one knee as a reference to the other diseased one. in comparison with ***Genburger;etal.,2009*** results were (RMS= 5.10 ± 0.76mm RLS=6.02 ± 1.19mm , LMS=5.14 ± 0.81mm and LLS=5.98 ± 1.11mm) we noticed that medial values slightly higher but still right values almost equal to the left one.

In the present study we found that mean JSW of knee lateral compartment was wider than medial one, the mean of medial space was 4.73±0.61mm. and lateral one was 5.6±0.72mm this result in agreement with ***Genesburger;etal.,2009*** but there values were higher in both compartment than our study as mentioned before, also ***Mehata ;etal ,2017 ,Anas;etal.,2013, Sargon*** **;etal.,*1996 ,Duren;etal.,2006*** **and** ***Lanyon;etal.,1998*** .were in agreement with the present study.

The medial knee JSW measured by (***Beattie et al. 2008***), (***Dacre;etal al.,1991***) and(***Duren et al.,2006***) higher than what was found in present study. the values of medial compartment in ***Beattie et al. 2008)*** was4.8 mm for females and 5.7 mm for males. This difference could be related to differences in the study design and possible characteristics of their study subjects. Nevertheless, these three studies did not measure the lateral knee JSW to allow for comparison with what was found in the present study.

Hall;etal.,2016,Koo;etal.,2005, **Ding;etal. ,2003** ,**Rayan;etal. ,2004** and **Butler ;etal .,1999,** were detected that, The difference of both compartments could be explained with the fact that the tibial cartilage on the lateral side was generally thicker than the cartilage on the medial side.

In the present study we found that the mean JSW of knee show initial increase with increasing ***age*** up to 34 years; thereafter, there is a gradual decrease with advancing the age especially in the medial compartments. In age group from 25 to <35 years recorded the highest values of JWS, with mean medial and lateral joint spaces measuring 5.52± 0.41, 6.52± 0.51, 5.53± 0.38 and 6.58 ± 0.46 on the right and left, respectively. Whether the age group from 55 and older recorded the lowest values for knee JSW. They measured

4.17± 0.21mm, 4.89 ± 0.40mm, 4.18 ±0.35 mm and 4.94 ±0.43mm on the respective medial and lateral compartments of the right and left sides. There is a statistically highly significant negative correlation between the age and the knee JSW. The noted decrease in JSW with increasing the age were well in the line with the findings of ***Anas;etal.,2013 ,Benichou;etal.,2010 ,Gensburger;etal.,2009, Hall;etal.,2010, Sargon;etal.,1996*** *and* ***Dacre;etal.,1991(*** that recorded a steady decline with increasing age).

On the other hand some studies showed that there wasn't decrease in knee JSW with advancing the age like ***Beattie;et al.,2008*** who showed somewhat constant JSW with increasing age. And ***Lanyon;etal.,1998*** they recorded that the Joint space loss was not a feature of asymptomatic aging. Other studies worked on the effect of increasing the age on the cartilage thickening, that showing decreasing the cartilage thickens values with aging as ***Ding;etal.,2007*** and ***Hall;etal.,2010***.

Furthermore, the measured JSW values in this study is lower than those recorded by ***Lanyon;et al.,1998*** in radiological normal knees although their study was compared between the normal and the osteoarthritic knee joint.

In the present study we found that the knee JSW values in males are slightly wider than in females, this difference is ***not statistically significant***, thus it is allowed for local use of the uniform reference values for both sexes in Egyptian individuals. However, **Beattie et al. ,2008** they found that the difference in medial JSW among 119 respondents, measuring 4.8 and 5.7 mm in females and males, respectively and it was a statistically significant. also ***dacre;etal .,1991,duren ;etal.,2006,lanyon;etal. ,1998*** and ***sargon; etal.,1996*** recorded that Males had significantly larger knee joint spaces than females.

Body mass index is one of the relevant parameters in assessing total body mass. It has a remarkable impact on the weight bearing joint, especially knee. Obesity, defined by either increased weight (kg) or BMI ***(Wollheim;etal.,2003)***.

In the present study a positive correlation exists between the mean body mass index and the narrowing of the knee space as The obese and overweight subjects in this study, show narrower JSW in compared to those with normal weight and underweight individuals. The values In underweight individuals are 4.72±0.04mm,5.48±0.23mm and 4.71 ±0.35mm and5.52 ± 0.26mm for medial and lateral spaces on right and left respectively. The values In normal weighted individuals 4.94± 0.63mm,5.82± 0.75mm,4.95± 0.95 0.63mm and 5.87± 0.76mm for medial and lateral spaces on right and left respectively. the values in obese individuals are 4.25± 0.37mm,5.06 ±0.44mm,4.26 ±0.39mm and5.08 ±0.47mm for medial and lateral spaces on right and left respectively also the values in over weighted individuals are 4.94± 0.63mm ,5.82 ±0.75mm, 4.95 ±0.63mm and 5.87± 076mm for medial and lateral spaces on right and left side respectively. Many studies are in agreement with that the obesity and increasing BMI have a negative effect on the space width. Like ***Wollheim;etal.,2003*** they documented that obesity was an unequivocal risk factor for the onset, progression, and symptoms of knee osteoarthritis also ***Zhou;etal.,2014, Coggon ;etal.,2011 ,Szoeke ; etal .,2006 , Blagojevic ;etal.,2010 and Reijman;etal.,2006.*** Moreover, maintaining an ideal body weight or BMI was found to reduce the risk of the onset of knee OA, and a reduction in either weight or BMI helps alleviate the pain and disability in people with established disease (***Mnek;etal., 2003, Techtahhl ;etal.,2008***) .also (***Duren; etal. ,2006***-) showed a positive correlation between BMI and narrowing of knee JSW.

The present study Obtains a reference values for width of the knee joint space in both sex with different age groups is valuable in detecting early changes in knee joint cartilage and cartilage degenerating disease.