Is the High Incidence of Shoulder Pathologies a Coincidence in Patients Having Advanced Stage Gonarthrosis and High Body Index?

Vücut Kitle İndeksleri Yüksek, İleri Evre Gonartrozu Olan Hastalarda Omuz Patolojilerinin Sık Görülmesi Tesadüf mü?

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ABSTRACT Objective: Shoulder pain is usually caused by overuse of shoulder girdle. In elderly, degenerative changes are responsible from pain. In these cases, it can possible that development of shoulder pathologies coincidency with advanced gonarthrosis in high body mass indexed (BMI) patients related to movements supported by shoulder in daily life. The aim of this study is to investigate the relationship between advanced gonarthrosis, BMI and shoulder pathologies. **Material and Methods:** 122 patients included in this study whom diagnosed with advanced gonarthrosis (grade 3-4) by Kellgren-Lawrence criterias and concurrently have shoulder pathologies from 269 patients. Patients classified on their BMI indexes to four groups. All patients were evaluated with their radiologic findings and Constant-Murley shoulder scoring system. **Results:** Totally 122 patients were included in the study; 24 (19.7%) were male and 98 (80.3%) were female. The mean age of the patients was 69.75±4.41 years. There was no statistically significance between groups regarding to mean of age, sex and side distribution (p>0.05). There was statistically significant difference in Constant-Murley shoulder scoring system between the groups (p:0.001; p<0.05). **Conclusion:** In daily life, lower extremity is responsible from body movement while upper extremity is not used in this activity. But, overuse of upper extremity, especially shoulder joint increases in lower extremity pathologies. In these cases, shoulder pathologies are significantly increased in high Body Mass index and advanced gonarthrosis related to decrease in body movements and increase in shoulder based movements. It is important to evaluate clinically concurrently shoulder pathologies in these patients.

Key Words: Shoulder; osteoarthritis; body mass index

ÖZET Amaç: Omuz ağrıları çoğu zaman kol ve omuz bölgesinin çok kullanılmasına bağlı olarak gelişmektedir. İlerleyen yaşlarda ise omuz ekleminin dejeneratif değişikliklerine bağlı olarak daha da artabilir. Bu durumda; vücut kitle indeksi (VKİ) yüksek, ileri evre gonoartrozlu hastalar için, günlük yaşamda omuz destekli hareketlerin artmasına bağlı omuz patolojilerinin gelişmesi söz konusudur. Bu çalışmada ileri evre gonartroz, VKİ ve omuz şikayetleri arasındaki ilişki değerlendirildi. **Gereç ve Yöntemler:** Kellgren-Lawrence kriterlerine göre ileri evre (evre 3-4) gonartroz tanısı alan 269 hastalar arasından eş zamanlı omuz ile ilgili şikayeti olduğu tespit edilen 122 hasta çalışmaya dahil edildi. Vücut kitle indekslerine göre gruplandırılan ve 4 gruba ayrılan hastalar mevcut radyolojik tetkikleri ve Constant-Murley omuz skorlamaları ile değerlendirildiler. **Bulgular:** Çalışmaya katılan hastaların 24'ü (%19.7) erkek, 98'i (%80.3) kadın, yaş ortalamaları 69.75±4.41 yıldır. Gruplar arasında yaş ortalamaları, cinsiyet ve taraf dağılımları açısından istatistiksel anlamlı bir farklılık bulunmamaktadır (p>0.05). Çalışmamızda elde edilen Constant-Murley omuz skorlamaları sonuçlarının istatistiksel değerlendirmeleri sonucunda gruplar arasında istatistiksel olarak anlamlı farklılık bulunmaktadır (p:0.001; p<0.05). **Sonuç:** Günlük yaşamımızda vücudun bir yerden başka bir yere taşınmasında aktif olan alt ekstremite iken, üst ekstremite nerede ise hemen hiç aktif olarak kullanılmamaktadır. Ancak alt ekstremite ile ilgili patolojilerde üst ekstremitenin, özellikle omuzun aktif olarak kullanılması artmaktadır. Bu durumda; VKİ yüksek ve ileri evre gonoartroz hastalarında, vücut hareketlerinin azalması ve omuz destekli hareketlerin artması ile hastaların omuzlarında anlamlı oranlarda sorun görülebilmektedir. Bu nedenle bu gruptaki hastaların eş zamanlı omuzlarının da klinik olarak değerlendirilmesi önemlidir.

Anahtar Kelimeler: Omuz; osteoartrit; beden kitle indeksi

It is hard to carry a heavy body, a high body mass index (BMI) body. This condition reduces the efficiency of muscle motions and thus causes staying immobile. An additional weight will be formed and pain will appear as a result of both increased body weight and immobility in middle age and elder individuals.[1,2] Although the pain is considered to appear in lower extremities primarily, the elevated mobility of upper extremities, especially shoulder-supported motions, is possible to move the body. In reality, in patients having advanced stage gonarthrosis and high body index, when slow body motions gathers with concomitant knee pains, it becomes hard to move the body.[3] This condition generates a distinct problem for shoulder joint which is highly important for body motion and has high possibility of being damaged due to age related reasons.

Shoulder joint enables extraordinary upper-extremity mobility due to its wide motion arc. It is intensively affected by macro and micro traumas in direct proportion of this joint mobility.[4] Shoulder functions are effected by pathologies of rotator cuff and joint capsule. Usually, they are caused by overuse or traumatic pathologies. In addition, there are difficulties in the evolution of patients having shoulder pain as the etiology causing pain is variable and it is difficult to detect the body parts causing pain.[5]

In the present study, we evaluated the relationship between advanced stage gonarthrosis, BMI and shoulder complaints based on the development of possible shoulder pathologies related to elevated shoulder-supported motions in daily life for patients having advanced stage gonarthrosis and high body index.

MATERIAL AND METHODS

A total of 269 patients who were diagnosed with advanced stage (Stage 3-4) gonarthrosis according to Kellgren- Lawrence criteria were retrospectively selected from patient record system of our hospital (HIS: Health Information Systems 2009; V5.5.8.5618). Patients in who concomitant shoulder complaint was detected, who had archive record and came for the control were included in the study (n=122). Patients were divided into four groups according to BMI; BMI≥40 (morbid obese patients) in Group 1; 30<BMI<39.9 (obese patients) in Group 2), 24<BMI<29.9 (over-weight patients) in Group 3 and BMI<23.9 (normal and under-weight patients) in Group 4. All patients were evaluated in terms of existing radiological examinations of their shoulders and their Constant-Murley Score during the examination.

Statistical analyses were performed by using IBM SPSS Statistics 22 (IBM SPSS, Turkey). Shapiro-Will test was used to determine whether the continuous variables were normally distributed and the results did not show normal distribution. In addition to descriptive statistical methods (mean, standard deviation, frequency), Kruskal Wallis was used for the evaluation of quantitative data, and Mann Whitney U test was used to detect the group causing variation. Chi-square test was used for the comparison of qualitative data. The level of significance was p<0.05.

RESULTS

Totally 122 patients aged between 62 and 79 were included in the study; 24 (19.7%) were male and 98 (80.3%) were female. The mean age of the patients was 69.75±4.41 years. When the patients were evaluated in terms of groups; the mean age of Group 1 was 60.29±5.8 (n=8; 2 males, 6 females); the mean age of Group 2 was 69.78±4.51 (n= 67; 12 males, 55 females); the mean age of Group 3 was 69.78±4.63 (n=41; 8 males, 33 females); the mean age of Group 4 was 68.67±3.5 years (n=6; 2 males, 4 females).

The complaints of patients were detected in dominant shoulder (n=49, 48.4%), in both shoulders (n=37, 30.3%) and in non-dominant shoulder (n=26, 21.3%). When the patients were investigated under four BMI groups, pathology was detected in dominant (37.5%) and both shoulders (62.5%) in 3 and 5 of eight patients in Group 1. The mean of Constant-Murley scores of these patients were found as 56.13±2.42. In group 2, pathology was detected in dominant (65.7%), both shoulders

TABLE 1: Evaluation of groups in terms of general characteristics.					
	Group 1 (n=8)	Group 2 (n=67)	Group 3 (n=41)	Group 4 (n=6)	p
Age [Mean±SD year (median)]	60.29±5.8 (58)	69.78±4.51 (69)	69.78±4.63 (69)	68.67±3.5 (68)	10.936
Gender n,%					
Male	2 (25%)	12 (17.9%)	8 (19.5%)	2 (33.3%)	20.805
Female	6 (75%)	55 (82.1%)	33 (80.5%)	4 (66.7%)	
Pathology side n,%					
Right	3 (37.5%)	44 (65.7%)	24 (58.5%)	4 (66.7%)	
Bilateral	5 (62.5%)	15 (22.4%)	11 (26.8%)	1 (16.7%)	20.331
Left	0 (0%)	8 (11.9%)	6 (14.6%)	1 (16.7%)	

[1]Kruskal Wallis test
[2]Chi-square test.

(22.4%) and in non-dominant shoulder (11.8%) in 44, 15 and 8 of 67 patients, respectively. The mean of Constant-Murley scores of these patients were found as 58.37±4.6. In group 3, pathology was detected in dominant (58.6%), in both shoulders (26.8%) and in non-dominant shoulder (14.6%) in 24, 11 and 6 of 41 patients, respectively. The mean of Constant-Murley scores of these patients were found as 62.61±5.62. In group 4, pathology was detected in dominant (66.7%), in both shoulders (16.6%) and in non-dominant shoulder (16.6%) in 4, 1 and 1 of 6 patients, respectively. The mean of Constant-Murley scores of these patients were found as 71.33±2.42.

As a result of statistical evaluation of general outcomes, no significant difference was detected in terms of mean age, gender and pathology side distribution between the groups (p>0.05). The evaluations of age, gender and pathology side distribution according to the groups were summarized (Table 1) (Figure 1).

There was a statistically significant difference between the groups in terms of Constant-Murley shoulder scores (p=0.001; p<0.05). As a result of paired comparison for the detection of significance, shoulder scores of patients in Group 4 (p<0.05) were significantly higher than those in Group 1 (p= 0.002), Group 2 (p=0.001) and Group 3 (p=0.002). Shoulder scores of patients in Group 3 (p<0.05) were significantly higher than those in Group 1 (p= 0.001) and Group 2 (p=0.001). No difference was detected between the shoulder scores of patients in

FIGURE 1: Radiological osteoarthritis of the knee.

Group 1 and Group 2 (p=0.245; p>0.05, respectively) (Table 2) (Figure 2).

DISCUSSION

Elevated levels of BMI occur when energy intake is higher than energy consumption. Over eating or malnutrition associated with limited mobility in daily life increases BMI and threatens human health.[6] Factors including age, gender and place of

| **TABLE 2:** Evaluation of groups in terms of Constant-Murley shoulder scores.				
	Group 1 Mean ± SD	Group 2 Mean ± SD	Group 3 Mean ± SD	Group 4 Mean ± SD	p
Shoulder score (median)	56.13±2.42 (56)	58.37±4.6 (57)	62.61±5.62 (62)	71.33±2.42 (71)	0,001*

Kruskal Wallis test
* p<0.05

living are effective on the increasing prevalence of BMI and the number patients with high BMI is elevated depending on the reduced physical activity especially after 50 years of age. According to the studies, the prevalence of increasing BMI is in the ratio of 25% and 20% in female and males, respectively. This ratio was 4% in patients with high BMI in 2003, and it was increased to 10% in 2007. The frequency of having high BMI is highest between the ages of 55 and 64 years according to the age classification (37.9%).[7]

Activation of various muscles causes energy consumption during walking.[8] In patients with high BMI, biomechanical loading is increased too much as a result of walking, and gross amount of energy consumed by women with high BMI is reported to be higher.[9,10] The walking speed is also one of the factors affecting energy consumption.[11] However, there is no study investigating the variations in energy consumption among individuals having different body composition. In a study, it was stated that walking inability arises and limitations were increasing in the daily life with increasing age. It is obvious that physical activity has an effect on energy consumption and energy consumption depends on body composition and body size.[12] It was shown in previous studies that individuals with high BMI preferred walking slower.[13-16] In the individual, aerobic capacity per kilogram is lesser than those with normal body weight, and they require more aerobic afford relatively during the preferred walking speed.[13,17]

Gonarthrosis generally occurs as a result of an unknown reason, and there is common belief that it develops according to the normal abrasion of joints in people older than 65 years. However, the relationship between aging, use of joint and go-
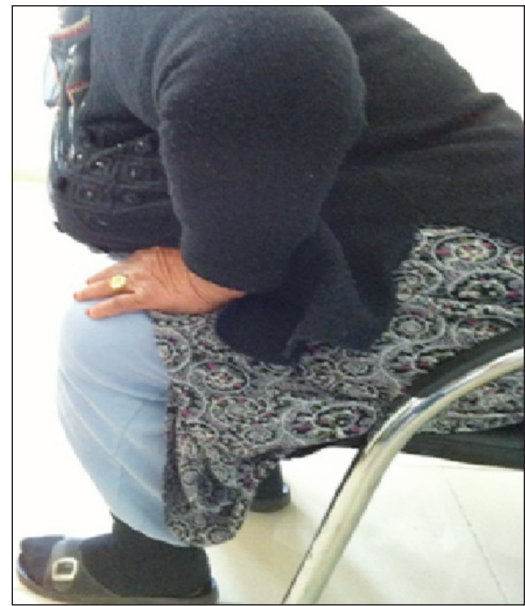
FIGURE 2: It is possible to observe elevated shoulder-supported body motions among individuals with increased BMI who admitted especially due to knee pain.

narthrosis is still unclear. Gonarthrosis associated with knee pain causes impairments in quality of life with increasing age.[18] In various studies, the relationship between osteoarthrosis (OA) and obesity was investigated. It is still contradictive although a connection has been reported between OA in hips and knees, and obesity. Obesity is not the only factor in the occurrence or worsening of degenerative joint disease. The prevalence of OA in hips and knees was not elevated in over weight individuals aged between 25 and 34 years.[19] The effects of pain and obesity on the functional condition of knee OA was found to be more important than structural variations that were observed radiologically.[20] In reality, obesity is the most common modifiable risk factors for OA; a close relationship was determined between increasing BMI and prevalence of OA in knee joint.[21]

In our daily life, another reason of painful complaint belongs to shoulder joint. Shoulder pain is the second common cause of painful conditions after low back pain. Shoulder pain is seen in all age groups. The prevalence of shoulder pain is 11% in individuals <50 years and it is reported as 25% in individuals >50 years.[22] They can cause shoulder pain with different etiologies in different age groups. Traumatic etiologies are mostly seen in young ages while degenerative etiologies in elderly age groups. The reasons of shoulder pain are examined in two groups; intrinsic (local) and extrinsic (distant and systemic). In general, problems regarding shoulder were classified under six diagnostic categories; capsular syndrome (adhesive capsulitis, arthrosis, frozen shoulder, etc.), acute bursitis, acromyoclavicular syndrome (chronic bursitis, tendinitis, rupture of rotator cuff), unclear clinical table of extrinsic reasons, other intrinsic reasons and complicated clinical tables.[4] The differential diagnosis of shoulder diseases is generally difficult when viewed from this aspect since there is no consensus both in classification and unique diagnosis criteria of disease.[2] The complication of these reasons is added, this condition grows difficult.

Vascular, degenerative, traumatic and mechanic-anatomic reasons are accused in its etiopathogenesis. However, it is obvious that aging will be the common point. The importance of age has been emphasized in studies. Degeneration of anatomical structures was emphasized with increasing age in etiology.[23] In patients older than 40 years, the prevalence of rotator cuff ruptures, glenohumeral joint and OA in acromyoclavicular joint are increased. Therefore, the joke of "cuff ruptures should be considered in individuals having grey hair and large cuff ruptures should be considered in individuals having white hair" is done. Osteoarthritis is a common degenerative joint disease. So, this disease can effect upper extremity and shoulder joint as well as lower extremity in predisposed patients. Also, osteoarthritis and rotator cuff pathologies are superimposed pathologies in degenerative diseases and constitute a potential reason for shoulder pain in elderly patients. 90-95%

of shoulder pain is caused by periarticular pathologies of shoulder caused by overuse.[24] Even computer desktop work can cause shoulder pain with overuse. One can conclude passive movements of shoulder can cause shoulder pain and its anatomical sensitivity. In daily life, shoulder joint is overused by working and sportive activities and it is increased by biomechanical disorders of the body. Location change of the body is mostly carried out by lower extremity while upper extremity is not used actively at all. But, in pathologies of the lower extremites overuse of the shoulder increases. In this situation, chronic pathologies cause increase in pain and decrease in quality of life.[25,26]

In conclusion, a typical table appears when reduced physical activity and increased BMI associated with anatomical variations especially in knee and shoulder joints are come together. It is possible to observe elevated shoulder-supported body motions among individuals with increased BMI who admitted especially due to knee pain. In that case, it is important to know the ratio of shoulder complaints prior to this condition or what if they never come to this condition. One of limitations of our study is the unclear knowledge about shoulder pathologies in this condition. However, the increased possibility of shoulder pathologies among individuals having advanced stage gonarthrosis and high BMI is not a coincidence according to our study results. By means of future studies, this table might be revealed by eliminating previous shoulder pathologies by a lot more patient number and multiple study centers. According to our study results, the clinical examination of pathologies of concomitant shoulder pathologies is emphasized in individuals having advanced stage gonarthrosis and high body index.

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