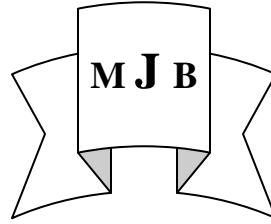


The Frequency of Comorbidities Associated with Knee Osteoarthritis in Men and Women in Babylon and Their Impact on Pain

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Abstract

Background: Knee osteoarthritis (KOA) is considered a major cause of physical disability, and because its prevalence increases with age, the coexistence with other chronic diseases is common making further impact on health and lifestyle.

Objective: To find out the correlation and frequencies of comorbidities(obesity, hypertension, diabetes mellitus(DM), dyslipidemia and metabolic syndrome) in patients with KOA ,to compare the result with that of individual without KOA, and to study how could these components impact pain in patients with KOA.

Methods : sixty five patients (40 females and 25 males) with symptomatic KOA were enrolled in the study in period between March 2010 to May 2011 at rehabilitation and rheumatologic clinic of Merjan teaching hospital . The OA was diagnosed according to American college of rheumatology criteria(ACR) and according to Kellegren-Lawrence radiographic grade for OA , Grade 2+ (definite osteophyte) was used as definition of KOA. Similar number of individuals without KOA nearly matched for age and gender were selected as a control group. Full medical history and physical examination were recorded. Body mass index (BMI) ,waist circumference(WC), fasting blood sugar, total cholesterol, triglyceride, high density lipoprotein(HDL) cholesterol, blood pressure were estimated for patients. and control groups.

Pain was measured in patients with KOA using visual analogue scale , (VAS).

Results: The frequency of co morbidities among patients with symptomatic KOA was as following: obesity (55.38%), dyslipidemia (49.23%) DM (18.4%) hypertension (64.6%) and metabolic syndrome(50.76%).which were higher than control group.

Comparing these components patients with metabolic syndrome had higher pain impact measured by VAS than patients without metabolic syndrome..

Conclusions: Metabolic risk factors or components of metabolic syndrome were associated closely with KOA. Which need investigation, detection and early treatment when dealing with KOA.

الخلاصة

يعتبر التهاب العظمي المفصلي لمفصل الركبة سبب رئيسي لاعتلال اللياقة البدنية ولكون نسبة حدوثه تزداد بتقدم العمر فإن احدنا يتوقع ان يرافق هذا الالتهاب امراض اخرى تضيف عبء اخر على الصحة وعلى نمط الحياة.

ان الهدف الرئيسي لهذه الدراسة هو تبيان نسبة العوامل الرئيسية المكونة للتأخر الأيضي مع مقارنة النتائج مع نفس العدد لاناس غير مصابين بهذا الالتهاب مقربين من حيث العمر والجنس لمجموعة الدراسة مع تبيان تأثير هذه العوامل على شدة الألم.تمت هذه الدراسة في مستشفى مرجان التعليمي ما بين سنة ٢٠١٠ و ٢٠١١ حيث تم اشراك ٦٥ مصابا بالتهاب العظمي المفصلي لأحد او كلا مفصلي الركبة بعد ان تم تشخيصها سريريا وشعاعيا ثم اجراء القياسات والفحوصات التالية لكلا المجموعتين قياس محيط الخصر وقياس مؤشر الكتلة الجسمية وقياس

ضغط الدم كذلك تم قياس نسبة الكلوكلوز في الدم (في حالة الصيام) مع قياس الكولستيرول الكلي والدهون الثلاثية والبروتين الدهني عالي الكثافة. كذلك تم قياس شدة الألم باستخدام (VAS) Visual analogue scale. أظهرت النتائج بأن نسبة وجود العوامل المكونة للتناذر الأيضى هي اعلى عند الأشخاص المصابين بالتهاب العظمي المفصلي وكذلك شدة الألم اعلى بوجود هذه العوامل. لذلك يتحتم علينا الأنتباه عند معالجة حالات التهاب العظمي المفصلي التأكد من وجود هذه العوامل المرافقة له لكي يتم تشخيصها و معالجتها مبكرا.

Introduction

Osteoarthritis (OA) is by far the most common form of arthritis in humans and a major cause of pain and disability [14].

Our ancestor' skeletons show that it has been with us for many centuries [2].

It is strongly associated with ageing, such by 65 years 80% of people have radiographic evidence of OA[1]. The knee and hip are the principal large joints involved. The knee OA (KOA) is prevalent in all racial groups [1]

The KOA is among contributor of pain and disabling types of osteoarthritis [5,6] Beside pain it is also associated with decreasing physical activities, and may lead to limitation one's independence and effect health related quality of life[5,7].

Because the prevalence of OA increases with ageing, co-existence with other chronic disease is common, further increasing impact on the quality of life of these patients. There is growing evidence that OA is not simply a disease related to ageing , obesity or mechanical stress of joint, only, but rather, a "metabolic disorders" in which various interrelated lipid, metabolic and humeral mediators contribute to the progression of disease process and association with other major co morbidities include systemic arterial hypertension(SAH), diabetes mellitus (DM) and dyslipidimia, a components of metabolic syndrome, and a consequence risk factors of cardiovascular diseases[5,8-10]. Recent epidemiological studies have

strengthened the evidence of increased incidence of OA in patients with metabolic syndrome. This demonstration of association of metabolic syndrome and KOA is a challenging because obesity, a component of metabolic syndrome is also a strong risk factor for KOA[11] That is why OA has become a major public health problem not only because of its increasing worldwide but also because of its frequent association with risk factors of cardiovascular disease, the leading cause of death in industrialized countries.[10]

Early detection and treatment of these co morbidities is not only to reduced the risk for possible cardiovascular events, but also because the OA therapy may complicate and aggravate these risk factors[9] The current study aimed to explore the frequency of co morbidities associated with KOA and their impact on pain intensity in Babylon city. The results were compared to that of age and sex matched individuals without KOA.

Methods and Patients

This case control study was conducted at rheumatologic and rehabilitation unit in Merjan Teaching Hospital in period from March 2010- to May 2011.

It including 65 patients (40 females and 25 males) with KOA of both or either knee joints presented in the out patient clinic because of pain and functional disability (patients had pain in all or most days of the last month) were diagnosed according to American College of Rheumatology (ACR)criteria

[2] and were confirmed by radiographic study. Similar number of nearly age and sex matched control healthy individuals without KOA were included in the study.

For both patients and control group, age below 18 years, pregnant woman, positive history for tobacco smoking, corticosteroid therapy, OA in any other site, previous trauma(including surgical) resulting in internal derangement or joint instability other current or previous rheumatic diseases to either knee joints or /and any other possible causes of 'secondary' causes of KOA were excluded from the study. All patients were not on current analgesia or non-steroidal inflammatory drugs at least for the last 48 hours. The control group were selected to have no history of DM, hypertension, dyslipidemia.

The consents of both, the patients and the control group, were taken.

The diagnosis of KOA was confirmed radiologically using standard antero-posterior radiograph of weight-bearing knees and scored according to the method of Kellgren-Lawrence (KL) [12] Patients were considered positive for OA in this study if Grade 2+ in KL scale in either knee joint. Grade 2+ KL represented those with definite osteophyte in either medial or lateral compartment but the joint space intact [13]

A thorough medical history for each patient and control was recorded.

The following measurements were done for both patients and control group:-

Body weight and height to the nearest 0.1 kg and 0.1 cm, respectively, using standardized equipment and procedures. Body mass index (BMI) was subsequently determined as $\text{weight}/\text{height}^2$ (kg/m^2). Obesity was labeled when $\text{BMI} > 30$, overweight was labeled

when BMI between 25-29. whereas thin and normal body weight were labeled when $\text{BMI} < 18$, 18-24 respectively.

The waist circumference (WC) was made to the nearest 0.1 cm at minimal respiration (at the end of normal expiration) at the level of iliac crest and central obesity was labeled when the WC 102 cm or over in men or 88 cm or over in women[14,15].

Blood pressure was measured, using a standard mercury sphygmomanometer, twice, after five minutes and the mean was used for study analysis. The patient was considered positive if one had a history of hypertension, even controlled during time of the study.

Fasting blood sugar and lipid profile (total cholesterol, triglyceride, high density lipoproteins cholesterol (HDL-C). Metabolic syndrome was defined according to International Diabetes Federation (IDF) criteria [16]with central(abdominal) obesity measured as waist circumference, plus two of the following: blood pressure $> 135/85$ mmHg, fasting blood glucose $> 100\text{mg}/\text{dl}$, triglyceride level $> 150\text{mg}/\text{dl}$ and high density lipoproteins cholesterol HDL-C for men $< 40\text{mg}/\text{dl}$ and women $< 50\text{mg}/\text{dl}$. Dyslipidemia was defined as an abnormal lipid status. Common lipid abnormalities include elevated of total cholesterol, low density lipoprotein cholesterol LDL-C, LP(a) and triglycerides, low level of high-density lipoproteins HDL cholesterol, and preponderance of small dense LDL particles. These abnormalities can be found alone or in combination [17]. In the current study high cholesterol, triglycerides, and low HDL cholesterol alone or in combination were considered the cause of dyslipidemia.

The pain severity was measured in patient group using 100-mm visual analogue scale (VAS). Descriptive analysis had been used. Results of measurements are presented in \pm SD and results of groups presented in number and percentage. Data were analyzed, with 95% significance, Odd ratio (OR) and 95% , confidence interval (CI) were calculated by use of SPSS statistical program version 15.0.

Results

All the patients and individuals in control group completed the study. Of 65 patients the females represents (61.53%) (n=40) and the males represent (38.47%) (n=25) with mean age of 56.29 ± 6.52 years.

Of 65 individuals of the control group , females represent (64.61%) (n=42) and

the males represent (35.38%) (n=23) with mean age of 55.67 ± 5.81 .(table 1)

Regarding the age distributions, the data showed the most cases of KOA occurred in age groups of 50-70 years. (table 2)

Table 3 shows the frequency and percentages of variables (DM, hypertension, dislipidymia , obesity, and metabolic syndrome). We observed a higher frequencies of these variables in patients group in comparison to control group.

Regarding the pain assessment in patients group, measured by VAS, we observed a higher pain scales among patients with metabolic syndrome in comparison to patients without metabolic syndrome. (table 4)

The results showed that most of cases(n=20) (60.6%) with metabolic syndrome occurred in age group of 50-60 years. (table 5).

Table 1 Demographic profiles of both patients and control groups.

variable	patients	control	p-value
Age (year)	56.29± 6.52	55.67±5.81	0.571
Female (n) (%)	40 61.53%	42 64.61%	
Male (n) (%)	25 38.47%	23 35.38%	

Table 2 Age (years) distribution of both patients and control group.

Age group	Patient (n)	Control (n)
≤ 39	1	0
40-50	10	11
51-60	35	40
61-70	18	14
≥ 71	1	0

Table 3 Frequency of co-morbidity factors in both patients and control groups.

Variable	Patient		Control		OR (odd ratio)	95% confidence interval (CI)
	n	%	n	%		
Obesity	36	55.38%	21	32.3%	2.601	(1.274-5.310)
Hypertension	42	64.6%	33	50.76%	1.771	(0.876-3.579)
DM	12	18.4%	6	9.32%	2.216	(0.781-6.349)
Dyslipidimia	32	49.23%	20	30.76%	2.149	(1.0567-4.369)
Metabolic syndrome	33	50.76%	17	26.15%	2.912	(1.394-6.082)

Table 4 Pain scale in patient with metabolic syndrome and patients without.

Variable	(Mean) mm yes	(Mean) no	P- value
Metabolic syndrome	78.15 ± 6.72	71.2 ± 5.7	0.000

Table 5 Distribution of metabolic syndromes according to patient age group.

Age group (years)	Metabolic syndromes (n)
≤ 39	0
40 – 50	6
51 – 60	20
61 – 70	7
≥ 71	0

Discussion

To the extent of our knowledge, there were little, if not at all, data or previous studies around this subject in Babylon.

The current study showed an obvious relationships or correlation between KOA and some of co morbidity factors like obesity, DM, SAH, and metabolic

syndrome, these findings are consistent with many previous studies [9, 13,18]. According to results of the current study the KOA and the associated co morbidities were more prevalent among middle and old aged groups, this fact was well recognized by previous studies [9,13,18]

With increase of life span of the population, the coexistence of chronic and degenerative diseases are becoming more and more frequent resulting in increasing impact on physical status, health and life quality.[9,5]. Possible explanation for the interrelation or association of the OA and the co morbidity factors include the shared etiology and physiopathological or the result of aging biological process, in which different events occur more frequently (cartilage degeneration. Insulin resistant, hypertension, obesity) which can appear simultaneously, even if not interrelated[9]

The current study and several other studies have shown that KOA is more prevalent in women than in men [1,2,19,20]. For instance the greater total body fat of the average adult female may partially account for the gender disparity toward OA, given that female, theoretically demonstrate high levels of adipose derived systemic leptin concentration than their male counterpart [21]

Several epidemiological studies linked the over weight and obesity to KOA.[1,2,9]. In addition to repeated weight bearing trauma, obesity also associated with hand OA or other non weight bearing joints[4,9] indicating that excess adipose tissue produce humoral factors altering articular cartilage metabolism[9].

The metabolic alteration in the striated muscles induced by the interaction of

insulin resistance and systemic inflammation in obese individual with metabolic syndrome would lead to OA as a final consequences [9]

It has postulated that the leptin system could be a link between metabolic abnormalities in obesity and increased risk of OA[4]

Several conditions like DM, dyslipidemia , SAH associated with obesity and sedentary lifestyle with low level of physical activities[9] On the other hand the negative impact of KOA on physical activity, make ones to assume that individual with KOA is most likely to gain weight which is principal features of metabolic syndrome. So both OA and metabolic syndrome are associated with obesity and it may therefore not be unexpected to see increased prevalence of OA in patient with metabolic syndrome and vice versa [18,22]

Majority of patients in this study are either over weighted (n=25) or with obesity (n=36) and this finding is consistent in most of previous studies [4,5,9,13,18]

The current study also showed a close association of hyperglycemia and KOA which present in (12) patients 18.4 % in comparison to 17.6 % in study of Alice et al 2011[9]

Many studies have directly examined the role of glucose and OA. Cimmino, etal found significantly higher levels of plasma glucose in women in the OA group in comparison to control group after adjusting for age[23]

A study comparing diabetic and non diabetic women, all with knee OA, and matched for age, weight, symptoms and duration of OA, found an increase incidence of osteophyte on radiograph of diabetic subject, when joint space

narrowing or sclerosis was equal between the groups[24] .

Several epidemiological and experimental data suggest the hypothesis that DM could be an independent risk factor for OA, at least in some patient, leading to the concept of a diabetes-induced OA phenotype, if this confirmed, the new paradigm will have a dramatic impact on prevention of OA initiation and progression[11]

Diabetes was first considered as a non – inflammatory disease. However , we now know that hyperglycemia can trigger a low- grade systemic inflammation, which is associated with cartilage loss[11]

The percentage of dyslipidemia in the current study among patients with symptomatic KOA was 49.23 % which is a little bit higher than was found in the study of Alice et al 2011 where the dyslipidemia represent 41 % of total patient[9]

This association of dyslipidemia and KOA emphasizing the importance of investigation for this component of metabolic syndrome in cases of KOA.

The current study showed that the association of metabolic syndrome and KOA obviously occurred in patients with age group between 50-66 years or even younger. The detection and recognition of metabolic syndrome or one or more of its components in patients with KOA, is highly essential, not because of increasing risks for cardiovascular events, but the treatment of KOA can aggravate these co morbidities.

The score of pain on VAS was higher in patient with those with metabolic syndrome This result is consistent with Alice et al 2011[9] .This partially can be explained or attributed to increase BMI[1,2,3,25].

In obesity has pain impact in KOA not only through mechanical stress induced by increasing body mass, but also through systemic inflammation by a mediators called adipokinase which are cytokines produced by fatty(adipose) tissue [9]

Conclusions and Recommendations

The co morbidities or components of metabolic syndrome is highly associated with symptomatic KOA mainly in females. Based on these finding , it is highly recommended to consider screening of these factors in management of KOA, not only the early detection and management of these risk factors is highly essential to reduce the possibility of cardiovascular events, but because the OA therapy may jeopardize and aggravate theses co morbidities.

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