Association of Hand Osteoarthritis with Carotid Atherosclerosis and Evident Coronary Heart Disease

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Abstract

Introduction: Evidence exists that OA patients are at higher risk than the general population for developing several additional serious conditions and cardiovascular disease (CVD) in particular.
Aim of the study: Our study aimed to search for the association of hand osteoarthritis (HOA), with evidence of atherosclerotic vascular disease in population above 45 years old.
Patients and Methods: This study was carried out at the Department of rheumatology and rehabilitation, Sohag University ,Sohag Hospital, during 2013-2014. It is a Cross-sectional study comprising the following groups: 30 patients with hand osteoarthritis above 45 years old, the patient diagnosed as having hand OA according to the American College of Rheumatology criteria for classification of HOA, 30 patients with non-hand osteoarthritis(knee OA) above 45 years old and 30 healthy volunteers as control.
Results: Comparing the three groups of our study together regarding cardiac symptomatology and cardiac signs, and also by investigations incluing ECG, Echo and Doppler, we found that hand OA patients showed the most frequent cardiac manifestations, followed by knee OA and least frequent among control subjects. However, these differences were only significant in the prevalence of dyspnea. The cause of non significance regarding other manifestations may be due to the limited number of positive cases in the three groups.
Conclusion: The exploration of the relationship of OA specially hand OA with heart disease, MI, CHF and angina and atherosclerosis remains a promising and important area of research. Since OA is a very common health condition, an association between OA and CVD and astherosclerosis would be important from a public health perspective.
Keywords: Hand OA, Atherosclerosis, CAD.

Introduction

Osteoarthritis (OA) is the leading cause of musculoskeletal morbidity in the elderly, the hands being one of the most frequent sites of osteoarthritis development. Disability directly related to hand osteoarthritis has largely been ignored, although several studies have shown a significant impact of osteoarthritis on hand strength and function[(1)].

The term atherosclerosis comes from the Greek Atheros, meaning gruel, and sclerosis, meaning hardening. Atherosclerosis begins at the adluminal surface, at the interface between blood and the arterial wall[(2)].

Atherosclerosis-related cardio-vascular events and cerebrovascular (CV) events are the cause of death in almost 50% of cases in developed countries. The presence of atherosclerotic disease in more than one arterial system is associated with a higher risk of recurrent symptoms and complications[(3)]. Worldwide over 8.6 million women die from CVD each year; this is almost equal to the number of deaths seen in men[(4)].

Evidence exists that OA patients are at higher risk than the general population for developing several additional serious conditions and cardiovascular disease (CVD) in particular. In fact, a number of studies

have demonstrated association of increased rates of cardiovascular morbidity in OA patients. Interestingly, recent study showed that the overall cardiovascular mortality to be directly proportional to the extent of radiographic evidence of OA by demonstrating diminished survival in women with an increased number of joint groups affected by OA[5].

Aim of the work:

Our study aimed to search for the association of hand osteoarthritis (HOA), with evidence of atherosclerotic vascular disease in population above 45 years old and to determine if there is correlation between the severity of the hand osteoarthritis and atherosclerotic changes in the carotid arteries.

Patients and Methods:

This study was carried out at the Department of rheumatology and rehabilitation, Sohag University ,Sohag Hospital, during 2013-2014.

It is a Cross-sectional study comprising the following groups:

1. 30 patients with hand osteoarthritis above 45 years old, the patient diagnosed as having hand OA according to the American College of Rheumatology criteria for classification of HOA.
2. 30 patients with non-hand osteoarthritis(knee OA) above 45 years old,
3. 30 healthy volunteers as control.

Exclusion criteria:

1) Knee osteoarthritis patient group with manifest hand osteoarthritis.
2) Patients known clinically and by laboratory analyses to have inflammatory arthritis (rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis and any other connective tissue disease).
3) Patients known to be hypertensive or diabetic will be excluded.
4) Patients before the age of 45 years old will be excluded.

Patients were subjected to:

1) Full history taking and complete general and musculoskeletal examination.
2) Plane X ray had been done for each patient.
3) 2-D ultrasound and Color Doppler study of the carotid artery was done.
4) Electrocardiogram was done searching for ECG changes suggestive of ischemia.
5) Echocardiography was done by Toshiba echocardiography device model (NEMIO30) for each patient.
6) Cardiac catheterization was done by (INFINI CBI bi-plane catheterization LAB) (TOSHIBA corporation japan) for some cases with positive myocardial ischemia 5 cases from hand OA group and 2 cases from knee OA group.

Statistical analysis:

- Statistical package for social sciences (IBM-SPSS), version 19 IBM-Chicago, USA was used for statistical data analysis.
- Data expressed as mean, standard deviation (SD), number and percentage. Mean and standard deviation were used as descriptive value for quantitative data. Student t test was used to compare the means between two groups, and one-way analysis of variance (ANOVA) test was used to compare means of more than two groups. P-value was considered significant if <0.05.

Results

The mean age of the study group was 56.41±6.494 years. Knee OA patients was older than hand OA or control subjects, but there was no significant difference between the three groups. There was female predominance in the three groups, ranging from 73.3% in the knee OA patients, to 86.7% in the hand OA group. Again, there is non significant difference between the three groups regarding sex distribution. The majority of the study population were overweight to obese, with a mean BMI of 28.33±3.54. There was non significant difference between the three groups regarding BMI.

Comparing the three groups of our study together regarding cardiac symptomatology and cardiac signs we found that hand OA patients showed the most frequent cardiac manifestations, followed by knee OA and least frequent among control subjects. However, these differences were only significant in the prevalence of dyspnea. The cause of non significance regarding other manifestations may be due to the limited number of positive cases in the three groups.

Table 1. Cardiac manifestations among the study groups

Sign	Hand OA		Knee OA		Control		Total		Chi	P value
	No	%	No	%	No	%	No	%	square	
Normal pulse rate	27	90	28	93.3	29	96.7	84	93.3	1.071	0.585(NS)
Pulse iregularity	4	13.3	2	6.7	1	3.3	7	7.8	2.169	0.338(NS)
Raised JVP	3	10	1	3.3	1	3.3	5	5.6	1.694	0.429(NS)
Dyspnea	10	33.3	8	26.7	1	3.3	19	21.1	8.940	**0.011 (S)**
PND	3	10	1	3.3	1	3.3	5	5.6	1.496	0.429(NS)
Angina	6	20	5	16.7	1	3.3	12	13.3	4.038	0.133(NS)
CCU admission	1	3.3	2	6.7	0	0	3	3.3	2.069	0.355(NS)
Stroke	0	0	0	0	0	0	0	0	-	-
TIA	3	10	4	13.3	1	3.3	8	8.9	1.921	0.383(NS)

Comparing the three groups regarding musculoskeletal manifestations we found that hand OA had the highest prevalence, followed by knee OA, and non of the control subjects. The only exception was the need for NSAIDs, which was more prevalent among knee OA patients than hand OA patients. The differences were, of course, highly significant.

The results of K&L hand score seen by X-ray is summarised in the following figure.

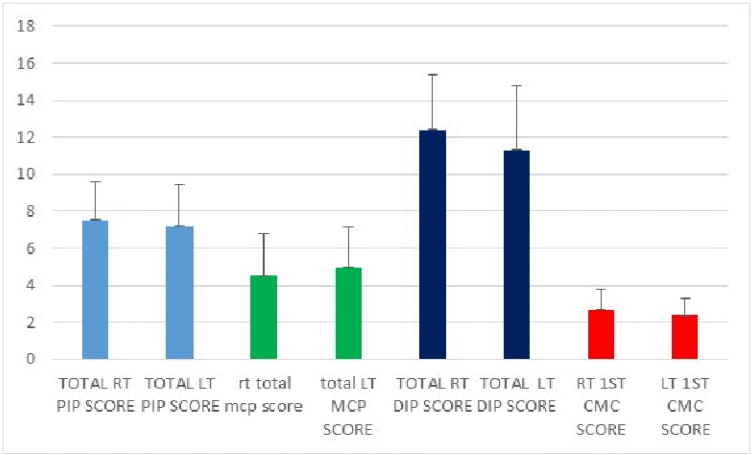

Figure 1. X-ray hand of group 1 patients

ECG examination of the study population we found that 8 cases out of the 30 hand OA patients (26.7%) had ECG findings suggesting of ischemia, compared to 5 cases in knee OA patients and one case in the control group (16.7% and 3.3%, respectively). The difference was statistically significant.

Echo examination of the study population we found that hand OA patients had the highest Echo findings suggesting of ischemia, followed by knee OA patients and least in the control group. The difference was statistically significant regarding all signs except ejection fraction.

Doppler of the study population revealed that the highest prevalence was seen in hand OA cases, followed by knee OA and least in control subjects. The differences were significant regarding all signs except stenotic changes which showed non significant difference, may be due to low number of positive cases in all groups.

LDL cholesterol level was highest among hand OA and lowest among control cases, with a significant difference.

Cardiac catheterization was done in 7 cases (5 hand OA and 2 knee OA). Four cases Out of the 5 hand OA cases and all of the two knee OA cases showed positive stenotic CAD on CA.

Discussion

Osteoarthritis and atherosclerosis are two seemingly un-connected degenerative chronic diseases that happen to have a high incidence of occurrence in developed countries. Both are silent processes and may remain virtually asymptomatic until decades later, as they are evolving with age and they both bear high economic cost that becomes evident when complications become overt[6].

Comparing the three groups of our study together regarding cardiac symptomatology and cardiac signs we found that hand OA patients showed the most frequent cardiac manifestations, followed by knee OA and least frequent among control subjects. Comparing the prevalence of cardiac symptomatology and cardiac signs between hand OA patients and control subjects, we found that the differences were significant regarding dyspnea and angina.

Our results are to some extent, in agreement with the data obtained by ***Rahman, et al.,***[7] who found a statistically significant positive associations of OA with heart disease, angina and CHF among both men and women.

Comparing the three groups regarding musculoskeletal manifestations we found that hand OA had the highest prevalence, followed by knee OA, and non of the control subjects. ESR was highest among Hand OA patients, and lowest among control subjects, with a significant difference between the three groups. Our results were not similar to those seen by ***Al-Rawi et al.,***[8] who found a non significant increase or difference in the ESR between HOA and control.

ECG examination of the study population we found that 26.7% of patients with hand OA patients had ECG findings suggesting of ischemia, compared to 16.7% in knee OA patients and 3.3% in the control group. Echo examination of the study population we found that hand OA patients had the highest Echo findings suggesting of ischemia, followed by knee OA patients and least in the control group. The difference was

statistically significant. Data from the Third National Health and Nutritional Examination Survey (NHANES III) by ***Singh, et al.***[9] and other study by ***Haara, et al.,***[10] indicate that U.S. adults with OA have a significantly higher prevalence of cardiovascular risk factors (increased BMI, hypertension, diabetes mellitus, physical activity, lipid profile, etc.) than the non-arthritic population, which may place OA patients at risk for developing CHD.

Doppler of the study population revealed that the highest prevalence was seen in hand OA cases, followed by knee OA and least in control subjects. Possible explanation is that: the vascular pathology is an integral part of osteoarthritis process, possibly contributing to the initiation or progression of HOA, in which a suggestive pathway that OA leads to a state of hypercoagulation and hyperfibrinolysis, and subsequently to circulatory disturbances in the subchondral bone contributing to the perpetuation of cartilage destruction and the pathophysiological process of OA[11]. Our results were similar to those seen by ***Al-Rawi et al.,***[8]. Such finding coincides with that obtained by ***Hoeven et al.,***[12] who found an association between atherosclerosis and OA of the knee, MCP and DIP joints in women.

Conclusion:

The exploration of the relationship of OA specially hand OA with heart disease, MI, CHF and angina and atherosclerosis remains a promising and important area of research. Since OA is a very common health condition, an association between OA and CVD and astherosclerosis would be important from a public health perspective.

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الملخص العربي

تلازم مرض خشونة مفاصل اليد مع تصلب الشرايين السباتية وقصور الشريان التاجي الظاهر

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يعد مرض خشونة المفاصل (OA) السبب الرئيسي لاعتلال العضلات والعظام في كبار السن، وتعد اليد واحدة من أكثر الأماكن شيوعا للإصابة بخشونة المفاصل. وقد تم تجاهل العجز الناتج عن خشونة المفاصل إلى حد كبير، على الرغم من أن العديد من الدراسات أظهرت تأثيراً كبيراً لخشونة المفاصل على قوة اليد ووظيفتها.

وتوجد أدلة على أن مرضى الخشونة معرضون أكثر من غيرهم للإصابة بمضاعفات خطيرة وبصفة خاصة أمراض القلب والأوعية الدموية.

تهدف دراستنا للبحث عن علاقة خشونة مفاصل اليد بزيادة الإصابة بأمراض الأوعية الدموية (تصلب الشرايين) بين المرضى الذين تزيد أعمارهم عن 45 سنة، وتحديد ما إذا كان هناك علاقة بين شدة مرض خشونة مفاصل اليد وتغييرات تصلب الشرايين في الشرايين السباتية.

شملت دراستنا 30 مريضا بخشونة مفاصل اليد و30 مريضا بخشونة الركبة و30 شخص سليم كمجموعة ضابطة، وكانت المجموعات الثلاثة متوافقة من حيث الجنس ومتوسط العمر، وكانت أغلبية المشاركين في المجموعات الثلاث من الإناث، وكانت الغالبية منهم يعانون من زيادة الوزن أو السمنة.

وعند مقارنة المجموعات الثلاث فيما يتعلق بالأعراض القلبية وعلامات مرض القلب وجدنا أن أعراض وعلامات أمراض القلب كانت أكثر شيوعاً بين مرضى خشونة اليدين تليها مجموعة خشونة الركبة وأقل مجموعة كانت المجموعة الضابطة، وكان الفارق بين المجموعات الثلاث ذا دلالة إحصائية.

وعند إجراء فحص تخطيط القلب لجميع المشاركين في الدراسة وجدنا أن 8 حالات من مرضى خشونة اليدين كانت نتائج تخطيط القلب تؤشر على نقص التروية، مقارنة مع 5 حالات من مرضى خشونة الركبة وحالة واحدة في المجموعة الضابطة، وكان الفرق ذا دلالة إحصائية، وقد حصلنا على نتائج مشابهة عند إجراء فحص بواسطة موجات الصدى (الإيكو) أو الدوبلر.

ونستنتج من هذه الدراسة أن استكشاف العلاقة بين خشونة المفاصل وخصوصاً مفاصل اليدين مع أمراض القلب مثل قصور الشرايين التاجية والذبحات الصدرية والجلطات وتصلب الشرايين لا تزال منطقة واعدة وهامة من الأبحاث. وحيث أن خشونة المفاصل هي من أكثر الأمراض شيوعاً فإن وجود ارتباط بين خشونة المفاصل والأمراض القلبية الوعائية وتصلب الشرايين ستكون مهمة من منظور الصحة العامة.