Carotid Intima-Media Thickness in Rheumatoid Arthritis Detected by Doppler Ultrasound

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Abstract

Background: The excess mortality associated with rheumatoid arthritis is largely due to cardiovascular disease. Rheumatoid arthritis is of primary importance in atherogenesis. The intima-media thickness of extracranial carotid arteries is a measurable index of the presence of atherosclerosis.

***Objective*:** To assess carotid intima-media thickness in rheumatoid arthritis by Doppler ultrasound.

***Methods*:** Fifty two Iraqi patients with rheumatoid arthritis were studied and compared with another fifty two, healthy individuals matched for age and sex as a control group. Full history was taken and complete clinical examination was done for all individuals in both groups. Rheumatoid arthritis diagnosis was based on The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. Carotid intima-media thickness was measured by Doppler ultrasound.

***Results*:** There was a significant increase in the frequency of increased carotid intima-media thickness among individuals with rheumatoid arthritis (44.2%) compared to healthy control group (3.8%) (P=0.000001).

***Conclusion*:** Increased carotid intima-media thickness occurs in high frequency in rheumatoid arthritis.

***Key words*:** carotid intima-media thickness, doppler ultrasound, rheumatoid arthritis

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Introduction

Rheumatoid arthritis (RA) is a common chronic autoimmune disease associated with systemic inflammation, a female predominance, and a prevalence of 1% that increases with age[1]. The diagnosis is a clinical based on the characteristic joint manifestations [2,3] . The excess mortality associated with RA is largely due to cardiovascular disease, particularly ischemic heart disease[4–10]. In view of the importance of chronic inflammation in atherogenesis, the presence of RA per se may be of primary importance [11].

The prevalence of carotid atherosclerosis in RA is at least as high as in diabetes mellitus [12]. The intima-media thickness (IMT) of extracranial carotid arteries provides an index of atherosclerosis in other vascular regions [13–17] and has been shown to be associated with most risk factors for atherosclerosis [18–20]. Recently, an increased thickness of carotid IMT determined by B-mode ultrasound has been shown to be directly associated with an increased risk of myocardial infarction and stroke in older adults without a previous history of cardiovascular disease [21]. Thus, increased carotid artery IMT has been proposed as a risk factor that may be included in the algorithms for cardiovascular risk assessment [21].

The aim of the study is to assess carotid intima-media thickness in RA by a non invasive screening carotid Doppler ultraonography.

Methods

A cross-sectional study was carried out at the Baghdad Teaching Hospital / Rheumatology Unit from December 2005 till September 2008. Fifty two Iraqi patients with RA were diagnosed on base of the American Rheumatism Association 1987 Revised Criteria for the classification of rheumatoid arthritis [2]. Another fifty two healthy individuals matched for age and sex were collected from relatives and accompanying persons of patients attending the Baghdad Teaching Hospital and to Rheumatology Unit, were studied as a control group. Full history and complete physical examination were done for both groups.

Diseases that cause atherosclerosis and increase carotid intima-media thickness (IMT) were excluded from the study like diabetes mellitus and hypertension.Serum lipid profile and carotid IMT measured by Doppler

ultrasound were done for both groups. Disease activity was assessed by disease activity score 28 (DAS 28).

A signed consent was taken from all individuals studied. Ethical approval was obtained from the Ethics Committee of Baghdad University, College of Medicine, Medical Department.

All data coded and entered to computer using statistical package for social science (SPSS 16). Association between discrete variables measured by Chi-Square test and Fisher's exact test, difference between continuous variables measured by t-test. P-value <0.05 was considered significant.

Results

The 52 patients with RA comprised of 43(50.6 %) females and 9(47.4%) males compared with 52 healthy individuals, 42 (49.4%) females and 10(52.6 %) males as a control group. The mean age was (47.46±11.37) years for the RA patients group, and (40.46±10.06) years for the control group (p=0.237) **(Table-1)**.

The frequency of increased carotid IMT in 52 patients with RA was (44.2%) compared to (3.8%) in 52 healthy individuals (p=0.000001,odd ratio=0.05,95%confidence interval=0.11-0.23) as shown in **(Table-2)**.

There was a highly statistical significant relationship between severity of carotid IMT in RA patients in comparison to the control group (p=0.00002) as shown in **(Table -3)**.

We found highly significant relationship between increased carotid IMT and RA patients' disease activity score 28(DAS 28) (p=0.00000000003) as shown in **(Table -4)**.

(Table-1)

Demographic characteristics of 52 patients with RA and 52 health controls

Variables	**Patients n=52**	**Controls n=52**	**P-value**
Age (years)	47.46±11.37	40.46±10.06	0.237^{ns}
Gender			
Male n (%)	9(47.4)	10(52.6)	0.500^{ns}
Female n (%)	43(50.6)	42(49.4)	

P-value is significant; n, number, %, percentile; NSAID, non-steroidal anti-inflammatory drugs, CHQ, chloroquine; DAS, disease activity score.

(Table-2)

Frequency of carotid IMT in 52 patients with RA and 52 controls

	Carotid IMT			
Group	Increased	Normal	P-value	Odd ratio
95%CI	n. (%)	n.(%)		
RA n=52	RA n=52	29(55.8)	0.000001^{*}	0.05
0.11-0.23				
Controls n=52	2(3.8)	50(96.2)		

P-value is significant. ; IMT, intima-media thickness; CI, confidence interval

(Table-3)

Severity of carotid IMT in 52 patients with RA compared to 52 healthy controls

Severity	**Patients** n=52	**Controls** n=52	**P-value**
Normal (IMT<8mm) n.(%)	29(36.7)	50(63.3)	
Mild (IMT=8-12mm) n.(%)	7(77.8)	2(22.2)	
Moderate (IMT12mm-16 mm) n.(%)	1(100)	0(0)	0.00002*
Severe (>16mm) n.(%)	15(100)	0(100)	

(*Table - 4)*

Risk factors for occurrence of increased carotid IMT in patients with RA

Risk Factors	**Carotid IMT**		**P-value**	**Odd Ratio**
	Increased	**Normal**		
Age n.(years) -5.45-7.42	23(46.91±13.03)	29(47.89±10.08)	0.760	-
Sex				
Males n.(%) 0.135-2.450	5(55.6)	4(44.4)		
Females n.(%)	18(41.9)	25(58.1)		
Duration n.(years)	23(6.32±5.98)	29(7.96±5.15)	0.294	
Lipid profile				
Normal n (%) 0.655-21.47		27(60)		
Increased n (%)	5 (71.4)	2 (28.6)		
Das28				
Remission	0(0)	11(100)		
Low	2(100)	0(0)	0.00000	
Moderate	24(100)	0(0)	00000*3 -	
Severe	15(100)	0(0)		
Drugs				
Steroids n. (%) 0.4-7.4	5(55.6)	4(44.4)	0.349	1.7
NSAID n (%) 0.3-3.9	6(46.2)	7(53.8)	0.561	1.1
CHQ n. (%) 0.38-4.94	18(46.2)	21(53.8)	0.439	1.37
Pencillamine n. (%) 0.42-0.704	0(0)	1(100)	0.558	0.5
Methotexate n.	19(74.5)	21(52.5)	0.229	1.8

Discussion

In the present study we found a significant association between increased carotid IMT and RA patients.

Chronic inflammation and immune dysregulation characterizing RA have a key role in accelerating atherosclerosis. Persistent endothelial dysfunction predisposes to organic damage of the vascular wall that, in a preclinical stage, can be detectable by ultrasound measurement of carotid intimal-medial thickness (IMT) [22–24].

In the present study, there was a statistical significant increase in carotid IMT among RA patients compared with control group. This agreed with del Rincon I *et al* [25], Gerli R et al [26], and Zal B *et a*l [27] studies.

In the recent study, we found a statistical significant relationship between severity of increased carotid IMT and RA patients in comparison to control group. This agreed with del Rincon I et al study [25].

In the present study, there was highly significant relationship between increased carotid IMT and Disease Activity Score 28(DAS28) of RA patients. This agreed with del Rincon I et al study [25].

Because of the high prevalence of carotid atherosclerosis in RA, it is attractive to consider application of secondary prevention guidelines to patients with RA [28, 29]

As the carotid IMT is a measurable index of subclinical atherosclerosis, we recommend measurement of the carotid intima-media thickness by Doppler ultrasound as a simple reading technique and a non invasive screening test for early preclinical detection and management of atherosclerosis in rheumatoid arthritis patients.

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