

ASSOCIATION OF METABOLIC SYNDROME WITH KNEE AND HAND OSTEOARTHRITIS: A COMMUNITY-BASED STUDY OF WOMEN

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Purpose:

It is unclear whether the association between osteoarthritis (OA) and metabolic syndrome (MetS) varies with the site of the affected joint and the presence of pain. Our aim was to assess the association of components of MetS, either singly or additively, with painful and painless ROA affecting two different sites (knee or hand) in a community-based cohort of middle-aged women.

Methods:

Cross-sectional data of 952 women, aged 45-65 years from the Chingford study, was analysed. Women with rheumatoid arthritis (RA) and those who did not have data available on either knee or hand pain and/or radiographic at baseline were excluded from the analysis. MetS was defined using the National Cholesterol Education Program Treatment Panel III criteria. Data was collected on components of MetS: elevated waist circumference (≥ 88 cm), elevated serum triglycerides (≥ 1.7 mmol/L), reduced high-density lipoprotein cholesterol (HDL-c) (< 1.3 mmol/L), hypertension (systolic blood pressure ≥ 130 mmHg and/or diastolic blood pressure ≥ 85 mmHg) and elevated fasting blood glucose (≥ 5.6 mmol/L). The outcome was four mutually exclusive OA subgroups: painful radiographic OA (ROA), ROA only, pain only and neither ROA nor pain (reference category). Knees and hands were considered to be symptomatic if pain and/or stiffness in the knee or distal and proximal interphalangeal (DIP and PIP) joints was reported to be present, while ROA was defined as Kellgren–

Lawrence (K/L) grade of ≥ 2 in at least one joint. Multinomial logistic regression models adjusted for age and body mass index (BMI) were used to evaluate the effect of MetS and its components on OA subgroups for knee and hand separately.

Results:

The most prevalent MetS component was hypertension (57.2%), followed by low HDL-c (19.3%), hypertriglyceridemia (16.6%), elevated waist circumference (15.7%) and raised fasting glucose (8.3%). The prevalence of painful knee and hand ROA was 7.1% and 12.4% respectively.

A significant association was observed between the presence and the number of MetS with painful knee ROA when adjusted for age; however, this association disappeared when BMI was included in the model (Table 1). In contrast, the presence and the number of MetS were associated with painful IPJ ROA after adjusting for both age and BMI. High waist circumference was the only metabolic component significantly associated with higher risk of painful knee ROA ($p < 0.001$). However, after adjusting for BMI, this association became non-significant. Three out of the five MetS components were associated with painful IPJ ROA after adjusting for BMI (Risk Ratio (RR) and 95% confidence of interval (CI): 2.2 (1.1-4.3), 1.7 (1.0-2.7) and 3.0 (1.2-7.4) for triglycerides, hypertension and glucose, respectively).

Conclusion:

Our findings demonstrate that MetS is strongly associated with painful IPJ hand OA when compared to the unaffected group. No association was found for knee OA when BMI is taken into account. These findings support the concept that OA affecting different joints may have different pathogenic pathways. Further attention to MetS and OA at different sites is needed to understand the metabolic phenotype in OA. These findings have important implications for public health as better control of metabolic factors may further improve quality of life for women of middle age.

Table 1. Cross-sectional association of presence and number of metabolic syndrome (exposure) with joint-specific pain and ROA (outcome)

Neither ROA nor pain: reference category	<i>Age-adjusted</i>		<i>Age and BMI adjusted</i>	
	RRR (95% CI)	p-value	RRR (95% CI)	p-value
Knee				
<i>Presence of MetS (≥3 vs. 0)</i>				
ROA only	2.2 (0.8-5.9)	0.139	1.0 (0.3-3.4)	0.996
Pain only	1.5 (0.8-2.6)	0.164	1.1 (0.6-2.2)	0.700
Painful ROA	4.3 (1.4-12.4)	<0.05	1.3 (0.4-4.4)	0.725
<i>Number of MetS</i>				
ROA only	1.3 (1.0-1.7)	0.089	1.0 (0.7-1.4)	0.980
Pain only	1.2 (1.0-1.3)	0.051	1.1 (0.9-1.3)	0.379
Painful ROA	1.4 (1.1-1.8)	<0.005	1.0 (0.7-1.3)	0.990
Hand (DIP/PIP joints)				
<i>Presence of MetS (≥3 vs. 0)</i>				
ROA only	2.2 (0.9-5.0)	0.072	2.0 (0.8-5.4)	0.158
Pain only	0.8 (0.3-1.8)	0.518	0.6 (0.2-1.7)	0.389
Painful ROA	3.9 (1.7-9.2)	<0.005	4.4 (1.7-11.5)	<0.005
<i>Number of MetS</i>				
ROA only	1.3 (1.0-1.6)	<0.05	1.3 (1.0-1.7)	0.069
Pain only	0.9 (0.7-1.2)	0.536	0.9 (0.7-1.2)	0.374
Painful ROA	1.4 (1.2-1.8)	<0.005	1.5 (1.2-2.0)	<0.005

OA, Osteoarthritis; MetS, Metabolic syndrome; ROA, radiographic osteoarthritis; RR, relative-risk ratio; CI, confidence intervals; BMI, Body Mass Index

*MetS components defined by the National Cholesterol Education Program III are as follows: waist circumference: ≥88 cm; triglycerides: ≥1.7 mmol/L or using lipids medication; HDL cholesterol: <1.3 mmol/L or using lipids medication; blood pressure: ≥130/85 mmHg or currently using antihypertensive medication; fasting glucose: ≥5.6 mmol/L or currently using anti-diabetic medication.