

## Diagnosis of Secondary Fibromyalgia in an Established Rheumatoid Arthritis Cohort

**Background/Purpose:** The prevalence of fibromyalgia (FM) is 7-10 times higher among rheumatoid arthritis (RA) patients than the general population. However, the diagnosis of FM in RA is difficult because symptoms of FM and RA overlap. Different methods of assessing FM in RA have been suggested, including using the Multidimensional Health Assessment Questionnaire (MDHAQ) pain/physical function ratio, MDHAQ fatigue/physical function ratio and the difference between tender joint count and swollen joint count. We applied these methods and the 2010 American College of Rheumatology (ACR) Diagnostic Criteria for FM to a cohort of RA patients. We examined the association between inflammation and the diagnosis of FM to determine which methods were most affected by inflammatory disease activity.

**Methods:** Our study population included 207 RA patients at an academic medical center. RA disease activity was assessed via joint examinations and C-reactive protein (CRP). To determine whether participants met the 2010 ACR Diagnostic Criteria for FM, participants completed the Widespread Pain Index and a combination of questions about cognitive and somatic symptoms. Participants also completed the MDHAQ. Four definitions of FM were assessed: 1) MDHAQ pain/physical function  $\geq 5$ , 2) MDHAQ fatigue/physical function  $\geq 5$ , 3) tender joint count – swollen joint count  $\geq 7$ , and 4) the ACR 2010 Diagnostic Criteria for FM. Multivariable associations were assessed using logistic regression models.

**Results:** The prevalence of FM varied from 12.6% to 23.7% depending on which FM definition was used. A difference of  $\geq 7$  between the tender joint count and swollen joint count was the most conservative measure, whereas a MDHAQ fatigue/physical function ratio  $\geq 5$  was most permissive. The diagnosis of FM based on MDHAQ pain/physical function ratios was most significantly associated with CRP  $\geq 3$  (OR 5.2, 95% CI 1.6-17.7) and swollen joint count  $\geq 1$  (OR 4.5, 95% CI 1.1-18.1), whereas the diagnosis of FM based on the ACR 2010 Diagnostic Criteria was most significantly associated with depression (OR 3.9, 95% CI 1.2-12.8) (Table).

**Conclusion:** Depending on the definition of FM, the relationship between inflammation and FM diagnosis varies. The ACR 2010 Diagnostic Criteria for FM and the difference between tender joint count and swollen joint count are less correlated with inflammation than the MDHAQ pain/physical function and fatigue/physical function ratios. Future studies are necessary to determine the validity of these measures compared with physician diagnosis of FM.

Table. Multivariable-adjusted associations between clinical variables and diagnosis of secondary fibromyalgia based on: 1) MDHAQ pain/physical function, 2) MDHAQ fatigue/physical function, 3) tender joint count – swollen joint count, and 4) ACR 2010 Diagnostic Criteria for Fibromyalgia.\*

Clinical Variable	Fibromyalgia Definition							
	MDHAQ Pain/Physical Function $\geq 5$		MDHAQ Fatigue/Physical Function $\geq 5$		Tender Joint Count – Swollen Joint Count $\geq 7$		ACR 2010 Diagnostic Criteria for Fibromyalgia	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Inflammatory Variables								
C-reactive protein $\geq 3.0$ mg/dl	<b>5.3 (1.6-17.7)</b>	<b>0.007</b>	2.7 (1.0-7.4)	0.05	1.6 (0.6-4.2)	0.35	0.6 (0.2-2.0)	0.39
Swollen joint count $\geq 1$	<b>4.5 (1.1-18.1)</b>	<b>0.03</b>	1.1 (0.5-2.9)	0.78	0.5 (0.2-1.2)	0.11	0.6 (0.2-1.7)	0.34
Psychosocial Variables								
Medical Outcomes Study Sleep Problems Index $> 35$	1.4 (0.4-4.6)	0.59	<b>14.1 (5.2-38.5)</b>	<b>&lt;0.0001</b>	1.2 (0.4-3.4)	0.79	3.4 (1.1-10.8)	0.05
Hospital Anxiety and Depression Scale Depression Score $\geq 8$	2.6 (0.7-10.2)	0.17	1.3 (0.4-3.9)	0.62	1.3 (0.4-4.3)	0.72	<b>3.9 (1.2-12.8)</b>	<b>0.03</b>
Hospital Anxiety and Depression Scale Anxiety Score $\geq 8$	2.0 (0.5-7.3)	0.29	0.9 (0.3-2.6)	0/87	1.5 (0.5-4.9)	0.48	2.0 (0.6-6.3)	0.25
Pain Catastrophizing Scale Score $\geq 15$	1.2 (0.3-5.0)	0.76	1.0 (0.3-2.7)	0.93	2.1 (0.7-6.6)	0.19	1.1 (0.3-3.6)	0.92

\* Each column is a separate model adjusted for age, gender and all variables listed in the table.