Musculoskeletal Pain and Arthritis in MS and Other Subjects with Pain: Case Control Study

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MSK Pain is very common

Musculoskeletal disorders and diseases are the leading cause of disability in the United States and account for more than one-half of all chronic conditions in people over 50 years of age in developed countries. The economic impact of these conditions is also staggering: For the years 2004-2006 the sum of the direct expenditures in health care costs and the indirect expenditures in lost wages has been estimated to be $950 billion dollars annually, or 7.4% of the national gross domestic product.

Burden of Musculoskeletal Diseases (2008) USA

Methods

Case Control Methodology

Total 300 examined, 4 excluded due to mismatch of identifiers. 3 year sample period, N = 296

- Control group is a sample of patients with a variety of chronic painful conditions referred for treatment.
- Excluded: persons seeking disability or worker compensation impairment benefits
- N = 260

- MS cases
- Referred by PCP or neurologist for MSK pain problems
- N = 36

All subjects examined by same PM&R physician.
Electronic health records documented all tests, imaging and notes.

Strengthening the reporting of observational studies - STROBE

We used the Strobe Statement principles as part of our design

All major rehabilitation journals have adopted criteria for reporting of observational studies: joint statement issued May 2014

Pre-specified hypothesis: → Persons with MS will have a higher rate of DJD in weight bearing joints than controls.

Case-control study—For matched studies, give matching criteria and the number of controls per case → Age and gender matching 1:1 Controls are pain patients without MS

Discuss the generalizability (external validity) of the study results → Patients seen in PM&R academic practice

Gender & Age Matched Controls

- Lists of subjects were made.
- Each MS subject was matched to the first available control on the control subject list that had identical age and gender, or + 1 year older if not identical age.

Our pre-specified hypothesis:

the rate of arthritis in the MS group would exceed the rate in the control group.

Outcome measure: XR abnormal

- Radiographic abnormalities consistent with degenerative joint disease/arthritis
- Hip, knee, ankle, spine films were examined when available.
- Usual clinical care decisions determined which pts. had radiographs made. (MD would x-ray symptomatic joints.)

- MRI imaging abnormalities also were examined when available.

- Studies were rated as abnormal consistent with spondylosis or DDD; spinal stenosis; fracture or disk herniation.

Results

Description of MS Group

	Age	BMI	MS Duration	NRS-now	PDQ-tot	PDQ_Fxn	PDQ Psych
Mean	53.1	26.9	10.0	4.5	75.7	48.3	27.4
N	36.0	36.0	34.0	32.0	23.0	23.0	23.0
Std. Deviation	7.8	6.1	7.4	2.9	28.6	17.8	12.5
Median	51.5	26.2	9.5	5.0	72.7	46.4	26.0
Minimum	37.0	14.3	1.0	0.0	33.0	22.0	9.0
Maximum	73.0	40.5	30.0	10.0	131.0	81.4	53.0
Std. Error of Mean	1.3	1.0	1.3	0.5	6.0	3.7	2.6

Pain Disability Questionnaire*

- Two subscales: Psychosocial and Functional
- Total: 0- 150 maximum (higher number is more abnormal): 90 functional/ 60 psychosocial.

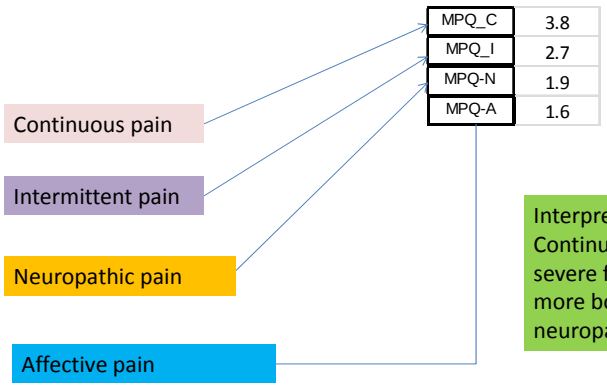
Interpretation: Total pain score is in the acute pain range. Functional disability exceeds psychosocial dysfunction.

PDQ-tot	PDQ_Fxn	PDQ-Psych
75.7	48.3	27.4

23 MS cases completed PDQ

*** Anagnostis et al. , Spine • Volume 29 • Number 20 • 2004**

McGill Pain Questionnaire SF-2



Interpretation: Continuous pain is most severe feature; it is 2x more bothersome than neuropathic pain.

36 MS cases, average values shown

Results: X-ray abnormalities

Disease	None	1	2	>= 3	Subtotal
No MS	337	91	27	5	460
MS +	64	8	0	4	76
Subtotals	401	99	27	9	536

Odds Ratio

- Odds ratio was 0.69 [C.I.: 0.58-0.80]
- This ratio implies that radiographic evidence of arthritis was less common in MS patients than in control group.
- Number of joints * gender: $\chi 2 = 4.346$, $p = .482$, NS.
- Variable # (spine + joint) abnormal: correlated with age: $r = 0.336$ [C.I.: 0.240-0.429], $p < .001$.

Secondary Measures Analyzed

Pulse pressure in our cases and controls;

Patient Reported Outcome Measures

- Pain Disability Questionnaire
- PROMIS Physical Function v. 1.2

Secondary measure: PP

Pulse pressure has been considered a measure of cardiovascular health.

One article on PP and walking impairment in MS:

Within the sample with MS, the 6 MW distance was significantly associated with brachial PP ($r = -.49$, $p<.005$).

Journal of the Neurological Sciences. 309(1-2):105-9, 2011 Oct 15.

Our Results:

Mean (control): 51.3

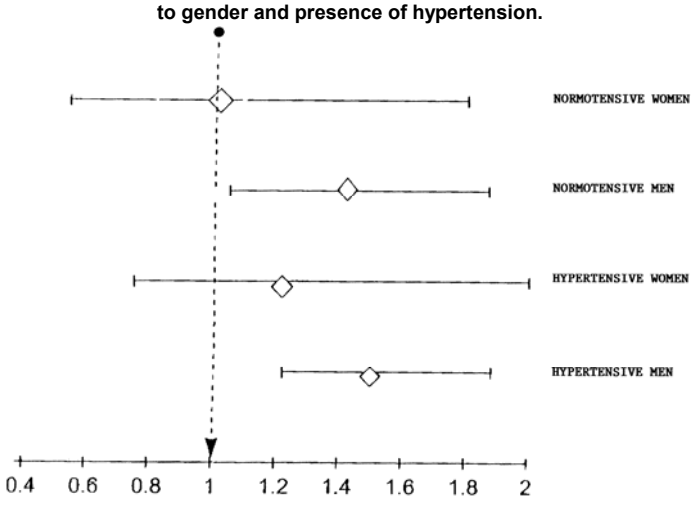
[95% C.I. = 49.4-53.3]

Mean (Cases): 44.3

[95% C.I. = 40.8-48.1]

Mann-Whitney U test: significant group difference ($p < .008$)

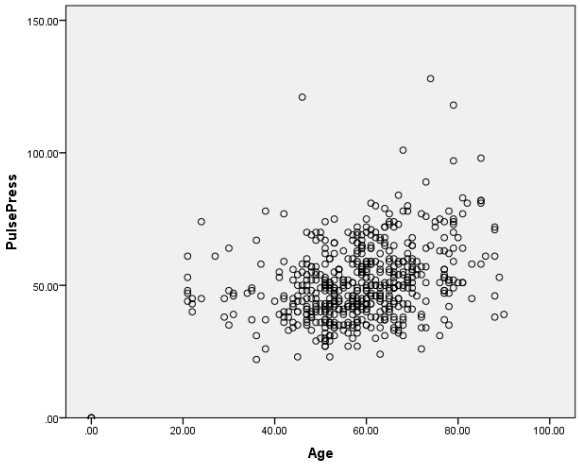
Relative risk and 95% confidence limits for total cardiovascular mortality in subjects with PP >50 mm Hg compared with subjects with PP ≤50 mm Hg in the 4 groups of subjects according to gender and presence of hypertension.



Benetos A et al. Hypertension 1998;32:560-564

American Heart Association.

Pulse Pressure was related to age



Each encounter had BP measured

R = .0361, p < .001

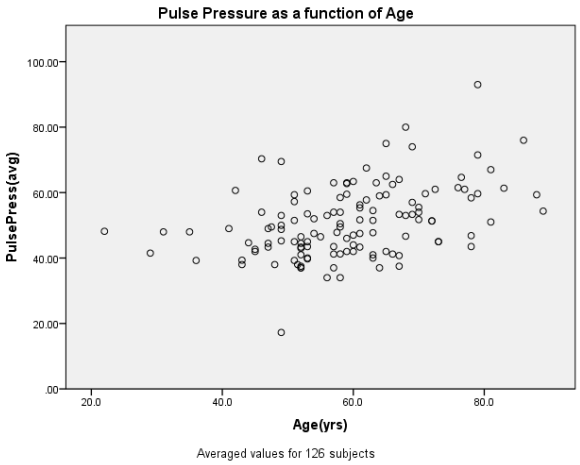
Pulse Pressure and Gender

Pulse Pressure by Visit	Mean	N	Std.Dev.
Gender			
Female	49.30	316	17.19
Male	49.87	236	16.73
Total	49.55	552	16.98

# Averaged PP (2 or more visits) per individual subject
N = 126

		Pulse Press (avg)	Age(yrs)	SBP(avg)	DBP(avg)
Female	Mean	52.2	58.8	130.2	78.0
	N	72.0	72.0	72.0	72.0
	Std. Deviation	10.5	12.1	14.4	9.4
Male	Mean	49.6	60.1	130.3	81.0
	N	54.0	54.0	54.0	54.0
	Std. Deviation	11.6	12.3	14.1	8.9
Total	Mean	51.1	59.3	130.3	79.2
	N	126.0	126.0	126.0	126.0
	Std. Deviation	11.0	12.2	14.2	9.2

Pulse pressure as a Function(Age)



R = 0.425, p < .001

MS Subjects

Persons with MS											
	Age	BMI	MS(Duration)	NRSnow	PDQtot	PDQ-Fxn	PDQ-Psych	MPQ_C	MPQ_I	MPQ-N	MPQ-A
Mean	53.1	26.9	10.0	4.5	75.7	48.3	27.4	22.6	16.2	11.2	6.5
N	36	36	34	32	23	23	23	16	16	16	16
Std. Deviation	7.76	6.10	7.44	2.90	28.61	17.81	12.45	15.79	14.57	12.96	8.97
Median	51.50	26.16	9.50	5.00	72.73	46.36	26.00	19.50	11.50	7.00	1.00
Minimum	37.00	14.31	1.00	0.00	33.00	22.00	9.00	3	0	0	0
Maximum	73.00	40.49	30.00	10.00	131.00	81.36	53.00	60	52	43	28
Std. Error of Mean	1.29	1.02	1.28	0.51	5.96	3.71	2.60	3.95	3.64	3.24	2.24

PROMIS Physical Function SF-2 (www.nihpromis.org)

PROMIS Patient-Reported Outcomes Measurement Information System
Dynamic Tools to Measure Health Outcomes From the Patient Perspective

		any difficulty	With a little difficulty	With some difficulty	With much difficulty	Unable to do
PFA11	Are you able to do chores such as vacuuming or yard work?	D 5	D 4	D 3	D 2	D 1
PFA12	Are you able to push open a heavy door?	D 5	D 4	D 3	D 2	D 1
PFA16	Are you able to dress yourself, including tying shoelaces and doing buttons?	D 5	D 4	D 3	D 2	D 1

PROMIS-Physical Function Scale

8 MS cases

Subscales:	PROMISTot	PromisMob	PromisTrans	PromisADL	PromisIADL	Age
Mean	63.7	10.7	7.5	39.5	6.4	52.8
N	8.0	8.0	8.0	8.0	8.0	8.0
Std. Deviation	22.8	6.0	1.9	12.2	3.4	6.9

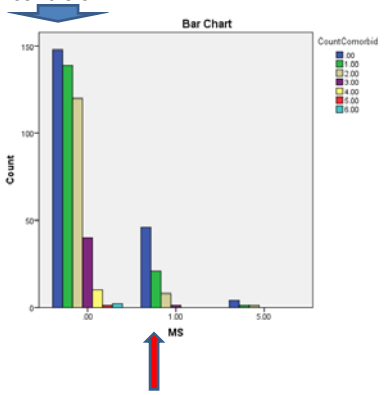
Task	Pt Score	Max Score
Mobility	10.7	20
Transfers	7.5	10
ADL	39.5	60
iADL	6.4	15
Total	63.7	105

Interpretation: MS cases report moderate disability, especially mobility, ADL's and instrumental ADL's.

Results

Comorbid Conditions

controls



Cases (MS)

Interpretation

Comorbid conditions were more common in the control group.

Conclusions - I

Ratings of pain (PDQ, NRS) did not differ significantly between cases and controls.

Type of pain: 24% somatic, 29% neuropathic, and 43% mixed. Did not differ between groups.

PDQ functional subscale and total scores did not differ significantly between groups. PROMIS showed moderate disability in the MS group.

Despite similar levels of pain, MS subjects had less frequent arthritis than controls with pain.

Conclusions - II

Pulse pressure was lower in MS cases than controls, contrary to previous report.

Our sample may be healthier than previous literature suggests due to their active involvement in home exercise and physical therapy input (academic MS center).

Thank You!