PAIN NEUROPHYSIOLOGY EDUCATION FOR THE APPLICATION OF ORTHOPEDIC MANUAL THERAPY

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MASTER EDUCATION IN ORTHOPEDIC MANUAL/MANIPULATIVE PHYSICAL THERAPY (OMT)
UNIVERSITY OF ZARAGOZA (SPAIN)

BACKGROUND
ORTHOPEDIC MANUAL/MANIPULATIVE PHYSIOTHERAPY EDUCATION

- 2 Years Master Program at University of Zaragoza (Spain)
- 120 ECTS:
  - face-to-face instruction: Extended Model or Intensive Model
  - online instruction
  - non-face-to-face instruction
BACKGROUND
PAIN NEUROPHYSIOLOGY EDUCATION

<table>
<thead>
<tr>
<th>FIRST YEAR</th>
<th>SECOND YEAR</th>
</tr>
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<tbody>
<tr>
<td>Mechanism-based pain classification</td>
<td>Central Sensitization neurophysiology</td>
</tr>
<tr>
<td>Nociceptive/neuropathic/CS general clinical features</td>
<td>Manual therapy-specific neurophysiological effects.</td>
</tr>
<tr>
<td>Classification based on duration of symptoms.</td>
<td>Manual therapy mechanical effects.</td>
</tr>
<tr>
<td>Analgesic neurophysiological mechanisms.</td>
<td>Pain behavior; biopsychosocial aspects</td>
</tr>
<tr>
<td></td>
<td>Cognitive-behavioral/graded activity</td>
</tr>
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</table>

Jones et al. 2011

BACKGROUND
Mechanisms-based classification of pain refer to the classification of pain according to the underlying neurophysiological mechanisms responsible for its generation and/or maintenance.
Gifford et al. 1998; Dallel et al. 2001

In absence of any diagnostic gold standards for mechanisms based pain diagnoses, it has been suggested that different categories may be identifiable and distinguishable from one another clinically based on the pattern recognition of clusters of symptoms and signs characteristic to each category by means of a standard clinical interview and physical examination process.
Butler 2000; Hansson, 2002

An expert consensus-derived list of clinical criteria associated with clinical dominance of “nociceptive”, “neuropathic” and “central” pain mechanisms exists. It provides indication of the criteria by which clinicians infer such classification of musculoskeletal pain.
Smart et al 2010
OBJECTIVES

1. To describe and analyze pain classifications the students do of real patients based on medical/physical therapy history and physical examination findings.
2. To describe the results obtained by students in the 1\textsuperscript{st} and 2\textsuperscript{nd} year of the OMT Master.
3. To describe and compare the effects of treatment (VAS and GPC) performed by the students in the 1\textsuperscript{st} and 2\textsuperscript{nd} year of the OMT Master.

MATERIAL AND METHODS

- Clinical Supervision Module (CS-1 and CS-2) of the Intensive Model of face-to-face-instruction of the OMT Master at University of Zaragoza.

<table>
<thead>
<tr>
<th>STUDENTS</th>
<th>PATIENTS</th>
</tr>
</thead>
</table>
| 1\textsuperscript{st} year education  
  n=25              | n=23     |
| 2\textsuperscript{nd} year education 
  n=30              |          |
| N= 55 students    | N= 53 patients |

- Patients were assessed and treated during four consecutive sessions (4 different days).
- Data for this study were collected at baseline (session 1) and at the end (session 4)
MATERIAL AND METHODS

STUDENT BASELINE (Session 1)

- Age
- Gender
- Symptomatic region
- Duration of symptoms (weeks)
- Intensity of symptoms (VAS)
- Classification of patient's pain
- Characteristics of pain taken into account for its classification

*Level of mechanosensitivity and physical diagnosis were also registered but have not been included in this study.*

MATERIAL AND METHODS

PATIENT BASELINE (Session 1)

- TAMPA Scale
- Central Sensitization Inventory (CSI)

**TAMPA Scale**

**Central Sensitization Inventory (CSI)**

Mayer 2012
MATERIAL AND METHODS

STUDENT FINAL
(Session 4)

- Intensity of symptoms (VAS)
- Global perceived change scale.

* Techniques applied, results obtained and satisfaction with the results were also registered, but have not been included in this study.

MATERIAL AND METHODS

PATIENT FINAL
(Session 4)

- Intensity of symptoms (VAS)
- Global perceived change scale.

* Techniques perceived, results obtained and satisfaction with the treatment and the results were also registered, but have not been included in this study.
MATERIAL AND METHODS

- Statistical analysis: SPSS 20.0 Windows

TOTAL SAMPLE DESCRIPTIVE RESULTS

- Age: 41.49 years (SD=15.74, range 14-81)
- Gender: 62.3% Women and 37.7% Men
- Symptomatic region: Knee (18.9%)/Shoulder(18.9%)/Lumbar Spine(17%)/Cervical Spine(15.1%)
- Symptom duration: 112.29 weeks (SD=270.12, range 3-1560)
- Symptom intensity (VAS): 4.76 (SD= 1.99, range .50-8)

- Age and symptomatic region were representative of musculoskeletal pain conditions . *McPhail et al. 2014
- Even if it is not clear enough, women are more likely to report muscle pain than men. *Jansen et al. 1991; Dannecker et al. 2008
- Pain is considered from moderate to intense (5/10) *Langley et al. 2011
TOTAL SAMPLE PAIN CLASSIFICATION

- Nociceptive: 81.1%
- Neuropathic: 9.4%
- Central Sensitization: 9.4%

<table>
<thead>
<tr>
<th>CLINICAL FEATURE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity</td>
<td>52.8%</td>
</tr>
<tr>
<td>Duration</td>
<td>47.2%</td>
</tr>
<tr>
<td>Distribution</td>
<td>54.7%</td>
</tr>
<tr>
<td>Behavior</td>
<td>58.5%</td>
</tr>
<tr>
<td>ROM</td>
<td>56.6%</td>
</tr>
<tr>
<td>Mecanosensitivity</td>
<td>49.1%</td>
</tr>
</tbody>
</table>

- Nociceptive processes are likely mechanisms underlying many clinical presentations of musculoskeletal pain.
- Most of the main clinical features are part of the expert clinician’s consensus for mechanism based classification of pain.
  * Smart et al. 2008

1ST YEAR SAMPLE DESCRIPTIVE RESULTS

NOCICEPTIVE (76.2%)
- Age: 38.07 (SD=16.13, range 14-67)
- Duration: 70.98 weeks (SD=127.57, range 3-416)
- Intensity (VAS): 4.98 (SD=2.38, range 5-8)

NEUROPATHIC (14.3%)
- Age: 46 (SD=11.13, range 34-56)
- Duration: 159 weeks (SD=216.37, range 6-312)
- Intensity (VAS): 6.5 (SD=3, range 6.2-6.8)

CENTRAL SENSITIZATION (9.5%)
- Age: 55.50 (SD=3.53, range 53-58)
- Duration: 806 weeks (SD=1066, range 52-1560)
- Intensity (VAS): 3.4 (SD=2.26, range 1.8-5)

- 1st year students seem to take pain intensity into account more than 2nd year students do when classifying patient’s pain; it is not an important descriptor for clinical experts.
  * Smart et al. 2008
- Central sensitization is closely related to central neural plasticity which takes time.
  * Latremoliere at al. 2009
2nd YEAR SAMPLE DESCRIPTIVE RESULTS

NOCTURPESIVE (64.4%)
- Age: 40.71 (SD=14.15, range 15-67)
- Duration: 53.6 weeks (SD=73.13, range 4-260)
- Intensity (VAS): 4.98 (SD=2.38, range .5-8)

NEUROPATHIC (6.3%)
- Age: 55 (SD=36.77, range 29-81)
- Duration: 53.6 weeks (SD=73.13, range 4-260)
- Intensity (VAS): 6 (SD=2.54, range 4.2-7.8)

CENTRAL SENSITIZATION (9.4%)
- Age: 42 (SD=22.6, range 23-67)
- Duration: 142.6 weeks (SD=191.72, range 28-364)
- Intensity (VAS): 3.4 (SD=1.68, range 1.5-4.7)

- 2nd year students rely more on subjective features such as clinical history findings, which is closer to what clinical expert panel recommend.

- It has been suggested that changes in central pain processing in some individuals with regional pain can result in later development of chronic widespread pain.

Smart et al. 2008
Mayer et al. 2012

RELATED MEASURE ANALYSIS 1ST YEAR: VAS

BASELINE VAS and PATIENT’S FINAL VAS

- 1st and 2nd year students obtained significant pain improvement regarding patient’s self-report of pain and students report of pain.

- Multiple mechanisms could be responsible for decreased pain; peripheral, spinal and supraspinal mechanisms.

- Functional improvements could have also lead to pain decrease; VAS scale measurement could be reflecting current functional status.

Bialosky et al. 2009
Franchignoni et al. 2012

FOMPT Teachers Meeting, Hoge School Utrecht, The Netherlands 27 September 2014
There were no differences between first and second year intensity of symptoms when measured by the physical therapist nor when reported by the patient.
## GLOBAL PERCEIVED CHANGE SCALE COMPARATIVE ANALYSIS

### 1ST YEAR STUDENT vs PATIENT

<table>
<thead>
<tr>
<th></th>
<th>Estadísticas</th>
<th>Estimaciones de varianza</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>¿Cuál crees que es la situación del paciente tras la semana de tratamiento?</td>
<td>¿Cuál crees que es la situación tras la semana de tratamiento?</td>
</tr>
<tr>
<td>N</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Valores</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Media</td>
<td>7.403</td>
<td>6.873</td>
</tr>
<tr>
<td>Mediana</td>
<td>7.1003</td>
<td>6.6003</td>
</tr>
<tr>
<td>Desv. std.</td>
<td>1.2497</td>
<td>1.7398</td>
</tr>
<tr>
<td>Minimo</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Maximo</td>
<td>18.00</td>
<td>18.00</td>
</tr>
</tbody>
</table>

- Physical therapist marked significantly smaller benefit obtained from treatment when compared to patient’s perceived global change.
- Students were not so aware of patient’s situation after treatment period as 2nd level students were.
- Global change scales collect information which is relevant for the patients and in this case it could be that the therapists failed to choose relevant outcomes to consider.
  - Evans et al. 2014

### 2nd YEAR STUDENT vs PATIENT

- There were no difference between patient’s and student’s perceived change.
- Pain education program could have made them aware of patient’s situation regarding the clinically relevant outcomes.
  - Jones et al. 2011

<table>
<thead>
<tr>
<th></th>
<th>Probabilidad</th>
<th>Puntuación final</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>p</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

### Prueba de comparación

<table>
<thead>
<tr>
<th></th>
<th>Media</th>
<th>Desv. std.</th>
<th>Diferencia</th>
<th>95% Intervalo de confianza para la diferencia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inferior</td>
<td>-1.7563</td>
<td>2.0484</td>
<td>1.7763</td>
<td>-3.7895 - 1.2732</td>
</tr>
<tr>
<td>Superior</td>
<td>-2.1546</td>
<td>1.7863</td>
<td>1.0242</td>
<td>-3.1795 - 1.086</td>
</tr>
</tbody>
</table>

10/21/14
CONCLUSIONS

1. The sample of patients in this study is representative of patients with musculoskeletal conditions.
2. The clinical features used by students for pain classification agree with those suggested by the experts.
3. Students trained in the specific neurophysiology education program (2nd year) rely to a greater extent in subjective findings from the clinical history and physical examination for the classification of pain than the students in the 1st year.
4. Students in both years of the OMT Master achieved statistically significant improvement in pain after the treatment sessions.
5. Students in the 2nd year of the OMT Master are more aware of the changes produced by treatment than students in the 1st year.

THANK YOU FOR YOUR ATTENTION