The Effects of Joint Protection on Task Performance in Rheumatoid Arthritis

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Disciplines
Occupational Therapy

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The Effects of Joint Protection on Task Performance in Rheumatoid Arthritis

Prepared by: Ryan Farwell (farwellr@pacificu.edu)
Date: 10/26/10
Review date: November 2012

CLINICAL SCENARIO: My father has a diagnosis of rheumatoid arthritis (RA). Through discussion, I learned that he had joint pain in his hands and would have his wife open the lids of jars for him. I asked how he opened the jar and instructed him on how to open the jar with the use of a joint protection technique. This prompted me to contemplate whether or not using joint protection would enable him to open the jars independently, thereby increasing his task performance. It is a clinically relevant question because joint protection is commonly employed by occupational therapists as an intervention for RA.

FOCUSED CLINICAL QUESTION: In RA, do joint protection techniques improve task performance?

SUMMARY of Search, ‘Best’ Evidence appraised, and Key Findings:
- Five research articles were selected for critical appraisal addressing joint protection.
- The “best” evidence supporting the PICO question came from a study done by Hammond and Freeman (2004) that evaluated the long-term effects of joint protection on early-onset RA using a behavioral-educational approach.
- This study was selected as the “best” evidence because it provided direct research regarding the effects of joint protection in the early stages of the disease and how that effect continued long-term.
- The key findings indicate that a behavioral-educational approach increased patient adherence to a joint protection program and functional ability was maintained as a result.
- Stamm et al. (2002) found that hand exercises and joint protection increased functional ability in osteoarthritis in a randomized controlled trial (RCT). This study holds significance for the PICO question because the pathology and symptoms of osteoarthritis (OA) are similar to that of RA.
- Another RCT evaluated the effectiveness of resting hand splints in RA. Adams, Burridge, Mullee, Hammond, and Cooper (2008) concluded that
resting hand splints did not provide functional benefits, but they did, however, help with decreasing early morning stiffness. Resting hand splints simulate some of the principles of joint protection, which made the study applicable to the PICO question.

- The last RCT, by Macedo, Oakley, Panayi, and Kirkham (2009) concluded that functional work outcomes improve after occupational therapy (OT) interventions for RA. The OT interventions included joint protection principles such as ergonomics and posture training.
- Lastly, a qualitative study by Williams and Adams (2000) found factors that increased or decreased patient adherence to joint protection education. The results showed that patient adherence is increased if the joint protection program was individualized and the benefits emphasized. This study was beneficial because patient adherence is necessary for joint protection to be effective.

**CLINICAL BOTTOM LINE:** Joint protection may provide benefits that increase task performance. At the very least, the use of joint protection management techniques may reduce direct and indirect symptoms or rheumatoid arthritis, which may help to enable the highest task performance possible. Because the use of joint protection relies on consistent use, patient adherence is of important consideration regarding the efficacy of joint protection. None of the evidence from the selected studies indicates that joint protection reduces task performance or contributes to further impairment.

**Limitation of this CAT:** This critically appraised topic (CAT) has not been peer-reviewed and the research was limited to five peer-reviewed articles. The author of this critically appraised paper is a 2nd year masters of occupational therapy (MOT) student, is not an expert in the topic, and is doing this CAT as part of an in class assignment for an MOT program.

**SEARCH STRATEGY:**

**Terms used to guide Search Strategy:**

- **Patient/Client Group:** Rheumatoid Arthritis
- **Intervention (or Assessment):** Joint protection techniques/principles
- **Comparison:** N/A
- **Outcome(s):** Task/functional performance/ability
### Databases and sites searched

<table>
<thead>
<tr>
<th>Databases and sites searched</th>
<th>Search Terms</th>
<th>Limits used</th>
</tr>
</thead>
</table>
| Cinahl                      | Joint protection and osteoarthritis: 1 article located  
Rheumatoid arthritis and occupational therapy: 1 article located  
Occupational therapy and osteoarthritis: 1 article located  
Joint protection and rheumatoid arthritis: 1 article located  
Splints and rheumatoid arthritis: 1 article located | English; linked full text |
| Medline                     |              |             |

### Search Terms

- Joint protection and osteoarthritis: 1 article located
- Rheumatoid arthritis and occupational therapy: 1 article located
- Occupational therapy and osteoarthritis: 1 article located
- Joint protection and rheumatoid arthritis: 1 article located
- Splints and rheumatoid arthritis: 1 article located

### Limits used

- English; linked full text

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### INCLUSION and EXCLUSION CRITERIA

- **Inclusion:**
  - Peer-reviewed
  - Linked full text
  - Diagnosis of RA or OA
  - Male or female
  - Any age
  - Any year of publication
  - Studies written in English
  - The terms “joint protection” in the study.

- **Exclusion:**
  - Studies focusing on pharmacological interventions
  - Diseases other than RA and OA
  - Studies written in a language other than English.

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### RESULTS OF SEARCH

#### Table 1: Summary of Study Designs of Articles retrieved

<table>
<thead>
<tr>
<th>Study Design/ Methodology of Articles Retrieved</th>
<th>Level</th>
<th>Number Located</th>
<th>Author (Year)</th>
</tr>
</thead>
</table>

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Prepared by Ryan Farwell (October 2011). Available at http://commons.pacificu.edu/otcats
BEST EVIDENCE

The following study/paper was identified as the ‘best’ evidence and selected for critical appraisal.


Reasons for selecting this study were:

- Focus on joint protection and RA
- High level of evidence; RCT
- Long-term follow-up to an earlier study
- Strong procedural rigor

SUMMARY OF BEST EVIDENCE

**Table 2:** Description and appraisal of (a randomized controlled trial) by (Hammond, A., & Freeman, K., 2004)

<table>
<thead>
<tr>
<th>Aim/Objective of the Study/Systematic Review:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study Design:</strong> RCT in which the assessor was blinded. Outcome measures were taken at baseline and at year 4.</td>
</tr>
<tr>
<td><strong>Setting:</strong> Two Hospital rheumatology clinics in the United Kingdom (UK)</td>
</tr>
<tr>
<td><strong>Participants:</strong> 127 participants were included in the study, consisting of 62 in the control group and 65 in the experimental group. Participants were recruited by mail and telephone. Inclusion criteria were as follows:</td>
</tr>
</tbody>
</table>

- 18-65 years
- Current patients of the rheumatology clinic
• Diagnosed by a rheumatology consultant within five years prior to the study beginning

• Hand pain with activity

• No other contributing medical conditions affecting hand function

• History of wrist and/or metacarpophalangeal inflammation and joint pain

• Self-report of hand function problems

Recruitment was done by mail and then through telephone, and participants were randomized into two groups. The age range of the participants was 45-59.25 for the experimental group and 44-59 for the control group. The male to female ratio was 18:44 for the control group and 12:53 for the experimental group. The median duration of disease for the participants at baseline was 21:17.5 months. Both groups had similar demographics at baseline. 82.25% of the total participants were available for follow-up, consisting of 49 in the control group and 48 in the experimental group, making the total number of drop-outs 20.

**Intervention Investigated**

*Control:* A standard group was given a standard UK arthritis education program for four weekly sessions lasting 2 hours consisting of RA education, medication treatments, pain management, joint protection, diet, exercise, and relaxation.

*Experimental:* The experimental group was given a behavioral-educational joint protection program over two sessions lasting 2.5 hours consisting of educational, behavioral, self-efficacy, and motor learning strategies.

**Outcome**

Outcome measures were taken at the rheumatology clinic by trained assessors. All assessments were conducted by an independent blinded assessor in the home of the participant.

**Primary:**

• Hand pain experienced within the last week measured by a 100-mm visual analogue scale (VAS); the VAS is a subjective scale

• Joint Behaviour Protection Assessment (JBPA): This assessment consists of 20 tasks related to making a hot drink and a snack. Scores for participants were correct, partially incorrect, or incorrect, relating to their adherence to joint protection techniques, with higher scores relating to better adherence to joint protection.

**Secondary:**

• EULAR 28 tender and swollen joint count
• Assessor and patient global rating of disease severity; used a 5-point likert scale

• Duration of early morning stiffness (in minutes)

• Overall pain within the last week using a 100-mm VAS

• The number of disease flare-ups in the last 6 months

• Arthritis Impact Measurement Scale 2 (AIMS2): scores ranged from 0-10, with 0 indicating higher function

• Grip strength, range of motion, and visible deformities of the hand; Grip strength was measured with a Jamar dynamometer. Range of motion was measured with a goniometer and data calculated with the Joint Alignment and Motion scale. This scale is scored 0-4 for level of deformity and range of motion for the metacarpalphalangeal and proximal interphalangeal joints (maximum bilateral score of 88).

• Arthritis Self-efficacy pain and other symptoms subscales (ASE): scored 10-100, with higher scores indicating higher self-efficacy

• Rheumatology Attitudes Index (RAI): scored 0-36, with higher scores indicating poorer attitudes

• Demographics, medications, and occupational therapy and physiotherapy data for the past 6 months.

Assessments also conducted by mail:

• AIMS2

• RAI

• ASE

**Main Findings:** The statistically significant results are as follows: Joint protection adherence was higher in the experimental group (28.59% compared with 17.71% for the standard group). 27 (61%) of the experimental group improved JPBA scores, 10 (23%) reduced to their initial score from their initial improvement at 6 months, and 7 (16%) did not change. For the standard group, 28% improved JPBA scores overall, 10% reduced back to their initial scores, and 6% did not change. JPBA scores after follow-up were significantly higher for the experimental group (P=0.001), as were durations of early morning stiffness (P=0.001), and better (lower) scores on the AIMS2.
The experimental group had fewer deformities of dominant hand radial deviation ($x^2=3.72; p=0.05$), wrist anterior subluxation ($x^2=4.47; p=0.03$) and MCP 2-5 ulnar deviation ($x^2=11.39; p=0.02$).

**Table 1: Baseline and 48-month scores for primary and secondary outcome variables (median and interquartile range): intent to treat analysis (Mann-Whitney U-test)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standard Intervention</th>
<th>Joint protection intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 months (n=62)</td>
<td>48 months (n=62)</td>
</tr>
<tr>
<td></td>
<td>48 months (n=62)</td>
<td>48 months (n=65)</td>
</tr>
<tr>
<td></td>
<td>48 months (n=65)</td>
<td>p-value</td>
</tr>
<tr>
<td>JPBA</td>
<td>12.5 (5-22.5)</td>
<td>13.15 (6.1-25.5)</td>
</tr>
<tr>
<td></td>
<td>15 (5-25)</td>
<td>23.5 (12.4-44)</td>
</tr>
<tr>
<td>Early morning stiffness</td>
<td>60 (13.75-120)</td>
<td>60 (20.25-105)</td>
</tr>
<tr>
<td></td>
<td>45 (11.25-82.5)</td>
<td>25 (2.13-60)</td>
</tr>
<tr>
<td>AIMS2: ADL (0-10)</td>
<td>1.25 (0-3.59)</td>
<td>1.87 (0.31-4.37)</td>
</tr>
<tr>
<td></td>
<td>0.8 (0-2.81)</td>
<td>1.25 (0-3.12)</td>
</tr>
</tbody>
</table>


**Original Authors’ Conclusions**

An educational-behavioral approach as part of an occupational therapy intervention for RA is more effective than a standard educational approach commonly used in the United Kingdom. This study provides evidence that a joint protection intervention employed by occupational therapists in treating RA can help to maintain long-term functional ability and decrease early morning stiffness.

**Critical Appraisal:** The authors included a summary of the methods used because the same methods were used in a previous study. However, it limits the study because a more thorough description of the methods was not included. The participants continued to receive medications and other treatments from OT and physical therapy (PT), so any maintenance in functional ability or decrease in early morning stiffness could be attributed to those interventions. However, the inclusion of this data should be commended, as this is a realistic expectation. RA is an aggressive and debilitating disease that cannot be treated with only one type of therapy. In addition, while the study contains a table describing pharmacological interventions used by participants, information on OT and PT is not present, so the possible contribution from these therapies cannot be accounted for. The study indicates that participants who did not want to be assessed in person could answer a questionnaire, but the study does not indicate how that affected the data collection or the results. Overall, the study’s methods were sound, prevented contamination, and considered co-intervention. The sample selection process was described adequately and the sample size was appropriate for a randomized controlled trial. Methods of analysis were appropriate for the variables and population being measured and results were reported in terms of statistical significance. This study provides solid ground for future research regarding the efficacy of joint protection with RA.
Validity  The assessors were trained to ensure reliability. Although the authors did not include information about the validity of the outcome measures, they provided references for each of the outcome measures. Based on research by this author on the outcome measures used, they were all found to have strong validity.

*PEDro Score 9/10*

- Eligibility Criteria was specified: yes
- Subjects were randomly allocated to groups: yes
- Allocation was concealed: yes
- The groups were similar at baseline regarding the most important prognostic indicators: yes
- There was blinding of all subjects: no, the subjects were aware that there were two treatment groups.
- There was blinding of all therapists who administered the therapy: yes
- There was blinding of all assessors who measured at least one key outcome: yes
- Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups: yes
- All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one outcome was analysed by “intention to treat:” yes
- The results of between-group statistical comparisons are reported for at least one key outcome: yes
- The study provides both point measures and measures of variability for at least one key outcome: yes

Interpretation of Results  The results supported the author’s belief that a behavioral-educational approach would be more effective than a standard approach in the United Kingdom, which in turn would favour the effectiveness of joint protection. The primary outcomes of interest, hand pain and adherence to joint protection, were better in the experimental group than in the control group. However, the difference in hand pain between the two groups was not statistically significant. The scores on the AIMS2 (Arthritis Impact Measurement Scale), a test of functional ability in ADLs, was significantly better for the experimental group, indicating a benefit to using joint protection in RA regarding functional ability.
Summary/Conclusion: The results indicate that patients with RA adhere better to a joint protection program when a behavioral-educational approach is used. As a result of improved adherence, patients experienced longer maintenance of functional ability.

Table 2: Characteristics of included studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention investigated</th>
<th>Comparison intervention</th>
<th>Outcome measures</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Adams et al. (2008)</td>
<td>The clinical effectiveness of resting hand splints in early RA</td>
<td>Standardized OT</td>
<td>Primary: • Grip strength</td>
<td>Resting static hand splints do not provide benefit for grip strength, structural impairment, or functional ability of the hand in the treatment of RA. However, they may provide a</td>
</tr>
<tr>
<td>2 Macedo et al. (2009)</td>
<td>The functional and work outcomes in patients with rheumatoid arthritis who receive targeted, comprehensive OT</td>
<td>Usual care medical management without OT</td>
<td>Secondary: • Structural impairment • Functional ability of the hand</td>
<td>OT can help individuals with RA improve functional work performance and remain employed.</td>
</tr>
<tr>
<td>3 Stamm et al. (2002)</td>
<td>The effect of joint protection and home exercises on hand function of patients with hand OA</td>
<td>Information session on OA</td>
<td>Primary: • Function • Work productivity • Coping • Disease activity</td>
<td>Hand exercises and joint protection increase hand function in individuals with OA. This type of intervention is realistic and beneficial because it is</td>
</tr>
<tr>
<td>4 Williams and Adams (2000)</td>
<td>Patient self-reported adherence levels with joint protection advice</td>
<td>None used as it was a qualitative study</td>
<td>Secondary: • Structural impairment • Functional ability of the hand</td>
<td>Adherence to joint protection and factors affecting joint protection adherence differ between individuals. According to the authors, factors increasing joint protection</td>
</tr>
</tbody>
</table>
decrease in the early morning stiffness experience by individuals with RA. Resting hand splints to do not provide significant therapeutic benefits beyond that of standard OT interventions.

easy to implement and does not have side effects that typically come from medication usage.

adherence include pain relief, improved symptoms, and perceived benefit. Factors decreasing joint protection adherence include time constraints, lack of social support, difficulty in making behavioral changes, and perceived lack of benefit.

**IMPLICATIONS FOR PRACTICE, EDUCATION and FUTURE RESEARCH**

- The selected research supports the use of joint protection by occupational therapists as a beneficial intervention for rheumatoid arthritis.

- The research also supports a behavioral-educational approach to increase patient adherence. Patient adherence is necessary for joint protection to be an effective intervention, which should be a consideration among occupational therapists.

- The research also gives insight into the factors that affect patient adherence. Basic instruction on joint protection may not be enough for patients to adhere to the principles enough to gain any significant benefit.

- Splinting (resting hand splints) may not provide the same benefits as joint protection principles and techniques.

- Based on the evidence, occupational therapists will need to begin joint protection interventions with patients early in the disease process to maintain functional ability.

- Students should be taught that evidence shows joint protection to be effective in providing a preventative outcome using a maintain intervention approach.

- Third party payers may not reimburse for joint protection interventions because the evidence does not show it to be effective in increasing functional ability. However, educating third party payers on the preventative benefit of joint protection may result in reimbursement for joint protection education.
• Current evidence does not show that joint protection in rheumatoid arthritis may increase task performance; evidence does support joint protection as effective in maintaining functional ability in affected joints.

• Future research needs to be done that specifically evaluates the effects of joint protection on functional performance and evaluates the effectiveness on specific joints that are commonly affected. Currently, evidence is lacking, which only evaluates joint protection as a secondary outcome or as part of a comprehensive intervention approach.
References


