Orthotic Management in Juvenile Idiopathic Arthritis

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Nothing to Disclose

Evidence-Based References


Objectives

- Identify the most commonly reported foot/ankle problems in juvenile idiopathic arthritis (JIA)
- Discuss the evidence for the efficacy of orthotic management to reduce foot-related problems in JIA
- Describe current practice in orthotic management of foot/ankle impairments in JIA (from the clinic)

JIA-Disease Types

<table>
<thead>
<tr>
<th>JIA Disease Type</th>
<th>Foot/ankle / soft tissue problems reported by children/adolescents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systemic JIA (sysJIA)</td>
<td>Yes* (poly course)</td>
</tr>
<tr>
<td>Polyarticular – RF+ (RF+ polyJIA)</td>
<td>Yes*</td>
</tr>
<tr>
<td>Polyarticular – RF negative (RF-polyJIA)</td>
<td>Yes*</td>
</tr>
<tr>
<td>Oligoarticular persistent (oligoJIA-P)</td>
<td>Yes</td>
</tr>
<tr>
<td>Oligoarticular-extended (oligoJIA-E)</td>
<td>Yes</td>
</tr>
<tr>
<td>Psoriatic arthritis (PsA)</td>
<td>Yes</td>
</tr>
<tr>
<td>Enthesitis-related arthritis (ERA)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*PolyJIA, older age, and longer disease duration were associated with higher frequency of foot problems.

Disease activity & foot-related problems* ICF Framework

Health Condition
Juvenile Idiopathic Arthritis

Body Functions
PAIN

Activity
Inability to walk as far as one would like

Participation
Restrictions in sports, dancing, other daily activities

*Dekker M et al., Clinical & Experimental Rheumatology 2010;28:905-911
*Hendry GJ et al., Musculoskeletal Care 2008;6(4):221-232
**Foot/Ankle Complex**

**Midfoot**
- Lateral column
- Medial column
- Forefoot

**Hindfoot**

**Common Foot Problems in JIA**

**Hindfoot and Midfoot**
- Pronated – excessive calcaneal eversion (valgus)
  - May be combined with mid-foot pronation (flat foot)
  - May see decreased “push-off” at terminal stance
- Supinated – excessive calcaneal inversion (varus)
  - Child tends to walk on lateral side of foot
  - May be combined with elevation of medial longitudinal arch (cavus foot)

*Spraul & Koenning. Descriptive study of foot problems in children with JRA. Arthritis Care Res 1994;7(3):144-150*

**Hindfoot / Midfoot Pronation**
- Flexible flatfeet in 3 y/o boy
- Flatfeet in child with JIA

**Hindfoot / Midfoot Supination**
- Calcaneal inversion resulting in a supinated hindfoot
- Supinated midfoot – weight borne on lateral side of foot

**Forefoot Problems in JIA**
- Just a few examples
  - Supinated midfoot with plantarflexed great toe
  - Limited MTP extension
  - Cock-up toes
  - Overlapping toes
  - Hallux Valgus in an adult with a long history of JIA

**Soft Tissue Inflammation**
- Plantar Fasciitis
- Achilles Enthesitis
Systematic Review
Focused Clinical Question

What is the efficacy of orthoses/orthotics to reduce pain and improve physical function (activities) in children and adolescents with JIA?

Population
Children and adolescents with JIA and documented foot/ankle problems

Intervention
Ankle/foot or in-shoe orthoses/orthotics

Comparison
Alternate or no treatment

Outcome
Decreased pain and improved functional status

Article Selection Process

48 articles identified through database searches:
19 from OVID Medline
2 from EBSCO-Cinahl
19 from PubMed
2 from Cochrane Library
2 from Scopus
3 from Web of Science

0 additional articles identified via hand search of references

9 articles excluded as duplicates

39 articles assessed for eligibility after duplicates were excluded

4 articles included for appraisal (2 Cochrane reviews, 2 RCTs)

24 articles excluded based on title

11 articles excluded based on abstract content

Results

Powell et al., 2005

CFO vs. SO: intervention for foot pain-FFI*

**Purpose:** Evaluate efficacy of semi-rigid CFOs with shock-absorbing posts on foot pain, walking speed, activities, disability, and HRQoL in children and adolescents with JIA

N = 48 randomized to CFOs, PFOs (with supportive shoes) or supportive shoes alone (SO)

40 completed the trial

**Primary Outcome:** Foot Function Index (FFI) at BL and 3 months post assessment

PT assessor blind to group allocation

Powell et al., 2005

CFO vs. SO: intervention for activities - FFI*

<table>
<thead>
<tr>
<th>Study</th>
<th>Powell et al. (2005)</th>
<th>Hendry et al. (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Design</td>
<td>Randomized control trial</td>
<td>Randomized control trial</td>
</tr>
<tr>
<td>Sample Size</td>
<td>N=48</td>
<td>N=44</td>
</tr>
<tr>
<td>JIA type</td>
<td>Oligoarticular: 6</td>
<td>Oligoarticular-persistent: 11</td>
</tr>
<tr>
<td></td>
<td>Polyarticular: 21</td>
<td>Oligoarticular-extended: 9</td>
</tr>
<tr>
<td></td>
<td>ERA: 2</td>
<td>RF-PolyJIA: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RF-ERA: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PsJIA: 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Undifferentiated: 1</td>
</tr>
<tr>
<td>Sample Age Range: mean (SD), range</td>
<td>12 ± 7 m (3.7 y); Range: 5-19 y</td>
<td>10.1 ± 4.22; Range: 6-17 y</td>
</tr>
<tr>
<td>Level of Evidence (CEBM)</td>
<td>2b</td>
<td>2b</td>
</tr>
<tr>
<td>PEDro Score</td>
<td>7/10</td>
<td>6/10</td>
</tr>
</tbody>
</table>

Mean Difference (CFO – SO)
IV, Fixed 95% CI
Mean Difference: 19.19 [2.88, 35.50]
Cohen’s d = 0.89
[0.1578, 1.7227]

Mean Difference (CFO – SO)
IV, Fixed 95% CI
Mean Difference: 19.38 [3.22, 35.54]
Cohen’s d = 0.94

*Favors SO
*CFO = custom shoe orthoses; SO = supportive athletic shoes only
Hawke et al., 2008

*Favors CFO
*CFO = custom shoe orthoses; SO = supportive athletic shoes only
Hawke et al., 2008; Rome et al., 2012
**Powell et al., 2005**

**CFO vs. SO: intervention for disability - FFI**

<table>
<thead>
<tr>
<th>FFI Component</th>
<th>Mean Difference</th>
<th>p level</th>
<th>Effect Size (Cohen's d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot Pain</td>
<td>12.11 (-4.73, 28.95)</td>
<td>ns</td>
<td>0.56</td>
</tr>
<tr>
<td>Activity Limitation</td>
<td>11.42 (-1.07, 23.91)</td>
<td>ns</td>
<td>0.71</td>
</tr>
<tr>
<td>Disability</td>
<td>14.38 (-1.46, 30.22)</td>
<td>ns</td>
<td>0.71</td>
</tr>
</tbody>
</table>

*CFO = custom shoe orthoses; SO = supportive athletic shoes only
Hawke et al., 2008; Rome et al., 2012

**Powell et al., 2005**

**CFO vs. PFO**

Mean Difference (CFO – SO)

<table>
<thead>
<tr>
<th>IV, Fixed 95% CI</th>
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</thead>
<tbody>
<tr>
<td>18.55 [2.68, 34.42]</td>
</tr>
<tr>
<td>Cohen's d = 0.91 [0.1317, 1.6919]</td>
</tr>
</tbody>
</table>

**Multidisciplinary Foot Care Program vs. Usual Care Program**

(Scriven et al., 2013)

- **Purpose**: Compare the effectiveness of MD-FCP to the UCP for children and adolescents with JIA
- **N = 44 participants randomized to MD-FCP (N = 21)** or UCP (N = 23)
- **Data analyzed**: MDFCP = 21; UCP = 20
- **Primary outcome**: Juvenile Arthritis Foot Disability Index (JAFI) at BL, 6 and 12 months post assessment
  - Frequency of foot-related impairments, activity limitations, participation restrictions during past week

**Secondary Measures**

- CHAQ Disability Index, VAS for pain, well-being
- HRQoL
- Active and limited joint count
- Foot disease (swollen and tender joints, enthesitis, US effusions)
- Deformity (erosions, structural index)

**Results**

- Overall improvement in foot-related impairments in both groups over 12 months
- No significant between-group differences in change scores for the JAFI or any secondary measure
- Effect sizes for all measures were negligible or small
- Complex intervention - difficult to standardized treatments
Random sequence allocation: Low Risk
Allocation Concealment (randomisation): Unclear Risk
Blinding (performance bias): Low Risk
Blinding (detection bias): Low Risk
Incomplete data (attrition bias): High Risk
Selective reporting (reporting bias): High Risk
Other Bias: Unclear Risk

 течение

Risk of Bias*

Powell et al., 2005

Hendry et al., 2013

+ = Low Risk
? = Unclear Risk
- = High Risk

*From Hawke et al., 2008; Rome et al., 2012; PEDro

Orthotic Intervention in JIA
Current Practice / Clinician Report

- PT assesses all patients with foot/ankle arthritis
- Physical Exam / observational gait analysis
- Recommendations
  - CFOs
  - PFO with modifications done “in-house”
  - Semi-customizable shoe inserts (rear and f/f posting)
- No standardized set of outcome measures

Measurement of Foot Problems

<table>
<thead>
<tr>
<th>Measurement</th>
<th>ICF Component*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot Function Index (FFI)*</td>
<td>Impairment, Activity, Participation</td>
</tr>
<tr>
<td>Juvenile Arthritis Foot Disability Index (JAFD)**</td>
<td>Impairment, Activity, Participation</td>
</tr>
<tr>
<td>Pain visual analog scale (VAS)*</td>
<td>Impairment</td>
</tr>
<tr>
<td>Structural Index**</td>
<td>Impairment</td>
</tr>
<tr>
<td>Gait Analysis (observational or instrumented)</td>
<td>Impairment</td>
</tr>
<tr>
<td>Childhood Health Assessment Questionnaire (CHAQ)</td>
<td>Activity / Disability</td>
</tr>
<tr>
<td>PedsQL</td>
<td>Participation / Quality of Life</td>
</tr>
</tbody>
</table>

*Powell et al., 2005; **Hendry et al., 2013

What have we learned?

- Foot/ankle problems are common in JIA
- Early examination and intervention for foot disease, pain and foot-related activity limitations are essential
- Evidence supports CFOs to reduce foot-related pain
- Needs of patient should dictate type and materials used
- A core set of outcome measures is necessary to document the effects of intervention for foot-related problems

Thank You!