Concise report

Controlled follow-up study of physical and psychosocial functioning of adolescents with juvenile primary fibromyalgia syndrome

Susmita Kashikar-Zuck1,2, Irina S. Parkins1, Tracy V. Ting3, Emily Verkamp1, Anne Lynch-Jordan1,2, Murray Passo4 and Thomas Brent Graham5

Abstract

Objectives. Currently, there are no prospective studies exploring the prognosis of patients with juvenile primary FM syndrome (JPFS) or their physical, emotional and social outcomes as they enter the early adult years. The primary objective of this study was to assess long-term outcomes of a paediatric sample of clinically referred JPFS patients and their matched healthy controls.

Methods. Participants were 48 youths (current mean age = 19 years) diagnosed with JPFS in childhood or adolescence and 43 healthy controls matched in age, gender and race. The average length of follow-up was 3.67 years (range 2–6 years). Participants completed online (web-based) self-report questionnaires about current pain and physical symptoms, health status, anxiety, depressive symptoms and current and past treatments.

Results. Results showed that 62.5% of participants in the JPFS group continued to experience widespread pain and 60.4% reported having all the cardinal features of FM syndrome (including widespread pain, poor sleep and fatigue) at follow-up. The JPFS group reported significantly lower scores on all measures of health status and physical functioning compared with healthy controls and significantly greater symptoms of anxiety and depression.

Conclusion. The results of this controlled follow-up study demonstrate that symptoms of FM appear to be chronic in a majority of clinically referred JPFS patients and the associated physical and emotional impairment can also be persistent. Implications for treatment and the need for further prospective longitudinal studies are discussed.

Key words: Juvenile fibromyalgia, Paediatric pain, Long-term outcome, Psychosocial functioning.

Introduction

Juvenile primary FM syndrome (JPFS) is characterized by chronic widespread musculoskeletal pain, multiple tender points and associated symptoms such as sleep difficulties, fatigue, headaches and irritable bowel symptoms [1]. The long-term prognosis for adolescents with JPFS is unclear. Longitudinal studies have included small sample sizes (ranging from 15 to 33 individuals) and no control groups. Community-based studies of paediatric chronic widespread pain have suggested a positive prognosis [2–4], but a clinic-based follow-up study revealed persistent pain, fatigue and sleep difficulties in the majority of JPFS patients [5]. One possible explanation for this discrepancy is that patients seen in paediatric rheumatology settings may present with more refractory or disabling symptoms than non-treatment-seeking children and adolescents in community-based studies. Adolescent JPFS patients seen in clinical settings have an average symptom duration of 2 years, suggesting a pattern of chronic symptoms [6], but their long-term outcomes are unclear.
The objective of this study was to gather comprehensive follow-up information about physical symptoms, treatment history, emotional functioning and educational/vocational functioning of clinically referred patients (and healthy controls) who previously participated in a case-controlled study of psychosocial functioning of adolescents with JPFS. Results of the initial study revealed that adolescents with JPFS reported higher levels of physical impairment than their peers. Socially, they were identified as being more withdrawn, isolated, and as having fewer friends. They demonstrated significantly greater internalizing symptoms (anxiety and depression) and behavioural problems (e.g. attentional difficulties).

All adolescent JPFS patients received usual medical care in a paediatric rheumatology clinic where management was primarily targeted towards improving sleep (often including a low-dose tricyclic agent) and pain relief using non-steroidal anti-inflammatory medications (NSAIDs) or non-opioid analgesics. Recommendations for graded aerobic exercise were also made and behavioural therapy was offered for patients with coping difficulties. Despite these recommendations, anecdotal evidence from the clinic suggests that adherence with lifestyle modifications is generally poor. At the time of this study, patients in the JPFS group were no longer followed at the clinic. In order to reach as many of the original cohort as possible and ensure high retention, measures were designed to be delivered in web-based format. It was hypothesized that at the time of follow-up, the JPFS group would show significantly greater pain, FM symptoms and mood difficulties, and suffer from poorer physical functioning and health status compared with healthy controls.

Materials and methods

Subjects

Participants eligible for this study included all 55 JPFS participants and 55 healthy controls who participated in our previous study of psychosocial functioning in JPFS [7]. At initial enrolment, JPFS participants met the classification criteria for JPFS [1], i.e. generalized musculoskeletal aching at three or more sites for ≥3 months in the absence of other underlying conditions, normal laboratory tests, severe pain in 5 out of 18 tender point sites, and three or more associated criteria such as fatigue, irritable bowel and sleep disturbance. Healthy controls were selected from JPFS patients’ classrooms in the initial study using a matching procedure based upon having the closest birth date to the JPFS patient, same sex and race and no history of chronic illness. Participants were eligible for the follow-up study if at least 2 years had elapsed since their participation in the first study.

Procedure

JPFS patients and controls (or their parents if <18 years of age) were contacted by phone to obtain consent. After signed consent forms were received by mail, participants used a unique login name and password for access to a secure website to answer study questionnaires. Nine participants completed the measures by mail due to lack of computer access. This study was approved by the IRB (Cincinnati Children’s Hospital Institutional Review Board) and conducted in accordance with current ethical standards for human subject research.

Measures

Background questionnaire

Information about demographics, educational level, job description (if employed) and annual income was gathered. In addition, information about all current and past (last 2 years) treatments was collected.

Pain intensity

Three items from the Brief Pain Inventory—Short Form, a well-validated and widely used pain assessment tool, were used to assess highest, lowest and average pain level over the last 24 h, using a 0–10 rating scale [9, 10].

FM symptoms

The Hudson–Pope FM syndrome module consists of 12 items that assess the presence of fibromyalgia syndrome (FMS) symptoms, including pain duration of at least 3 months, three or more body parts affected by pain and additional symptoms (fatigue, headaches, difficulties sleeping, difficulties concentrating and numbness). For this study, the measure was modified as a self-report questionnaire. Preliminary data suggest that it is a reliable measure [11] and performs similarly to the ACR criteria [12, 13].

Beck Depression Inventory II

The Beck Depression Inventory II is a validated 21-item self-report questionnaire measuring the severity of depressive symptoms for adolescents (≥13 years old) and adults in the past 2 weeks [14].

The Beck Anxiety Inventory

The Beck Anxiety Inventory is a validated 21-item self-report scale that measures the severity of anxiety symptoms for individuals aged ≥17 years [15–17].

The Short Form-36 Health Survey—Version 2

The Short Form-36 (SF-36) Health Survey—Version 2 is a self-report questionnaire that measures the individual’s perception of his/her overall health status in the past 4 weeks in eight health domains: physical functioning, role limitations due to physical problems, social functioning, bodily pain, mental health, role limitations due to emotional problems, vitality and general health. The SF-36 has strong psychometric properties [18] and is useful in assessing functional impairment in adult FMS patients [19].

Career Decision-Making Self-Efficacy Scale—SF

This validated 25-item scale assesses self-efficacy with regard to career decisions and attainment in older adolescents and young adults and has been used extensively in research on career development [20, 21].
Statistical analyses
Descriptive information on all outcome variables was computed. A one-way between-groups multivariate analysis of co-variance (MANCOVA) was conducted to examine differences between the JPFS group and healthy controls on measures of pain, anxiety, depression, perceived health status and career self-efficacy. Holm’s correction (modified Bonferroni procedure) was applied to correct for multiple comparisons [22].

Results

Demographic information
Of the 55 eligible JPFS participants and 55 healthy controls, 48 JPFS (87.3%) and 43 controls (78.2%) participated. Participants were primarily female (91.7%) and Caucasian (87.5%; Table 1). The average age of the two groups at follow-up was comparable (JPFS = 19.02 years, controls = 18.93 years). The average length of follow-up was 43.96 months (3.67 years). JPFS participants were somewhat less likely than controls to be enrolled in college (39.6 and 55.8%, respectively).

FM symptoms
The majority of participants in the JPFS group (62.5%) reported having widespread pain and >70% also reported continuing fatigue, trouble sleeping and headaches. In the absence of a physical exam, it was not possible to determine whether full criteria for FMS were met, but based upon self-report of ACR criteria [23], 60.7% of JPFS patients met all the cardinal features of FM including widespread pain, fatigue and sleep difficulty at follow-up (compared with none of the controls).

Current and past treatments
Of the participants with a history of JPFS, 72.1% were currently taking at least one medication (mean no. of medications = 2.63), most common were the selective serotonin or norepinephrine reuptake inhibitors, NSAIDS and/or anti-convulsants. Only 25.6% of healthy controls were taking medications (mean no. of medications = 0.56) and none of these were for pain- or mood-related problems. JPFS participants were much more likely to be in ongoing psychotherapy for depression or anxiety symptoms (29.8%) than controls (0%). Only one JPFS participant was currently participating in physical therapy. Use of alternative treatments (e.g. acupuncture, massage and chiropractic care) was much higher in the JPFS group (22.9 vs 4.7%). Similar results were obtained for treatments in the past 2 years, with the JPFS group reporting having tried multiple medications including anti-depressants, anti-inflammatory and anti-convulsant

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>JPFS (n = 48) Mean (s.d.)</th>
<th>Healthy controls (n = 43) Mean (s.d.)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, range (15–23), years</td>
<td>19.02 (2.34)</td>
<td>18.93 (2.39)</td>
<td>0.86</td>
</tr>
<tr>
<td>Average length of follow-up, months</td>
<td>45.33 (16)</td>
<td>42.59 (16.98)</td>
<td>0.47</td>
</tr>
<tr>
<td>Years of education</td>
<td>11.54 (2.92)</td>
<td>12.12 (3.25)</td>
<td>0.38</td>
</tr>
<tr>
<td>Annual income categorya</td>
<td>3 (2.38)</td>
<td>2.65 (2.55)</td>
<td>0.54</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4 (8.3)</td>
<td>3 (7)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>44 (91.7)</td>
<td>40 (93)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>6 (12.5)</td>
<td>5 (11.6)</td>
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</tr>
<tr>
<td>Caucasian</td>
<td>42 (87.5)</td>
<td>38 (88.4)</td>
<td></td>
</tr>
<tr>
<td>Currently in college</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>19 (39.6)</td>
<td>24 (55.8)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>29 (60.4)</td>
<td>19 (44.2)</td>
<td></td>
</tr>
<tr>
<td>Currently employed</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30 (62.5)</td>
<td>32 (74.4)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>18 (37.5)</td>
<td>11 (25.6)</td>
<td></td>
</tr>
<tr>
<td>Current living arrangement</td>
<td></td>
<td></td>
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<tr>
<td>Alone</td>
<td>1 (2)</td>
<td>1 (2.3)</td>
<td></td>
</tr>
<tr>
<td>With parents</td>
<td>32 (66.7)</td>
<td>28 (65.1)</td>
<td></td>
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<tr>
<td>With spouse/partner</td>
<td>8 (16.7)</td>
<td>1 (2.3)</td>
<td></td>
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<tr>
<td>With peers (roommates, dormitory, etc.)</td>
<td>3 (6.3)</td>
<td>11 (25.6)</td>
<td></td>
</tr>
<tr>
<td>Other (e.g. extended family)</td>
<td>4 (6.6)</td>
<td>2 (4.7)</td>
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<td>Marital status</td>
<td></td>
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<tr>
<td>Married</td>
<td>6 (12.5)</td>
<td>1 (2.3)</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>41 (85.4)</td>
<td>42 (97.7)</td>
<td></td>
</tr>
<tr>
<td>No information</td>
<td>1 (2.1)</td>
<td>0 (0)</td>
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</tr>
</tbody>
</table>

aAnnual income category 2: $4000–7000; 3: $7000–10000; 4: $10 000–15 000.
medications, 52.1% had received psychotherapy and 34.0% had participated in physical therapy.

Pain, emotional distress and health status
The results of the MANCOVA showed significant differences between the JPFS group and healthy controls on the combined dependent variables of pain, perceived health status on the SF-36, emotional distress and career self-efficacy (F = 10.27, P = 0.000). As hypothesized, the JPFS group had significantly higher levels of pain, depressive and anxiety symptoms and lower levels of all aspects of perceived health status in physical, social and emotional domains (Table 2). No significant differences in career self-efficacy were found.

Discussion
This is the first case-controlled study of a reasonably large group of clinically referred JPFS patients, and consisted of a follow-up of longer duration and excellent retention compared with past studies. Results compellingly show that the majority of adolescent patients with JPFS are likely to continue to experience symptoms of FM even after 3–4 years. Specifically, results indicated that JPFS patients reported significantly more widespread pain, fatigue, headaches and sleep difficulties than healthy controls in late adolescence and early adulthood. About 60% of the JPFS group continued to meet all of the cardinal features of FMS and only a minority of them (<20%) were symptom free at follow-up. The findings are similar to earlier follow-up studies in clinical FM populations [5, 24, 25], but stand in contrast to the more favourable prognosis for non-treatment-seeking children with JPFS symptoms [2] who may have less refractory symptoms.

Over 70% of the JPFS participants were currently taking at least one medication for FM or associated symptoms and about one-third were in psychotherapy. Treatments received were focused primarily on pharmacotherapy and psychotherapy. Engagement with physical therapy was minimal despite recommendations to increase exercise. The continuing problems with pain and other symptoms after 3–4 years suggest that current treatments for management of juvenile FM are sub-optimal and more work is needed to develop effective interventions. Structured exercise programmes with greater attention to adherence to recommendations is a promising area for future study, particularly in light of findings from an early study suggesting that JPFS patients with an active exercise programme tend to have more positive outcomes [26].

In our previously published study of the same cohort in their early adolescent years, JPFS patients had significantly greater anxiety and depressive symptoms compared with healthy controls by their parents’ report [8]. At this follow-up assessment, anxiety and depressive symptoms continued to be significantly elevated, and about one-third of the JPFS group was currently receiving psychotherapy. These findings indicate a need for greater attention to mental health care for those JPFS patients who show early signs of comorbid anxiety or depression. Impairments in physical and emotional functioning might also begin to have an impact on pursuit of life goals at this age, as indicated by the findings that youths with JPFS were less likely to be in college than matched healthy controls.

This study provides a first look at children and adolescents with juvenile FM as they begin to enter the early adult years; however, results can be generalized only to those adolescents with JPFS who seek subspecialty care.

<table>
<thead>
<tr>
<th></th>
<th>JPFS (n = 48)</th>
<th>Healthy controls (n = 43)</th>
<th>F</th>
<th>P-value</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief Pain Inventory Average Pain (0–10)</td>
<td>4.51 (2.20)</td>
<td>1.12 (2.17)</td>
<td>54.44</td>
<td>0.000*</td>
<td>1</td>
</tr>
<tr>
<td>Beck Anxiety Inventory (0–63)</td>
<td>22.65 (13.21)</td>
<td>12.33 (10.58)</td>
<td>16.67</td>
<td>0.000*</td>
<td>0.98</td>
</tr>
<tr>
<td>Beck Depression Inventory (0–63)</td>
<td>16.54 (11.3)</td>
<td>8.23 (7.53)</td>
<td>16.62</td>
<td>0.000*</td>
<td>0.98</td>
</tr>
<tr>
<td>SF-36 (0–100)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Physical functioning</td>
<td>44.7 (9.5)</td>
<td>52.14 (8.68)</td>
<td>15.06</td>
<td>0.000*</td>
<td>0.97</td>
</tr>
<tr>
<td>Role—physical</td>
<td>43.74 (10.55)</td>
<td>54.23 (4.35)</td>
<td>36.84</td>
<td>0.000*</td>
<td>1</td>
</tr>
<tr>
<td>Bodily pain</td>
<td>39.69 (9.94)</td>
<td>55.91 (7.69)</td>
<td>85.05</td>
<td>0.000*</td>
<td>1</td>
</tr>
<tr>
<td>General health</td>
<td>34.65 (11.06)</td>
<td>51.28 (8.53)</td>
<td>63.39</td>
<td>0.000*</td>
<td>1</td>
</tr>
<tr>
<td>Vitality</td>
<td>40.17 (9.48)</td>
<td>52.03 (9.26)</td>
<td>36.26</td>
<td>0.000*</td>
<td>1</td>
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<tr>
<td>Social functioning</td>
<td>38.56 (12.55)</td>
<td>50.76 (8.26)</td>
<td>29.27</td>
<td>0.000*</td>
<td>1</td>
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<tr>
<td>Role—emotional</td>
<td>42.11 (13.98)</td>
<td>50.46 (9.06)</td>
<td>11.12</td>
<td>0.001*</td>
<td>0.91</td>
</tr>
<tr>
<td>Mental health</td>
<td>42.08 (13.01)</td>
<td>50.2 (9.25)</td>
<td>10.51</td>
<td>0.001*</td>
<td>0.91</td>
</tr>
<tr>
<td>Physical component summary</td>
<td>41.45 (8.3)</td>
<td>54.58 (7.32)</td>
<td>63.32</td>
<td>0.000*</td>
<td>1</td>
</tr>
<tr>
<td>Mental component summary</td>
<td>40.43 (12.91)</td>
<td>48.88 (11.08)</td>
<td>11.09</td>
<td>0.001*</td>
<td>0.91</td>
</tr>
<tr>
<td>Career self-efficacy (1–5)</td>
<td>3.79 (0.72)</td>
<td>4.01 (0.64)</td>
<td>2.42</td>
<td>0.12</td>
<td>0.34</td>
</tr>
</tbody>
</table>

*Significant after Holm’s correction for multiple comparisons.
and may represent those with more severe symptoms. Furthermore, the sample size was not large enough to examine within-group differences in the JPFS group. Additional longitudinal studies with large enough sample sizes to assess within-group differences are necessary to examine trajectories of children and adolescents with JPFS during their transition from late adolescence into young adulthood. Also, this study relied solely on the reports made by the participants themselves and did not utilize physical examination; therefore, confirmation of FM classification by a clinician was not possible.

In summary, many adolescents and young adults with a history of JPFS continue to experience symptoms of widespread pain, difficulty sleeping, fatigue and other associated features of FM. Despite a poor prognosis for many patients, several patients improved significantly and did not report any continuing symptoms of FM or related impairment. More research into the variability of outcomes within the JPFS group, with closer examination of risk and protective factors associated with future outcomes is essential to designing focused interventions. Given the limited benefits of current treatment approaches, the evidence for promising treatments such as structured exercise programmes and cognitive–behavioural therapy should be tested to improve long-term outcomes.

**Rheumatology key messages**

- Adolescent patients with FM continue to have symptoms at 3- to 4-year follow-up.
- Effective treatments to lessen the impact of FM early in its course are needed.

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**References**


