Clinical expression profiles of Complex Regional Pain Syndrome, Fibromyalgia and a-specific Repetitive Strain Injury: More common denominators than pain?

JOHAN MARINUS & JACOBUS J. VAN HILTEN

Department of Neurology, Leiden University Medical Centre, Leiden, The Netherlands

Abstract

Purpose. To systematically evaluate and compare the clinical manifestations, disease course, risk factors and demographic characteristics of Complex Regional Pain Syndrome type 1 (CRPS), fibromyalgia (FM) and a-specific Repetitive Strain Injury (RSI).

Method. A literature search was performed using terms related to the aforementioned topics and diseases. Only original clinical studies that included at least 20 subjects were eligible.

Results. Fifty-nine studies on CRPS, 73 on FM and 7 on a-specific RSI were identified. The diseases show similarities in age distribution, male-female ratio, pain characteristics and sensory signs and symptoms. Motor, autonomic and trophic changes are frequently reported in CRPS, but only occasionally in FM and RSI. Systemic symptoms are found in patients with CRPS and FM, and in a subgroup of patients with RSI. In all three disorders, symptoms usually start locally, but may spread to other body regions later, which, in the case of FM, is a prerequisite for diagnosis. Disease onset is always, usually, or occasionally of traumatic origin in RSI, CRPS and FM, respectively. Anxiety and depression are more frequent in patients compared to controls, but probably not very different from patients with other pain conditions or chronic diseases.

Conclusions. Apart from some obvious differences between CRPS, FM and RSI, the similarities are conspicuous. The common features of CRPS, FM and a-specific RSI may suggest that a common pathway is involved, but until patients with these type of symptoms are assessed with a uniform assessment procedure, a thorough comparison cannot be made. A systematic evaluation of patients with a suspected diagnosis of CRPS, FM or RSI, may lead to a better appreciation of the differences and similarities in these diseases and help to unravel the underlying mechanisms.

Keywords: Complex regional pain syndrome, fibromyalgia, a-specific repetitive strain injury, review, TREND.

Introduction

Complex Regional Pain Syndrome type 1 (CRPS), fibromyalgia (FM) and Repetitive Strain Injury (RSI) are commonly known as chronic benign pain syndromes that generally respond poorly to conventional treatment modalities. As a consequence, these syndromes decrease people's quality of life, increase healthcare resource utilization, and, given their high prevalence, have a major socio-economic impact on society. Because these syndromes lack a solid scientific basis, symptoms and signs are frequently interpreted as being of psychological or psychosocial origin.

A major problem in CRPS, FM and RSI is the lack of a gold standard for diagnosis. The diagnosis is therefore made on the basis of clinical criteria, which makes it virtually impossible to evaluate their validity, since the lack of an independent criterion will inevitably lead to circular reasoning (initially 'typical' patients are used to develop the criteria, after which the criteria are used to classify patients). In CRPS, the International Association for the Study of Pain (IASP) criteria are usually applied [1], whereas for FM the criteria of the American College of Rheumatology are most often used [2]. Both criteria sets have been criticized for their lack of specificity [3,4], which may give rise to inclusion of a high proportion of false positive patients in studies. However, this situation compares favourably to RSI, where no generally accepted set of criteria is available and criteria differ between studies. As a consequence, it is almost impossible to summarize findings from different studies in RSI. The most evident problem is that in some studies specific diagnoses (e.g., carpal tunnel...
syndrome, epicondylitis, tenosynovitis) are included, whereas others exclude these specific diagnoses. In this review only a-specific RSI will be addressed.

Increasingly, there are indications that these syndromes share more than just the aspect of chronic pain. Similarities have been noted for clinical manifestations, risk factors, age at onset, gender distribution and other sociodemographic characteristics. These similarities have led some researchers to argue that RSI may be considered a form of localized FM (or, oppositely, FM a form of generalized RSI) [5,6], whereas others used similar arguments with respect to CRPS and FM, contending that FM reflects a generalized CRPS [7]. If CRPS, FM and RSI share denominators, this may indicate that these syndromes evolve through a common pathway. To enhance our knowledge of the similarities and differences between these syndromes, we reviewed the literature. The aim of this study was to systematically evaluate and compare the clinical manifestations, disease course, risk factors and demographic characteristics of CRPS, FM and RSI.

Methods
A literature search was performed using electronic databases (Pubmed, Cochrane Library) and by tracking reference lists of relevant publications. Synonyms of CRPS, FM and RSI (see appendix) were combined with the following terms: Incidence, prevalence, follow-up studies, course, prognosis, cohort, sensitivity, specificity, diagnosis, risk factor, determinant, and trauma. In the search for literature on RSI, specific RSIs were excluded (e.g., de Quervain’s disease, carpal tunnel syndrome, epicondylitis). Only original clinical studies that included at least 20 patients were eligible. Reviews, meta-analysis, guidelines, case reports and editorials were excluded from this review, but were used to track references. Information on epidemiology, disease course, signs and symptoms, distribution of symptoms and determinants was additionally retrieved from the eligible publications and compared between diseases.

Results
We found 59 eligible studies on CRPS [3,8–65], 73 studies on FM [2,66–137] and 7 studies on a-specific RSI [6,19,78,138–141]. Findings are reported by category.

Epidemiology and sociodemographic characteristics
The incidence of CRPS varies from 5–45 per 100,000 person years [30,50] whereas for FM it varies between 600–3,200 per 100,000 person years [81,98]. Since the incidence of RSI is usually assessed in the context of work environment, no information on the incidence in the general population is available. Point prevalence rates in the general population vary from 20–90 per 100,000 [30,50] for CRPS and from 700–3,200 per 100,000 for FM [75,99,103,125,131]. All three diseases show a female predominance; for CRPS, ranges from 1:2–1:6 were found in population-based and large clinic-based studies [12,24,30,54,60,61], whereas reported ranges for FM vary from 1:6–1:15 [2,87,92,98,133,137], and for RSI from 1:1–1:11 [6,140]. Mean age at onset for these three conditions usually is in the age range of 35–55 years, although CRPS and FM can also be found in children [32,43,57,64,107,134]. Given the fact that repetitive tasks are usually studied in an occupational setting, no reports on a-specific RSI in children were found. No evidence was found for a relation between race and either CRPS or FM, since prevalence rates usually did not differ from the race distribution in the source population. No studies were found that addressed this item in RSI. Lower socioeconomic status and education level were associated with both presence and severity in FM [87,103,125,131], but no data that addressed this relation in CRPS or RSI were found.

Disease course and the role of trauma
The ‘repetitive strain’ in RSI is usually considered a trauma and hence, by definition, trauma is the provoking factor in RSI in 100% of the patients. The onset of complaints in RSI is usually gradual, but can be abrupt in a quarter of the patients [140]. In general, symptoms are initially localized to one anatomical region, but may spread to the neck or other arm in later stages. FM usually begins without an identifiable cause, although a few studies reported that viral infections preceded the onset of FM in 17–33% of the patients [68,87]. The role of trauma in the onset of CRPS is debated [127], although there are reports of a preceding trauma in 11–36% of the patients [87,102,103,125,131,142,143]. FM usually starts with localized pain, which spreads to other body parts later [82]. Trauma or surgery precedes the onset of CRPS in 77–97% of the patients [8,25,28,40,52,54,60,61], whereas a ‘spontaneous’ onset (i.e., without identifiable cause) is found in 5–16% of the patients [8,28,54,60,61].

In CRPS, 74–97% of the patients have been found to recover, although differences in definition of recovery were used [50,65]. In some studies recovery was defined as a complete resolution of symptoms, whereas in other studies patients who no longer met the diagnostic criteria (but still had symptoms) were considered recovered. Follow-up studies in FM show little improvement in symptoms
over time [82,144] and one study found that 28% of the FM patients no longer met the diagnostic criteria after 5.5 years follow-up [82]. No data were available for recovery in a-specific RSI.

**Distribution of symptoms**

As opposed to CRPS and RSI, symptoms in FM are widespread by definition. A-specific RSI only affects upper extremities, whereas CRPS affects both upper and lower extremities in approximately equal frequencies. However, other extremities may become affected later in the course of the disease in 4–7% of the CRPS patients [8,14,61], whereas in RSI the neck and other (i.e., initially uninvolved) arm frequently become affected as time goes by [140].

**Pain and sensory signs and symptoms**

Pain, both spontaneous as well as during activities, plays a major role in all three conditions. Additionally, hyperalgesia (exaggerated response to noxious stimulus) and allodynia (painful response to non-noxious stimulus) were also found in these conditions. Another sensory symptom includes paraesthesias, found in 27–71% of the CRPS patients [40], 27–90% of the FM patients [73,88] and 87–91% of the RSI patients [139,140]. Hyperaesthesia was found in 18–76% of the CRPS [12,60] and 26–71% of the FM patients [68,133], but no data on hyperaesthesia among a-specific RSI patients were found. Apart from these so-called ‘plus’ symptoms, also ‘minus’ symptoms were noted. Hypaesthesia was present in 34–75% [28,30] of the CRPS patients and hypalgesia in 42–73% [12,56]. Hypaesthesia was found 36–82% of the FM patients [126,134], but no reports on hypaesthesia in RSI, but hypalgesia was found in 78% of these patients [140].

**Autonomic signs and symptoms**

Autonomic changes have been studied in detail in CRPS. Differences in colour, temperature, volume (i.e., edema), and sudomotor activity between affected and unaffected extremities were noted frequently (see Table I). These features were less often studied in FM, but Raynaud-like phenomena were frequently reported (11–53% of the patients) [68,122,136]. A feeling of swelling of body parts was reported by 20–82% of the FM patients [73,88], but since this feature is rarely found at examination, it may rather reflect a change in sensory perception than an autonomic problem. Changes in colour, temperature and volume were also noted in RSI patients, albeit much less frequently [140]. Studies on vasomotor activity in RSI gave contradictory results, with one study reporting vasoconstriction [141] and another reporting vasodilatation [19]. Raynaud-like phenomena were found in 43% of the patients with RSI in one study [139].

**Motor signs and symptoms**

Restricted range of motion was frequently found in CRPS and occasionally in RSI [140], but not in FM. A limited range of motion usually is the result of trauma induced trophic changes and hence may not be considered a true motor sign, since it is not caused by an altered nerve or muscle function. Localized muscle weakness was reported very often in CRPS, but not in FM, whereas we found no reports on muscle weakness in a-specific RSI. Dystonia (14–30%) [12,33,60], tremor (5–68%) [28,40] and myoclonia (11–36%) [30,40,60] were frequently seen in CRPS, but not in FM or RSI, although focal dystonia may accompany RSI [145,146].

**Trophic signs and symptoms**

Changes in nail and hair growth, atrophy of bone and skin, and dry skin are frequently present in CRPS, but not in FM or RSI, although one study by Swezey et al. reported lower bone mineral density in the lumbar spine of FM patients in comparison with controls [120].

**Systemic signs and symptoms**

Bowel and bladder symptoms, and sicca complaints of mouth and eyes were found in CRPS [17,56] and FM [2,109,136]. Bowel symptoms in CRPS included both diarrhoea and constipation, whereas in FM irritable bowel syndrome was frequently noted, with percentages ranging between 14–74% [73,137]. For a-specific RSI, we found only one study that addressed this issue [139]. In this study systemic complaints were noted in patients with regional unilateral and bilateral pain who did not fulfil the diagnostic criteria for FM, but not in patients with only local unilateral complaints. Dysmenorrhoea was found in FM2 and RSI [139] but not reported in CRPS.

**Other symptoms**

Vertigo and nausea were frequently reported in FM and may also be present more often in RSI than in controls, since it was found in RSI patients with regional unilateral or bilateral pain, but not in those with local pain only [139]. Speech difficulties were only found in CRPS and not evaluated in the other conditions [62]. General stiffness and morning stiffness was not assessed in CRPS, but was found
Table I. Comparison of characteristics in CRPS, FM and RSI

<table>
<thead>
<tr>
<th></th>
<th>CRPS</th>
<th>FM</th>
<th>RSI</th>
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<tbody>
<tr>
<td><strong>Epidemiology</strong></td>
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<tr>
<td>male/female ratio</td>
<td>1:2 – 6</td>
<td>1:6 – 15</td>
<td>1:1 – 11</td>
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<tr>
<td>mean age, range</td>
<td>39 – 53</td>
<td>34 – 54</td>
<td>35 – 49</td>
</tr>
<tr>
<td>incidence per 100,000 person years</td>
<td>5 – 45</td>
<td>600 – 3200</td>
<td>NAS</td>
</tr>
<tr>
<td>prevalence per 100,000 persons</td>
<td>20 – 90</td>
<td>700 – 10500</td>
<td>NAS</td>
</tr>
<tr>
<td>race differences</td>
<td>no</td>
<td>no</td>
<td>NAS</td>
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<tr>
<td><strong>Disease course</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>trauma onset</td>
<td>77 – 97%</td>
<td>11 – 36%</td>
<td>100%</td>
</tr>
<tr>
<td>spontaneous onset</td>
<td>5 – 16%</td>
<td>31 – 50%</td>
<td>NAS</td>
</tr>
<tr>
<td>percentage recovered</td>
<td>70 – 97%</td>
<td>0 – 28%</td>
<td>NAS</td>
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<tr>
<td>preceding viral infections</td>
<td>NAS</td>
<td>17 – 33%</td>
<td>NAS</td>
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<tr>
<td><strong>Distribution of symptoms</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>upper extremity involved</td>
<td>44 – 67%</td>
<td>NAP</td>
<td>100%</td>
</tr>
<tr>
<td>lower extremity involved</td>
<td>33 – 56%</td>
<td>NAP</td>
<td>0%</td>
</tr>
<tr>
<td>multiple extremities affected</td>
<td>4 – 7%</td>
<td>100%</td>
<td>43%</td>
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<tr>
<td><strong>Pain</strong></td>
<td></td>
<td></td>
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<tr>
<td>pain (spontaneous/in rest)</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>pain (during exercise)</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>allodynia (on light touch)</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>tenderness (on pressure)</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td><strong>Sensory signs and symptoms</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paraesthesia</td>
<td>27 – 71%</td>
<td>27 – 90%</td>
<td>87 – 91%</td>
</tr>
<tr>
<td>Hyperaesthesia</td>
<td>18 – 76%</td>
<td>26 – 71%</td>
<td>–</td>
</tr>
<tr>
<td>Hypaesthesia</td>
<td>34 – 75%</td>
<td>36 – 82%</td>
<td>NAS</td>
</tr>
<tr>
<td>Hyperalgasia</td>
<td>30 – 100%</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Hypalgesia</td>
<td>42 – 73%</td>
<td>NAS</td>
<td>78%</td>
</tr>
<tr>
<td><strong>Motor signs and symptoms</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restricted range of motion</td>
<td>55 – 96%</td>
<td>–</td>
<td>6%</td>
</tr>
<tr>
<td>Dystonia</td>
<td>14 – 30%</td>
<td>NAS</td>
<td>+</td>
</tr>
<tr>
<td>Localized muscle weakness</td>
<td>56 – 100%</td>
<td>–</td>
<td>NAS</td>
</tr>
<tr>
<td>Tremor</td>
<td>5 – 68%</td>
<td>NAS</td>
<td>NAS</td>
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<tr>
<td>myoclonia</td>
<td>23 – 30%</td>
<td>NAS</td>
<td>NAS</td>
</tr>
<tr>
<td><strong>Autonomic signs and symptoms</strong></td>
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<td></td>
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<tr>
<td>colour changes/differences</td>
<td>37 – 92%</td>
<td>NAS</td>
<td>17%</td>
</tr>
<tr>
<td>temperature changes/differences</td>
<td>42 – 100%</td>
<td>NAS</td>
<td>2 – 22%</td>
</tr>
<tr>
<td>Sweating/oedema</td>
<td>40 – 92%</td>
<td>NAS</td>
<td>3%</td>
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<tr>
<td>Impaired blood flow</td>
<td>+</td>
<td>11 – 53%</td>
<td>Raynaud</td>
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<tr>
<td>sudomotor dysregulation</td>
<td>0 – 69%</td>
<td>NAS</td>
<td>NAS</td>
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<tr>
<td><strong>Trophic signs and symptoms</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>nail growth</td>
<td>9 – 60%</td>
<td>NAS</td>
<td>NAS</td>
</tr>
<tr>
<td>hair growth</td>
<td>9 – 55%</td>
<td>NAS</td>
<td>NAS</td>
</tr>
<tr>
<td>bone atrophy</td>
<td>1 – 63%</td>
<td>+ ?</td>
<td>NAS</td>
</tr>
<tr>
<td>skin atrophy</td>
<td>14 – 61%</td>
<td>NAS</td>
<td>NAS</td>
</tr>
<tr>
<td>dry skin</td>
<td>23%</td>
<td>NAS</td>
<td>NAS</td>
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<tr>
<td><strong>Systemic symptoms</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bowel symptoms</td>
<td>+</td>
<td>+</td>
<td>+/−?</td>
</tr>
<tr>
<td>bladder symptoms</td>
<td>+</td>
<td>+</td>
<td>+/−?</td>
</tr>
<tr>
<td>sicca eyes</td>
<td>+</td>
<td>+</td>
<td>+/−?</td>
</tr>
<tr>
<td>sicca mouth</td>
<td>+</td>
<td>+</td>
<td>+/−?</td>
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<tr>
<td><strong>Other symptoms</strong></td>
<td></td>
<td></td>
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<tr>
<td>Vertigo</td>
<td>NAS</td>
<td>47 – 70%</td>
<td>+</td>
</tr>
<tr>
<td>speech disorders</td>
<td>+</td>
<td>NAS</td>
<td>−</td>
</tr>
<tr>
<td>general stiffness</td>
<td>NAS</td>
<td>29 – 91%</td>
<td>+</td>
</tr>
<tr>
<td>concentration difficulties</td>
<td>NAS</td>
<td>71%</td>
<td>50%?</td>
</tr>
<tr>
<td>body mass index (BMI)</td>
<td>NAS</td>
<td>+</td>
<td>NAS</td>
</tr>
<tr>
<td>Nausea</td>
<td>NAS</td>
<td>21 – 45%</td>
<td>38%?</td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td>NAS</td>
<td>+</td>
<td>32%</td>
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(continued)
in 29–91% of the FM patients [74,84] and in 52–88% of the RSI patients [139,140]. Concentration difficulties were encountered in 71% of the FM patients [126] and may occur in a-specific RSI patients with regional unilateral and bilateral pain complaints, but not in those with local unilateral pain only [139]. Two studies found a relation between higher body mass index (BMI) and FM [80,105]. Sleep disturbances were found in all three conditions. Fatigue and headaches were very frequent among FM and RSI patients, but were not reported in CRPS.

Psychological characteristics

Data on anxiety and depression in CRPS are contradictory. In comparison with controls, usually higher levels are found, but these levels may not be very different from patients with low back pain (LBP), limb pain or headache [15,20]. Apart from phobic anxiety and somatization, Bruehl et al. [15] found no differences in a number of other psychiatric manifestations (i.e., depression, obsessive-compulsive disorder, hostility, paranoia, psychotic behaviour) in comparison with LBP and limb pain patients. Depression and anxiety were also very common in FM and occurred more often in patients than in controls, but, again, the occurrence may be similar to other diseases, as was demonstrated for rheumatoid arthritis [66,96]. Depression and anxiety were also reported in RSI, but not compared to patients with other pain conditions. High levels of irritability were reported in one study in FM and one in RSI [126,140].

Factors associated with onset or progression

Factors associated with onset. Stressful life events preceded the onset of CRPS in 42–50% of the patients [12,27], and psychiatric problems at the time of onset were found in 34% [27]. Sixty percent had either a stressful life event or psychiatric problem preceding the onset of CRPS [27]. Stressful life events occurred more frequently in CRPS patients than in patients undergoing elective hand surgery [26], but other studies found no difference in psychological profile between CRPS patients and LBP patients [42] or chronic rehabilitation patients [55]. The history of FM patients frequently included emotional neglect and physical and sexual abuse, and this was more often found in patients with FM than in patients with rheumatoid arthritis or multiple sclerosis [69,101]. Post-traumatic stress disorders were also frequently found in FM [77,117]. Depression and anxiety were common in FM [128] but were comparable to levels found in other chronic diseases [96].

Factors associated with progression. In CRPS, social support and fracture as initiating event (relative to the generally less severe soft tissue injury) were associated with a good prognosis [22,50], and neither higher age nor female gender were related to poorer prognosis [50]. Contradictory results were...
reported for the relation between stress and poor prognosis [26,54]. In FM, having a job was associated with better outcome [87], whereas female gender, lower education, lower socioeconomic status, stress and being divorced were associated with worse outcomes [87,125,137]. Most of these determinants were not assessed in a-specific RSI. In RSI, stress was related to poorer outcomes, whereas job decision latitude and social support were related to better outcomes [6].

Discussion

Symptoms and signs

Pain is a cardinal feature in CRPS, FM and RSI. The pain characteristics and sensory signs and symptoms of these disorders are similar. More apparent differences include the motor, autonomic and trophic changes, which are frequently reported in CRPS, but only occasionally in FM and RSI. It is not clear whether this difference in reporting results from the fact that these features are not present in FM and RSI, or simply have not been evaluated systematically. Tremor, dystonia and myoclonia are found in patients with CRPS, but not reported in FM or RSI. A similar picture is found for autonomic symptoms, which were frequently found in CRPS, but were (except for Raynaud and Raynaud-like phenomena) not reported in FM or RSI. It is not clear whether the vasomotor abnormalities found in CRPS resemble the Raynaud-like phenomena in FM. Apart from one study on bone mineral density of the lumbar spine and femoral neck in patients with FM, no information is available for trophic features in FM or RSI, whereas this has been studied extensively in CRPS. Systemic symptoms may be present in patients with CRPS and FM, and possibly in RSI patients with regional and bilateral symptoms. With respect to bowel symptoms in CRPS, diarrhoea, constipation and an alternating pattern of diarrhoea and constipation have been reported, but these symptoms predominantly occur in patients with generalized symptoms [56]. In FM, bowel symptoms are usually assessed in the context of an irritable bowel syndrome (IBS) and frequently evaluated according to the Rome criteria [147]. These criteria include abdominal pain or discomfort that is relieved with defecation and which may or may not be associated with a change in frequency, consistency, form or passage of stool, the passage of mucus, bloating, or a feeling of abdominal distension. It is likely (although not quite clear) that the bowel symptoms that may occur in these syndromes are similar, but differences in applied assessment methods between the different medical disciplines that evaluate the separate patient groups make it difficult to determine this. Voiding symptoms in CRPS and FM include urgency and frequency. A urethral syndrome has been described in RSI patients with regional unilateral or bilateral symptoms, but since this concerned a small subgroup in a study without healthy controls, the possibility that this is a chance finding cannot be excluded.

Disease course and distribution of symptoms

The onset of RSI, CRPS and FM is always, usually, or occasionally of traumatic origin, respectively. However, spontaneous onsets of CRPS (in 5–16%) and traumatic onsets of FM (in 11–36%) have also been reported. Symptoms in CRPS usually start abrupt in response to trauma, but also may develop more slowly in some cases, whereas symptoms in patients with FM and RSI usually start gradually and may be abrupt in some. In general, symptoms start locally in these syndromes, but subsequently may spread to other body regions later, which, in the case of FM, is a prerequisite for diagnosis. The differences with respect to onset, course and distribution of symptoms may therefore be interpreted as more gradual rather than absolute.

Sociodemographic factors and risk factors

The age distribution of the disorders is similar and women are more often affected than men in all three conditions. The frequency of anxiety and depression is higher in patients with these diseases than in controls, but probably not different from patients with other pain conditions or chronic diseases. It is difficult to determine whether these characteristics predispose to these disorders or are a consequence of them. Stressful life events, psychiatric problems and a history of some form of abuse may be a risk factor in the onset of CRPS and FM.

Methodological issues

There were several problems in comparing the three syndromes. One problem concerned the different assessment methods that are applied in the distinct specialist fields. Each discipline follows its own standard method of assessment and may evaluate similar symptoms in a different context, which makes it difficult to determine whether certain symptoms are actually similar or different. Additionally, some problems may not be recognized since they are outside the expertise of non-specialists in a particular field and hence are not reported. For instance, movement disorders in CRPS did not receive much attention until movement disorder specialists came in contact with this patient group and started to evaluate these patients systematically.
Clinical expression profiles of CRPS, FM and a-specific RSI

Despite the fact that there are considerable differences between CRPS, FM and a-specific RSI, the similarities are noteworthy and may actually even be greater than reported here, because of the differences in evaluation methods with respect to these disorders. These similarities may indicate a common underlying mechanism. One accompanying feature of this mechanism is the altered processing of sensory stimuli, with lower thresholds to pain, pressure and heat stimuli (allodynia, hyperalgesia, hyperaesthesie) that has been demonstrated in CRPS, FM and RSI [48,49,78,79,97,142]. Although the similarity in symptoms is conspicuous, we will remain uncertain about the extent of overlap, unless we apply a uniform systematic evaluation. Applying a uniform assessment to all CRPS, FM and RSI like syndromes, with appropriate attention for all potentially involved domains, may lead to better possibilities to compare disease characteristics (see structure and function level in Figure 1). It also presents opportunities to study the way in which a particular disease is expressed in a given domain, which may lead to a better understanding of the involved underlying pathophysiological mechanism. Additionally, the application of a uniform assessment module may contribute to the development of more accurate disease criteria as long as biomarkers are not available.

In this study, we compared three extremity-related chronic benign pain conditions, but within this context, other painful disorders would have been just as interesting to study. Almost any anatomic region appears to have its own chronic, poorly understood, benign pain syndrome. Examples in the musculoskeletal system are chronic low back pain, frozen shoulder, whiplash associated disorders and pelvic pain syndrome, whereas examples for other systems include headache, irritable bowel syndrome and interstitial cystitis.

Acknowledgement

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References


Clinical expression profiles of CRPS, FM and a-specific RSI


51. Sarangi PP, Ward AJ, Bennett GJ, Atkins RM. Clinical expression profiles of CRPS, FM and a-specific RSI 359


Appendix

Search terms for Complex Regional Pain Syndrome

CRPS, complex regional pain syndrome, reflex sympathetic dystrophy, posttraumatic dystrophy, algodystrophy, Südeck, shoulder-hand syndrome.

Search terms for fibromyalgia

Fibromyalgia, FM, FMS, fibrositis.

Search terms for Repetitive Strain Injury

RSI, repetitive strain injury, work related upper limb disorder, work related upper extremity disorder,
occupational overuse syndrome, occupational cervicobrachial disorder, cumulative trauma disorder.

Clinical points

- CRPS, FM and a-specific RSI show similarities in socio-demographic and clinical characteristics. The similarities may even be greater than reported here, because of methodological differences between studies on these syndromes;
- The common clinical features of CRPS, FM and RSI may suggest that a common pathway is involved;
- Differences in applied assessment methods between the different medical disciplines that evaluate the separate patient groups hamper an accurate comparison of disease characteristics of CRPS, FM and RSI;
- A uniform systematic evaluation of patients with a suspected diagnosis of CRPS, FM or RSI, may lead to a better appreciation of the differences and similarities in these diseases and help to unravel the underlying mechanisms.