# Emotional repression in patients with chronic inflammatory rheumatism

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**Research article**

**Keywords:** Chronic inflammatory rheumatism, Emotional repression, Stress, Life event, Emotional regulation, Rheumatoid arthritis, Spondyloarthritis

**Posted Date:** December 30th, 2019

**DOI:** https://doi.org/10.21203/rs.2.19702/v1

# Abstract

Background: This preliminary study was undertaken to assess and compare the psychological profiles of patients with chronic inflammatory rheumatisms (CIRs), rheumatoid arthritis (RA) or spondyloarthritis (SpA), to try to identify a particular emotional profile compared to patients without CIRs. Emotional repression, i.e., a tendency to inhibit the expression of negative feelings and/or unpleasant thoughts, has been the most studied.

Methods: This monocenter observational pilot study included patients followed in a university rheumatology department who underwent systematic assessment of different psychological parameters by an experienced psychiatrist. The clinical and biological characteristics of their rheumatisms were collected. Comparisons were performed used Chi 2 or Fisher's exact tests.

Results: Fifty-nine patients were assessed: 47 with CIRs (27 RA and 20 SpA) and 12 non-CIR controls (nine osteoarthritis, and one each viral disease, osteoporosis or osteomalacia). The rates of severe emotional repression, and the rates of severe early life events, were higher in the group of CIR patients than in the control group (respectively $P = 0.02$, $P = 0.02$). In contrast, the rates of severe psychological and somatic complaints were significantly higher than in the control group (respectively, $P < 0.01$ and $P = 0.01$).

Conclusion: Our results confirm the importance of emotional repression in coping with various traumatic life events which contribute to the etiology and/or evolution of CIRs. They suggest that these patients would probably benefit from psychotherapy in addition to medical management of their CIRs.


# Declarations

Ethics Approval and Consent to Participate: A declaration of conformity to a reference methodology with the CNIL (National Commission for Computing and Liberties) was carried out under the number 2214762v0.

Consent for publication: All patients were informed and accepted the use of their computerized medical data

Availability of data and supporting materials section: data are available at the university hospital of Amiens.

Competing interests: we have no competing interests.


Funding: none. This is an academic research.


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Acknowledgements: We want to thank the patients who accepted to participate to this study.

# Background

Several factors, notably genetic, environmental, hormonal, infectious and/or psychological, can be involved in the development of chronic inflammatory rheumatisms (CIRs)(1)(2). However, the degree of implication of these different factors in CIR onset has not been determined.

Non-medication treatments are being used more-and-more frequently, especially regular physical activity, educational therapeutic workshops with support groups, mindfulness meditation… Over the past few years, self-reported evaluation criteria and patient-reported outcomes have been accorded increasing importance in the assessment of their disease, suggesting that the rheumatologist's perception of his/her patients' psychological well-being is essential in routine practice to correctly determine the efficacy of disease management(3).

Numerous studies on traumatic life events and stressful situations suggested that these factors could be implicated in triggering disease onset and its symptomatic progression of some diseases such as lupus, diabetes, multiple sclerosis or rheumatoid arthritis (RA)(4)(5). The hypothesis of the present study was that a particular psychological profile, namely emotional repression, was associated with autoimmune deregulation, and investigated a possible link between autoimmunity and emotional regulation.

The objective of this preliminary and exploratory study was to examine CIR patients' emotional function by assessing their psychological profiles to update and put into perspective their global management. Our secondary objectives were to determine whether RA and spondyloarthritis (SpA) patients have different emotional profiles, and whether a particular profile was associated with different rheumatological characteristics, in particular a biological inflammatory syndrome, the presence of sacroiliitis, a visualized structural involvement, a rheumatoid factor (RF)- or anti-citrullinated peptide antibody (ACPA)-positivity, orhuman leukocyte antigen (*HLA)-B27* allele carriage.

# Patients And Methods

Population and study design

This monocenter cross-sectional observational, pilot study was conducted, between December 2012 and June 2014, in a university hospital rheumatology department during routine follow-up in a day hospital consultation by an experienced psychiatrist who assessed patients' psychological parameters.

Patients were included for a work-up in the framework of global CIR management, which includes dermatological, dental and gynecological consultations; rheumatologist-requested assessment of psychiatric manifestations (anxiety disorders, depressive disorders, sleep disorders, conjugal violence, childhood traumas); or requested by the patient. Among the 59 patients addressed to this consultation, none refused to participate. Exclusion criteria were: age <18 or >65 years old, cognitive disorders, substance-dependence, or acute somatic or any psychiatric disorders requiring emergency hospitalization.

The participating patients were followed in the rheumatology department by seven different rheumatologists. CIR patients fulfilled the RA, meeting the American College of Rheumatology/European League Against Rheumatism classification 2010 criteria; SpA, satisfying the Assessment of Spondyloarthritis international Society (ASAS) 2009 criteria; or psoriatic arthritis fulfilling ClASsification criteria for Psoriatic ARthritis (CASPAR) classification criteria. The 12 patients with ankylosing spondyloarthritis and 8 with psoriatic arthritis were combined under spondyloarthritides, due to their weak number, to facilitate statistical analyses. Even though subtle differences exist between their clinical characteristics, these pathologies share common pathophysiological mechanisms and genetic backgrounds, such as HLA-B27-postivity.

The non-CIR controls were patients followed in the department for other rheumatological diseases.

Psychological assessment tools

An experienced psychiatrist collected information during a semi-structured, semi-directed interview lasting 1.5 to 2 hours. The following psychological parameters were assessed, **depressive symptoms and their severity,** based on the Montgomery-Asberg Depression Rating Scale (MADRS)(6); **history of major depression episodes; anxiety symptoms**, using the Beck Anxiety Inventory, a 21-question multiple-choice self-report inventory, which assess severity (minimal, mild, moderate, severe anxiety)(7); **alexithymia,** a behavioral trait of persons unable to identify and describe their interior feelings, with limited imaginative capacity, and tending to focus their thoughts externally rather than resorting to introspection(8)(9), and its severity, using the 20-item Toronto Alexithymia Scale (TAS-20)(10); **social desirability intensity**, i.e., the tendency to seek approval of others and preserve one's self-image, using the Marlowe-Crowne Social Desirability scale (MCSD), a 33-item self-report questionnaire (11); **the severity of emotional repression**, a general term that describes a tendency to inhibit the expression of negative feelings or disagreeable thoughts, in accordance with the Weinberger classification; combination of the State-*Trait* Anxiety Inventory (*STAI*) (12) and the MCSD enables classification as repressors individuals with a low STAI score and high MCSD.

The psychiatrist used a Likert-type scale to assess the severity of the psychological parameters in a specific questionnaire which assessed : the **severity of somatic and psychological complaints**, i.e., the place the patient accords disease symptoms during the interview, with complaints rated severe when the responses to the majority of questions focus on them;**emotional-expressivity intensity** was graded as mild, when the patient had several emotional passages without breaking down or flights of fancy;

moderate, when facial expressions accompanying break downs or exuberant joy agreed with the verbal response and changed as the discussion progressed; or severe, when the patient had a tendency for hyper-expressivity throughout the interview; **life events and their intensities,** with type 1 being those occurring before the age of 15 years and type 2 those appearing during the 3 years preceding rheumatological disease onset; intensity was classified as: mild, when stressful events were non-existent or only mild; moderate, when stressful events did not incur traumatic stress (e.g., emotional deprivation concerning socio-economic difficulties, severe or disabling diseases of close friends/relatives), or severe, a traumatic event (sudden death of a person caring for a child, physical or sexual assault, patient witnessed a death or thought he/she would die); **somatic escalade,** which corresponds to the occurrence of a series of several somatic disorders or another chronic pathology before disease onset; **actual stress level**; importance the patient accorded to his/her rheumatological disease's **impact on professional** activities, corresponding to the occupational repercussions experienced, was classified as mild for minor suffering, moderate for notable suffering or severe for a painful experience (difficult loss of professional environment and activity, feeling of injustice or elevated fear of losing one's job); **manual labor**; whether **physical activity was enjoyable before and after disease onset**.

For the different psychological parameters, we combined mild and moderate intensities for comparison against severe intensities. Indeed, mild-to-moderate psychological disorders were easily identified in our patients exhibiting severe anxiety or depressive comorbidities and emotional experiences, often affected by chronic pain, but retaining severe intensity allows a more significant clinical difference. That approach represents an attempt to adjust for the population recruitment bias.

During the same day-hospitalization, various patient characteristics, notably rheumatological, were collected from the electronic medical files using the DxCare (medical information and prescription software) program: biological inflammatory syndrome, defined as an erythrocyte sedimentation rate ³ 30 mm/1$^{st}$ h and/or C-reactive protein ³5 mg/L; ACPA-positivity, defined as 7 U/mL by enzyme-linked immunosorbent assay (ELISA); RF >15 IU/mL by ELISA;magnetic resonance imaging (MRI) detection of grade-2 bilateral or grade-3 unilateral sacroiliitis, with active, inflammatory (edema) or chronic (erosion, bone condensation, bone bridges, fat conversion) lesions.

Statistical analyses

Continuous variables were expressed as median [Q1-Q3]. Categorical variables were expressed as number (percentages), (percentages calculated were calculated excluding missing data) and were compared by Chi$^2$ test or Fisher's exact test, as appropriate. Missing data were not replaced. For all analyses, $P<0.05$ was considered statistically significant. Because of the exploratory character of the comparisons, the type I error was not adjusted for multiplicity. All statistical analyses were performed with SAS release 9.4 (SAS Institute Inc, Cary, NC).

# Results

Patient characteristics

Our study population was comprised of 59 patients, 47 (79.7 %) with CIRs and 12 (20.3%) non-CIR patients followed in the department for pathologies other than inflammatory rheumatisms. Participants' characteristics according to their disease are summarized in Table 1.

The non-CIR control group consisted of 12 women (median age 65.0 years [55.0-72.0]): nine (75%) with arthroses and three (25%) with viral disease, osteoporosis or osteomalacia; 75% with structural involvement.

Among the 47 CIR patients (72.3% women and 27.7% men; median age 55.0 years [39.0-60.0]), 27 (57.4%) had RA and 20 (42.6%) SpA. Among the 27 RA patients (81.5% women median age 57 years [52-63]), most were RF-positive, ACPA-positive or had structural involvement and a solid third a biological inflammatory syndrome. Among the 20 SpA patients (60.0% women; median age 41.5 years [34.5-53.0]), a third had a biological inflammatory syndrome, and almost half were *HLA-B27*-postive and 55.6% had MRI-detected sacroiliitis.

Psychological assessments

Too few patients were *HLA-B27*-positive or had sacroiliitis and thus their associations with psychological parameters could not be analyzed.

## *Assessments of patients with CIRs vs. other diseases*

Comparisons of these two patient groups for the parameters chosen found that they differed significantly for emotional repression, somatic complaints, psychological complaints, type-1 life-event severity, manual labor or enjoyment of physical activity before disease diagnosis (Table 2).

## *Assessments of RA vs. SpA patients*

Comparisons of these two patient groups for the parameters chosen found that they differed significantly for previous depressive episode, professional impact and manual labor (Table 3).

## *Assessments of patients with vs. without biological inflammatory syndromes*

Comparisons of these patients' psychological data showed their significant differences for emotional repression (Table 4).

## *Assessments of patient with vs. without structural involvement*

Significant differences for patients according to structural involvement status were observed for somatic complaints, emotional repression severity, professional impact and enjoyment of physical activity prior to disease onset (Table 5).

## *Assessments of RF- or ACPA-positive patients*

No psychological finding was significantly associated with these antibodies (data not show).

# Discussion

CIR patients, compared to those with other rheumatological pathologies, presented significantly more frequent severe emotional repression, whereas those with other pathologies had significantly more frequent severe psychological and somatic complaints, potentially attesting to their strong emotional repression.

Temoshok (13) previously described the personality profile of RA patients as type C, which regroups submission, conciliatory approach, repression of hostility, self-effacement of personal needs and depressive vulnerability. Grossarth-Maticek and al. (14)(15) made similar observations in patients with cancer. Bayle and al.(16), devised a psychological vulnerability score and obtained converging results very close to the type C personality, which was significantly higher for patients with secondary Raynaud's syndrome than a control group with idiopathic or primary Raynaud's syndrome.

Nagano and al. (17) showed that, for RA patients, rational/anti-emotional behaviors, characterized by an extreme tendency to squelch emotional behaviors and rationalize negative experiences, was associated with poorer prognoses. Ishii and al. (18) found that RA patients, who were easily brought to tears in response to stress, had better responses to treatment and better overall prognoses.

Our results and those reported in the literature highlight the importance of emotional dysregulation, especially emotional repression, on CIR etiology and prognosis. However, the present study and its findings cannot be generalized with respect to identifying it as a factor favoring CIR or a secondary coping strategy of CIR. The repressive behavior has sometimes been analyzed as a consequence of the disease diagnosis, rather than its cause (19)(20).

The intensity of key early life events was significantly more severe for CIR patients than those with other diseases. Cutolo and Straub (21)(22) showed that stressful events preceded RA onset for 86% of their patients.

Reported findings also underscore the role of trying life events in favoring CIR onset or flares, whereas others accorded greater emphasis to the role of minor life events and daily stress. In contrast, we found no significant difference for the actual stress level presented by CIR and other-pathology patients, probably because of a lack of statistical power. Rimón and Laasko (23) described that higher stress at RA onset predicted a poorer prognosis for the disease. O'Donovan and al. (24) also found that veterans

experiencing trauma and developing PTSD could enhance the risk of developing autoimmune diseases, including RA. Based on their study of Vietnam veterans, Boscarino and al. (25) reported that those with RA had more PTSD symptoms, compared to their control counterparts.

The results of those studies are in agreement with a biopsychosocial model linking psychological stress and stressful life events with various immune-function changes in the etiology of autoimmune diseases. It could be thought that the impact of stress, resulting from an intense life event, modulated by adjustment strategies, like emotional repression, would increase vulnerability to autoimmune diseases because of dysregulated immune-system function (26)(27)(28)(29)(30) and enhanced inflammatory activity.

Herein, no significant difference was found between CIR and non-CIR patients regarding frequency of depression disorders, depression severity, history of prior depressive episode(s) or anxiety symptoms (100% of each group).

However, depressive and anxiety disorders are described as the most frequent comorbidities psychiatric of CIR patients. Reynier-Legarçon and al. (31) found that patients with autoimmune diseases (systemic lupus erythematosus, systemic scleroderma or primary Goujerot-Sjögren syndrome) presented more severe depressive and anxiety symptoms controls from general population. Baerwald and al. (32) found that the rates of depressive disorders for RA patients were significantly higher in for the general population. We were not able to replicate those findings, probably because of a lack of statistical power. In contrast, the homogeneity of our patients in terms of depressive and anxiety symptoms attenuates any potential bias linked to their emotional dysregulation associated with these psychological comorbidities.

Also, no significant difference were found between RA and SpA groups for the frequency of depression and depression severity. On the other hand, RA presented significantly more frequent prior depressive episodes that those with SpA, which has never been reported previously. Nonetheless, some findings indicated that anxiety symptoms, depression and perception of the disease impacted the physical quality of life differently for SpA and RA patients. Some authors noted that RA patients had more physical quality-of-life difficulties, while those with psoriatic arthritis and ankylosing spondyloarthritis had more mental quality-of-life issues (33)(34)(35). Hyphantis and al. (36) showed that SpA patients' quality of life of was associated with anxiety linked to the disease but not because of depressive symptoms, unlike those with RA. Our results, in line with those reported previously, suggest a link between depression and RA patients, compared to those with SpA.

Together, these results suggest that CIR (RA or SpA) patients would probably benefit from aid with emotional management (depression, disease representation and living with it) from psychotherapists and antidepressants for symptomatic depressive episode. Moreover, these symptoms can contribute to a poorer prognosis of their rheumatological disease (37). Bijsterbosch and al. (38) showed that arthrosis patients' perceptions of their disease were predictive of the functional disability and that cognitive-behavioral therapy could modify the representations of the disease and obtain a better functional result.

A biological inflammatory syndrome was significantly associated with low disorder of emotional regulation (mild/moderate emotional repression). However, examination of the literature find more association between emotional disorders and a biological inflammatory syndrome.

Smoak and al. (39) found increased nuclear factor-κB activity in patients with PTSD resulting from childhood violence, compared to healthy controls. Howren et al. (40) reported that patients with depression had significantly higher interleukin-1 and -6, tumor necrosis factor-α and C-reactive protein levels. Goldsmith and al. (41) also found in a meta-analysis of 68 studies, that patients with schizophrenia, bipolar disorder or major depressive episodes had increased inflammatory cytokines levels. In addition, depressive symptoms were more frequent in patients with autoimmune diseases and respond to anti-inflammatory drugs. Gobin and al. (42) found that antidepressants lowered production of inflammatory cytokines, e.g. interleukins-1β and -6 and tumor necrosis factor-α.

Several monoclonal antibodies targeting relevant inflammatory pathways for the treatment of CIRs were associated with neuropsychiatric adverse events, notably depression, or suicidal ideation or behavior (43). Indeed, development of brodalumab, a molecule targeting interleukin-17, was stopped after suicidal behaviors were observed during clinical trials(44).

Our results, in line with the literature suggest a bidirectional relationship between a depressive syndrome and a biological inflammatory syndrome but need to be confirmed by a longitudinal study to establish conclusions. It remains to be determined whether systemic inflammation itself induces emotional symptoms by acting on certain neuronal cells or whether these emotional disorders are at the origin of a biological inflammatory syndrome that subsequently triggers the onset of CIRs.

One of the main limitations of this preliminary study is its lack of statistical power due to of the small sample. However, this pilot study investigated potential associations between CIRs and biopsychosocial factors, and its findings are merely indicative of what items should be examined in greater depth during future studies. In addition, because this was an observational study, no conclusions can be drawn about any association with causality. Because this was a cross-sectional investigation, it was not possible to know whether the primary emotional regulation disorders, possibly contributing to the rheumatological disease onset, or secondary disorders, should be interpreted as adaptive or coping modalities to handle a functional handicap or at limiting pain caused by the disease. Our study suffers from two selection biases: it was monocentric, recruiting patients consulting at a university hospital, who could represent a particular sociodemographic status; and most patients were followed in a day hospital focusing on more severe pathologies and comorbidities. Furthermore, the clinical psychological parameters chosen for assessment, although not subjected to consensual agreement, do correspond to clinical entities. Nonetheless, participants in this study benefited from combined psychiatric and rheumatological work-up during a day of hospitalization, which is novel, enabling evaluation of a large number of psychological factors and to compare them to concomitant rheumatological findings.

# Conclusion

To summarize, the results of our pilot study showed an association between emotional dysregulation, more specifically, a tendency towards emotional repression and intense life events, and the CIR etiological or evolutionary process. These findings join those already published in other fields, like cancerology, or other autoimmune diseases, e.g., lupus or Gougerot-Sjögren syndrome. Moreover, among the highly frequent psychiatric disorders identified, RA patients had significantly more previous depressive episodes than those with SpA. Our observations could suggest that CIR patients would probably benefit from psychotherapy in conjunction with medical management.

Our observations also show how informative a multimodal assessment of emotional regulation in future studies could contribute to improving management of CIR patients.

# Abbreviations

ACPA: Anti-citrullinated peptide antibodies; CIR: Chronic inflammatory rheumatism; HLA: Human leukocyte antigen; MRI, Magnetic resonance imaging; PTSD; Post-traumatic stress disorder; RA: Rheumatoid arthritis; RF: rheumatoid factor; SpA: Spondyloarthritis

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# Tables

**Table 1.** Clinical and laboratory characteristics of the 59 patients

| Characteristic | RA<br><br>*n* = 27 | SpA<br><br>*n* = 20 | All CIRs<br><br>*n* = 47 | Other diseases<br><br>*n* = 12 |
|---|---|---|---|---|
| Age, yr median [Q1-Q3] | 57.0 [52.0-63.0] | 41.5 [34.5-53.0] | 55.0 [39.0-60.0] | 65.0 [55.0-72.0] |
| Female/male sex ratio | 22/5 | 12/8 | 34/13 | 12/0 |
| Rheumatoid factor+ | 18/27 (66.7%) | 1/8 (12.5%) | 19/35 (54.3%) | 0 |
| ACPA+ | 17/27 (63%) | 1/8 (12.5%) | 18/35 (51.4%) | 0 |
| Elevated ESR and/or CRP | 10/27 (37.0%) | 6/19 (30%) | 16/47 (34.0%) | 0 |
| *HLA-B27*+ | 0 | 9/19 (47.4%) | 9/21 (42.9%) | 0 |
| Sacroiliitis | 0 | 10/18 (55.6%) | 10/20 (50%) | 0 |
| Structural involvement | 14/27 (51.9%) | 0 | 14/40 (35%) | 9/11 (81.8%) |

RA, rheumatoid arthritis; SpA, spondyloarthropathy; CIRs, chronic inflammatory rheumatisms; ACPA, anti-citrullinated peptide antibodies; ESR, erythrocyte sedimentation rate first hour; CRP, C-reactive

**Table 2** Psychological evaluations of patients with chronic inflammatory rheumatisms (CIRs) vs. those with other diseases

| Psychological parameter | All CIRs n = 47 | Other diseases n = 12 | *P* |
|---|---|---|---|
| Depression | 38/47 (80.9%) | 11/12 (91.7%) | 0.67 |
| Intensity | | | 0.40 |
| Mild/moderate | 32/38 (84.2%) | 8/11 (72.7%) | |
| Severe | 6/38 (15.8%) | 3/11 (27.3%) | |
| Previous depression | 37 (78.7%) | 11 (91.7%) | 0.43 |
| Anxiety | 47/47 (100%) | 12/12 (100%) | - |
| Intensity | | | 0.17 |
| Mild/moderate | 21/47 (44.7%) | 8/12 (66.7%) | |
| Severe | 26/47 (55.3%) | 4/12 (33.3%) | |
| Alexithymia | 46/47 (97.9%) | 11/12 (91.7%) | 0.37 |
| Intensity | | | 1.00 |
| Mild/moderate | 20/46 (43.5%) | 5/11 (45.5%) | |
| Severe | 26/46 (56.5%) | 6/11 (54.5%) | |
| Social desirability | | | 0.43 |
| Mild/moderate | 37/47 (78.7%) | 11/12 (91.7%) | |
| Severe | 10/47 (21.3%) | 1/12 (8.3%) | |
| Emotional repression | | | 0.02 |
| Mild/moderate | 25/47 (53.2%) | 11/12 (91.7%) | |
| Severe | 22/47 (46.8%) | 1/12 (8.3%) | |
| Somatic complaints | | | 0.01 |
| Mild/moderate | 32/47 (68.1%) | 3/12 (25.0%) | |
| Severe | 15/12 (31.9%) | 9/12 (75.0%) | |
| Psychological complaints | | | <0.01 |
| Mild/moderate | 33/47 (70.2%) | 2/12 (16.7%) | |
| Severe | 14/47 (29.8%) | 10/12 (83.3%) | |
| Emotional expressivity intensity | | | 1.00 |
| Mild/moderate | 32/47 (68.1%) | 8/12 (66.7%) | |
| Severe | 15/47 (31.9%) | 4/12 (33.3%) | |
| Life event 1 | 29/44 (65.9%) | 8/11 (72.7%) | 1.00 |
| Intensity | | | 0.02 |
| Mild/moderate | 15/29 (51.7%) | 8/8 (100%) | |
| Severe | 14/29 (48.3%) | 0 | |
| Life event 2 | 44/47 (93.6%) | 11/12 (91.7%) | 1.00 |
| Intensity | | | 1.00 |
| Mild/moderate | 30/44 (68.2%) | 8/11 (72.7%) | |
| Severe | 14/44 (31.8%) | 3/11 (27.3%) | |
| Somatic escalade | 14/47 (29.8%) | 7/12 (58.3%) | 0.09 |
| Actual stress level | | | 1.00 |
| Mild/moderate | 44/47 (93.6%) | 12/12 (100%) | |
| Severe | 3/47 (6.4%) | 0 | |
| Professional impact | | | 0.06 |
| Mild/moderate | 22/44 (50%) | 7/8 (87.5%) | |
| Severe | 22/44 (50%) | 1/8 (12.5%) | |
| Manual labor | 28/47 (59.6%) | 2/12 (16.7%) | <0.01 |
| Physical activity enjoyable prediagnosis | 23/47 (48.9%) | 2/12 (16.7%) | 0.04 |
| Physical activity enjoyable postdiagnosis | 8/47 (17%) | 1/12 (8.3%) | 0.67 |

**Table 3** Psychological evaluations of patients with rheumatoid arthritis (RA) vs. those with spondyloarthropathy (SpA)

| Psychological parameter | RA<br>$n = 27$ | SpA<br>$n = 20$ | *P* |
|---|---|---|---|
| Depression | 21/27 (77.8%) | 17/20 (85%) | 0.71 |
| Intensity | | | 0.20 |
| Mild/moderate | 16/21 (76.2%) | 16/17 (94.1%) | |
| Severe | 5/21 (23.8%) | 1/17 (5.9%) | |
| Previous depression | 26/27 (96.3%) | 11/20 (55.0%) | <0.01 |
| Anxiety | 27/27 (100%) | 20/20 (100%) | - |
| Intensity | | | 0.07 |
| Mild/moderate | 9/27 (33.3%) | 12/20 (60.0%) | |
| Severe | 18/27 (66.7%) | 8/20 (40.0%) | |
| Alexithymia | 27/27 (100%) | 19/20 (95.0%) | 0.43 |
| Intensity | | | 0.17 |
| Mild/moderate | 14/27 (51.9%) | 6/19 (31.6%) | |
| Severe | 13/27 (48.1%) | 13/19 (68.4%) | |
| Social desirability | | | 0.48 |
| Mild/moderate | 20/27 (74.1%) | 17/20 (85.0%) | |
| Severe | 7/27 (25.9%) | 3/20 (15.0%) | |
| Emotional repression | | | 0.33 |
| Mild/moderate | 16/27 (59.3%) | 9/20 (45.0%) | |
| Severe | 11/27 (40.7%) | 11/20 (55.0%) | |
| Somatic complaints | | | 0.38 |
| Mild/moderate | 17/27 (63.0%) | 15/20 (75.0%) | |
| Severe | 10/27 (37.0%) | 5/20 (25.0%) | |
| Psychological complaints | | | 0.21 |
| Mild/moderate | 17/27 (63.0%) | 16/20 (80.0%) | |
| Severe | 10/27 (37.0%) | 4/20 (20.0%) | |
| Emotional expressivity intensity | | | 0.13 |
| Mild/moderate | 16/27 (59.3%) | 16/20 (80.0%) | |
| Severe | 11/27 (40.7%) | 4/20 (20.0%) | |
| Life event 1 | 16/24 (66.7%) | 13/20 (65.0%) | 0.91 |
| Intensity | | | 0.84 |
| Mild/moderate | 8/16 (50.0%) | 7/13 (53.8%) | |
| Severe | 8/16 (50.0%) | 6/13 (46.2%) | |
| Life event 2 | 24/27 (88.9%) | 20/20 (100%) | 0.25 |
| Intensity | | | 0.38 |
| Mild/moderate | 15/24 (62.5%) | 15/20 (75.0%) | |
| Severe | 9/24 (37.5%) | 5/20 (25.0%) | |
| Somatic escalade | 6/27 (22.2%) | 8/20 (40.0%) | 0.19 |
| Actual stress level | | | 0.25 |
| Mild/moderate | 24/27 (88.9%) | 20/20 (100%) | |
| Severe | 3/27 (11.1%) | 0/20 | |
| Professional impact | | | <0.01 |
| Mild/moderate | 17/25 (68%) | 5/19 (26.3%) | |
| Severe | 8/25 (32%) | 14/19 (73.7%) | |
| Manual labor | 12/27 (44.4%) | 16/20 (80.0%) | 0.01 |
| Physical activity enjoyable prediagnosis | 10/27 (37.0%) | 13/20 (65.0%) | 0.06 |
| Physical activity enjoyable postdiagnosis | 5/27 (18.5%) | 3/20 (15.0%) | 1.00 |

**Table 4** Psychological evaluations of CIRs patients with biological inflammatory syndromes vs. those without

| Psychological parameter | Biological inflammatory syndrome | | *P* |
|---|---|---|---|
| | Yes, *n* = 16 | No, *n* = 31 | |
| Depression | 13/16 (81.3%) | 25/31 (80.6%) | 1.00 |
| Intensity | | | |
| Mild/moderate | 11/13 (84.6%) | 21/25 (84.0%) | 1.00 |
| Severe | 2/13 (15.4%) | 4/25 (16.0%) | |
| Previous depression | 14/16 (87.5%) | 23/31 (74.2%) | 0.46 |
| Anxiety | 16/16 (100%) | 31/31 (100%) | 1.00 |
| Intensity | | | 0.25 |
| Mild/moderate | 9/16 (56.3%) | 12/31 (38.7%) | |
| Severe | 7/16 (43.8%) | 19/31 (61.3%) | |
| Alexithymia | 16/16 (100%) | 30/31 (96.8%) | 1.00 |
| Intensity | | | 0.22 |
| Mild/moderate | 5/16 (31.3%) | 15/30 (50.0%) | |
| Severe | 11/16 (68.8%) | 15/30 (50.0%) | |
| Social desirability | | | 0.7 |
| Mild/moderate | 12/16 (75.0%) | 25/31 (80.6%) | |
| Severe | 4/16 (25.0%) | 6/31 (19.4%) | |
| Emotional repression | | | 0.03 |
| Mild/moderate | 12/16 (75%) | 13/31 (41.9%) | |
| Severe | 4/16 (25%) | 18/31 (58.1%) | |
| Somatic complaints | | | 0.56 |
| Mild/moderate | 10/16 (62.5%) | 22/31 (71.0%) | |
| Severe | 6/16 (37.5%) | 9/31 (29.0%) | |
| Psychological complaints | | | 1.00 |
| Mild/moderate | 11/16 (68.8%) | 22/31 (71.0%) | |
| Severe | 5/16 (31.3%) | 9/31 (29.0%) | |
| Emotional expressivity intensity | | | 0.21 |
| Mild/moderate | 9/16 (56.3%) | 23/31 (74.2%) | |
| Severe | 7/16 (43.8%) | 8/31 (25.8%) | |
| Life event 1 | 11/14 (78.6%) | 18/30 (60.0%) | 0.31 |
| Intensity | | | 0.81 |
| Mild/moderate | 6/11 (54.5%) | 9/18 (50.0%) | |
| Severe | 5/11 (45.5%) | 9/18 (50.0%) | |
| Life event 2 | 15/16 (93.8%) | 29/31 (93.5%) | 1.00 |
| Intensity | | | 1.00 |
| Mild/moderate | 10/15 (66.7%) | 20/29 (69.0%) | |
| Severe | 5/15 (33.3%) | 9/29 (31.0%) | |
| Somatic escalade | 7/16 (43.8%) | 7/31 (22.6%) | 0.18 |
| Actual stress level | | | 0.54 |
| Mild/moderate | 16/16 (100%) | 28/31 (90.3%) | |
| Severe | 0/16 | 3/31 (9.7%) | |
| Professional impact | | | 0.75 |
| Mild/moderate | 8/15 (53.3%) | 14/29 (48.3%) | |
| Severe | 7/15 (46.7%) | 15/29 (51.7%) | |
| Manual labor | 8/16 (50.0%) | 20/31 (64.5%) | 0.34 |
| Physical activity enjoyable prediagnosis | 7/16 (43.8%) | 16/31 (51.6%) | 0.61 |
| Physical activity enjoyable postdiagnosis | 3/16 (18.8%) | 5/31 (16.1%) | 1 |

**Table 5** Psychological evaluations of CIRs patients with structural involvement vs. those without

| Psychological parameter | Structural involvement | | *P* |
|---|---|---|---|
| | Yes, *n* = 14 | No, *n* = 26 | |
| Depression | 11/14 (78.6%) | 20/26 (76.9%) | 1.00 |
| Intensity | | | 1.00 |
| Mild/moderate | 9/11 (81.8%) | 17/20 (85%) | |
| Severe | 2/11 (18.2%) | 3/20 (15%) | |
| Previous depression | 14/14 (100%) | 19/26 (73.1%) | 0.08 |
| Anxiety | 14/14 (100%) | 26/26 (100%) | 1.00 |
| Intensity | | | 0.08 |
| Mild/moderate | 4/14 (28.6%) | 15/26 (57.7%) | |
| Severe | 10/14 (71.4%) | 11/26 (42.3%) | |
| Alexithymia | 14/14 (100%) | 25/26 (96.2%) | 1.00 |
| Intensity | | | 0.58 |
| Mild/moderate | 6/14 (42.9%) | 13/25 (52.0%) | |
| Severe | 8/14 (57.1%) | 12/25 (48.0%) | |
| Social desirability | | | 0.22 |
| Mild/moderate | 13/14 (92.9%) | 19/26 (73.1%) | |
| Severe | 1/14 (7.1%) | 7/26 (26.9%) | |
| Emotional repression | | | 0.19 |
| Mild/moderate | 10/14 (71.4%) | 13/26 (50.0%) | |
| Severe | 4/14 (28.6%) | 13/26 (50.0%) | |
| Somatic complaints | | | 0.03 |
| Mild/moderate | 6/14 (42.9%) | 21/26 (80.8%) | |
| Severe | 8/14 (57.1%) | 5/26 (19.2%) | |
| Psychological complaints | | | 0.48 |
| Mild/moderate | 8/14 (57.1%) | 19/26 (73.1%) | |
| Severe | 6/14 (42.9%) | 7/26 (26.9%) | |
| Emotional expressivity intensity | | | <0.01 |
| Mild/moderate | 5/14 (35.7%) | 21/26 (80.8%) | |
| Severe | 9/14 (64.3%) | 5/26 (19.2%) | |
| Life event 1 | 9/13 (69.2%) | 14/24 (58.3%) | 0.72 |
| Intensity | | | 1.00 |
| Mild/moderate | 5/9 (55.6%) | 7/14 (50%) | |
| Severe | 4/9 (44.4%) | 7/14 (50%) | |
| Life event 2 | 12/14 (85.7%) | 25/26 (96.2%) | 0.28 |
| Intensity | | | 1.00 |
| Mild/moderate | 8/12 (66.7%) | 16/25 (64.0%) | |
| Severe | 4/12 (33.3%) | 9/25 (36.0%) | |
| Somatic escalade | 6/14 (42.9%) | 4/26 (15.4%) | 0.12 |
| Actual stress level | | | 0.54 |
| Mild/moderate | 14/14 (100%) | 23/26 (88.5%) | |
| Severe | 0/14 | 3/26 (11.5%) | |
| Professional impact | | | <0.01 |
| Mild/moderate | 11/13 (84.6%) | 10/25 (40.0%) | |
| Severe | 2/13 (15.4%) | 15/25 (60.0%) | |
| Manual labor | 7/14 (50%) | 15/26 (57.7%) | 0.64 |
| Physical activity enjoyable prediagnosis | 3/14 (21.4%) | 15/26 (57.7%) | 0.03 |
| Physical activity enjoyable postdiagnosis | 2/14 (14.3%) | 4/26 (15.4%) | 1.00 |