Physical and mental impact of COVID-19 outbreak on fibromyalgia patients

V. Aloush[1], A. Gurfinkel[2], N. Shachar[2], J.N. Ablin[1], O. Elkana[2]

[1]Institute of Rheumatology, Tel Aviv Sourasky Medical Center and Sackler School of Medicine, Tel Aviv University; [2]School of Behavioral Sciences, Tel Aviv - Yaffo Academic College, Israel.

Valerie Aloush, MD
Avital Gurfinkel, BA in Psychology
Noam Shachar, BA in Psychology
Jacob N. Ablin, MD
Odelia Elkana, PhD

Please address correspondence to:
Valerie Aloush,
Institute of Rheumatology,
Tel Aviv Sourasky Medical Center,
Weizman Street 6,
Tel Aviv 64239, Israel.
E-mail: Valerie.aloush@gmail.com

Competing interests: none declared.

ABSTRACT

Objective. *Acute or chronic stress may trigger or aggravate symptoms of fibromyalgia (FM). We aimed to evaluate the physical and mental health of fibromyalgia patients during the COVID 19 outbreak and identify protective/risk factors.*

Methods. *An online survey was published in May 2020, following two months of lockdown due to the COVID 19 outbreak, including questionnaires regarding demographic characteristics, access to medical services, anxiety, depression, life approach, coping strategies, perception of social support, widespread pain index (WPI) and symptoms severity scale (SSS), insomnia severity index (ISI) and patient global assessment.*

Results. *Of the 233 patients included in the study, 98% were forced to discontinue complementary or alternative treatments during lockdown. Up to 30% of responders who had been treated with medical cannabis had to stop due to logistic difficulties and this was associated with significantly higher scores of WPI/SSS (p=0.024). Higher levels of anxiety and depression were significantly correlated with higher levels of pain, sleep disorders and subjective perception of deterioration (p=0.00). Higher scores of social support and positive life approach were correlated with less anxiety and depression (p<0.01), lower levels of pain (p<0.05) and less sleep disturbances (p<0.01). Avoidant coping style was strongly associated to higher levels of pain, sleep disturbances, anxiety, depression, and subjective perception of worsening (p<0.01).*

Conclusion. *Fibromyalgia patients reported adverse mental and physical outcomes during the COVID-19 outbreak. Factors such as stopping current treatments may play a central role. Social support and a positive life approach appear to be protective.*

Introduction

While the immediate and dramatic effects of COVID-19, such as respiratory failure, have been in the centre of worldwide attention since the emergence of the pandemic, as times goes by and as an increasing number of individuals enter the stage of convalescence, attention is drawn to the concept of a possible post-Corona syndrome. Multiple symptoms are described by patients recovering from the infection and careful clinical and epidemiological analysis is necessary in order to distinguish between the anecdotal and the more stereotypical presentations of this novel condition. Moreover, and possibly equally significant, the pandemic has been associated with a quite dramatic increase in levels of anxiety, stress and depression, brought about by many aspects of the situation (1), ranging from the very exposure to a novel and thus frightening pathogen, through the devastating economic hardship suddenly inflicted on many and culminating in the dire consequences of social isolation and loneliness and the associated withdrawal of social support (2). Based on such considerations, Clauw *et al.* have reviewed the potential for exacerbation of chronic pain in the aftermath of the COVID-19 pandemic (3). As pointed out by these authors, chronic pain has previously been associated with many infectious disorders, including the original SARS outbreak (4), while catastrophic events and the associated stress have similarly been reported to play a role (5, 6). Other more mundane factors are also hypothesised to be responsible for a putative link between the COVID-19 pandemic and chronic pain, such as limited access to medical and complimentary treatment during periods of lockdown and difficulty acquiring necessary medications. More recently, Salaffi *et al.* showed that symptoms such as pain, fatigue and insomnia are more severe

in fibromyalgia patients with concomitant COVID 19 infection (7).

Fibromyalgia syndrome (FM) is often considered a prototype of chronic centralised (AKA nociplastic) pain. Pathogenetically associated with increased processing of pain within the central nervous system (8-10), the FM clinical spectrum runs a gamut of functional symptoms including widespread pain, fatigue, disrupted sleep, cognitive impairment, irritable bowel symptoms as well the frequent comorbidities of anxiety and depression (11). On an aetiological level as well, FM has served as a model for analysing the effects of various triggers, ranging from infections (12) through physical trauma to psychological stress and also relating to the underlying genetic background (13, 14). In this regard, a worldwide pandemic, its associated lockdown measures, social distancing, and future uncertainty entail substantial psychological stress, with potential deleterious effects on physical and mental well-being of particularly vulnerable FM patients. Coping strategies, involving both cognitive and behavioural responses, play a central role in managing internal and/or external stressors, and have substantial influence on subjective wellbeing and psychological distress. Generally, failure to cope adaptively with stress may lead to psychological trauma and mental disorders (15, 16).

Several other factors have been identified as protective against psychological distress in everyday life. Social support is considered to directly safeguard mental health, leveraging the benefits of social interactions, while indirectly shielding against stressful circumstances (17-19). Optimism, defined as a relatively stable generalised tendency to expect positive *versus* negative life outcomes is also recognised as a protective factor (20). Subjects who reported higher levels of optimism were found to be more durable to stress and more prone to use adaptive coping strategies (21).

Thus, the aim of the current study was to assess the effects of the current pandemic on physical and psychological well-being of FM patients and to identify related protective and risk factors.

Methods

Digital questionnaires were composed on QualtricsXM (https://www.qualtrics.com). The form included a demographic questionnaire with a specific section designated to the COVID-19 outbreak (see supplementary material), the Generalised Anxiety Disorder (GAD), Patient Health Questionnaire (PHQ), The Multi-dimensional Perceiver Social Support (MSPSS), the Brief Coping strategies (COPE), the life orientation Test (LOT) and Insomnia severity questionnaire (ISI). To measure FMS severity, we combined the widespread pain index (WPI) score with the symptom severity (SSS) score and used two visual analog scales (VAS) to measure patient global assessment and patient personal perception of deterioration.

These digital questionnaires were published in a snowball sampling method via social media dedicated to fibromyalgia patient associations in Israel. Responses were recorded within a ten-day window between May 6th and May 16th, 2020, when Israeli government policy included lockdown, social distancing, mandatory face masks, and quarantine for those exposed to confirmed COVID-19 patients.

Participants included in the study were patients who were listed one of the fibromyalgia patients association platforms, who reported time elapsed from diagnosis, and who filled out more than half of the whole form.

The ethics committee of the Academic College of Tel-Aviv Yaffo approved the experimental procedure, and all participants signed an informed consent before filling the questionnaires online.

Measures

Demographic and personal information included age, gender, socio-economics status and disease duration. In addition, we asked about the relevance of COVID-19 to the participant's life's (personal or close relative diagnosis of COVID-19 infection).

– Anxiety

The Generalised Anxiety Disorder Scale (GAD-7) comprises 7 items and is part of the full PHQ questionnaire (22, 23). The 7 items are based on the DSM-IV assessment criteria of generalised anxiety disorder. The GAD-7 items validated Hebrew version are scored from 0 to 21, with scores of ≥5, ≥10 and ≥15 representing mild, moderate, and severe anxiety symptom levels, respectively.

– Depression

The Patient Health Questionnaire (PHQ-9) (22) is a 9-item depression module from the full PHQ questionnaire (22). Each item ranges from 0 (not at all) to 3 (nearly every day). All scores are summed to obtain a global score, which ranges from 0 to 27. Scores of ≥5, ≥10, ≥15 and ≥20 representing mild, moderate, moderately severe, and severe depression, respectively. We used the validated Hebrew version (25).

– Social support

The Multi-Dimensional Perceiver Social Support (MSPSS) is a self-report questionnaire evaluating the personal subjective perception of the degree of social support (26). It contains 12 items and is divided into three subscales: family, friends, and significant others. The participant is asked to rate his or her relation to each item from 1 (not at all) to 7 (very much). A mean score of total social support scale is calculated, ranging from 1 to 7. A score from 1 to 3 is considered low support; 3 to 5 is considered moderate support and a score from 5 to 7 is considered high support.

– Coping strategies

The Coping strategies questionnaire (Coping Orientation to Problems Experienced - COPE) is a self-report tool that examines how a person deals with stressful and negative events, ranging from 1 (not at all) to 5 (very much). The questionnaire is a short form of the COPE scale (27) translated and validated in Hebrew (28). It contains 15 subscales: Active coping, planning, seeking instrumental social support, seeking emotional social support, suppression of competing activities, religion, positive reinterpretation, restraint coping, acceptance, ventilation of emo-

tion, denial, mental disengagement, behavioural disengagement, alcohol and drug use, and humour. Principal - Components Analysis (PCA), with varimax rotation, was applied to the 30 items and revealed a four-factor structure: a Problem-focused scale, a Seek-support scale, a Self-regression scale, and an Acceptance scale.

– *Optimism*
The life orientation test (LOT) is a is a 6-item scale self -reported questionnaire that measures how optimistic or pessimistic people feel about the future (29). Respondents used a 5-point rating scale (0 = strongly disagree; 4 = strongly agree) to show how much they agree with 10 statements about positive and negative expectations. All scores are summed to obtain a global score, higher ratings meaning more optimism.

– *Insomnia severity*
The insomnia index (ISI) is a brief self-report questionnaire designed to assess the nature, severity, and impact of insomnia in adults (30). The questionnaire is composed of 7 items that evaluate: (a) the severity of sleep-onset, (b) sleep maintenance, (c) early morning awakening problems, (d) satisfaction with current sleep pattern, (e) interference with daily functioning, (f) noticeability of impairment attributed to the sleep problem, and (g) level of distress caused by the sleep problem. Items were rated on a five-point Likert scale from 0 (not at all) to 4 (extremely), summed to obtain a global score from 0 to 28. Scores of ≥15 and ≥22, representing moderate severity and severe levels of clinical insomnia, respectively (31).

– *Fibromyalgia diagnosis
  and severity assessment*
We use the Widespread Pain Index (WPI) that quantifies the extent of bodily pain on a 0-19 scale, and the Symptom Severity Scale (SSS), according to the 2011 modified ACR criteria for Fibromyalgia. We also calculated the Poly-Symptomatic Distress (PSD) score by summing the WPI and SSS score for each participant, to assess disease severity (32).
Self-reported patient global physical

condition was assessed by a Visual analogical scale, providing a range of scores from 0 ("extremely bad condition") to 10 ("excellent condition"). Participants were also asked to fill a second VAS regarding their subjective perception of deterioration of their overall medical condition since the beginning of the COVID-19 outbreak and lockdown measures, with a score ranging from 0 ("no deterioration at all") to 10 ("severe deterioration").

Statistical analysis
All analyses were conducted using SPSS for Windows v. 26 (SPSS, Inc., Chicago, IL). For questionnaires which did not distribute normally, results are represented in median with Inter Quartile Range (IQR). Scores were correlated with the Pearson's rho. Correlation between "VAS PGA" and "VAS deterioration" to different measures was studied using Spearman's correlation test.

Results
Demographic features
Participant's characteristics are displayed in Table I. Two hundred thirty-one FM patients out of the 283 individuals who started to fill the questionnaire, completed the survey, for a response rate of 81.9%. Most responders were females (90.9% female 8.7% male 0.4% other). Almost half were between the age 40-60 (46.4%) and most were married (62.8%). 24.2% had primary school education, 25.5% had high school education and 42.9% had an academic education.

Occupational characteristics
We asked about changes in occupational status following COVID-19 pandemic. Only 55 responders (23.8%) indicated that they were working as usual whereas 11.7% were working less than usual, 21.6% were on unpaid leave, 3.5% had been fired, and 24.2% were unemployed prior to Covid-19 outbreak.

Treatment characteristics
More than half the responders (55.4%) continued their relationship with their treating physician after the COVID-19 outbreak: 38.5% via phone calls (test, messages texts or e-mails), while only

Table I. Responders characteristics.

	Total (%)
Overall	231
Gender	
Female	210 (90.9)
Male	20 (8.7)
Age	
17-25	33 (14.5)
26-39	56 (24)
40-60	107 (46.4)
61+	35 (15.1)
Marriage status	
Married	145 (62.8)
Unmarried	86 (37.2)
Education	
<12 years	58 (25.1)
12 years with diploma	64 (27.7)
Bachelor's degree	66 (28.6)
Master's degree and higher	37 (16)
Employment	
Working as usual	55 (23.8)
Working less than usual	27 (11.7)
Unpaid leave	50 (21.6)
Fired	8 (3.5)
Unemployed (unchanged)	56 (24.2)
Retired	35 (15.2)
Medical services/treatments	*Before lockdown*
Psychiatric medications	85 (36.8)
Psychiatrist/psychologist	88 (38.1)
Complementary alternative medicine	119 (51.5)
Medical cannabis	96 (41.6)
Physical exercise	140 (60)
Depression history	105 (45.5)

16.9% continued meeting their doctor in person. In addition, 38.1% of the responders indicated that they had been under psychiatric/psychological follow-up prior to the lockdown. Only 5.2% continued their meetings in person, while 32.9% continued via phone calls or online.
Half of the responders had been treated with complementary medicine such as acupuncture, hydrotherapy, and physiotherapy before the outbreak. 97.5% had to stop these treatments after COVID-19 restrictions. 41.6% had been treated with medical cannabis, and one third of them had to stop because of the difficulty to get their license renewed during quarantine or due to difficulties with supply.
Physical exercise is a crucial aspect of FM treatment. 60.6% of responders used to exercise once a week, or more, before the COVID-19 outbreak. Only 14.3% of them continued their routine

exercise, whereas 27.3% continued to a lesser extent.

Anxiety, depression, and insomnia levels

45.5% of responders stated that they had a history of anxiety and depression disorders, of which 81% took medications for these conditions. Results for GAD and PHQ questionnaires, evaluating anxiety and depression are displayed in Table II. The median (IQR) GAD-7 and PHQ-9 were 10 (5-15.5) and 15 (10-19) respectively. More than half the responders reported moderate - severe to severe levels of anxiety and depression. Anxiety highly correlated with depression (Pearson correlations of 0.72 P<0.01).

The median (IQR) ISI was 18 (15-22). Overall, 78% had moderate-severe to severe insomnia.

Association between fibromyalgia scores, anxiety, depression, and insomnia

As noted above, a patient satisfies diagnostic criteria for FM if the WPI≥7, the SSS≥5 and the WPI+SSS≥12. In our study, 28 responders, previously diagnosed with FM, had less than 12 points on their combined WPI+SSS score, thus not currently fulfilling FM criteria. As mentioned above, all participants were recruited from fibromyalgia patients' platforms and had to mention time elapse from diagnosis to reinforce the accuracy of the diagnosis. We assume that these 28 patients were previously diagnosed fibromyalgia patients with low disease activity at the time of the study.

The median (IQR) of the self-reported patient global physical condition VAS was 4 (3-6), indicating a relatively poor condition, and the median (IQR) of VAS subjective perception of deterioration since COVID-19 outbreak was 6 (3-8), pointing at a relatively high perception of deterioration. VAS perception of deterioration correlated with GAD-7, PHQ-9 and ISI (Pearson correlation of 0.37, 0.35 and 0.24 respectively, *p*<0.01) *i.e*. subjective perception of deterioration correlated with higher levels of anxiety, depression and insomnia.

SSS highly correlated with GAD-7 and

Table II. Clinical and psychological characteristics of participants.

Questionnaire (score range)	Median (IQR)	
GAD-7 (0-21)	10 (5-15.5)	23% mild, 25.3% moderate, 22.1% moderate- severe 29.5% severe.
PHQ-9 (0-27)	15 (10-19)	4.1% minimal, 15.5% mild, 28.5% moderate, 28% moderately – severe, 23.8% severe.
ISI (0-28)	18 (15-22	3.6% no insomnia, 18.8% subthreshold insomnia, 48.2% moderate severe insomnia 29.4% severe insomnia.
COPE (1-5)		
Problem	3.57 (3-3.85)	
Seek support	3 (2.5-3.5)	
Self-regression	2.55 (2.11-3.08)	
Acceptance	3 (2.25-3.5)	
MSPSS (1-7)	4.66 (3.25-5.91)	
LOT (0-24)	13 (10-17)	
WPI (0-19)	9 (7-13)	
SSS (0-12)	9 (7-10)	
PDS (0-31)	18 (14-23)	
VAS- PGA (0-10)	4 (3-6)	
VAS deterioration (0-10)	6 (3-8)	

GAD: general anxiety disorder scale; PHQ: Patient Health Questionnaire, it objectifies the degree of depression severity; ISI: insomnia severity index; COPE: coping strategies questionnaire; MSPSS: multi-dimensional perceiver social support questionnaire; LOT: life orientation test; WPI: widespread pain index; SSS: symptoms severity scale; PSD: poly-symptomatic distress scale; VAS-PGA: visual analogue scale of patient global assessment; VAS deterioration: subjective perception of deterioration since COVID-19 outbreak.

PHQ-9 (Pearson correlation of 0.55 and 0.46 respectively *p*<0.01). Additionally, SSS had a negative correlation with cease of medical cannabis use treatment (Pearson correlation of -0.22, *p*<0.05). WPI correlated with GAD-7 and PHQ-9 (Pearson correlation of 0.24 and 0.27 respectively *p*<0.01).

ISI correlated with GAD-7, PHQ-9, SSS and WPI (Pearson correlation of 0.47, 0.52, 0.58 and 0.27 respectively, *p*<0.01), indicating a strong correlation between anxiety, depression, somatic symptoms and pain and severity of sleep disorder (Table III).

Psycho-social characteristics as protective/risk factors

The COPE questionnaire was divided into four groups of coping strategy. "Regression to self" had the most profound correlation with GAD-7 (0.53 *p*<0.01), PHQ-9 (0.61 *p*<0.01), SSS (0.52 *p*<0.01) and ISI (0.37 *p*<0.01), indicating that this maladaptive coping

mechanism, including denial, mental disengagement, venting of emotion and substance use, was strongly correlated with a higher degree of anxiety, depression, symptoms severity and sleep disturbances.

"Acceptance" was found negatively correlated with GAD-7 (-0.29 *p*<0.01), PHQ-9 (-0.35 *p*<0.01), VAS deterioration (-1.9 *p*<0.01) and ISI (-0.14 *p*<0.05) indicating that a higher degree of accepting coping mechanism (internalisation and comprehension of the situation) is correlated with a lower degree of anxiety, depression and personal perception of deterioration.

"Problem" was found negatively correlated with GAD-7 (-0.14 *p*<0.05), PHQ-9 (-0.27 *p*<0.01) and VAS deterioration (-0.17 *p*<0.05) indicating that a higher degree of problem coping mechanism (modify the situation by gathering information and conducting task-oriented action in order to develop practical plans for dealing with the

Table III. Correlations between fibromyalgia scores, anxiety, depression, and insomnia.

	GAD-7	PHQ-9	WPI	SSS	ISI	VAS
GAD-7 PHQ-9	0.72**					
WPI	0.24**	0.27**				
SSS	0.55**	0.46**	0.39**			
ISI	0.47**	0.52**	0.27**	0.58**		
VAS- PGA	-0.17*	-0.19**	-0.14	-0.24**	-0.17*	
VAS deterioration	0.37**	0.35**	0.15*	0.344**	0.24**	-0.03

GAD: general anxiety disorder scale; PHQ: Patient Health Questionnaire, it objectifies the degree of depression severity; ISI: insomnia severity index; COPE: coping strategies questionnaire; MSPSS: multi-dimensional perceiver social support questionnaire; LOT: life orientation test; WPI: widespread pain index; SSS: symptoms severity scale; VAS-PGA: visual analogue scale of patient global assessment; VAS deterioration: subjective perception of deterioration since COVID-19 outbreak.
*$p<0.05$, **$p<0.01$.

Table IV. Correlations between psychosocial and clinical characteristics.

	GAD-7	PHQ-9	WPI	SSS	ISI	VAS-PGA	VAS deterioration
Coping strategies							
Problem	-0.14*	-0.27**	-0.04	-0.12	-0.08	0.16*	-0.11*
Seek support	0.15*	0.07	0.02	0.37	0.03	0.03	0.09
Self-regression	0.53**	0.61**	0.09	0.52**	0.37**	-0.11	0.24**
Acceptance	-0.29**	-0.35**	-0.02	-0.16*	-0.14*	0.21**	-0.194**
MSPSS	-0.28**	-0.36**	-0.03	-0.31**	-0.24**	0.13	-0.15*
LOT	-0.37**	-0.49**	-0.44	-0.27**	-0.19**	0.13	-0.20**

GAD: general anxiety disorder scale; PHQ: Patient Health Questionnaire, it objectifies the degree of depression severity; ISI: insomnia severity index; COPE: coping strategies questionnaire; MSPSS: multi-dimensional perceiver social support questionnaire; LOT: life orientation test; WPI: widespread pain index; SSS: symptoms severity scale; VAS-PGA: visual analogue scale of patient global assessment; VAS deterioration: subjective perception of deterioration since COVID-19 outbreak.
*$p<0.05$, **$p<0.01$.

stressor or the problem) is correlated with a lower degree of anxiety, depression and personal perception of deterioration.

A negative correlation was found between the MSPSS questionnaire and levels of anxiety (-0.28 $p<0.01$), depression (-0.36 $p<0.01$) sleep disturbances (-0.24 $p<0.01$) and pain (-0.31 $p<0.01$).

The same negative correlation was found between optimism score (measured by LOT questionnaire) and levels of anxiety (-0.37 $p<0.01$), depression (-0.49 $p<0.01$), sleep disturbances (-0.19 $p<0.01$) and pain (-0.27 $p<0.01$), indicating that lower levels of perceived social support and lower scores of optimism were linked to higher levels of anxiety, depression, sleep disturbances and pain (Table IV).

Discussion

In the current study, we have found high levels of pain, anxiety, depression, sleep disturbances and subjective perception of worsening among FM patients during the COVID-19 outbreak and lockdown measures. Patients were confronted with the hardships entailed by social distancing and economic issues, as in general population, but also had to deal with difficulties pertaining to accessing medical facilities, complementary treatments, and special medications such as medical cannabis. Better social support and positive life approach were found to be protective factors, leading to less anxiety and depression, lower levels of pain and less sleep disturbances. An avoidant coping pattern, including denial and behavioural disengagement, was identified as a risk factor for higher levels of pain, sleep disturbances, anxiety, depression, and subjective perception of worsening. To our knowledge, this is the first study to report changes in physical and mental health among FM patients during the COVID-19 global crisis.

The COVID-19 pandemic and the severe restriction measures taken by governments to contain it, carries the potential for a substantial negative impact on health outcomes. A recent study conducted among populations dealing with chronic illnesses during lockdown periods due to the COVID-19 outbreak has showed high rates of reported decline in health condition and deterioration of health behaviours, including a decrease in vegetable consumption and physical activity (33). Adverse mental health consequences of the pandemic are also notable, such as anxiety and depression, self-reported stress, sleep disturbances, as well as increased feeling of loneliness (34).

Physical and psychological trauma and exposure to chronic stress, are well-known factors associated with triggering and exacerbating chronic pain and FM symptoms. Previous studies have shown high rates of FM-related symptoms, as well as mental and physical worsening of FMS patients following earthquakes (5, 35), in populations exposed to repeated missile attacks (36), or in survivors of a major train crash (6). Interestingly, no increase in FMS symptoms was observed in a cohort of women in New-York after the 9/11 terrorist attacks (37), probably due to the lack of a direct personal exposure to the attack on the part of the women included in the study, and possibly due to the protective influence of the strong social cohesion and solidarity that prevailed following the attacks.

The COVID-19 pandemic represents a unique stressful condition, in which people have to face a novel infectious agent with initially yet-to-be defined clinical features and treatment, carrying a relatively high rate of mortality (especially during the study period), and causing radical personal, familial, professional, economic and social changes that culminate during the periods of lockdown. Patients dealing with chronic pain, and related anxiety and depression symptoms, are particularly vulnerable to the imposed social distancing, limited access to medical consultation, interruption of complementary treatments, restrictions concerning physical activity and access to specific medications. In our study, practically all participants followed by a psychia-

trist or psychotherapist continued follow-up by phone or by online platform, but all patients had to stop alternative treatments such as hydrotherapy or acupuncture, 43% lost contact with their treating physician, 57% stopped physical exercise, and a third of patients who were treated by medical cannabis were forced to discontinue treatment due to logistical difficulties. In fact, lockdown measures led to the dismantling of FM core treatment programs. Participants evaluated their global health condition as poor (mean of 4 on a VAS of 0-10) and had a high degree of subjective perception of worsening since the beginning of the pandemic, which correlated with higher levels of anxiety, depression and insomnia. While stopping visiting the personal physician was not found to be associated with any worse prognosis, patients who stopped receiving medical cannabis had higher levels of pain and functional symptoms than patients that continued treatment.

Consistent with previous studies (38, 39), we found that participants who used maladaptive coping strategies more frequently, such as mental disengagement, self-blaming, denial, giving up and substance use (what we refer to as "regression to self") had significantly higher levels of depression and were exposed to more stressors and symptom severity. Inversely, we found that positive affect being was associated with more active approach and planning oriented coping strategies ("acceptance" and "problem focused" strategies), consistent with previous research suggesting that individuals who are clear about their emotions and are actively coping with the situation, have the requisite information about the status of their goals, and therefore have the ability to effectively make sound decisions in order to solve their particular problems (40, 41).

Decreased perceived social support was previously found to be significantly associated with elevated risk for depression and poorer sleep quality during COVID-19 pandemic (42). In the same line, we found in the present study a negative correlation between perceived social support and levels of anxiety, depression, and sleep distur-

bances, but also with higher levels of pain (-0.31 $p<0.01$).

Optimism also appears to be considered (especially in adverse situations, such as the current pandemic) a protective factor during the COVID-19 (43). Having a positive perspective on future results, focusing attention on positive stimuli, and avoiding those perceived as threatening leads to an increase in well-being. Previous study demonstrated the multidimensional nature of optimism which appears to be related to fewer depressive episodes following stressful and anxiety-provoking life events (44). In the present study, lower level of optimism was linked to higher levels of anxiety, depression, sleep disturbances and pain.

The main limitation to this study is that mental and physical symptoms of fibromyalgia patients were evaluated in a cross-sectional evaluation during the lockdown, and parameters were not compared to pre-pandemic data nor to a control group, but rather express subjective assessment of disease symptoms at this period.

As the rheumatological community comes to grapple with the impact of the COVID-19 pandemic on the management of patients suffering from chronic autoimmune inflammatory disorders, and on the role of immunosuppressive medications in this context (45), professional guidelines have begun to be developed regarding optimal ways to combat these challenges (46). So far however no such initiative has been proposed regarding the management of chronic non – inflammatory musculoskeletal conditions such as FM. In view of the currently recognised extensive clinical co-morbidity between FM and inflammatory rheumatic disorders, (47), it appears that attention should be drawn to the optimal management of FM and chronic pain as well, withing the sphere of the rheumatological response to the COVID-19 pandemic.

Governmental policies aiming at containing the pandemic must take into account these specific issues regarding patients dealing with chronic pain. Continuous medical follow-up by telemedicine, online platforms for patients support, addressing specific psychological

issues to enhance positive coping, strategies for continuous supply of medical cannabis, as well as permitted physical exercise compatible with public health constraints such as walking, appear to be crucial in order to ensure continuous care and better health outcomes.

References

1. HUANG Y, ZHAO N: Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res* 2020; 288: 112954.
2. ARMITAGE R, NELLUMS LB: COVID-19 and the consequences of isolating the elderly. *Lancet Public Health* 2020; 5: e256.
3. CLAUW DJ, HÄUSER W, COHEN SP, FITZCHARLES M-A: Considering the potential for an increase in chronic pain following the COVID-19 pandemic. *Pain* 2020; 161: 1694-7.
4. HUI DSC, CHAN MCH, WU AK, NG PC: Severe acute respiratory syndrome (SARS): epidemiology and clinical features. *Postgrad Med J* 2004; 80: 373-81.
5. SALAFFI F, ATZENI F, TALOTTA R, DI CARLO M, SARZI-PUTTINI P: Earthquake vulnerability of fibromyalgia patients: six-month follow-up after the catastrophic disasters in central Italy. *Clin Exp Rheumatol* 2017; 35 (Suppl. 105): S93-9.
6. BUSKILA D, ABLIN J, BEN-ZION I *et al.*: A painful train of events: increased prevalence of fibromyalgia in survivors of a major train crash. *Clin Exp Rheumatol* 2009; 27 (Suppl. 56): S79-85.
7. SALAFFI F, GIORGI V, SIROTTI S *et al.*: The effect of novel coronavirus disease-2019 (COVID-19) on fibromyalgia syndrome. *Clin Exp Rheumatol* 2020 Nov 16; PMID 33200740 [Online ahead of print].
8. MEEUS M, NIJS J: Central sensitization: a biopsychosocial explanation for chronic widespread pain in patients with fibromyalgia and chronic fatigue syndrome. *Clin Rheumatol* 2007; 26: 465-73.
9. YUNUS MB: Fibromyalgia and overlapping disorders: the unifying concept of central sensitivity syndromes. *Semin Arthritis Rheum* 2007; 36: 339-56.
10. BAZZICHI L, GIACOMELLI C, CONSENSI A *et al.*: One year in review 2020: fibromyalgia. *Clin Exp Rheumatol* 2020; 38 (Suppl. 123): S3-8.
11. CLAUW DJ: Fibromyalgia: a clinical review. *JAMA* 2014; 311: 1547-55.
12. BUSKILA D, ATZENI F, SARZI-PUTTINI P: Etiology of fibromyalgia: the possible role of infection and vaccination. *Autoimmun Rev* 2008; 8: 41-3.
13. PARK D-J, LEE S-S: New insights into the genetics of fibromyalgia. *Korean J Intern Med* 2017; 32: 984-95.
14. SMITH SB, MAIXNER DW, FILLINGIM RB *et al.*: Large candidate gene association study reveals genetic risk factors and therapeutic targets for fibromyalgia. *Arthritis Rheum* 2012; 64: 584-93.

15. FOLKMAN S, LAZARUS RS: Stress, appraisal, and coping. New York: Springer Publishing Company, 1984: 150-3.

16. CHRISTENSEN MV, KESSING LV: Clinical use of coping in affective disorder, a critical review of the literature. *Clin Pract Epidemiol Ment Health* 2005: 1: 20.

17. GARIEPY G, HONKANIEMI H, QUESNEL-VALLEE A: Social support and protection from depression: systematic review of current findings in Western countries. *Br J Psychiatry* 2016; 209: 284-93.

18. MCGUIRE AP, GAUTHIER JM, ANDERSON LM *et al.*: Social support moderates effects of natural disaster exposure on depression and posttraumatic stress disorder symptoms: effects for displaced and nondisplaced residents. *J Trauma Stress* 2018; 31: 223-33.

19. VISEU J, LEAL R, DE JESUS SN, PINTO P, PECHORRO P, GREENGLASS E: Relationship between economic stress factors and stress, anxiety, and depression: Moderating role of social support. *Psychiatry Res* 2018; 268: 102-7.

20. SCHEIER MF, CARVER CS: Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychol* 1985; 4: 219-47.

21. CONVERSANO C, ROTONDO A, LENSI E, DELLA VISTA O, ARPONE F, REDA MA: Optimism and its impact on mental and physical well-being. *Clin Pract Epidemiol Ment Health* 2010; 6: 25-9.

22. SPITZER RL, KROENKE K, WILLIAMS JB: Patient Health Questionnaire Primary Care Study Group. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *JAMA* 1999; 282: 1737-44.

23. SPITZER RL, KROENKE K, WILLIAMS JB, LÖWE B: A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Int Med* 2006; 166: 1092-7.

24. KROENKE K, SPITZER RL, WILLIAMS JB: The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001; 16: 606-13.

25. GEULAYOV G, JUNGERMAN T, MOSES S, FRIEDMAN N, MIRON R, GROSS R: Validation of the Hebrew version of the PHQ-9, a screening instrument for depression in primary care. *Isr J Psychiatry* 2009; 46: 45.

26. ZIMET GD, DAHLEM NW, ZIMET SG, FANLEY GK: The multidimensional scale of perceived social support. *J Personality Assess* 1988; 52: 30-41.

27. CARVER CS, SCHEIER MF, WEINTRAUB JK: Assessing coping strategies: a theoretically based approach. *J Pers Soc Psychol* 1989; 56: 267-83.

28. BEN-ZUR H, ZEIDNER M: Coping patterns and affective reactions under community crisis and daily routine conditions. A*nxiety Stress Coping* 1995; 8: 185-201.

29. SCHEIER SF, CARVER CS: Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychol* 1985; 4: 219.

30. MORIN CM, BELLEVILLE G, BÉLANGER L, IVERS H: The Insomnia Severity Index: psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep* 2011; 34: 601-8.

31. BASTIEN CH, VALLIÈRES A, MORIN CM: Validation of the insomnia severity index as an outcome measure for insomnia research. *Sleep Medicine* 2001; 2: 297-307.

32. WOLFE F, WALITT, BT, RASKER JJ, KATZ RS, HÄUSER W: The use of polysymptomatic distress categories in the evaluation of fibromyalgia (FM) and FM severity. *J Rheumatol* 2015; 42: 1494-501.

33. ELRAN-BARAK R, MOZEIKOV M: One month into the reinforcement of social distancing due to the COVID-19 outbreak: subjective health, health behaviors, and loneliness among people with chronic medical conditions. *Int J Environ Res Public Health* 2020; 17: 5403.

34. RAJKUMAR RP: COVID-19 and mental health: A review of the existing literature. *Asian J Psychiatr* 2020; 52: 102066.

35. USUI C, HATTA K, ARATANI S *et al.*: Vulnerability to traumatic stress in fibromyalgia patients: 19-month follow-up after the great East Japan disaster. *Arthritis Res Ther* 2013; 15: R130.

36. ABLIN JN, COHEN H, CLAUW DJ *et al.*: A tale of two cities - the effect of low intensity conflict on prevalence and characteristics of musculoskeletal pain and somatic symptoms associated with chronic stress. *Clin Exp Rheumatol* 2010; 28 (Suppl. 63): S15-21.

37. RAPHAEL KG, NATELSON BH, JANAL MN, NAYAK S: A community-based survey of fibromyalgia-like pain complaints following the World Trade Center terrorist attacks. *Pain* 2002; 100: 131-9.

38. MEYER B: Coping with severe mental illness: Relations of the Brief COPE with symptoms, functioning, and well-being. *J Psychopathol Behav Assess* 2001; 23: 265-77.

39. MAHMOUD JSR, STATEN RT, HALL LA, LENNIE TA: The relationship among young adult college students' depression, anxiety, stress, demographics, life satisfaction, and coping styles. *Issues Ment Health Nurs* 2012; 33: 149-56.

40. CARVER CS, SCHEIER MF, WEINTRAUB JK: Assessing coping strategies: a theoretically based approach. *J Personality Social Psychol* 1989; 56: 267.

41. GOHM CL, CLORE GL: Four latent traits of emotional experience and their involvement in well-being, coping, and attributional style. *Cogn Emot* 2002; 16: 495-518.

42. GREY I, ARORA T, THOMAS J, SANEH A, TOMHE P, ABI-HABIB R: The role of perceived social support on depression and sleep during the COVID-19 pandemic. *Psychiatry Res* 2020; 293: 113452.

43. HERNÁNDEZ-SÁNCHEZ BR, CARDELLA GM, SÁNCHEZ-GARCÍA JC: Psychological factors that lessen the impact of COVID-19 on the self-employment intention of business administration and economics' students from Latin America. *Int J Environ Res Public Health* 2020; 17: 5293.

44. KLEIMAN EM, CHIARA AM, LIU RT, JAGER-HYMAN SG, CHOI JY, ALLOY LB: Optimism and well-being: a prospective multi-method and multi-dimensional examination of optimism as a resilience factor following the occurrence of stressful life events *Cogn Emot* 2017; 31: 269-83.

45. GIANFRANCESCO MA, HYRICH KL, GOSSEC L *et al.*: Rheumatic disease and COVID-19: initial data from the COVID-19 global rheumatology alliance provider registries. *Lancet Rheumatol* 2020; 2: e250-e3.

46. MIKULS TR, JOHNSON SR, FRAENKEL L *et al.*: American College of rheumatology guidance for the management of adult patients with rheumatic disease during the COVID-19 pandemic. *Arthritis Rheumatol* 2020; 72: e1-e12.

47. ZHAO SS, DUFFIELD SJ, GOODSON NJ: The prevalence and impact of comorbid fibromyalgia in inflammatory arthritis. *Best Pract Res Clin Rheumatol* 2019; 33: 101423.