

# Possible repercussions of the COVID-19 pandemic on women with fibromyalgia: longitudinal study

## *Possíveis repercussões da pandemia da COVID-19 em mulheres com fibromialgia: estudo longitudinal*

Géssika Araújo de Melo<sup>1</sup>, Marcela Laís Lima Holmes Madruga<sup>2</sup>, Maria Beatriz Ribeiro de Oliveira<sup>3</sup>, Nelson Torro<sup>1</sup>

DOI 10.5935/2595-0118.20220043-en

### ABSTRACT

**BACKGROUND AND OBJECTIVES:** In the context of the pandemic caused by COVID-19, individuals with chronic pain, as in fibromyalgia, experienced the impact of social isolation. Thus, considering the scarcity of studies that contemplate initial assessments of women with fibromyalgia before the pandemic period and that compare them with the pandemic context moment, the objective was to analyze the possible repercussions of the pandemic resulting from COVID-19 on the psychological symptoms, quality of life and pain.

**METHODS:** A descriptive, cross-sectional, observational research with an exploratory and quantitative approach. The sample was composed of 15 women with fibromyalgia for at least three months, aged between 43 and 55 years and with pain level above four on the Visual Analog Scale (VAS). The Sociodemographic and Clinical Questionnaire, the Beck Anxiety Inventory (BAI), the Beck Depression Inventory (BDI), and the Health Assessment Questionnaire (HAQ) were used.

**RESULTS:** On average, pain intensity during social isolation ( $8,40 \pm 1,50$ ) and anxiety level ( $29,80 \pm 13,97$ ) were higher than before the pandemic ( $6,06 \pm 1,62$ ,  $p=0,001$ ) and ( $22,33 \pm 9,69$ ,  $p=0,006$ ), respectively. In other words, the participants showed higher levels of anxiety and pain during the period of social iso-

lation. Mean depressive symptoms and quality of life differed minimally, showing no statistical significance, with  $p=0,94$  and  $p=0,46$ , respectively.

**CONCLUSION:** The COVID-19 pandemic may have contributed to the increase in pain and anxiety levels during the pandemic period. However, other uncontrolled variables may have influenced this result, such as resilience and family support, for example.

**Keywords:** Coronavirus infection, COVID-19, Fibromyalgia, Mental health, Social isolation.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** Diante do contexto da pandemia ocasionada pela COVID-19, os indivíduos com dor crônica, como na fibromialgia, experimentaram o impacto do isolamento social. Assim, considerando a escassez de estudos que contemplem avaliações iniciais de mulheres com fibromialgia antes do período de pandemia e que as comparem com o momento de contexto pandêmico, objetivou-se analisar as possíveis repercussões da pandemia decorrentes da COVID-19 em sintomas psicológicos, qualidade de vida e dor.

**MÉTODOS:** Trata-se de uma pesquisa observacional descritiva, longitudinal, com abordagem exploratória e quantitativa. A amostra foi composta por 15 mulheres com fibromialgia a pelo menos três meses, com idades entre 43 e 55 anos e com nível de dor acima de quatro na Escala Analógica Visual (EAV). Foram utilizados o Questionário Sociodemográfico e Clínico, o Inventário Beck de Ansiedade (IBA), o Inventário Beck de Depressão (IBD) e o *Health Assessment Questionnaire* (HAQ).

**RESULTADOS:** Em média, a intensidade da dor durante o isolamento social ( $8,40 \pm 1,50$ ) e o nível de ansiedade ( $29,80 \pm 13,97$ ) foram maiores do que antes da pandemia ( $6,06 \pm 1,62$ ,  $p=0,001$ ) e ( $22,33 \pm 9,69$ ,  $p=0,006$ ), respectivamente. Ou seja, as participantes mostraram maiores níveis de ansiedade e dor durante o período de isolamento social. A média dos sintomas depressivos e qualidade de vida diferiram minimamente, não demonstrando significância estatística, com  $p=0,94$  e  $p=0,46$ , respectivamente.

**CONCLUSÃO:** A pandemia da COVID-19 pode ter contribuído para o aumento das queixas de dor e ansiedade durante o período pandêmico. Entretanto, outras variáveis não controladas podem ter influenciado nesse resultado, como resiliência e suporte familiar, por exemplo.

**Descritores:** COVID-19, Fibromialgia, Infecções por coronavírus, Isolamento social, Saúde mental.

Géssika Araújo de Melo – <https://orcid.org/0000-0003-2938-7280>;  
 Marcela Laís Lima Holmes Madruga – <https://orcid.org/0000-0002-4018-2692>;  
 Maria Beatriz Ribeiro de Oliveira – <https://orcid.org/0000-0002-1413-5219>;  
 Nelson Torro – <https://orcid.org/0000-0003-3678-5762>.

1. Federal University of Paraíba, Cognitive Science and Perception Laboratory, João Pessoa, PB, Brazil.
2. Federal University of Paraíba, Department of Physical Therapy, João Pessoa, PB, Brazil.
3. Faculty of Venda Nova do Imigrante, Department of Physical Therapy, Venda Nova do Imigrante, ES, Brazil.

Submitted on May 24, 2021.

Accepted for publication on September 13, 2022.

Conflict of interests: none – Sponsoring sources: this work was partially supported by funding from the National Council for Scientific and Technological Development (CNPQ) and the Foundation for Research Support of the State of Paraíba (FAPESQ).

### HIGHLIGHTS

- Individuals with fibromyalgia experienced the impact of social isolation.
- Chronic diseases are associated with higher levels of psychological stress.
- The COVID-19 pandemic may have repercussions on pain and anxiety levels.

### Correspondence to:

Géssika Araújo de Melo

E-mail: gessika.fisio@gmail.com

## INTRODUCTION

Since December 2019, the outbreak of disease caused by a new coronavirus (COVID-19) has become a pandemic affecting all continents<sup>1</sup>. Thus, in light of the current context, public health recommendations and governmental measures have imposed blockages and restrictions. While these restrictions help decrease the infection rate, such limitations result in possible negative effects, reducing participation in Activities of Daily Living (ADLs), physical activity, travel, and access to many forms of exercise, as well as prolonged impacts on the human mind, mental health, and social interaction<sup>2</sup>.

The pandemic of COVID-19 brought with it a plethora of problems and, in this regard, individuals with chronic pain also experienced this impact, in which there was increased inactivity due to confinement, resulting in physical deconditioning and having an influence on patients who rely on exercise programs as part of their pain management programs<sup>3</sup>. The exacerbation of mental health problems, including anxiety, depression, post-traumatic stress disorder, and alcohol dependence disorder, have also become significant concerns in the general population.

In this context, individuals with fibromyalgia (FM) stand out because they are affected by chronic generalized musculoskeletal pain accompanied by sleep problems, mood swings, cognitive dysfunction, autonomic nervous system disorders, fatigue and impaired Quality of Life (QoL)<sup>4</sup>. The persistence of these symptoms for long periods of time and an incapacitating clinical picture are also associated, highlighting FM as a condition of challenging clinical management<sup>5</sup>.

Thus, in the face of the installed health emergency, the effects of social isolation and other pandemic circumstances on pre-existing symptoms in individuals with FM become relevant for the observation of the course of the disease in the context installed by the pandemic.

In the biopsychosocial approach to pain, the dynamic and multidimensional integration among physiological, psychological and social factors, which mutually influence each other, encourages the discussion of the possible influence of social isolation on pain symptoms<sup>6</sup>. Considering the scarcity of studies that contemplate initial assessments of individuals with FM before the pandemic period and that compare them with the pandemic context moment, the approach brought in the present study becomes pertinent for the comprehension of the studied population. Therefore, the aim was to analyze the pandemic repercussions arising from COVID-19 on psychological symptoms, QoL, and pain of women with FM.

## METHODS

The Strengthening the Reporting of Observational studies in Epidemiology (STROBE Checklist) was used to prepare the present study. The research was approved by the Research Ethics Committee of the Health Sciences Center of the UFPB, under CAAE: 64247317.6.0000.5188, and all ethical recommendations were followed, as ruled by Resolution 466/2012 of the Brazilian National Health Council.

This is a descriptive, longitudinal observational research with an exploratory and quantitative approach, with the initial data coming from the first stage of a randomized clinical trial protocol<sup>7</sup>.

Women with FM were followed up during the development of a randomized clinical trial<sup>6</sup> in which they were previously evaluated, and the data from this first evaluation served as information about their health status before the pandemic period. Due to the need to analyze the health context of these women during the pandemic and compare it to the moment before the pandemic period, data were collected in 2020, which served as a reevaluation parameter. Given the impossibility of maintaining the research in a face-to-face format, and given the social isolation and the context of the pandemic, the final evaluation was performed virtually, from August to September 2020. The questionnaires were applied by trained evaluators, who assisted the research participants during the completion of the questions.

The inclusion criteria were: (1) diagnosis of FM according to the American College of Rheumatology criteria; (2) having been diagnosed at least three months before; (3) being female; (4) being between 35 and 60 years of age; (5) presenting pain level above four on the Visual Analog Scale (VAS); and (6) signing the Free and Informed Consent Term (FICT). Exclusion criteria were: (1) cognitive deficit, with a score of less than 24 on the Mini Mental State Examination (MMSE); (2) illiterate; (3) metallic implants located in the head, cochlear implants, and cardiac pacemakers; (4) pregnant women; and (5) history of seizure.

The study variables were measures of pain levels, anxiety, depression, and QoL.

### Data sources/measurement

The Sociodemographic and Clinical Questionnaire was used to characterize the sample, the VAS to assess the level of pain at the time of assessment<sup>8</sup>, the Beck Anxiety Inventory (BAI) to measure the severity of anxiety symptoms<sup>9,10</sup>, the Beck Depression Inventory (BDI), used to quantify current depression symptoms<sup>10,11</sup> and the Health Assessment Questionnaire (HAQ) to assess QoL through general health status<sup>12</sup>.

### Bias

The initial and final assessment methods differed, given the installation of the social isolation measures. Thus, the reassessments were adapted and performed in a remote format. In order to mitigate possible measurement and inter-rater biases, the research team was trained to standardize the application of the assessment instruments, which were adapted to the remote and online format.

### Size of research

The sample was a non-probabilistic convenience sample of 15 women with FM, aged between 43 and 55 years, who had previously been evaluated to participate in a clinical intervention<sup>7</sup> in the city of João Pessoa, PB.

## Statistical analysis

The statistical analysis was carried out using the IBM SPSS software version 24<sup>7</sup>. First, descriptive analyses were performed, in addition to the Shapiro-Wilk normality test. After verifying the normality of the data, the inferential statistics were performed, with the t-test for paired samples and effect size, through Cohen's d test.

## RESULTS

It was found that most of the sample had completed high school (93.3%, n=14) and monthly income equal to or greater than one minimum wage (80%, n=12). The mean age of the participants was 48.53±3.60 years and the overall mean duration time of FM diagnosis was 46.07±44.55 months. About 93.3% of the sample reported drug use (n=14) and only one participant reported being a drinker and smoker.

The mean pain intensity was 6.06±1.62 out of 10, defined as moderate in the VAS<sup>8</sup> scale. Anxiety and depression scores were 22.33±9.69 and 19.86±10.80, respectively, representing moderate degrees of anxiety and depression<sup>10,11</sup>. The mean QoL score was 22.6 ± 9.94. As for the subjective evaluation of perceived symptoms, 87% (n=13) of the sample reported worsening of sleep quality and worsening of pain symptoms during the period of social isolation. In the context of physical activity, 60% (n=9) of the participants discontinued the practice due to the COVID-19 pandemic. In the therapeutic domain, 40% (n=6) discontinued physical therapy treatment and 20% (n=3) discontinued psychotherapy.

In the sample, 93.3% (n=14) were not diagnosed with COVID-19. That is, only one participant was diagnosed with the disease and did not require hospitalization, but still reported having respiratory sequelae after COVID-19. In the family context, 13% (n=2) of the sample reported to have lived with family members diagnosed with COVID-19.

When performing the Shapiro-Wilk test, it was verified that the data related to the variables pain (p=0.45), anxiety (p=0.46), depression (p=0.10) and QoL (p=0.63) follow normal distribution. Therefore, the dependent measures t-test was used to compare means before and during social isolation. The summary of the comparison of means between the two periods analyzed is shown in table 1.

On average, participants showed higher levels of anxiety and pain intensity, reflecting in worsening of anxiety and pain symptoms during the period of social isolation, and this difference was statistically significant. Mean depressive symptoms and QoL differed minimally, showing no statistical significance.

## DISCUSSION

The present study investigated the context arising from the pandemic of COVID-19 and its potential relationship with pain and psychological symptoms in women with FM. Although pain is the symptom of greatest expression in this population, it commonly presents associated symptoms of depression and anxiety<sup>13</sup>. It is assumed that emotional reactions favor the exacerbation of physical symptoms in FM<sup>14</sup>. Therefore, the evaluation of these comorbidities in the pandemic period plays an important role in comprehending the impacts on the respective domains of the disease.

In the COVID-19 pandemic, a systematic review with meta-analysis referring to the general population highlighted an increase in mental disorders resulting from social isolation<sup>14</sup>. This same research presented studies that point out that chronic diseases are associated with higher levels of psychological stress in this context<sup>15</sup>. Thus, it was shown that social isolation can be dramatic for patients with chronic pain, reflecting in losses to their clinical conditions<sup>16</sup>.

From the analysis made in this study, an increase in anxiety levels was observed in women with FM during the isolation period. In this sense, it is important to highlight the several aspects that contribute to the exacerbation of the condition, enhanced by social withdrawal. In a clinical trial, a relationship between worse sleep quality and high anxiety levels was suggested<sup>17,18</sup>. Thus, the subjective worsening reported by 87% of the participants regarding sleep during quarantine may be related to increased anxiety symptoms during this period. Moreover, floods of catastrophic information about the current pandemic scenario were shared every day on the Internet, television and other media, which can be configured as a trigger to fear, nervousness, exacerbation of the non-restorative sleep already evidenced in FM and, consequently, anxiety.

In addition, another factor to be highlighted is the practice of physical activity. Regular physical exercise has been related to the normalization of neuroimmune signaling in the central nervous system, preventing and reversing hyperalgesia conditions<sup>19</sup>. Clinically, the literature points to the therapeutic potential of physical exercise in anxiety symptoms<sup>19</sup> and in FM<sup>21</sup>. Thus, in the context of health restrictions, more than half of the participants interrupted the practice of physical activities for months, losing therapeutic benefits, which may have negatively impacted the clinical condition of these women.

The increase in the BDI averages, related to the levels of depression in the population, was minimal and not statistically significant.

**Table 1.** Comparison of variable averages in the isolation and pre-pandemic periods

Variables	Pre-pandemic Mean(SD)	Social isolation Mean(SD)	p-value	Cohen's d test
Anxiety	22.33 (9.69)	29.80 (13.97)	p=0.006*	-0.296
Depression	19.86 (10.80)	20.20 (11.42)	p=0.94	-0.012
Quality of Life	1.59 (0.61)	1.63 (0.61)	p=0.46	-0.103
Pain	6.06 (1.62)	8.40 (1.50)	p=0.001*	-0.599

SD = standard deviation; Dependent t-test significance value \*p<0.05.  
Source: survey data, 2021.

cant. On the other hand, a systematic review with meta-analysis observed that patients with COVID and pre-existing clinical conditions (cancer, psychiatric disorders, and diabetes) had a higher prevalence of depressive symptoms compared to the general population during social isolation<sup>22</sup>. However, in view of the clinical particularities of FM, the relevance of a specific analysis focused on the condition was noted.

A survey with 340 participants conducted by the Spanish Pain Society (SED) observed that 91.4% of the participants confirmed that the confinement negatively affected their emotional state and 63% pointed out that their sleep worsened compared to prior to the pandemic. Similarly, 59.4% of the individuals with chronic pain perceived that the confinement aggravated their pain condition due to the sedentarism caused by the pandemic of COVID-19, considering that only 49% of the participants answered that they maintained the daily physical exercises recommended by doctors and physical therapists<sup>23</sup>.

Meanwhile, 87% of the participants in the present study showed an increase in their pain, with moderate to severe scores on the VAS. Factors such as loneliness linked to social withdrawal and increased level of concern and uncertainty in health care have been related to this scenario in the COVID-19 pandemic<sup>23</sup>. In this context, pain is characterized as a stressor and its sensory and emotional dimensions are closely correlated, and there are several psychological, social, and neurobiological factors that result in this painful cycle<sup>24</sup>.

A German study<sup>25</sup> noted that patients with painful polyneuropathy who experienced a change in social life as a consequence of the regulations had increased pain ratings, reported less QoL, and showed more catastrophizing thoughts. Thus, the social context in which the individual is embedded is highlighted, further prioritizing the negative impact of social changes brought about by the COVID-19 crisis and its potential effect on individuals living with chronic pain conditions<sup>26</sup>.

The sample's QoL, according to the statistical analysis, was unaltered. Although the participants suffered some negative impact from social isolation, they remained active in the context of performing their ADLs, such as household chores.

Accordingly, it was observed that QoL, two weeks after the beginning of social isolation, was not affected in a population with painful polyneuropathy (with and without social change)<sup>26</sup>. However, the authors justify this result with the hypothesis that data collection at later dates could reveal more substantial changes, since the collection was done in the initial weeks of confinement.

Although the present study had data from the period after the beginning of confinement, as suggested in the German study<sup>25</sup>, the results did not differ. In view of this, it was hypothesized that the results stemmed from the fact that the data collection period occurred during a relative reduction in social isolation. Thus, the participants were beginning to resume their work activities, so the negative impact on QoL could have been minimized, justifying the results presented. Nevertheless, although restrictive measures were being lightened, the participants reported that they felt apprehensive about

contracting the virus and remained reclusive at home for most of the day.

In contrast, a study that aimed to assess the impact of COVID-19-related distress in chronic pain patients compared to healthy individuals found that confinement caused moderate to extreme changes in habits outside the home, work, and home management in half of the survey participants and negatively impacted the QoL of both chronic migraine patients and healthy individuals<sup>26</sup>. Corroborating the above findings, several studies<sup>27-30</sup> have highlighted the negative impact on QoL, habits, behavior, and mental health in patients with chronic diseases and in the general population<sup>27-30</sup>.

The present study had limitations. Given the protective measures against the spread of SARS-CoV-2 established by the World Health Organization (WHO), the difference between the mode of assessment and re-evaluation of the participants during data collection may have interfered with the outcomes, occurring in person and virtually, respectively. In addition, other variables that could influence the results of this research, such as resilience and family support, were not evaluated. Other longitudinal studies should be developed to observe the present events in the chronological social changes throughout the pandemic, reflecting on other possible intervening variables. Another relevant factor refers to the data collection period, in which some of the participants were already returning to their work activities. However, this return was happening gradually, in a remote format, and the circumstantial factors of the pandemic were still strongly present.

The data presented reflect the reality of individuals with FM in the present sample, observing the increase in anxiety and pain symptoms and their possible associations with the pandemic context. For future perspectives, the clinical particularities in FM should be analyzed in the light of the biopsychosocial model of pain, since chronic pain is strictly associated with the development of social pain and physical pain. Social pain, in this specific context, can be potentiated by the fear of infection by the virus, loss of a close person, loss of a job, and anxiety arising from the new social scenario.

## CONCLUSION

Therefore, from the results found, one can observe differences between levels of pain intensity and anxiety between the period before and during the pandemic of COVID-19. That is, the COVID-19 pandemic may have negatively impacted pain and anxiety, making them more pronounced than before. Thus, this period may have been a possible aggravating factor in the clinical condition of individuals with pre-existing FM symptoms. However, other uncontrolled variables may have influenced this result, such as resilience and family support, for example. Despite the proposed reflections, the scientific evidence necessary to measure the contribution of the pandemic in the particularities of the clinical condition of FM is still scarce. Based on the exploratory analyses of the present study, new studies should investigate the effects of the pandemic period in populations with chronic pain and the respective implications in their clinical conditions.

## AUTHORS' CONTRIBUTIONS

### Géssika Araújo de Melo

Statistical analysis, Resource Management, Project Management, Methodology, Writing - Preparation of the original, Writing - Review and Editing

### Marcela Laís Lima Holmes Madruga

Statistical analysis, Data Collection, Research, Writing - Preparation of the original, Writing - Review and Editing

### Maria Beatriz Ribeiro de Oliveira

Data Collection, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing

### Nelson Torro

Funding acquisition, Resource Management, Project Management, Writing - Preparation of the original, Writing - Review and Editing, Supervision

## REFERENCES

- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, Cheng Z, Yu T, Xia J, Wei Y, Wu W, Xie X, Yin W, Li H, Liu M, Xiao Y, Gao H, Guo L, Xie J, Wang G, Jiang R, Gao Z, Jin Q, Wang J, Cao B. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395(10223):497-506.
- Hossain MM, Sultana A, Purohit N. Mental health outcomes of quarantine and isolation for infection prevention: a systematic umbrella review of the global evidence. *Epidemiol Health*. 2020;42:e2020038.
- El-Tallawy SN, Nalamasu R, Pergolizzi JV, Gharibo C. Pain management during the COVID-19 pandemic. *Pain Ther*. 2020;9(2):453-66.
- Miró E, Lupiáñez J, Hita E, Martínez MP, Sánchez AI, Bucla-Casal G. Attentional deficits in fibromyalgia and its relationships with pain, emotional distress, and sleep dysfunction complaints. *Psychol Health*. 2011;26(6):765-80.
- Bair MJ, Krebs EE. Fibromyalgia. *Ann Intern Med*. 2020;172(5):ITC33-ITC48.
- Meints SM, Edwards RR. Evaluating psychosocial contributions to chronic pain outcomes. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018;87(Pt B):168-82.
- Melo GA, Oliveira EA, Santos Andrade SMM, Torro N. Neuromodulation complementary to physiotherapy in fibromyalgia and its electroencephalographic correlates: a randomized clinical trial protocol. *Res Soc Dev*. 2020;9(9):e292996799.
- Kopf, A, Patel NB. Guia para o tratamento da dor em contextos de poucos recursos. Seattle: IASP. (International Association for the Study of Pain); 2010.
- Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol*. 1988;56(6):893-97.
- Cunha JA. Manual da Versão em português das Escalas Beck. Casa do Psicólogo, São Paulo, 2001.
- Beck AT, Steer RA, Carbin MG. Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clin Psychol Rev*. 1988;8(1):77-100.
- Bruce B, Fries JF. The health assessment questionnaire (HAQ). *Clin Exp Rheumatol*. 2005;23(5):S14.
- Bellato E, Marini E, Castoldi F, Barbasetti N, Mattei L, Bonasia DE, Blonna D. Fibromyalgia syndrome: etiology, pathogenesis, diagnosis, and treatment. *Pain Res Treat*. 2012;2012:426130.
- Ramiro Fde S, Lombardi Júnior I, da Silva RC, Montesano FT, de Oliveira NR, Diniz RE, et al. Investigation of stress, anxiety and depression in women with fibromyalgia: a comparative study. *Rev Bras Reumatol*. 2014;54(1):27-32.
- Salari N, Hosseini-Far A, Jalali R, Vaisi-Raygani A, Rasoulpour S, Mohammadi M, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Glob Health*. 2020;16(1):1-11.
- Piraccini E, Byrne H, Taddei S. Chronic pain management in COVID-19 Era. *J Clin Anesth*. 2020;65:109852.
- Andrade A, Vilarino GT, Sieczkowska SM, Coimbra DR, Bevilacqua GG, Steffens RAK. The relationship between sleep quality and fibromyalgia symptoms. *J Health Psychol*. 2020;25(9):1176-86.
- Diaz-Piedra C, Catena A, Sánchez AI, Miró E, Martínez MP, Bucla-Casal G. Sleep disturbances in fibromyalgia syndrome: the role of clinical and polysomnographic variables explaining poor sleep quality in patients. *Sleep Med*. 2015;16 (98):917-25.
- Sluka KA, Frey-Law L, Bement MH. Exercise-induced pain and analgesia? Underlying mechanisms and clinical translation. *Pain*. 2018;159(1):S91-S97.
- Kandola A, Vancampfort D, Herring M, Rebar A, Hallgren M, Firth J, Stubbs B. Moving to beat anxiety: epidemiology and therapeutic issues with physical activity for anxiety. *Curr Psychiatry Rep*. 2018;20(8):63.
- Del Pozo-Cruz J, Alfonso-Rosa RM, Castillo-Cuerva A, Sañudo B, Nolan P, Del Pozo-Cruz B. Depression symptoms are associated with key health outcomes in women with fibromyalgia: a cross-sectional study. *In J Rheum Dis*. 2017;20(7):798-808.
- Luo M, Guo L, Yu M, Wang H. The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and public - a systematic review and meta-analysis. *Psychiatry Res*. 2020;291:113190-9.
- Montero A, Pacheco de Vasconcelos SR. COVID-19 and chronic pain: many questions and few certainties. *Semergen*. 2020;46(6):365-7.
- Dueñas M, Ojeda B, Salazar A, Mico JA, Failde I. A review of chronic pain impact on patients, their social environment and the health care system. *J Pain Res*. 2016;9:457-67.
- Kersebaum D, Fabig SC, Sendel M, Sachau J, Lassen J, Rehm S, Hüllemann P, Baron R, Gierthmühlen J. The early influence of COVID-19 pandemic-associated restrictions on pain, mood, and everyday life of patients with painful polyneuropathy. *Pain Rep*. 2020;5(6):e858.
- Karos K, McParland JL, Bunzli S, Devan H, Hirsh A, Kapos FP, et al. The social threats of COVID-19 for people with chronic pain. *Pain*. 2020;161(10):2229-35.
- Consonni M, Telesca A, Grazzi L, Cazzato D, Lauria G. Life with chronic pain during COVID-19 lockdown: the case of patients with small fibre neuropathy and chronic migraine. *Neurol Sci*. 2021;42(2):389-97.
- Cerami C, Santi GC, Galandra C, Dodich A, Cappa SF, Vecchi T, Crespi C. Covid-19 outbreak in Italy: are we ready for the psychosocial and the economic crisis? Baseline findings from the PsyCovid study. *Front Psychiatry*. 2020;11:556-65.
- Solomou I, Constantinidou F. Prevalence and predictors of anxiety and depression symptoms during the COVID-19 pandemic and compliance with precautionary measures: Age and sex matter. *Int J Environ Res Public Health*. 2020;17(14):1-19.
- Chudasama YV, Gillies CL, Zaccardi F, Coles B, Davies MJ, Seidu S, Khunti K. Impact of COVID-19 on routine care for chronic diseases: a global survey of views from health-care professionals. *Diabetes Metab Syndr*. 2020;14(5):965-7.

