Acute psychological and behavioral effect of COVID-19 confinement measures in Spanish population

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Summary

Objective: The COVID-19 pandemic is now a major global health issue and quarantine is being applicated worldwide as a suppression measure. The aim of this study was to analyse the psychological and behavioural modifications associated with the first phase of the confinement period in Spanish population.
Material and method: Variables of anxiety, sleep quality, motivation, food intake and physical activity habits and body weight were analysed in ninety-one participants (35.7±10.4 years old) at the beginning of the quarantine, after three days, one week, two weeks and three weeks of the confinement decreed in Spain.
Results: A significant (P<0.05) increase of 20% prevalence was found in the number of participants that started to exercise. Despite this, anxiety levels increased throughout the confinement, being significant after 2 weeks of isolation compared to the initial moment. None of the other variables significantly presented modifications. Correlation analysis showed that anxiety levels were positively related to the number of daily food intakes and negatively to sleep quality. On the other hand, the time dedicated to aerobic exercise was negatively related to body weight and the number of intakes, and positively to the time dedicated to anaerobic exercise (p <0.05 for all correlations).
Conclusion: We found how first phase of confinement period in the COVID-19 pandemic in Spain produced a significant increase in anxiety levels, and subjects that started to exercise, do not significantly affecting body weight, food intakes, sleep quality and motivation of subjects. Higher food ingestions per day positively correlated with anxiety and negatively with sleep quality.

Key words:
Anxiety. Stress. Physical activity. COVID-19. Nutrition.

Efecto psicológico y conductual agudo de las medidas de confinamiento del COVID-19 en población española

Resumen

Objetivo: La pandemia de COVID-19 es ahora un importante problema de salud mundial y la cuarentena se está aplicando en todo el mundo como medida de supresión. El objetivo de este estudio fue analizar las modificaciones psicológicas y conductuales asociadas a la primera fase del período de encierro en población española.
Material y método: Se analizaron variables de ansiedad, calidad del sueño, motivación, ingesta alimentaria y hábitos de actividad física y peso corporal en noventa y un participantes (35,7 ± 10,4 años) al inicio de la cuarentena, después de tres días, una semana, dos semanas y tres semanas del confinamiento decretado en España.
Resultados: Se encontró un aumento significativo (P <0,05) del 20% de prevalencia en el número de participantes que comenzaron a hacer ejercicio. A pesar de ello, los niveles de ansiedad aumentaron a lo largo del confinamiento, siendo significativo a las 2 semanas de aislamiento respecto al momento inicial. Ninguna de las otras variables estudiadas presentó modificaciones significativas. El análisis de correlaciones mostró que los niveles de ansiedad se relacionaron positivamente con el número de ingestas de comida diaria y negativamente con la calidad del sueño. Por otro lado, el tiempo dedicado a ejercicio aeróbico se relacionó negativamente con el peso corporal y el número de ingestas, y positivamente con el tiempo dedicado a ejercicio anaeróbico (p<0,05 para todas las correlaciones).
Conclusión: Encontramos cómo la primera fase del período de encierro en la pandemia de COVID-19 en España produjo un aumento significativo en los niveles de ansiedad, y los sujetos que comenzaron a hacer ejercicio, no afectaron significativamente el peso corporal, la ingesta de alimentos, la calidad del sueño y la motivación de los sujetos. La mayor ingesta diaria de alimentos se correlacionó positivamente con la ansiedad y negativamente con la calidad del sueño.

Palabras clave:
Ansiedad. Estrés. Actividad física. COVID-19. Nutrición.

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Introduction

The COVID-19 pandemic is now a major global health issue, with no vaccines and heard immunity[1], this represent the most serious respiratory virus since the 1918 H1N1 influenza pandemic[2]. Governments are quickly responding worldwide with different counter measurements since epidemiologists relate 7.0 billion infections and 40 million deaths globally for the year 2020 if no-interventions were done[3]. Since there is no actual vaccine, suppression measures are taken worldwide in a continuous nor intermittent way for as long as the virus is circulating. Confinement is the main approach to prevent further the risk of spread the virus. Confinement is expected to reduce up to 60% of the transmissions of the COVID-19 outbreak[4] till progressively population is infected (70%) obtaining collective immunity[5]. Despite confinement has been used for centuries to control infectious diseases such as cholera, bubonic plague, or the severe acute respiratory syndrome (SARS) with successes[6,7], psychological implications are understudied.

Confinement refers to the separation and restriction of movement of people who have potentially been exposed to a contagious disease to ascertain if they become unwell, so reducing the risk of them infecting others[8,9] or the separation of people who have been diagnosed with a contagious disease from people who are not sick[8]. A recent review highlights the importance of providing effective and rapid information for people in quarantine (in addition to medical supplies)[10]. They also suggested that the confinement period should be short, and the duration should not be changed unless in extreme circumstances[10]. In Spain, in response to COVID-19 pandemic, confinement has extended more than 4 weeks, and subject to changes.

Canadian population confinement due to SARS experienced symptoms of posttraumatic stress disorder (PTSD) and depression (28.9% and 31.2% of the population respectively)[6]. Hospital staff who quarantined for 9 days ended having acute stress disorder, reporting exhaustion, detachment from others, anxiety when dealing with febrile patients, irritability, insomnia, poor concentration, indecisiveness, deteriorating work performance, and reluctance to work or consideration of resignation[11]. Parents and children who quarantined were compared to those who did not quarantine, finding a prevalence of stress scores four times higher in children who had been quarantined than in those who were not quarantined[12]. In the case of the COVID-19 China epidemic, previous researchers found a prevalence of 45.3% of moderate and severe depressive symptoms, from which 84.7% spent between 20-24 hours a day confined at home[13]. These indicences are modulated by the psychological profile, academic level of subjects[14,15].

However, the majority of people are not expected to suffer mental disorders in the actual pandemic[16], but a significant percentage of population will experience intense emotional adjustment reactions, including fear of contagion. The impact of prolonged confinement, in addition to the death of relatives and increased social adversity[17] may lead to psychological adverse effects, increasing the risk of emotional disturbance, depression, low mood, irritability, insomnia and posttraumatic stress symptoms[10].

Large differences between countries are expected both in the progression of the virus and the psychological effects of large confinements[18]. The aim of this study was to analyse the psychological and behavioural modifications associated with the first phase of the confinement period in Spanish population. We hypothesized that confinement would increase anxiety levels and modify previous behaviour of participants.

Material and methods

Participants

Ninety-one participants (35.7±10.4 years) volunteered to participate in this study. Prior to the beginning of the study, all participants were informed about the study procedures, indicating the right to withdraw from the study at any time, and providing written informed consent. The study was approved by the local ethics committee. All the procedure was conducted following the Helsinki Declaration (as revised in Brazil, 2013).

Design and procedure

A within-subjects study was conducted. The survey was anonymously completed by participants at the beginning of the quarantine decreed by the Government of Spain due to the state of alarm for the COVID-19 pandemic (day 1, March 17th; M1), and then after three days (day 3, March 20th; M2), and after one week (week 1, March 24th; M3), two weeks (week 2, March 31st; M4) and three weeks (week 3, April 7th; M5) of confinement.

Measures

Participants self-reported their morning nude body weight after voiding using their own scales, their perception of sleep quality the night before and motivation level ranging from 0 (minimum) to 100 (maximum), anxiety levels by the State-Trait Anxiety Inventory (STAI) short form[19], the number of steps performed the day before using accelerometery app of their mobile phones, the number of food intakes they did the day before, whether they performed exercise or not the day before, and if they did, how much time they spent performing aerobic and anaerobic exercise.

Statistical analysis

Descriptive statistics were presented as mean (M) and standard deviation (SD). Shapiro–Wilk test was used to confirm normal distribution of data. All variables were analysed using one-way analysis of variance (ANOVA) with repeated measures. After a significant F ratio (Greenhouse–Geisser adjustment for sphericity), pair-wise differences were identified using Tukey's (honest significant difference) post hoc procedure. The effect size was evaluated using the Cohen's d test. A bivariate correlation analysis between variables at M1 was performed using Pearson correlation analysis. The level of significant was set at $p < 0.05$. Data analysis was performed using SPSS software v. 21 (IBM, Chicago, IL, USA).

Results

At M1 ninety-one volunteers (56 men and 35 women) complete the survey. However, participants withdrew at every time point. At M2, 55 people complete the survey (25 m and 30 w), 40 (22 m and 18 w) reported at M3, and finally, 20 participants (11 m 9 w) completed the survey at M4 and M5. Participants age at every time point were 35.7 ± 10.4 at M1, 37.3 ± 9.9 at M2, 37.6 ± 10.2 at M3, and 37.2 ± 9.5 at M4 and M5 respectively with no significant differences between them.

Participants' body weight increased among weeks although it was not statistically significant. However, there was a significant increase of 20% prevalence in the number of participants that started to exercise. In this line, the time spent in aerobic (F=0.74; p=0.47) and anaerobic (F=1.45; p=0.26) exercise were not significantly different among time points with a low effect size for aerobic and anaerobic exercise between M1 and M5 (medium effect size of 0.12 and 0.28 respectively, Figure 1). Further, the number of steps performed, and the amount of food intakes were similar every time point.

We found an increase anxiety along time points (medium effect size), being statistically significant at M4 compared to M1. Besides, there was a decrease in sleep quality (medium effect size) along with time points although these were not statistically significant. Finally, the level of motivation remained similar in every report (Table 1).

The correlation analysis showed several significant correlations: bodyweight negatively correlates with the time spent in aerobic exercise. The number of food intakes correlates in a positive way with anxiety and motivation, and negatively with sleep quality and the time spent in aerobic exercise. Anxiety negatively correlates with sleep quality. And finally, the time spent in aerobic exercise positively correlates with the time spent in anaerobic exercise (Table 2).

Discussion

This study aimed to analyse the psychological and behavioural changes associated with a 3-weeks confinement period. The initial hypothesis was partially confirmed since anxiety levels increased, but only exercise habits presented modifications.

The COVID-19 pandemic can make challenging to maintain a physically active lifestyle, most of the citizens do not dispose of any equipment for physical activity, such as weights, treadmills nor exercise bikes at home, which in addition to the limitation of movement and outdoors activities, limited the physical activity of the population. In this line, institutions such as the American College of Sports Medicine (ACSM) or the World Health Organization (WHO) are giving guidelines and proposing routine of exercises[20,21], remarking the importance of staying active since physical activity strengthens immunological and inflammation processes, having a positive effect on viral respiratory infections[22], and preventing/treating chronic diseases such as cardiovascular diseases, cerebrovascular diseases, diabetes or cancer[23]. This is the vital importance since all of them increase the risk of severe illness

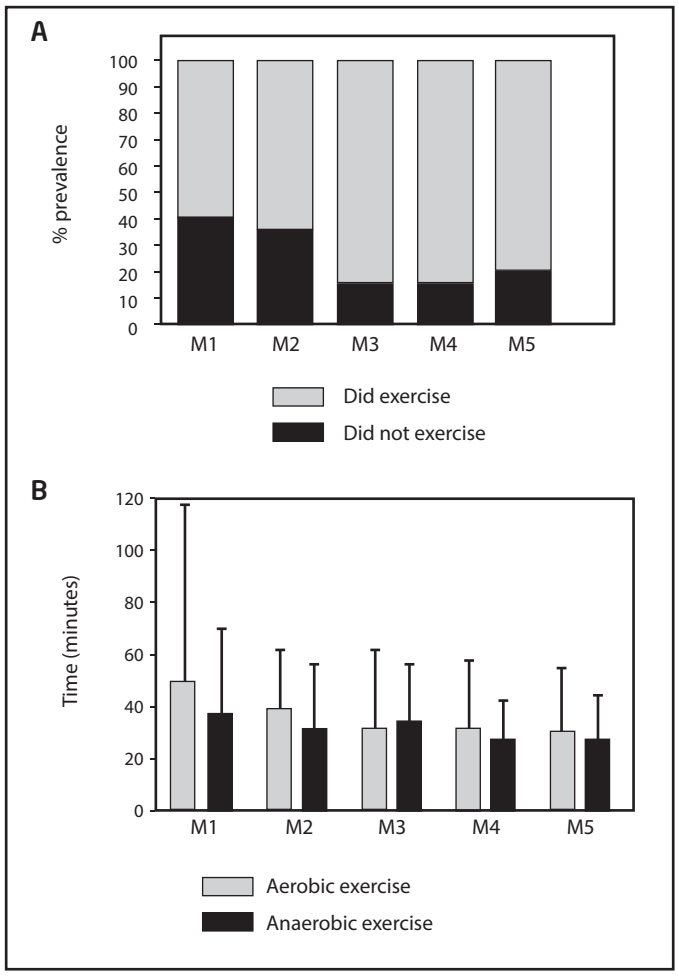
Table 1. Table 1. Body weight, number of food intakes, number of steps performed, anxiety level, sleep quality and motivation level at the beginning of the covid-19 quarantine in Spain (M1), after three days (M2), after 1 week (M3), after 2 weeks (M4) and after 3 weeks (M5). Data are presented as mean ± SD. *Significantly different than M1 p=0.05.

	M1	M2	M3	M4	M5	F	p	Cohen's D M1 vs M5
Body weight (kg)	70.8 ± 13.7	70.1 ± 13.7	71.5 ± 13.8	71.6 ± 13.8	71.7 ± 13.8	0.69	0.44	-0.07
Number of food intakes	4.1 ± 1.3	4.1 ± 1.1	3.8 ± 0.8	3.9 ± 0.9	4.0 ± 0.9	0.86	0.43	0.08
Number of steps	5072.1 ± 4788.2	4433.7 ± 3065.1	4474.3 ± 4029.8	5159 ± 3476.9	5075.2 ± 3720.7	0.38	0.66	-0.001
Anxiety	11.7 ± 3.2	13.4 ± 3.8	12.9 ± 3.2	13.5 ± 3.6*	13.2 ± 3.6	1.18	0.05	-0.47
Sleep quality	77.3 ± 13.1	76.5 ±13.9	75.2 ± 12.9	73.5 ± 17.6	71.5 ± 17.5	0.98	0.39	0.44
Motivation	68.5 ± 19.4	67.5 ± 19.1	69.5 ± 13.5	67.5 ± 20.7	67.8 ± 20.0	0.09	0.87	0.04

Table 2. Correlation analysis of variables during the confinement.

		Anxiety	Sleep quality	Motivation	Time spent in aerobic exercise	Time spent in anaerobic exercise
Body weight	Pearson correlation coefficient	,064	-,043	-,092	**-,183***	,044
	P value	,338	,528	,230	,028	,606
Number of food intakes/day	Pearson correlation coefficient	**,163***	**-,211***	**,156***	**-,213***	-,092
	P value	,014	,002	,041	,011	,273
Anxiety	Pearson correlation coefficient		-,180	,000	,007	-,080
	P value		,037*	,998	,932	,339
Time spent in aerobic exercise	Pearson correlation coefficient					**,261***
	P value					,003

Figure 1. A. Participants that did or did not exercise and B. Time spent in aerobic and anaerobic exercise by those who engaged exercise at the beginning of the COVID-19 quarantine in Spain (M1), after three days (M2), after 1 week (M3), after 2 weeks (M4) and after 3 weeks (M5). Data in panel A are presented as the percentage of prevalence. Data in panel B are presented as mean ± SD.



and death among those infected with the SARS-CoV-2[24]. Interestingly, the analysis of results obtained in the present research highlighted that subjects performed 25% steps below the recommended 7500 daily threshold and half-way between the sedentary 2500 steps per day associated with significant changes in mortality[25], with an increase of 20% prevalence in the number of subjects that started to exercise from M1 to M3 maintained till the end of this study, despite no statistically significant changes in terms of body weight, amount of exercise, or the number of daily food intakes among periods were found. However, the minimum of physical activity is not being achieved. Regarding the new studies, due to the novel characteristics of COVID-19 and its potential impact on the immune system, being more cautious regarding continuing exercise in symptomatic patients seems reasonable[26], but encouraging asymptomatic and those quarantined to overcome the present values and maintain daily physical activity is recommended.

In the present context, its normal to perceive and somatise high levels of anxiety, resulting from the perception of lack of control to adapt to contextual demands[26] and the imposition of a restriction of liberty or perception of non-voluntary self-isolation[26]. Its health impact may be related to the duration of the quarantine (longer periods are associated with poorer mental health, avoidance behaviours and anger), the fear of infection, frustration and boredom, inadequate supplies (e.g. water, clothes, accommodation) or inadequate information[10]. In the present study we found how after 3 weeks the anxiety levels increased significantly, showing how confinement caused an increase in the stress response of the individuals. This parameter is important because it could make the subject try to break the rules of confinement, putting himself and the rest of the population at risk. In addition, the small effect size decrease on sleep quality evaluated, evidenced the effect of anxiety response in basic biological function as it is sleep. The combination of anxiety and sleep disturbance are two important facts that could compromise health[27], therefore they must be considered for possible interventions in this situation.

Being active present important benefits on mental health, which may help ongoing stress and avoid psychological illness[28], presenting acute bouts of exercise a small reduction in state anxiety[29]. We found how the confinement increased the prevalence of exercise of the population analysed, showing aerobic and anaerobic exercises similar expended times. This result differs from the average of the physically active population in Spain (43%)[30], probably showing how the group of participants in the present study were mainly physical activity active or with a tendency to practice in physical activities, increasing their practice with confinement. The increased anxiety levels evaluated in the present research was in line with the evaluated in China[13]. In this line, with higher anxiety, an increase in depression symptom (the leading cause of disability in the world) is expected[31]. Since the minimum physical activity requirements are not being achieved, an increase and worsening of chronic diseases is expected, only three sessions per week may have a reduction of 35% in all-cause mortality risk[32], being both the leading causes of death globally, according to the WHO estimations[33,34]. Every single session of physical activity may attenuate symptoms of depression and anxiety, so being active every day can be an antidote to the induced stress of being confined.

We found a positive correlation between anxiety and number of food intake per day. This information is highly relevant, since previous authors related the existence of "stress eaters", in where subjects submitted to emotional or environmental aggressions/stress exhibit compulsive eating responses[35]. In addition, we found a negative correlation between sleep quality and number of food intake per day. Individuals with poor sleep quality are more likely to consume high-density energy-rich foods with higher proportions of calories from fats or refined carbohydrates than subjects with more regular and quality sleep[36]. These correlations could be showing a vicious circle in where anxiety is retro alimented by the increased food intakes and the poorer sleep quality, that increase anxiety, closing the circle. Thus, exposure to a "stressor stimuli/environment" does not inevitably cause stress, but the behaviours associated may do. Greater number of food intakes are related to low nutritional profile, calorically high and pro-inflammatory foods (e.g: salty, sweets), which leads to deficiency in vitamin D, niacin,

folate, vitamin B6, Vitamin B12, and omega-3 fatty, increasing the susceptibility to stress and depression[37]. This increased anxiogenic response due to the stress situation of the quarantine may disrupt the balance between cortisol and other hormones that negatively affect the immune system[38], worsening COVID-19 symptomatology. Finally, the number of subjects that continue with the questionnaire tends to low up among time, exposing a decrease in the commitment of subjects and their psychological state. Subjects who kept fulfilling the questionnaire are those who maintained their weight and stayed physically active among quarantine, being no significant differences among moments evaluates, which can further reinforce the positive effect of physical activity.

Because physical activity has immediate effects on the immune and inflammatory system, the population can attenuate the risk of severe viral infections and their risk from multiple chronic diseases by simply taking an indoor walk every day. In addition, due to the acute effects of physical activity, being active every day can be an antidote to the induced stress of being quarantined. Furthermore, physical exercise and social support have been proven to buffer or ameliorate the adverse effects of stress on health[39]. In addition, psychological interventions to reduce the increased anxiety levels, as well as, nutritional recommendations and/or recommendations for quarantine would be also helpful tools to reduce anxiety as previous authors found[40].

Finally, we recognized as a limitation the low number of participants of the present research. The demanding stressful circumstances, the speed in the design and distribution of the questionnaires limited to reach a higher population. Even with these limitations, we present the evolution of subjects before and during the first phase of confinement period in the COVID-19 pandemic in Spain, showing the impact of the confinement in the psychological and behavioural status of participants. Future research should monitor the effect of longer periods of quarantine at different psychological and physiological levels.

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Conflict of interests

The authors do not declare any conflict of interests.

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Authors' contribution statement

All authors equally contributed to this research.

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