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ORIGINAL

PHYSICAL ACTIVITY IN YOUNG CHILEAN WOMEN DURING COVID-19 LOCKDOWN

ACTIVIDAD FÍSICA EN MUJERES JÓVENES CHILENAS DURANTE EL CONFINAMIENTO POR COVID-19

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ABSTRACT

Objective: This study answers the question: Are there differences in the level of physical activity of Chilean women before and during the COVID-19 lockdown? **Method:** The study has a non experimental longitudinal trend design with n = 1,051 young Chilean women. Differences in the level of physical activity between the pre (preCOVID) and post (COVID-19) groups were measured and, in the case of the COVID-19 sample, contrasted with theoretical data from both previous physical activity studies and national government questionnaires. **Results:** the women of the COVID-19 group present lower levels of physical activity than the women of the preCOVID sample as well as vis-à-vis the samples of women from previous empirical studies. **Conclusion:** in times of COVID-19,

young Chilean women present a lower level of physical activity than in previous times without lockdown due to the pandemic.

KEY WORDS: Health; Preventive medicine; Leisure time activities; COVID-19; Coronavirus; Lockdown.

RESUMEN

Objetivo: El presente estudio da respuesta a la pregunta: ¿Existen diferencias en el nivel de actividad física de mujeres chilenas antes y durante el confinamiento por COVID-19? **Método:** El estudio tiene un diseño no experimental longitudinal de tendencia con un n=1.051 mujeres chilenas jóvenes. Se midieron las diferencias en el nivel de actividad física entre los grupos pre (preCOVID) y post (COVID-19); y de la muestra COVID-19 con los datos teóricos tanto de estudios de actividad física previos como de encuestas nacionales gubernamentales. **Resultados:** las mujeres del grupo COVID-19 presentan niveles de actividad física significativamente más bajos que las mujeres de la preCOVID y que las muestras de mujeres de estudios empíricos anteriores. **Conclusión:** en tiempos de COVID-19 las mujeres jóvenes chilenas presentan un nivel de actividad física significativamente menor que en tiempos previos al confinamiento.

PALABRAS CLAVE: Salud; Medicina preventiva; Actividad de tiempo libre; COVID-19; Coronavirus; Confinamiento.

INTRODUCTION

The pandemic outbreak brought about by COVID-19 is a disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which originated in the city of Wuhan, China, in December 2019 (Liu et al., 2020). On 11 March 2020, the World Health Organization (WHO) declared this illness to be a pandemic (Viner et al., 2020).

With regard to Chile, the numbers as of 22 July 2020 were 336,402 people infected and 8,722 deceased due to COVID-19 (MINSAL, 2020). This situation motivated the authorities to implement strategies aimed at hindering the propagation of the virus, specifically quarantine, lockdown and social distancing (Crisafulli & Pagliaro, 2020). These measures have led people to cut down on their physical activity (PA) (Dunton et al., 2020; Hall et al., 2020). In fact, physical inactivity has also been categorised as a pandemic (Kohl et al., 2012).

Physical inactivity is a worldwide trend and constitutes a risk factor for chronic non-communicable diseases, different types of cancer, fractures, depression and higher mortality rates (Barker et al., 2019; Guthold et al., 2018; WHO, 2009). In this respect, the female population is especially affected, as shown in the results of the latest Chilean national health questionnaire (ENS), which indicates that 90% of women over 15 years old are sedentary (Ministerio de Salud, 2018). Moreover, the Encuesta Nacional de

Actividad Física y Deporte (ENAFD - Chilean National Physical Activity and Sports Survey) evidences a significant gender difference, revealing that while 45.3% of men are “active”, in women this figure is only 25.8% (Ministerio del Deporte [ENAFD], 2018).

Physical inactivity is the fourth cause of death at a global level, and the empirical evidence indicates that it represents 6% of worldwide mortality. This figure increases if we take into account the WHO population studies, which indicate that 31% of the world population over 15 years old does not comply with the minimum suggested PA recommendations (Kohl et al., 2012; WHO, 2010).

Specifically, the WHO recommendations indicate a minimum 150 minutes of moderately intensive PA weekly, or 75 minutes of vigorous intensity PA, or else an equivalent combination of moderate and vigorous activities in order to obtain full health benefits (WHO, 2010) and particularly those related to the correct functioning of the immune system, a necessary condition in the pandemic context in which we are living today.

However, the social distancing and lockdown imposed and/or suggested by the authorities is based on the assumption that these measures would help mitigate the transmission of COVID-19 (Hou et al., 2020; Lau et al., 2020; Nussbaumer-Streit et al., 2020), but they have also favoured the propagation of another pandemic: physical inactivity (Chen et al., 2020; Lippi et al., 2020; Mattioli et al., 2020).

The evidence confirms a reduction in the amount of PA of the population at all levels, as indicated in studies performed in the United States (Dunton et al., 2020) and Spain, where high intensity (vigorous) and low intensity activities such as walking have decreased significantly (Castañeda-Babarro et al., 2020).

The reduction in the PA level in Spain also affects minors, revealing a decline in the amount of time school students in COVID-19 lockdown devote to PA, because the physical education teachers have privileged the teaching of theoretical content, “relegating physical activity to second place” (Baena-Morales et al., 2020, p. 393).

In Canada, the results show differences depending on the degree of PA carried out prior to the pandemic. Specifically, 40.5% of the inactive population reported to have practised less PA than before the COVID-19 lockdown, whereas the active population reported higher levels of PA during lockdown (Lesser & Nienhuis, 2020).

Authors who have researched the subject of PA in times of COVID-19 lockdown have stated that the available evidence is still insufficient to demonstrate the effect of COVID-19 on PA (Simpson & Katsanis, 2020). Empirical studies already exist, however, which point to the efficiency of PA to counteract the negative psychological effects of social isolation (Brooks et al., 2020; Goethals et al., 2020), reducing the inflammation and incidence (Duggal et al., 2019; Nieman & Wentz, 2019), symptoms, duration and severity of viral respiratory diseases and their resulting mortality (Grande et al., 2020). PA is also beneficial to deter the reactivation of one or more latent viruses and improve the immune response to vaccinations (Agha et al., 2020; Duggal et al., 2019).

Another major factor associated with PA is the body mass index (BMI). In this regard, studies show that the quarantine due to the COVID-19 pandemic has increased the BMI of the population in general (Rundle et al., 2020; Zachary et al., 2020). This can influence the activation of chronic inflammatory mechanisms and the alteration of the immune response (Petrakis et al., 2020; Simonnet et al., 2020), increasing the risk of experiencing a severe case of COVID-19 (Cai et al., 2020), the need to be admitted to intensive care units (ICU) (Simonnet et al., 2020), mechanical ventilation (Caussy et al., 2020) and the risk of dying (Hajifathalian et al., 2020).

Taking into account the above information, the question that this article seeks to answer is: are there differences in the level of PA of young Chilean women before and during the COVID-19 lockdown?

In connection with the research question, two specific objectives are proposed:

1) to compare the PA level of young Chilean women before the pandemic and during the COVID-19 lockdown; 2) corroborate whether there are significant differences between active and inactive women depending on their age, socioeconomic status and nutritional condition during the COVID-19 lockdown; and 3) compare the results of the PA level of Chilean women in studies conducted prior to COVID-19 with those obtained during the COVID-19 lockdown.

METHOD

Study design

The study has a non experimental longitudinal trend design, given that changes take place over time within a young female population (Hernández et al., 2006).

Participants

The participants (n= 1,051) are divided into two samples gathered before and during COVID-19 by means of an online questionnaire (Google form).

The data collecting process took place between 30 May and 15 June 2020. During this period there were over 105,000 people infected and 1,100 dead in Chile. A state of emergency had been declared, therefore sanitary measures had been put in place, such as closing all borders, implementing quarantine and sanitary cordons, curfews, setting up sanitary residences and field hospitals in order to avoid the collapse of the health system.

Sample 1 (hereinafter "COVID-19" sample) is made up of n=810 Chilean women. The average age is 24.26 ± 6.05 ; their socioeconomic status is 30.5% low, 53.3% middle and 17.2% high.

Of these, 62.1% are inactive and 37.9% active according to WHO criteria (MINSAL, 2018; Ministerio del Deporte, Chile, 2018; WHO, 2010); in terms of levels of physical activity, 47.9% are low, 27.8 moderate and 24.3% high.

Sample 2 (hereinafter “preCOVID” sample) is made up of university students in Temuco, Chile. The questionnaire was completed by the participants online and *in situ*, and could be answered via a smartphone or computer connected to the Internet. The data collecting process took place from April 2018 to June 2018.

The preCOVID sample is made up of n=241 Chilean women. The average age is 23.82 ± 5.69 ; their socioeconomic status is 28.6% low, 62.7% middle and 8.7% high.

Of these, 59.3% are inactive and 40.7% active; in terms of levels of physical activity, 29.9% are low, 36.1% moderate and 34% high.

It is useful to mention that in order to meet objective 1, a random selection of cases from the COVID-19 sample was made in order to equate the samples and limit bias due to differences in age or socioeconomic status. Specifically the COVID-19 sample used for objective 1 was n=668 women with an average age of 23.89 ± 5.48 and a socioeconomic level the same as the preCOVID sample: 28.6% low, 62.7% middle and 8.7% high.

Before the participants answered the questionnaire, they were informed about the purpose of the study and gave their informed consent to participate by choosing the “Yes” option to the question “Do I accept to participate in this research?”

Instrument

For the data collecting process a fully anonymous, voluntary online questionnaire was provided, self-administered via the Internet, which made it possible to get to know the PA level using the International Physical Activity Questionnaire (IPAQ) validated in Spanish and in its application to the Chilean population (Craig et al., 2003; Serón et al., 2010).

The PA level of the participants was categorised as active if the WHO recommendations were met, specifically carrying out 150 min/week of moderate PA or 75 minutes of vigorous PA (WHO, 2010). Socioeconomic status was measured by means of the ESOMAR matrix, used to measure this indicator in a Chilean context (Adimark, 2000; Serón et al., 2010).

Statistical analysis

The analyses were conducted using the SPSS v257 software and IPAQ-SF Scoring system (Cheng, 2016). First of all, the descriptive data of the sample were measured. Continuous variables are expressed in terms of means (M) and standard deviations (SD) and the categorical variables in frequencies and percentages. The Chi-squared (χ^2) test was used to compare the categorical variables and the comparisons of the continuous

variables with the Mann-Whitney U test, because the normality of the sample calculated via the Kolmogorov-Smirnov test resulted in $p < 0.05$. For the answer to the research question, a χ^2 test was carried out for a sample using the theoretical data provided by the ENAFD (2018), and the Kruskal-Wallis h test.

RESULTS

The descriptive data of the sample gathered in times of COVID-19 lockdown are presented based on the differences between active and inactive women adjusted by age, level of physical activity, socioeconomic status and nutritional condition (Table 1)

Table 1. Cross data of the sample in times of COVID-19

Variables	Inactive	Active	Total	p value
	PA <150 min/week moderate intensity or PA <75 min/week vigorous intensity	PA >150 min/week moderate intensity or PA >75 min/week vigorous intensity		
n	503	307	810	
Age in years, n (SD)				
Age	24.02 (6.26)	24.64 (5.68)	24.26 (6.05)	$p = 0.002$
Level of Physical Activity, n (%)				
Low	364 (72.4)	24 (7.8)	388 (47.9)	$p < 0.001$
Moderate	130 (25.8)	95 (30.9)	255 (27.8)	
High	9 (1.8)	188 (61.2)	187 (24.3)	
Socioeconomic Status, n (%)				
Low	156 (31.0)	91 (29.6)	247 (30.5)	$p = 0.699$
Middle	265 (52.7)	159 (51.8)	424 (53.3)	
High	82 (16.3)	57 (18.6)	139 (17.2)	
Nutritional condition, n (SD)				
Height	1.60 (0.06)	1.60 (0.06)	1.60 (0.06)	$p = 0.240$
Weight	64.92 (12.47)	63.93 (11.53)	64.91 (12.48)	$p = 0.149$
BMI	25.60 (4.88)	24.81 (4.29)	25.30 (4.67)	$p = 0.033$

SD=Standard Deviation; n= Frequency; %= percentage.

In answer to objective 1, the results regarding the PA of the women of both groups (Table 2), show that women during the COVID-19 lockdown (Low PA = 51.8%; Moderate PA = 26.2%; High PA = 22%) display significantly lower percentages than those of the preCOVID sample in terms of physical activity (Low PA = 29.9%; Moderate PA = 36.1%; High PA = 34%; $\chi^2=153.523$, $p < 0.001$).

In the comparison made with regard to metabolic cost, the results show that women in COVID-19 lockdown have a lower metabolic cost (Me=691 MET/min/week) than in preCOVID periods (Me=1275 MET/min/week, Wilcoxon=17,591.5; $p < 0.001$).

The results of the measurement of the inactive women of both groups show that, in times of COVID-19 their metabolic cost is significantly lower (Me=297 MET/min/week) than that of the inactive preCOVID women (Me= 594 MET/min/week; Wilcoxon=29,483.5; $p < 0.001$).

In terms of the comparison between active women of both groups, the results show that the active women in times of COVID-19 have a significantly lower metabolic cost (Me= 2.290 MET/min/week) than the preCOVID women (Me=2.838 MET/min/week; Wilcoxon=9,420; $p = 0.001$).

Table 2. Comparison between preCOVID and COVID-19 groups

Grupos	preCOVID-19	COVID-19	
IPAQ			
Low	29,9%	51,8%	
Moderate	36,1%	26,2%	$p < 0,001$
High	34,0%	22,0%	
Gasto Metabólico (Mets/min/week)			
Inactivas	594	297	$p < 0,001$
Activas	2.838	2.290	$p = 0,001$
Activas e inactivas total	1275	691	$p < 0,001$

In connection with objective 2, our results reveal significant differences (Table 1) between the groups of active and inactive women adjusted by age ($p < 0.01$), PA level according to the IPAQ questionnaire ($p < 0.01$) and body mass index ($p = 0.03$). However, in our sample, the family socioeconomic status of the women is not a differentiating factor between active and inactive women (Kruskal-Wallis $h = 0.51$, $p = 0.475$)

With regard to objective 3, the most recent accepted theoretical results indicate that 74.2% of Chilean women are inactive (Ministerio del Deporte, 2018). This differs significantly from the sample taken during the COVID-19 lockdown period, where inactive women represent 62.1% ($\chi^2 = 61.96$, $p < 0.001$).

Moreover, the results were checked against the latest study on PA in Chilean women (Morales, 2017), which shows that 42.5% had a low level of PA, 46.3% moderate and 11.3% high. This differs significantly from the sample gathered during the COVID-19 lockdown. In this group, 47.9% of the women have a low level of PA; 27.8% moderate and 24% high ($\chi^2 = 187.29$, $p < 0.001$).

DISCUSSION

Our results reflect how the pandemic has made currently inactive women even more inactive, and active women have also reduced their level of physical activity.

Comparing the samples studied prior to and during the coronavirus pandemic, it is observed that the level of PA in young women decreased significantly. These findings coincide with the results obtained with samples from the United States (Dunton et al., 2020) and Spain (Castañeda-Babarro et al., 2020), which reveal that the population showed a decline in its PA in times of COVID-19 lockdown. However, our findings differ from the study carried out in a Canadian population (Lesser & Nienhuis, 2020), where the results indicate that the active population has increased its level of physical activity.

Another difference observed between our findings and the pre-COVID literature is that the age of active women was older on average than that of inactive women. It is necessary to note, however, that the age difference is not substantial but it does have a high level of significance. These results differ from those of ENAFD (2018), because that survey indicates that PA levels decrease with age.

We also found another difference with the current evidence related to socioeconomic status as a factor influencing the PA level (Ministerio del Deporte, 2018). Our findings reveal that, in pandemic times, the PA level does not exhibit significant differences in terms of family socioeconomic status, contrary to the ENAFD (2018) results.

Moreover, sedentarism is significantly lower in COVID-19 times than the levels shown in ENAFD (2018) and the theoretical data of Morales (2017). This difference can be explained by the fact that women state that they do not practise PA because “they don’t have time” (Ministerio del Deporte, 2018), a factor that can be eliminated in COVID-19 times, because quarantine has supposedly allowed people to have more time to devote to other activities, such as, for example, exercising at home. This difference could also be due to the average age of our sample, which is lower than that of both the ENAFD (2018) and Morales (2017) studies.

In terms of the importance of physical activity, it is useful to note that the theory is compelling in demonstrating empirically that a reduction in PA levels has repercussions on mental health (Brooks et al., 2020), reduces sexual desire in young people (López-Rodríguez et al., 2020), diminishes the immune system response (Fallon, 2020; Simpson & Katsanis, 2020), bone mineralisation and strengthening (López-García et al., 2019) thus increasing the risk of osteoporosis (Castrogiovanni et al., 2016), increases the risk of cardiovascular events (Mattioli et al., 2020) as well as non communicable chronic diseases such as diabetes (Bhaskarabhatla & Birrer, 2005) and cancer (Sanchis-Gomar et al., 2015) among others.

The latest review on the metabolic impact of the COVID-19 lockdown (Martinez-Ferran et al., 2020) evidences that abruptly reducing the level of PA has a short term impact, specifically in increasing insulin resistance, total body fat, abdominal fat and pro-inflammatory cytokines. All these factors have been strongly associated with the development of metabolic syndrome. It has also been reported that acute physical inactivity reduces VO_2 max and muscle mass levels, and this reduction in turn is directly associated with a lower life expectancy (Barrios et al., 2018).

The limitations of this research are due in large part to the fact that the information was gathered during the period of highest proliferation of contagions in Chile. This is particularly relevant in terms of the BMI measurement, because the calculation was made based on the data provided by the participants without measuring this factor with our own instruments. Consequently, we recommend that the results adjusted to the BMI be used solely as a reference.

A second suggestion is in line with the assertions of Urbaneja et al. (2020), who propose that the data provided should be considered to assist in understanding the evolution of and adaptation to this “new reality” by people who practise sports. However, from our study we also suggest that a follow-up be made of inactive or sedentary people who represent 31.1% of the world population (Kohl et al., 2012) and in the case of Chilean women, constitute 90% (Ministerio de Salud, 2018).

The strength of our study is the n=810 young Chilean women during the COVID-19 lockdown period, which makes it possible to obtain reliable results regarding the young female population. Therefore, the results obtained in this research can be considered as a theoretical datum for future post-pandemic comparisons aimed at verifying the PA levels of the young female population.

CONCLUSION

In times of COVID-19 lockdown, young Chilean women present a significantly lower PA level than in times prior to COVID-19. For this reason, the current coronavirus pandemic is intensifying the pandemic of physical inactivity and its catastrophic effects on global public health, on the economy of the countries and above all on the quality of life of women and the population in general.

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