

Impact of quarantine due to COVID-19 on female urinary incontinence during exercise in CrossFit practitioners: an observational study

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Research Article

Keywords: CrossFit, cross-sectional study, urinary incontinence, air squat, COVID-19, quarantine

Posted Date: July 23rd, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-43711/v2>

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Version of Record: A version of this preprint was published at Revista Brasileira de Ginecologia e Obstetrícia / RBGO Gynecology and Obstetrics on July 16th, 2020. See the published version at <https://doi.org/10.1055/s-0041-1739463>.

Abstract

Introduction and hypothesis: Urinary incontinence (UI) during exercise (athletic incontinence) affects about 30% of CrossFit practitioners. Due to the COVID-19 pandemic, CrossFit academies were closed, impacting on several dimensions of the health of these athletes. We aimed to evaluate the effect of quarantine due to COVID19 pandemic on the training volume and UI during exercises for female crossfitters.

Methods: A cross-sectional study was performed among 197 female CrossFit practitioners. An online questionnaire was emailed containing questions about frequency, duration and intensity of training and data related to the COVID-19 pandemic. Whether UI stopped among participants, they were asked about the possible reasons why this happened. A 5% significance level was established.

Results: Mean age of the participants was 32 years old, with an average frequency of training of 50 minutes per day, four times/ week. Most participants lived in an apartment (65.5%) and with another person (40.1%). Main CrossFit training location during quarantine was inside home (55%). There was a decrease in training intensity in 64% of the respondents. Exercises with their own body weight, such as air squat (98.2%) followed by push up (92.2%) were the most performed. UI was reported by 32% of participants before the COVID-19 pandemic, and only 14% of them during the pandemic (OR = 0.32[0.19-0.53], $p < 0.01$; univariate analysis). Practitioners reported that the reason possibly related to UI improvement was the reduction of training intensity and not performing double under exercise.

Conclusion: Quarantine by COVID-19 reduced in 18% of UI during exercises by CrossFit practitioners.

Introduction

Urinary incontinence (UI) during exercise, also termed athletic incontinence, is defined as the involuntary loss of urine during physical exercise [1]. High performance and high impact sports, such as acrobatic trampoline, weightlifting and long-distance running, may cause a two-fold to increase the odds for UI in young athletes [2,3]. In middle-aged women, losing urine significantly limits physical activity [4,5].

Recent studies have shown that the prevalence of UI in CrossFit practitioners is around 30%, with skipping rope the most related to this event [6,7]. The etiopathogenesis of this condition is related to the increase in intra-abdominal pressure that is not balanced by the contraction of the pelvic muscles [8]. In addition, the displacement of the pelvic organs during the skipping rope movement also precipitates urine loss [9].

Due to the COVID-19 pandemic, the Ministry of Health counselled quarantine in March 2020 and ordered the closure of non-essential services, including CrossFit gyms [10]. Patients affected by the mild form of the disease were instructed to undergo social isolation and the most severe cases were referred to the health service [11,12]. However, staying physically active during the COVID-19 pandemic was a recommendation by the World Health Organization (WHO) to maintain immunity [9,10]. Thus, it is not

known how sports people have adapted their training during quarantine and whether modifying their sport schedule could impact UI. Given that, we sought to evaluate the effect of quarantine and social isolation due to the COVID-19 pandemic on the training volume of women practicing CrossFit and the impact on UI.

Methods

This cross-sectional study was conducted immediately after the quarantine of Brazil (March 2020) following the guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology Statement (STROBE) guidelines. Institutional Review Board of Federal University of São Paulo approved our study protocol (CAAE 31964920.1.0000.5505) and respondents would read and signed an informed consent before starting an online survey. Thus, after signing a yes-no question to confirm their willingness to participate voluntarily, they completed a questionnaire. Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research

A Google Forms (<https://forms.gle/9HbTvZEAgTbxExvy7>) questionnaire was sent to athletes registered on the site www.crosscontinencebrazil and who had already

participated in a survey on athletic incontinence [6]. Inclusion criteria were nulliparous women between 18-45 years, who had training in accredited CrossFit gym before quarantine at a CrossFit gym in the Brazil (maps.crossfit.com). Exclusion criteria

consisted of training independently outside of a CrossFit gym, previous parity, and patients with UI occurring not only during physical activity.

The questionnaire consisted of demographic variables (age, occupation, housing and number of people living together), variables related to CrossFit training (frequency, duration and intensity), variables related to COVID-19 and UI. Participants were asked to answer whether they were infected with COVID-19 and what treatment/recommendation they have followed. These variables were categorized into

social isolation (mild clinical manifestations) or hospital treatment (moderate to severe clinical manifestations).

To evaluate symptoms of UI before and during quarantine, participants were asked: *“before quarantine, have you lost urine during CrossFit training?”/ “during quarantine, have you lost urine during CrossFit training?”*. Possible answers were yes or no. Moreover, an open-ended question was included: *“if you don't lose urine during exercise this quarantine, what was the main reason?”*

Sample size calculation was based on previous reports [6]. Thus, stipulating a 95% confidence interval and a standard error of 5%, a total sample of 169 subjects was established. The statistical treatment was descriptive and parametric tests were used for categorical variables, with a significance level of $p < 0.05$.

Univariate analysis with odds ratio and 95% confidence intervals were also calculated for some associations.

Results

A total of 197 female athletes were enrolled in the present study. Table 1 depicts the general characteristics of the participants. Mean age of participants was 32 years, with an average training frequency of 50 minutes per day, four times a week. Only three athletes stopped CrossFit training during quarantine. Most participants lived in an apartment (65.5%), and most of them reported that they live with another person (40.1%). Twenty-two athletes reported symptoms by COVID-19 and were socially isolated.

CrossFit's main training site during quarantine was at home (55%) followed by the outside area of the building or home (19.4%) There was a decrease in training intensity in 64% of the participants, and exercises that needed specific materials such as (medicine ball and wall ball) were practiced by less than half of the athletes. Figure 1 displays the most prevalent exercises chosen by the respondents. In general, exercises using their own body weight, such as air squat, were the most performed (98.2%) followed by push up (92.2%) and burpee (89.1%).

Regarding UI, before quarantine, 32% of athletes reported the symptom and during quarantine, only 14% of participants reported this problem. This reduction was statistically significant (OR = 0.32[0.19-0.5307]; $p < 0.001$) by univariate analysis. When asked to the athletes what the reasons were, they considered to be the cause for UI improvement (n=36), 22 reported they have reduced the training intensity and 14 stopped doing exercises with rope.

Discussion

Our study has found a 64% reduction on CrossFit training during quarantine and a 18% reduction of UI during this period. The sudden onset of a state of social isolation implies a radical change in the population's lifestyle, such as the level of physical activity, eating habits and sleep [13]. Thus, many medical societies released information on how to avoid a sedentary lifestyle during COVID-19 pandemic [14,15]. At the same time, gyms and elite athletes provided free online training to help people stay active at home [16]. One of the main characteristics of CrossFit training is that it is performed in a gym equipped with rings, bars, and weights [17]. Therefore, one of the possibilities of this

study was that CrossFit practitioners would not be able to train at home. However, it was observed that 98.5% of the interviewees maintained their training, adapting their exercise routine indoors.

Exercises that needed special equipment like wall ball and medicine ball were the least practiced by the participants (10.9% and 15.5% respectively), while exercises using participant's own body weight, such as air squat and push up, were maintained by most athletes (98.4% and 98.2%, respectively). Another interesting fact is that the specificity of CrossFit training involves the association of Olympic lifting exercises (squats, sprints, throws); aerobic exercises (such as rowing, running and cycling) and gymnastic movements (such as handstands, parallel bars, rings and bars) [18]. In this sense, it was a surprise to realize in our study that the interviewees were able to maintain their physical exercise routine in their homes, even in small environments such as a balcony.

Studies show that about 5% of CrossFit practitioners have some degree of addiction to exercise [19]. If this motivation may have been the explanation for maintaining their routine at home, on the other hand, it concerns the effect of high-intensity exercise on the immune system. It is observed that 22 athletes reported having symptoms of COVID-19 and, as a treatment, they did social isolation. It has been shown that high-intensity training can lead to lymphocyte apoptosis and predispose to immunosuppression [20]. Even in recreational athletes, a CrossFit® training protocol with 10 repetitions of horizontal bench press, deadlifts, and squats, performed at 75% of a maximum repetition, and without a break, significantly increases interleukin-6 (IL-6). In terms of COVID-19, data suggest that IL-6 may play a key role in the evolution of

the inflammatory immune response that causes acute respiratory distress syndrome [21].

The reduction of UI during exercise after starting the quarantine was statistically significant and the reasons appointed by the respondents were the interruption of double under exercises and the reduction in the intensity of the training. Double under is the CrossFit movement that most frequently increases the intra-abdominal pressure (429 cm H₂O), this value being one of the highest ever attributed to any sporting gesture [5]. In a previous study performed from our group [6], it was the exercise mostly associated with UI. Thus, the interruption of this exercise in the quarantine explains the improvement in urinary incontinence. Another important fact is that the increase in intra-abdominal pressure in CrossFit exercise varies with the intensity of the training, repetitions, and the use or not of load [8]. In this sense, quarantine may have indirectly assured the protective effect to the pelvic floor, due to the difficulty in using training accessories and decreased training intensity.

The volume of training has been reported in previous studies as a risk factor for athletic incontinence. Women who play high-impact sports or who have a higher volume of training should be aware of the symptoms associated with pelvic floor dysfunction [9, 10]. The level of exercise can be calculated based on the time (in minutes) usually spent per week or the intensity (light, moderate, intense). Normally,

athletes, from any modality and who train for competitive purposes are at twice the risk for UI when compared to sedentary ones.

Some reports indicate that physical inactivity will persist long after we recover from the COVID-19 pandemic [13]. In this sense, maintaining the CrossFit training routine at home was a positive element for future health [22].

To our knowledge, this is the first study analysing the impact of COVID-19 quarantine to CrossFit training and the repercussion on UI during exercise. The limitations of this study include the use of an online questionnaire, the lack of physical examination, the self-report of COVID-19 symptoms without laboratorial confirmation. Despite sample size calculation has been performed, there is a risk of type 2 error with regard to analysing the associated factors for the reduction of CrossFit training, and for this reason we opted out to not performing a multivariate analysis.

In conclusion, quarantine by COVID-19 improved athletic incontinence in CrossFit practitioners due to decreased training intensity and interruption of higher intra- abdominal pressure exercises.

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Tables

Table 1: General characteristics surveyed about 197 female CrossFit practitioners.

Variable	n	%
Type of housing during quarantine		
Home	68	34.5
Apartment	129	65.5
Number of people in the household		
Alone	26	13.2
Two	79	40.1
Three	54	27.4
More than three	38	19.3
Reported COVID-19 symptoms		
Yes	22	11.2
No	175	88.8
Type of treatment for COVID-19		
Social isolation (home)	22	100
Hospitalization	0	0
Were you able to train CrossFit during quarantine?		
Yes	194	98.5
No	3	1.5
Location where you trained during quarantine		
Indoor house or apartment	108	55
On a small balcony in the house or apartment	27	13.7
Outside the house or apartment	58	19.4
In the garage of the house or apartment	2	1.9
Intensity of CrossFit training during quarantine		

Increased	0	0
Same	71	36
Decreased	126	64

Table 2: Urinary incontinence during exercise before and after quarantine (n=197)

	Before quarantine	During quarantine	
With UI	63 (32%)	27 (14%)	90
Without UI	134 (68%)	170 (86%)	304
Marginal column totals	197	197	394

z-statistic= 4.427, p value <0.001. OR=0.32 [0.19-0.53]

Figures

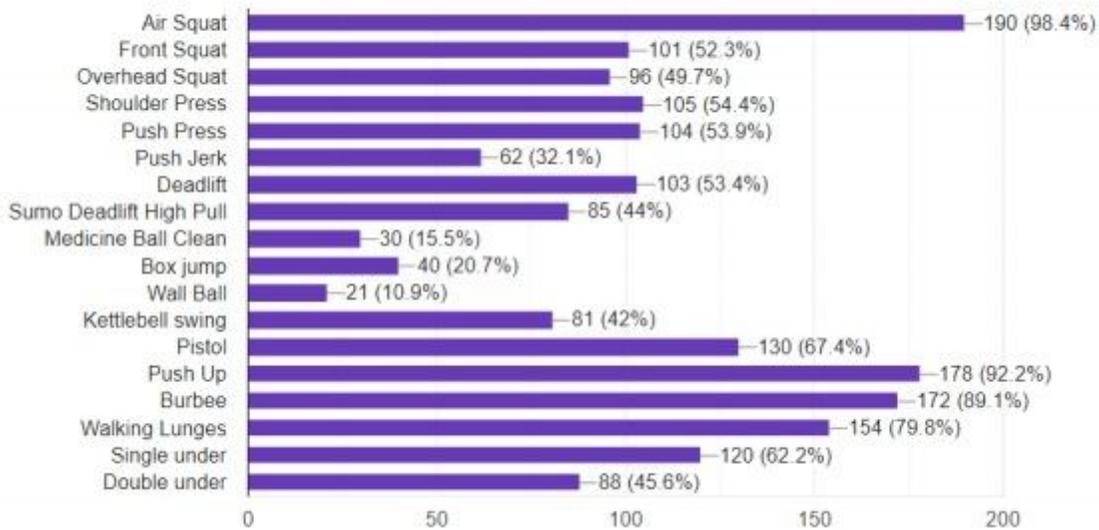


Figure 1

Types of CrossFit exercises performed at home during quarantine due to the COVID-19 pandemic (n=197)