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Pelvic dysfunctions in women who practice CrossFit

Pelvic dysfunctions in women practicing crossfit

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Summary

CrossFit is an increasingly popular sport among women, and the proposed high-impact exercises can influence pelvic floor muscle function. The objective of this study is to evaluate pelvic floor dysfunctions in female CrossFit practitioners. This cross-sectional study was conducted with women aged 18 to 40. Data collection was conducted electronically via online questionnaires on the Google Forms platform. The questionnaire included questions on sociodemographic and anthropometric data, obstetric history, characterization of CrossFit activity, and knowledge of pelvic floor muscle contractions and the identification of their dysfunctions (urinary incontinence, anal incontinence, painful intercourse, and pelvic organ prolapse). The results found that 73.4% of participants had one or more pelvic floor dysfunctions, including 35.1% urinary incontinence (33% reported loss during training), 4.3% prolapse, 26.6% pain during sexual intercourse, 27.7% flatus loss, 10.7% stool loss, and 30.9% constipation. Logistic regression analysis with risk factors for pelvic floor dysfunction demonstrated statistical significance in the variable "practice" of another physical exercise (p = 0.023). In the comparisons between the groups with and without pelvic floor dysfunction, there was no difference. Therefore, the study demonstrated a high prevalence of pelvic floor dysfunction in women who practice CrossFit, with urinary incontinence being the most reported symptom. The only association found was with the practice of another physical exercise besides CrossFit.

Keywords: urinary incontinence; pelvic floor; prolapse; exercise; Crossfit.

Abstract

CrossFit is an increasingly popular modality among women, and its high-impact exercises may influence the function of the pelvic floor muscles. The aim of this study was to evaluate pelvic floor dysfunctions in women practicing CrossFit. This is a cross-sectional study conducted with women aged 18 to 40 years. Data collection was carried out online through Google Forms, which included questions on sociodemographic and anthropometric data, obstetric history, characterization of CrossFit activity, knowledge of pelvic floor muscle contractions, and identification of dysfunctions (urinary incontinence, anal incontinence, dyspareunia, and pelvic organ prolapse).
The results showed that 73.4% of the participants presented one or more pelvic floor dysfunctions, with 35.1% reporting urinary incontinence (33% reported leakage during training), 4.3% prolapse, 26.6% dyspareunia, 27.7% loss of flatus, 10.7% fecal incontinence, and 30.9% constipation. Logistic regression analysis of risk factors for pelvic floor dysfunction showed statistical significance for the variable “practice of another physical exercise” (p = 0.023). No significant differences were found between the groups with and without pelvic floor dysfunction.
Therefore, the study demonstrated a high prevalence of pelvic floor dysfunction among women practicing CrossFit, with urinary incontinence being the most frequently reported symptom. The only significant association observed was with the practice of another physical exercise besides CrossFit.

Keywords: urinary incontinence; pelvic floor; prolapse; exercise; Crossfit.

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1 Introduction

The pelvic floor (PF) constitutes a highly flexible muscle-fascia-ligament complex. functional relevance, responsible for supporting pelvic viscera, contributing to the mechanisms of urinary and fecal continence and offer resistance to increases in intra-abdominal pressure during efforts such as coughing, jumping, and lifting (Wei; Delancey, 2004). Changes in their function result in so-called pelvic floor dysfunctions (PFD), especially urinary incontinence (UI), anal incontinence (AI) and pelvic organ prolapse (POP), a common clinical condition throughout the female life cycle.

In the United States, it is estimated that about 25% of women report at least one of these dysfunctions (Wu et al., 2014). In the Brazilian context, the naturalization of UI persists as "normal" event of aging, which postpones the search for diagnosis and treatment (Silva; Lopes, 2009), although stress UI frequently affects women of working age (25–49 years) (Minassian; Drutz, 2003).

In athletes and physically active women, the prevalence of PAD, especially UI, is still higher, ranging from 28% to 80% depending on the modality, with a significantly higher risk higher than in sedentary women (Bo, 2004; Heath et al., 2014; Hagovska et al., 2018; Teixeira et al., 2018).

The Meta-analysis presented by Teixeira et al (2018) indicates a prevalence of UI of 36% in female athletes and a 177% higher risk compared to non-athletes. Likewise, repeated overload on the AP muscles, typical of high-impact exercises and sessions strenuous, can lead to fatigue, failure to synchronize with the trunk muscles and UI effort (Bo, 2004). Faced with these symptoms, some women abandon physical activity or adopt palliative strategies (use of absorbent pads, water restriction), with a negative impact on the quality of life (Caetano et al., 2007). Such evidence supports the need for preventive and specific care for athletes and practitioners (Almeida et al., 2016).

The rise of CrossFit - a strength and conditioning program that combines exercises high-intensity functional training, weightlifting/powerlifting, gymnastics and plyometrics, increased interest scientific on PAD in this audience (Crossfit inc., 2021; Claudino et al., 2018). The modality advocates the primacy of function and performance, with application to beginners and experienced athletes (Glassman, 2021), and has expanded rapidly in Brazil since 2009.

National and international research has observed relevant prevalence of symptoms pelvic floor exercises among female practitioners. In an online survey of 314 women in In the USA, POP (3.2%), UI (26.1%), and fecal incontinence (6%) were reported (High, 2019).

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In Brazil, studies indicate UI during CrossFit exercises in 29.95% of respondents, especially in tasks such as *Double under* and *Single under;* practice time, weekly frequency and previous vaginal delivery did not show a statistically significant association with UI in this study (Poli de Araújo et al., 2020). In a larger sample (n=828), a prevalence of AI of 52.7% was found (with predominance of flatus loss), UI in 36% (84.2% during training), dyspareunia in 48.7% (inverse association with age and BMI) and POP in 1.4%; constipation and practice >5 times/week increased the chance of IA (Pisani et al., 2020). Narrative and systematic reviews reinforce the relationship between CrossFit and IU and recommend specific kinesthetic awareness and strengthening training of the AP, in addition to better load and technical planning (Oliveira, 2019; Souza; Siqueira, 2017).

From a physiological and biomechanical point of view, explanatory hypotheses for PAD in practitioners of CrossFit include repeated spikes in intra-abdominal pressure, fatigue and/or microdamage of structures muscular and connective tissues, individual connective tissue characteristics, and suboptimal coordination between AP and trunk muscles in high-demand tasks (Yang et al., 2019; Elks et al., 2020; Pisani et al., 2020; Wikander et al., 2020). This set of factors may predispose to symptoms urinary and anorectal disorders, as well as sexual dysfunctions, and needs to be mapped to guide prevention and management.

Therefore, this study is justified in light of the 2030 Agenda, as it investigates PAD in women CrossFit practitioners directly dialogues with SDG 3 (Health and Well-being), by favoring promoting health, reducing morbidity and maintaining active lifestyles safely; with SDG 5 (Gender Equality), when tackling a problem that disproportionately affects women, reduces stigma and expands access to information and care; and with SDG 10 (Reduction of Inequalities), by proposing accessible screening and education strategies, including via tools digital, mitigating geographic and economic barriers. Furthermore, SDG 4 (Quality Education) is contemplated by the training of coaches and health professionals to recognize, guide and refer cases; and SDG 17 (Partnerships for the Goals) is called for by arrangements collaborative projects between universities, affiliated boxes and health services.

Given this panorama, it becomes pertinent to consolidate local evidence through studies observational studies with transparent design, validated instruments and an expanded approach to symptoms. This research is based on the premise that the practice of CrossFit, because it involves exercises high impact and high loads, can influence the function of the AP and increase the occurrence of PAD in young women.

Thus, by integrating national and international literature, training exposure profile and screening for urinary, anorectal, sexual and prolapse symptoms, the introduction presented here justifies the need to assess the magnitude of the problem, its correlates and the opportunities for prevention and care, aligned with the goals of the 2030 Agenda.

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2 Study development

This is a cross-sectional study carried out with women practicing CrossFit in the city of Bauru (SP) and region. Ethical considerations followed the principles of scientific research, guaranteeing the confidentiality of the participants' identity, the absence of coercion and conflicts of interest institutional or personal. All volunteers were previously informed about the objectives and study procedures, and data were collected only after signing the Terms of Use Free and Informed Consent (TCLE), in accordance with Resolution No. 466/12 of the National Health Council of the Ministry of Health (Brazil). As this is an online survey, Agreement to participate was recorded electronically by clicking the “Yes” button after reading the informed consent form. The project was approved by the Research Ethics Committee of the Platform Brazil, under number 4,620,517.

The sample was non-probabilistic, for convenience, composed of women aged between 18 and 40 years old, CrossFit practitioners in Bauru and the surrounding area, who agreed to participate in the study during the period from August 2021 to June 2022.

The inclusion criteria included women who had been practicing CrossFit for at least six consecutive months, with a minimum frequency of two sessions per week. Those were excluded who had an active urinary and/or vaginal infection, pregnancy, diagnosis of diabetes mellitus, neurological diseases, cognitive deficits or history of previous urogynecological surgeries for treatment of urinary incontinence and/or pelvic organ prolapse. Also excluded were participants who did not fully respond to the questionnaires or gave up completing the search.

Data collection was carried out electronically using the Google application Forms, a web technology, which allows the generation of a *link* to the questionnaire, which was shared in WhatsApp groups, Instagram and via email with CrossFit gyms. Initially, CrossFit-affiliated gyms were contacted by email requesting partnership. with the study and permission to send the invitation for the research, in their *mailing list ,* if there was one positive feedback. Other people from groups and social networks were also invited, in a process sampling process known as **“snowboll,” in which participants** invite other respondents from your network of friends and acquaintances, who belong to the target population. The the name "snowball" proves precisely this idea: in the same way that a snowball rolls downhill, increasing its size more and more, the analogy is made with this process, whose The sample grows as those selected invite new participants.

It is worth noting that this technique allows for sampling that is difficult to access; it is a economical and simple process and requires planning and few human resources. However, as

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any non-probabilistic technique does not guarantee representativeness, nor does it allow for obtaining a lot of accuracy, as the sample will not be diverse enough. Undoubtedly, the main risk of this technique sampling is not having a representative group of the population that you want to observe, because recruitment of new members can maintain the same characteristics as the original group that shared the invitation, preventing sampling adversity.

The questionnaire consisted of 35 questions, 33 of which were closed or mixed, one open and an evaluative one, using the Likert scale that requires respondents to indicate their degree interference of urine loss in your daily life – zero (0) being non-interfering and ten (10) for very interfering - assigning numerical values to the responses to reflect the strength and direction of the the interviewee's reaction to their statement. This scale has the advantage of simplicity in construction; of using statements that are not explicitly linked to the attitude studied; and also, it allows more accurate information about the respondent's opinion regarding the attitude being evaluated (Mattar, 2001).

The online questionnaire consisted of questions about sociodemographic data and anthropometric data (age, weight and height), obstetric history, characterization of Crossfit activity (length of experience, frequency of training, duration, participation in competitions, weight in exercises) and questions about prior knowledge about floor muscle contractions pelvic.

In order to verify the occurrence of urinary incontinence (UI), all participants were asked about the presence of this symptom. Those who responded affirmatively completed the **International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF),** an instrument that assesses the impact of UI on quality of life, identifies the type of incontinence and quantifies urinary loss.

The questionnaire was validated for the Brazilian reality by **Tamanini et al. (2008).** The symptom Pelvic organ prolapse was assessed using **question 5** (“Do you notice a 'lump' or a 'ball' going down in your vagina?”) from the **International Consultation on Incontinence Questionnaire – Vaginal Symptoms (ICIQ-VS).**

Regarding sexual function, for the symptom of dyspareunia the question “In In the last four weeks, how often have you experienced discomfort or pain during vaginal penetration?” from the Female Sexual Function Index (FSFI) questionnaire, validated for the Portuguese by Hentschel *et al.* (2007). The proctological symptoms investigated were about anal incontinence (AI) (involuntary loss of flatus, solid and/or liquid stools) and constipation. The AI questions were taken from the Fecal Incontinence Severity Index “How often in the last month have you experienced loss of flatus? " “How many times in the last month have you experienced loose solid stools?” “How many times in the past month have you had loose liquid stools?”

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(Rockwood et al., 1999). For constipation, the question was asked how many times a week the woman evacuates and effort is made."

Data analysis was conducted using descriptive and analytical approaches. collected information was organized into Microsoft Excel spreadsheets and subsequently analyzed in the statistical program **SPSS,** version 20.0.

In the descriptive analysis, measures of central tendency (mean) and dispersion were used. (standard deviation), in addition to absolute and relative frequency values to characterize the sample. The associations between complaints of pelvic floor dysfunctions - **urinary incontinence (UI), anal incontinence (AI), pelvic organ prolapse (POP)** and **dyspareunia -,** the clinical data and the variables related to CrossFit practice were tested through **regression analysis logistics.**

The study sample consisted of 94 volunteers, who participated in the research among months of February and June 2022. For analysis purposes, the participants were divided into two distinct groups: those with pelvic floor (PF) dysfunction and those without dysfunction. The comparison between the groups was carried out according to the nature of the variables investigated. The numerical variables with normal distribution were analyzed using Student's *t*- test for independent samples, while categorical variables were compared using the test of Chi-square ($ÿ^2$).

All statistical analyses adopted a significance level of 5% ($p < 0.05$), ensuring accuracy in the interpretation of results. The process of selection and inclusion of participants, as well as the data collection and analysis steps, are detailed in the flowchart presented in

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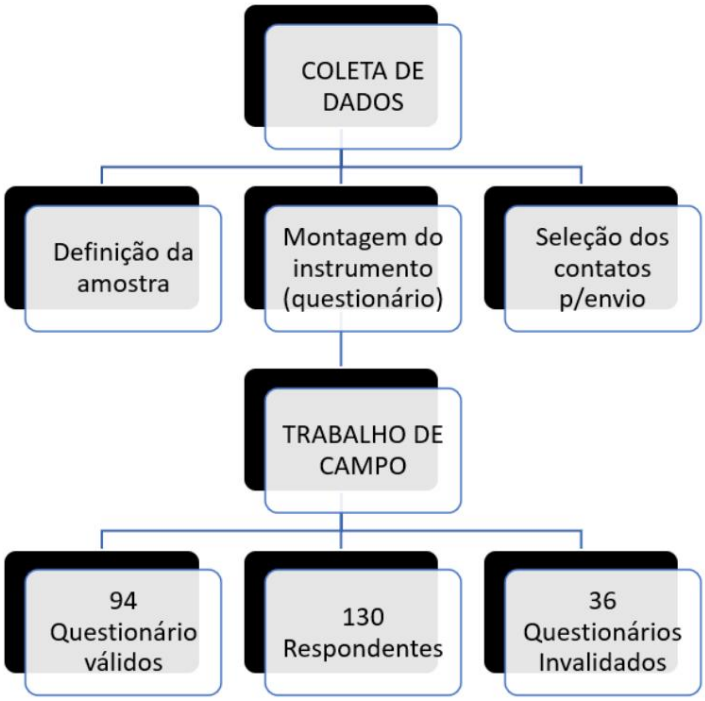
Figure 1.

Figure 1 - Data collection flowchart.



Source: Prepared by the authors

The sociodemographic and clinical characteristics of the participants are presented in **Table** 1, which includes information regarding age group, body mass index (BMI), obstetric history and practice of other physical exercises, totaling 94 volunteers (n = 94). Observe-It is known that the majority of participants were in the age group of **30 to 40 years old (58.5%),** while **41.5%** were between **18 and 29 years old.** The **average BMI was 24.85 ± 3.80 kg/m²,** indicating, on average, a classification within the weight parameters considered appropriate.

Regarding obstetric history, **92.6%** of women reported **not having had births vaginal,** and **79.8%** had not undergone **cesarean delivery,** suggesting that most of the sample was composed of nulliparous women. Regarding the practice of other physical activities, **35.1%** of participants reported performing some type of exercise in addition to the main activity investigated. The The most mentioned modalities were **running (36.36%), yoga/pilates (24.24%), weight training (21.21%), team sports (18.18%)** and **dance (15.15%).** And, it is worth highlighting that some participants reported more than one modality.

These data contribute to a detailed characterization of the sample, allowing contextualize the results obtained in subsequent analyses.

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Table 1 - Sample characterization

Features	N (%)
Age range	
18 to 29 years old	39 (41.5%)
30 to 40 years old	55 (58.5%)
Body mass index (kg/cm2)	24.85 ±3.80 **a**
Vaginal births	
None	87 (92.6%)
One	6 (6.4%)
Two or more	1 (1.1%)
Caesarean sections	
None	75 (79.8%)
One	12 (12.8%)
Two or more	7 (7.4%)
Practice other physical exercises	33 (35.1%)
Modality **#**	
Race	12 (36.36%)
Yoga/Pilates	8 (24.24%)
Bodybuilding	7 (21.21%)
Sports	6 (18.18%)
Dances	5 (15.15%)

Source: Direct research

Note: A = mean ± standard deviation - # Some participants performed more than one modality

The variables related to the practice of CrossFit are presented in **Table** 2, including practice time, weekly frequency, session duration and maximum loads in the main exercises. It is observed that the sample presents a **balanced distribution in relation to time of practice,** with **34.0%** of participants practicing CrossFit between **1 and 2 years,** followed by **23.4%** with **6 to 12 months, 20.2%** between **2 and 3 years,** and **22.3%** with **three or more years** of experience. These data indicate that most volunteers already had an intermediate to advanced level of involvement with the modality, which contributes to the homogeneity of the sample in terms of adaptation to training.

Regarding **weekly frequency,** it is noted that the vast majority of participants **(62.8%)** performed **five or more sessions per week,** while **36.2%** trained **three to four times,** and only **1.1%** maintained a frequency of less than twice a week. This result shows a profile of practitioners with **high regularity and commitment to training.**

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Regarding the **duration of the sessions, 88.3%** of the volunteers reported training for **approximately one hour per day,** which is in line with the traditional structure of CrossFit classes. Only a minority reported two- **(8.5%)** or three-hour sessions **(3.2%).**

In relation to the **maximum loads lifted,** a variation compatible with the heterogeneous profile of the sample. The averages recorded were **34.60 ± 13.70 kg** in the *snatch,* **79.61 ± 32.47 kg** in *the deadlift,* **45.19 ± 19.65 kg** in *the clean* and **65.23 ± 33.69 kg** in *the backsquat.* These values reflect different levels of strength and technical experience among the participants, aspects expected in a sample composed of women with different practice times and training intensity.

Table 2 - Variables related to CrossFit practice (n=94)

Variables	n=94
Time spent practicing the sport	
6 – 12 months	22 (23.4%)
1- 2 years	32 (34.0%)
2-3 years	19 (20.2%)
3 years or older	21 (22.3%)
Training frequency (days/week)	
1-2 times	1 (1.1%)
3-4 times	34 (36.2%)
5 or more times	59 (62.8%)
Training hours	
1 hour	83 (88.3%)
2 hours	8 (8.5%)
3 hours	3 (3.2%)
Maximum weight in exercises	
Snatch	34.6011 ± 13.70260
Deadlift	79.6117 ± 32.46505
Clean	45.1968 ± 19.65362
Backsquat	65.2287 ± 33.68934

Source: Direct research

The exercises that women reported being more likely to cause urine leakage during the training, were the *Double under* (30.1%), the *Single under* with 25.3% of the responses, the *Box jump* and *Wall ball* with 9.5%, *Clean* and *Back squat* with 4.8%, *Front squat* and *Deadlift* with 3.2%, and with only 1.6% are the *overhead squat,* snatch , and *thruster,* and 4.8% in others. The only exercise that did not have

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no practitioner of the sport reporting urine loss during the movement was the medicine *ball clean.*

Table **3** refers to the symptoms of pelvic floor dysfunction in women practicing of CrossFit, which include those with more than one dysfunction, reports of prolapses, discomfort or pain during vaginal penetration, proctological symptoms, involuntary losses of feces (liquid or solid, the presence of constipation, the efforts to evacuate and the urinary symptoms.

Table 3 - Symptoms of pelvic floor dysfunction

Pelvic floor dysfunctions	**n(%)**
Participants with one or more pelvic floor dysfunctions	
	69 (73.4%)
Report of pelvic organ prolapses	4 (4.3%)
Discomfort or pain during vaginal penetration	
Never=0	66 (70.2%)
1 to 2 times = 1	25 (26.6%)
3 to 5 times = 2	3 (3.2%)
Proctological symptoms	
Involuntary loss of flatus in the last month	
Never	68 (72.3%)
Yes	26 (27.7%)
1 to 2 times	15 (16.0)
3 to 5 times	8 (8.5%)
More than 5 times	3 (3.2)
Involuntary loss of solid stools in the last month	1 (1.1%)
Involuntary loss of liquid stools in the last month	9 (9.6%)
Presence of intestinal constipation	29 (30.9%)
Makes an effort to evacuate	
Always	6 (6.4%)
Sometimes	37 (39.4%)
Rarely	37 (39.4%)
Never	14 (14.9%)
Urinary symptoms	

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Involuntary loss of urine	33 (35.1%)
Involuntary loss of urine during CrossFit training	31 (33.0%)

Source: Direct research

It is noted that 84% of respondents stated that they knew what the pelvic floor was and only 16% said they were unaware of the term. The majority (62.8%) reported knowing how to perform the AP contraction, however, only 10.6% always perform this contraction during CrossFit exercises, 28.7% do it sometimes and 60.7% do not perform the AP contraction when they are practicing.

When asked about physiotherapy treatment for floor dysfunctions pelvic (pelvic and sexual organ prolapses and urinary and fecal incontinence), 39.4% said have heard of, but are unaware of, therapeutic resources; 19.1% declare that they know the procedures and 41.5% said they did not know or had heard anything about this subject.

Participants who reported urinary loss also answered questions about frequency and amount of urine loss **(Table 4)** and type of urinary incontinence **(Graph** 1).

Table 4 - Frequency and amount of urine loss

	n(%)
How often do you leak urine?	
Every day = 3	2 (2.1%)
2 to 3 times a week = 2	4 (4.3%)
1 x per week = 4	5 (5.3%)
Once a month = 5	3 (3.2%)
Rarely (less than once a month) =1	26 (27.7%)
Never=0	53 (56.4%)
Amount of urine you think you ask for	
None	53 (56.4%)
A small amount	36 (38.3%)
A moderate amount	5 (5.3%)
ISIQ-SF questionnaire score	6.18 ± 3.71

Source: Direct research

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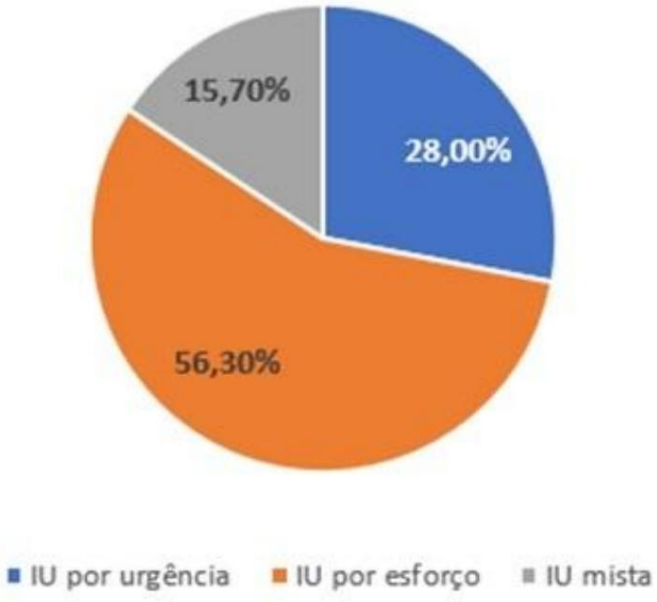
Chart 1 - Types of urinary incontinence



Source: Direct research

Logistic regression analysis with risk factors for pelvic floor dysfunction, demonstrated statistical significance only in the variable Practice of another physical exercise with p=0.023, OR of 4.6 with a minimum confidence interval of 1.23 and a maximum of 17.11, demonstrating that performing activity other than CrossFit is predictive of having PF dysfunction **(Table** 5).

Table 5- Logistic regression with pelvic floor dysfunction as the dependent variable.

	B(EP)	Significance	Exp (B)	IC# bottom#	IC# superior
Age range	0.967	0.234	2,630	0.535	12,938
Body mass index (kg/cm2)	0.007	0.926	0.993	0.860	1,147
Type of delivery					
Vaginal birth	1,556	0.223	4,741	0.388	57,976
Caesarean section	1,173	0.173	3,230	0.598	17,452
Maximum load in exercises					
Snatch	,039	0.432	1,040	0.944	1,145
Deadlift	,008	0.659	1,008	0.972	1,046

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Clean	,003	1,003	1,073	0.938	
Backsquat	0.017	0.350	0.984	0.950	1,018
Practice of another physical exercise	1,526	0.023*	4,600	1,237	17,114
Do you know what AP is?	0.074	0.932	0.929	0.170	5,083
Know how to contract AP	0.380	0.626	1,463	0.316	6,765
Contracts the AP during CrossFit	0.344	0.608	0.709	0.191	2,636
Training frequency (days/week)					
1-2 times	17,309	1,000	329114	0.000	
			86.52		
3-4 times	0.636	0.291	0.530	0.163	1,723
5 or more times	0.318	0.505	1,375	,0540	3,504
Training hours					
1 hour	-21.654	0.999	0.000	0.000	
2 hours	-22.795	0.999	0.000	0.000	.
3 hours	20,118	999	5460	0.000	.
			7429		
			3.52		
Time spent practicing the sport					
6 – 12 months	-1.385	0.221	0.250	0.027	2,304
1- 2 years	-0.148	0.867	0.863	0.152	4,889
2-3 years	-0.864	0.354	0.421	0.068	2,620
3 years or older	-0.017	0.976	0.983	0.309	3,120
Constant	1,929	1,000	6,885		

Source: Direct research

Note: #95% Confidence Interval for EXP (B) - * p<0.05

Legend: AP = Pelvic floor

The sample studied was divided into two groups: **with pelvic floor dysfunction (PFD) and without dysfunction.** Comparisons between these groups are presented in **Tables 6, 7 and 8.** The **Table 6** presents the variables related to obstetric history and the practice of other exercises. physical and the knowledge and ability to contract the pelvic floor of women with and without DAP. **Table 7** displays the variables related to weekly training frequency, training hours per day and total time of practice of the sport. Finally, **Table 8** shows the data on the **workload maximum of the exercises** performed during CrossFit training between participants with and without pelvic floor dysfunction.

It is important to highlight that **no statistically significant difference was observed** between the groups in the comparisons made.

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Table 6 - Variables related to obstetric history

Variable behold	Group the with DAP (n=69)	Group the without DAP (n=25)	Val or of p
Childbirth vaginal	6 (8.7 %)	1 (4.0 %)	0.3 98
Childbirth cesarean section	15 (21.7 %)	4 (16.0 %)	0.3 84
Practice of others exercise iOS physicists	28 (40.6 %)	5 (20.0 %)	0.0 52
Do you know what? which is AP	58 (84.1 %)	21 (84.0 %)	0.6 09
He knows contracts ro AP	44 (63.8 %)	15 (60.0 %)	0.4 59
Against io AP during and the CrossF it	26 (37.7 %)	11 (44.0 %)	0.3 74

Source: Direct research

Legend: AP = Pelvic Floor; DAP = Pelvic Floor Dysfunctions

Table 7 - Weekly training frequency

Variables	Group with DAP	Group without DAP	p-value
Training frequency (days/week)			
1-2 times	1 (1.4%)	0	0.734
3-4 times	23 (33.3%)	11(44.0%)	0.238
5 or more times	45 (65.2%)	14 (56.0%)	0.281

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Training hours (per day)			
1 hour	62 (89.9%)	21 (84.0%)	0.326
2 hours	4 (5.8%)	4 (16%)	0.127
3 hours	3 (4.3%)	0	0.391
Practice time of modality			
6 – 12 months	15 (21.7%)	7 (28.0%)	0.353
1- 2 years	25 (36.2%)	7 (28.0%)	0.313
2-3 years	13 (18.8%)	6 (24.0%)	0.388
3 years or older	16 (23.2%)	5 (20.0%)	0.491

Source: Direct research

Legend: PFD = Pelvic Floor Dysfunction

Table 8 - Maximum exercise load

	Group with DAP	Group without DAP	VValue of p
Maximum load in exercises			
Snatch	34.57±13.74	34.66±13.87	0.980
Deadlift	79.48±31.06	79.96±36.74	0.950
Clean	44.89±19.27	46.04±21.05	0.804
Backsquat	65.45±33.79	64.60±34.07	0.914
Body mass index (kg/cm2) 24.84±3.82		24.88±3.80	0.96

Source: Direct research

Legend: PFD = Pelvic Floor Dysfunction

In general, the comparative analysis between the groups with and without floor dysfunction pelvic examination did not show statistically significant differences in the variables investigated, including obstetric aspects, practice of complementary physical activity, knowledge and execution pelvic muscle contraction, frequency and training time, as well as maximum loads used in the main CrossFit exercises. These results suggest that the presence of pelvic floor dysfunction among practitioners of the sport is not directly associated with intensity or frequency of training, nor performance in the maximum loads lifted.
This finding reinforces the need to consider other individual factors, such as execution technique, body awareness and specific training of the pelvic muscles, in understanding the occurrence of these dysfunctions in women who practice high-intensity exercises.

In light of these results, it becomes pertinent to discuss how such findings relate to the existing literature on the prevalence and factors associated with pelvic floor dysfunctions in

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sporting contexts. The discussion and considerations section then delves deeper into these relationships, highlighting convergences and divergences with previous studies and pointing out possible implications for clinical practice and for guiding training programs aimed at women.

Discussion of results and considerations

The main finding of this study was that 73.4% of female CrossFit practitioners have one or more pelvic floor dysfunctions and practice exercises other than Crossfit was a predictive factor for having dysfunction. When participants were separated into groups with and without dysfunction of the AP, there was no difference in the variables studied (BMI, route of delivery, maximum load on the exercises, frequency and hours of training and practice time), which corroborates the study carried out in 2020 (Poli de Araujo; Brito; Rossi; Garbiere *et al.,* 2020) and differs from research that associated the dysfunctions with greater age, parity, history of vaginal births and body mass index (Dominguez-Antuna; Diz; Suarez-Iglesias; Ayan, 2022; High; Thaia; Virani; Kuelhl *et al.,* 2020).

Regarding the logistic regression analysis that identified the practice of other exercises physical factors as predictors of AP dysfunctions, the hypothesis of AP overload generated by the a large number of hours of physical exercise per week, since most people train with a frequency high (five or more times a week and 1 hour a day).

In addition to CrossFit, 35.1% of women practiced other activities, the most common being frequent, running, another exercise that generates impact. This data corroborates another study that found a high prevalence of UI (44.4%) in female athletes, being more frequent in those who practice long-distance running (Velazquez-Saornil; Mendez-Sanchez; Gomez-Sanchez; Sanchez-Mila *et al.,* 2021).

This factor can also be substantiated in the research undertaken by Alves, et al., (2017), in which he found a relationship between the volume of exercise, measured in weekly minutes and the frequency of urine loss. Although the prevalence of UI by type of sport, practice in hours per day and days per week was not significant, as found in two studies (Cardoso *et al.,* 2018) (Jácome *et al.,* 2011), time of sports practice in years showed a significant relationship with the UI in the article by Cardoso *et al.,* (2019), emphasizing this result. Simeone *et al.,,* (2010), pointed out that the chance of developing UI increases about 2.5 times more when practicing sports over eight years, supporting the idea that intense and prolonged effort affects the mechanism of urinary continence.

In the study conducted on athletes from different high-impact sports, it was found that the group who trained more than eight hours a week, had 14.8% of anal incontinence, 33.1% of UI, 36.1% of constipation and 20.1% of dyspareunia, data that are in line with our findings.

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(Vitton; Baumstarck-Barrau; Brardjanian; Caballe *et al.,* 2011).

Light to moderate physical activity decreases the risk of UI, but female athletes are about three times more likely to have urinary incontinence compared to controls. (Bo; Nygaard, 2020).

UI was also the most prevalent symptom in athletes in another study (53.2%) and there was a highest proportion of UI among athletes who practiced artistic gymnastics and trampolining (88.9%), followed by swimming (50.0%), judo (44.4%) and volleyball (43.5%). The authors concluded that athletes are at greater risk of developing UI, flatulence and sexual dysfunction, whether engaging in activities high impact or intense effort (Almeida; Barra; Saltiel; Silva-Filho *et al.,* 2016).

A systematic review with meta-analysis of eight studies showed a prevalence of 36% of UI in female athletes in different sports, and in comparison with sedentary women, athletes had a 177% higher risk of developing UI (Teixeira; Colla; Sbruzzi; Mallmann *et al.,* 2018).

The prevalence of UI among female CrossFit practitioners was 32.1% (n=2187) and SUI was 35.8%. CrossFit exercises associated with greater stress urinary incontinence were jumping rope, double under, weightlifting, and box jumps. (Alavarez-Garcia; Doganay, 2022).

A systematic review that included **13 studies with 4,823 women practicing CrossFit** identified a **prevalence of urinary incontinence (UI) of 44.5%,** with the **stress urinary incontinence (SUI)** is the most common type, reported in **81.2%** of cases. authors concluded that the main factors associated with the increased likelihood of UI were **age, body mass index (BMI) ,** and **parity.** Furthermore, they highlighted that **exercise based on jumps** showed a strong association with episodes of urinary loss (Dominguez-Antuna; It says; Suarez-Iglesias; Ayan, 2022).

Similarly, **Pisani et al. (2020)** found that in a sample of **828 women practicing CrossFit, 26%** had some degree of UI, with the majority also classified as **SUI.** However, during training, the **incidence increased significantly to 84.2%.** The exercises with **the highest occurrence of urinary loss** were *Double under* (30.1%), *Single under* (25.3%), *Box jump* and *Wall ball* (both 9.5%). In another study, the same exercises appear among those most associated with UI, maintaining the **same order of prevalence** — *Double under* (18.4%), *Single under* (12.1%) and *Box jump* (8.8%) —, reinforcing the hypothesis that the **repetitive jumping movement** is an important triggering factor (Pisanti et al., 2020).

Other authors corroborate this evidence: **Yang et al. (2019) and Araújo et al. (2020)** also observed a higher frequency of urinary loss in exercises involving **impact and jumping,** while **Domingues (2020)** emphasizes that activities with **high vertical impact loads** are commonly associated with pelvic floor dysfunction.

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In addition to urinary dysfunctions, the literature also points to **significant values of proctological dysfunctions** among physically active women. Prevalence rates of **27.7% for flatus loss, 10.7% for fecal loss and 30.9% for constipation.** The high-performance sport, according to **Vitton et al. (2011),** may represent a **risk factor independent** for **anal incontinence (AI)** in healthy young women.

In agreement, **Pisani et al. (2020)** reported that the **most prevalent symptom** among practitioners evaluated was **anal incontinence (52.7%),** with **flatus incontinence** being the most common manifestation **(93.3%).** Women with constipation were **1.7 times more** likely to **chances** of developing flatus incontinence, while those who trained **more than five times per week** had **three times the risk** of presenting the same symptom.

The **relationship between constipation and UI** had already been identified by **Caetano et al. (2009),** who demonstrated that constipated women are **2.8 times more likely** to develop urinary incontinence compared to those who are not constipated. Similarly, **Lopes et al. (2020)** reinforce this association, indicating that women CrossFit practitioners with constipation are **95% more likely to have UI** than those without the problem.

The **prevalence of pelvic organ prolapse (POP) symptoms** observed in this study was **4.3%,** a value considered low and **similar to that found by High et al.,** in which only **3.2% of female CrossFit practitioners** reported this symptom. Consistently, others studies have also not identified significant differences in the occurrence of POP among **women athletes and non-athletes,** suggesting that sports practice, when carried out in a controlled manner, **does not represents an isolated risk factor for the development of prolapse** (Almeida et al., 2016; Carvalho et al., 2020).

Regarding **dyspareunia** (defined as pain during sexual intercourse), the prevalence found was **26.6%,** configuring it as a relevant symptom among the participants. In study by **Pisani et al. (2020),** dyspareunia had the **highest prevalence rate (48.7%),** result close to that observed in **female cheerleading athletes,** whose occurrence was **53.8%** (CARVALHO et al., 2020). Similarly, **Vitton et al. (2020)** found that **The frequency of dyspareunia was significantly higher in women who practiced sports high intensity** compared to non-intensive modalities **(20.1% vs. 9.4%; p = 0.002),** the which suggests a possible relationship between **the level of physical effort and pelvic dysfunction.**

The study by **Cardoso et al. (2018)** also identified an association between **sports practice and the simultaneous presence of dyspareunia and urinary incontinence (UI),** indicating that women with painful complaints during sexual activity are **more likely to have UI.** For To explain this finding, the authors resort to the theory proposed by **Mense (1993),** according to which **pathological visceromuscular reflexes** can trigger **muscle instability and hypertonia,**

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resulting in **reduced pelvic floor function, urinary incontinence** and even **development of myofascial syndrome** with tension points and chronic pain.

Another relevant aspect of this study refers to the **knowledge and perception of participants on pelvic floor muscle (PFM) contraction.** Although **63.8%** of women claim **to know how to perform muscle contraction,** only **37.7%** reported **performing it during the practice of CrossFit,** highlighting a **deficit between knowledge and practical application.** Furthermore, when asked about **physiotherapy treatment for dysfunctions of the pelvic floor (PFLs),** only **19.1%** of participants said **they knew the procedures prevention and rehabilitation,** which reinforces the **need for greater education and awareness about the importance of strengthening and caring for these muscles** among practitioners of modality.

These data are in agreement with Cardoso *et* al., (2018) who report that female athletes in sports high-impact individuals presented adequate knowledge and attitudes, but inadequate practices on UI. Even with a high prevalence of UI, few athletes sought medical attention, and even that none sought physiotherapy care or reported urinary loss to the trainer. The practice strengthening of the AP muscles is rarely performed by athletes, due to lack of knowledge the existence of these exercises, it is important to introduce preventive physiotherapy (Cardoso; Lima and Ferreira 2018). It is important to note that AP training is considered the standard treatment gold for stress urinary incontinence (Dumoulin; Hay-Smith; Mac Habee-Seguin, 2014).

Given the numerous proven benefits of regular physical exercise , **Women should not be discouraged from exercising.** However, it is crucial that **women young people involved in high-impact, long-duration sports,** such as CrossFit, are **adequately informed about the possible effects of these activities on floor function pelvic floor (PAL).** The adoption of **preventive and educational measures** is essential, prioritizing strategies **primary prevention,** aimed at guiding and strengthening the pelvic muscles, even before secondary prevention interventions , aimed at detecting and treating dysfunctions (VITTON et al., 2011).

The **presence of pelvic floor dysfunction (PFD)** among CrossFit practitioners reinforces the **need for monitoring by trained professionals,** especially physiotherapists pelvic muscles, which can **guide the proper execution of exercises,** preventing overloads and reducing the risk of injury. Furthermore, the relevance of this study is highlighted , which contributes to broaden the discussion on **possible associations and complications arising from the practice of CrossFit,** especially when performed without adequate technical supervision.

Among the **limitations of the research,** the **impossibility of carrying out a physical assessment** stands out **directly** from the participants' AP, due to restrictions imposed by the COVID-19 pandemic, which

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required **remote data collection.** Another limitation concerns the **sample size,** reduced by **low adherence to the online questionnaire** and the **exclusion of incomplete or incompatible responses with the inclusion criteria.**

Despite these limitations, the present study presents **theoretical and methodological consistency,** situated in the field of **quantitative research** and making use of appropriate procedures for **understanding the practices and physiological implications of CrossFit in women.** The results obtained **show consistency with findings from previous studies,** conferring **credibility and validity scientific** to the conclusions presented.

It is concluded that there is **a high prevalence of pelvic floor dysfunctions in women CrossFit practitioners,** with **urinary incontinence** being the **most recurrent symptom,** followed by **constipation, loss of flatus, dyspareunia, fecal incontinence ,** and **organ prolapse pelvic.** The only statistically significant association identified was with the **practice concomitant with another physical exercise besides CrossFit.**

It is hoped that this research **will serve as a basis for future empirical research,** with focus on the **evaluation and physiotherapeutic treatment** of PADs, in addition to **promoting greater awareness of the importance of prevention and strengthening of the pelvic floor** among physically active women. Deepening this topic could contribute to the **development of more effective educational programs and intervention strategies,** ensuring that physical exercise continues to be a safe, healthy and sustainable practice throughout life.

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