ABENFISIO

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ERECTILE/SEXUAL FUNCTION OF FRONTLINE AND NON-FRONTLINE HEALTH CARE PROFESSIONALS IN THE FACE OF COVID-19 PANDEMIC: A CROSS-SECTIONAL STUDY

FUNÇÃO ERÉTIL / SEXUAL DOS PROFISSIONAIS DE SAÚDE QUE ATUARAM E QUE NÃO ATUARAM NA LINHA DE FRENTE NA PANDEMIA DE COVID-19: ESTUDO TRANSVERSAL

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Patient consent statement: All participants in the study signed an informed consent form after being informed about the study procedures, according to The Checklist for Reporting Results of Internet E-Surveys (CHERRIES).

ABSTRACT

Introduction and hypothesis: Pandemic situations, such as the crisis experienced by the Coronavirus Disease 2019 (COVID-19), pose challenges for healthcare workers and can harm their physical, mental, and sexual health. Knowing the impact of the COVID-19 pandemic on the sexual health of health professionals can help to better cope with the situation, as well as allow the formulation of prevention/intervention strategies capable of reducing this impact and guaranteeing the physical, mental and sexual health of these professionals in the performance of their work duties. **Aim:** This study aims to compare the sexual/erectile function among health professionals who have or have not worked on the front line during the COVID-19 pandemic, considering the presence of Post-Traumatic Stress Disorder (PTSD), the sexual frequency and the complaints and the fact of being in social isolation with their partner. **Methods:** Cross-sectional study that interviewed health professionals of both sexes, older than 18 years, through Google Forms, using the questionnaires Female Sexual Function Index (FSFI), International Index of Erectile Function (IIEF-5), and Impact of Event Scale-Revised (IES-R, PTSD), with the investigation of sex life aspects during the pandemic. Spearman correlation, Shapiro-Wilk, Kruskall-Wallis, Chi-squared, and Dwass-Steel-Critchlow-Fligner tests were performed using R software, 2020. **Results:** It was verified that there was higher sexual dysfunction among non-frontline women (66.9%). The women with lower FSFI scores presented a higher IES-R score, identifying PTSD as 18.6 vs. absence as 19.9 ($p<0.001$). Those who maintained or increased sexual activity (FSFI=20.6 and 20.8, respectively) vs. decreased (FSFI=18.5), suspended (FSFI=15.0) or no sexual activity (FSFI=10.4) ($p<0.001$), and those never presented any sexual complaint (FSFI=20.1) vs. have already given (FSFI=19.0) or currently present (FSFI=16.2) ($p<0.01$). On the other hand, a higher FSFI score was found among the female frontline professionals with sexual activity (frontline=21.1 vs. non-frontline=20.6; $p<0.001$); previous sexual complaint vs. current complaint (FSFI=19.7 vs. 17.4; $p<0.01$). Among men, a difference was observed in non-frontline professionals (previous sexual complaint: IIEF-5=24 vs. current complaint: 23; $p=0.02$). **Conclusions:** There was an association between non-frontline professionals and the presence of sexual dysfunction. The COVID-19 pandemic has led to an increase in the anxiety levels of both female and male healthcare workers, and this has harmed their sexual functions.

Keywords: COVID-19; Pandemic; Sexual Dysfunction; Post-traumatic Stress Disorder; Rehabilitation.

RESUMO

Introdução e hipótese: situações pandêmicas, como a crise vivida pela doença do coronavírus 2019 (covid-19), colocam desafios aos trabalhadores da saúde e podem ter um impacto negativo na sua saúde física, mental e sexual. Conhecer o impacto da pandemia de covid-19 na saúde sexual dos profissionais de saúde pode ajudar a enfrentar melhor a situação, bem como permitir a formulação de estratégias de prevenção/intervenção capazes de reduzir esse impacto e garantir a saúde física, mental e sexual desses profissionais no desempenho de suas funções laborais e saúde deles. Objetivo: este estudo tem como objetivo comparar a função sexual/erétil entre profissionais de saúde que atuaram ou não na linha de frente durante a pandemia de covid-19, considerando a presença de Transtorno de Estresse Pós-Traumático (TEPT), a frequência sexual, suas queixas e o fato de estarem em isolamento social com o companheiro. **Métodos**: estudo transversal com profissionais de saúde de ambos os sexos, maiores de 18 anos, por meio do Google Forms, utilizando os questionários: Índice de Função Sexual Feminina (IFSF), Índice Internacional de Função Erétil (IIFE-5) e Escala de Impacto de Eventos-Revisado (IES-R, identificar TEPT), com a investigação de aspectos da vida sexual durante a pandemia. Os testes de correlação de Spearman, Shapiro Wilk, Kruskall Wallis, Qui quadrado e Dwass Steel Critchlow Fligner foram realizados usando o Software R 2020. **Resultados**: verificou-se maior disfunção sexual entre mulheres fora da linha de frente (66,9%). As mulheres com menor escore IFSF apresentaram maior escore IES-R, identificando TEPT presente, 18,6 vs ausente: 19,9 ($p<0,001$). Aqueles que mantiveram ou aumentaram a atividade sexual (IFSF=20,6 e 20,8, respectivamente) vs diminuíram (IFSF=18,5), suspenderam (IFSF= 15,0) ou nenhuma atividade sexual (IFSF=10,4) ($p<0,00$); e os que nunca apresentaram queixa sexual (IFSF=20,1) vs já apresentaram (IFSF=19,0) ou apresentam (IFSF=16,2) ($p<0,001$). Por outro lado, um escore IFSF mais alto foi encontrado entre as profissionais da linha de frente com atividade sexual (linha de frente=21,1 vs fora da linha de frente=20,6; $p<0,001$); queixa sexual anterior vs queixa atual (IFSF=19,7 vs 17,4; $p<0,01$). Entre os homens, uma diferença foi observada em profissionais não da linha de frente (queixa sexual anterior IIFE-5= 24 vs queixa atual 23; $p=0,02$). **Conclusão**: houve associação entre profissionais de fora da linha de frente e presença de disfunção sexual. A pandemia da covid-19 levou a um aumento nos níveis de ansiedade de profissionais de saúde, tanto do sexo feminino quanto masculino, e isso teve um impacto negativo em suas funções sexuais.

Palavras-chave: COVID-19; Pandemia; Disfunção Sexual; Transtorno de Estresse Pós-Traumático; Reabilitação.

INTRODUCTION

In December 2019, in Wuhan, Hubei province, China, several cases of pneumonia of unknown etiology were reported[1]. The agent, a virus from the coronavirus family, was named SARS-CoV-2 and identified as the cause of a disease then called Coronavirus Disease 2019 (COVID-19)[2]. The spread of SARS-CoV-2 causes COVID-19 through direct contact with large respiratory droplets or secretions from infected people[3]. Within a short time, thousands of people were infected with the virus, and the disease spread rapidly around the world. As a result of the increasing number of cases reported worldwide, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic on March 11, 2020[4,5]. When COVID-19 was classified as a pandemic, 4,291 people had already died from the disease worldwide. After four years, the virus has killed more than 7 million people. The worst years for mortality were 2020 and 2021. As of December 24, 2023, 773,119,173 people have been confirmed to be infected with COVID-19 worldwide. Of these, 6,990,067 patients died, with a mortality rate of 1%[6]. In May 2023, WHO declared the end of COVID-19 a global health emergency thanks to the improved clinical management and the widespread immunity acquired through natural infection vaccines or both[7].

The COVID-19 pandemic has overwhelmed health systems in most countries and led to substantial economic losses. Health workers and health systems have faced various problems during the pandemic, suffering physical and psychological pressure[8,9]. The role of healthcare workers has increased dramatically due to the need to meet the health requirements of an increasing number of people, putting a strain on their workload and risk of infection. The death of colleagues, the social isolation, the economic uncertainties, and the fear of spreading the disease to family members, especially at the beginning of the pandemic, increased the stress levels of these professionals, negatively affecting their physical and psychological well-being[10,11].

Whether working on the front line or in other areas, health professionals have played a central role in the fight against COVID-19. In carrying out their duties, these professionals were among the groups most vulnerable to transmission of the coronavirus and the emotional and psychological consequences of the pandemic[12]. The main factors related to the occupational impact of the pandemic on health professionals include aspects such as the changes introduced into the work routine, increased working hours, the creation of isolation spaces, and increased recommendations for the use of Personal Protective Equipment (PPE). As for the psychological impact, there is the possibility of associations with stress, anxiety, insomnia, and depressive symptoms, as well as events related to sexual health[13].

Given these initial considerations, this study aims to compare the sexual/erectile function among health professionals who have or have not worked on the front line in the fight against COVID-19, taking into account the presence of Post-Traumatic Stress Disorder (PTSD), the sexual frequency and the complaints, and the fact of being in social isolation with their partner.

METHODS

Study design, setting and participants

A cross-sectional study, developed from July to September 2020, applied to health professionals who declared whether they had an active sexual life or not and also agreed to answer the interview and sign the Informed Consent Form (ICF), as previously approved by the Institutional Review Board from Federal University of Alfenas (UNIFAL-MG – Brazil), under register: CAAE 34056120.7.0000.5142 (Approval number 4128647). Non-heterosexual individuals could answer as long as they engaged in sexual activity with vaginal penetration. Those who did not declare themselves as health professionals were excluded.

The interview was proposed by researchers at the UroPhysiotherapy Laboratory of the Postgraduate Program in Rehabilitation Sciences, UNIFAL-MG – Brazil performed through the Google Forms platform and made available to the recipients in Portuguese and Spanish, through the authors', co-authors' and contributors' social media; every invitee was also requested to share in social media (Facebook, Instagram, WhatsApp, e-mail, local and regional newspapers).

The study followed the standards of good practice in clinical studies involving humans, which agreed with Resolution n. 466/12 from the National Health Council. It fulfilled the requirements of the Helsinki Declaration and the Good Clinical Practice Guidelines, Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Guidelines, and the Checklist for Reporting Results of Internet E-Surveys (CHERRIES).

Measurement and quantitative variables

Independent variables: The study participants (convenience sample) were classified into professionals working at the frontline (taking care of patients with symptoms or positive diagnoses of COVID-19) or those working in other areas (face-to-face or remote clinical care).

Dependent variables: Sexological outcomes: Male erectile function and female sexual function.

Erectile function men's required condition for sexual intercourse with penetration was evaluated by the domain of the erectile function from the International Index of Erectile Function (IIEF) questionnaire, originally developed and validated in 1997 by Rosen et al.[4], translated and validated in Spanish by Zegarra et al.[8] and in Portuguese by Gonzales et al.[9]. Its reduced, self-applicable and reproducible version, IIEF-5, aims to precisely analyze and measure erectile function[10], through the summation of answers (from 1 to 5), which results in a final domain score (from 5 to 25 points), and the following classification is considered: IIEF-5 score total: minimum 5 (worst erectile function); maximum 25 (best erectile function); cut-off point: 22, classified as: without erectile dysfunction: ≥ 22; with erectile dysfunction: < 22.

For the evaluation of sexual function in the female population, the Female Sexual Function Index (FSFI) questionnaire was used, as validated and translated to Portuguese by Pacagnella, Martinez, and Vieira11 and to Spanish by Blümel et al.[12]. It consists of 19 self-applicable, specific and multidimensional questions, evaluating the following sexual aspects (domains): sexual desire, arousal, vaginal lubrication, orgasm, satisfaction, and pain[13]. The total score is the sum of each domain score multiplied by its corresponding factor, varying from 2 to 36. The following classification was considered: FSFI total score: minimum 2 (worst sexual function); maximum 36 (best sexual function); cut-off point: 26.55, classified as without sexual dysfunction: ≥ 26,55; with sexual dysfunction: < 26.55.

Co-variables

PTSD, considering COVID-19 pandemic impact: The social distancing/isolation imposed during the COVID-19 pandemic was considered an event that triggered PTSD, which was evaluated by the validated Impact of Event Scale-Revised (IES-R) survey, a self-applicable scale developed by Weiss et al. [14] in 1997, in which the individual answers to the questions based on their last seven days. The scale comprises 22 items distributed into three sub-scales (avoidance, intrusion, and hyperarousal), defining the criteria for PTSD evaluation. The score for each question varies from 0 to 4 points. The total score is the sum of the sub-scales scores (avoidance: from 0 to 32; intrusion: from 0 to 32; hyperstimulation: from 0 to 24), varying from 0 to 88, in which a higher score means higher impact[6,15]. The following classification was considered: total IES-R score: minimum 0 (lower PTSD) and maximum 88 (higher PTSD); cut-off point: 24 points, classified in ≥ 24: PTSD is a clinical concern, in other words, the higher the score, more intense is PTSD; ≥ 33: best cut-off point for likely PTSD diagnosis; ≥ 37 extreme PTSD, with enough consequences to suppress the immune system, even ten years after the triggering event.

Sexual life aspects: Frequency, complaints, and presence of the partner during isolation.

Frequency of sexual activity: Present with increased frequency; present with no change in frequency; present with decreased frequency; suspended or no sexual activity.

Sexual complaint: Never displayed; previously presented; currently present.

In isolation with a partner: partner at home during the COVID-19 pandemic (lives with or without a partner).

Bias

The study was developed anonymously, as declared in the ICF, to avoid participants feeling shy or reluctant when providing intimate and sexual information. The researcher committed to sharing the study among the Latin American population, reaching most Latin American countries due to the possibility of answering the questionnaire in Spanish and Portuguese.

Study size

The study included health professionals recruited at convenience who volunteered to answer the online and anonymous interviews.

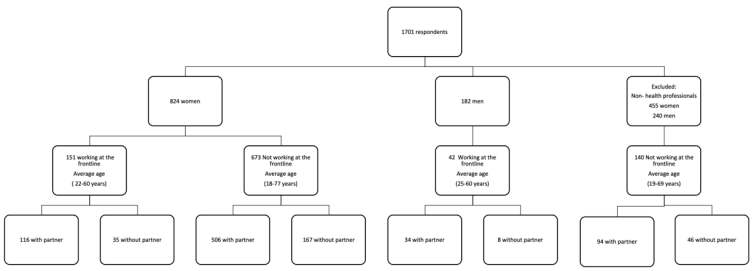
Statistical analysis

Initially, descriptive analyses were performed to identify the research participants. Health professionals were selected and grouped as COVID-19 frontline or non-frontline workers. Shapiro-Wilk test was used to verify if the continuous variables followed a normal distribution. The found significance level was $p<0.05$, indicating that the data was not normally distributed. A chi-squared test was used to verify the associations between qualitative variables. A comparison of the other variables was performed using a non-parametric Mann-Whitney test. Since male and female sexual function indexes were not normally distributed, the Kruskall-Wallis test was used to compare FSFI and IIEF for the professionals that work or do not work at the COVID-19 frontline, regarding IES-R classifications, isolation with or without a partner, sexual activity during the pandemic, and sexual complaint. Male and female groups were analyzed separately to determine whether they worked in the COVID-19 frontline. The dwass-Steel-Critchlow-Fligner test was used for the multiple comparisons to point out the differences; the R software[16] was used, with a significance level of 5%.

RESULTS

One thousand seven hundred one individuals participated in the study; however, 455 women and 240 men were excluded because they did not work in health care. Eight hundred twenty-four women and 182 men remained, totaling 1006 professionals (193 working at the COVID-19 frontline and 813 non-frontline), as shown in Figure 1.

Figure 1. Flow diagram of the study



Among the studied individuals, most participants were between 21 and 40 years old (73.06%), working (19.18%) or not (80.82%) in the COVID-19 frontline. Most of them were single, divorced, or widowed (50.3%), and 749 individuals were in social isolation with their partners (74.45%); 40.25% maintained or increased their sexual activity frequency, while 59.75% decreased, suspended, or not sexually active; 76.05% never presented or presented sexual complaints previously. It was observed that 680 of the health professionals (67.59%) demonstrated clinical change for PTSD, mostly (55.66%) those who were not working on the COVID-19 frontlines (Table 1).

Table 1. Demographic and clinical data of the study population

Variables f (%)	**Female** 824 (81.91%)		**Male** 182 (18.09%)		**Total** 1006 (100%)	
	Working at COVID-19 frontline					
	Yes	**No**	**Yes**	**No**	**Yes**	**No**
	151 (18.32%)	673 (81.68%)	42 (23.08%)	140 (76.92%)	193 (19.18%)	813 (80.82%)
Age						
18-20	0 (0%)	6 (0.73%)	0 (0.00%)	4 (2.20%)	0 (0.00%)	10 (0.99%)
21-40	117 (14.20%)	513 (62.26%)	28 (15.38%)	77 (42.31%)	145 (14.41%)	590 (58.65%)
41-60	34 (4.13%)	133 (16.14%)	14 (7.69%)	47 (25.82%)	48 (4.77%)	180 (17.89%)
> 61	0 (0%)	21 (2.55%)	0 (0%)	12 (6.59%)	0 (0%)	33 (3.28%)
Marital status						
Married	72 (8.74%)	340 (41.26%)	23 (12.64%)	65 (35.71%)	95 (9.44%)	405 (40.26%)
Single	65 (7.89%)	287 (34.83%)	2 (1.10%)	12 (6.59%)	67 (6.66%)	299 (29.72%)
Divorced	14 (1.70%)	43 (5.22%)	17 (9.34%)	63 (34.62%)	31 (3.08%)	106 (10.54%)
Widowed	0 (0%)	3 (0.36%)	0 (0%)	0 (0%)	0 (0%)	3 (0.30%)
In isolation with a partner						
Yes	116 (14.08%)	506 (61.41%)	34 (18.68%)	93 (51.10%)	150 (14.91%)	599 (59.54%)
No	35 (4.25%)	167 (20.27%)	8 (4.39%)	47 (25.82%)	43 (4.27%)	214 (21.27%)
Sexual activity						
Present, no change in frequency	44 (5.34%)	192 (23.30%)	16 (8.79%)	47 (25.82%)	60 (5.96%)	239 (23.76%)
Present, with increased frequency	11 (1.33%)	73 (8.86%)	5 (2.75%)	17 (9.34%)	16 (1.59%)	90 (8.95%)
Present, with decreased frequency	62 (7.52%)	248 (30.10%)	15 (8.24%)	38 (20.88%)	77 (7.65%)	286 (28.43%)
No sexual activity	17 (2.06%)	74 (8.98%)	2 (1.10%)	16 (8.79%)	19 (1.89%)	90 (8.95%)
Suspended	17 (2.06%)	86 (10.44%)	4 (2.20%)	22 (12.09%)	21 (2.09%)	108 (10.74%)
Sexual complaint						
Never displayed	80 (9.71%)	311 (37.74%)	19 (10.44%)	83 (45.60%)	99 (9.84%)	394 (39.17%)
Previously presented	36 (4.37%)	194 (23.54%)	15 (8.24%)	27 (14.84%)	51 (5.07%)	221 (21.97%)
Currently present	35 (4.25%)	168 (20.39%)	8 (4.40%)	30 (16.48%)	43 (4.27%)	198 (19.68%)
IES-R						
Avoidance	79 (9.59%)	398 (48.30%)	10 (5.49%)	23 (12.64%)	89 (8.85%)	421 (41.85%)
Intrusion	62 (7.52%)	213 (25.85%)	6 (3.30%)	34 (18.68%)	68 (6.76%)	247 (24.55%)
Hyperarousal	10 (1.21%)	62 (7.52%)	26 (14.29%)	83 (45.60%)	36 (3.58%)	145 (1.41%)
PTSD						
IES-R ≥ 24 (present)	98 (11.90%)	495 (60.07%)	22 (12.09%)	65 (35.71%)	120 (11.93%)	560 (55.66%)
IES-R < 24 (absent)	53 (6.43%)	178 (21.60%)	20 (10.99%)	75 (41.21%)	73 (7.26%)	253 (25.15%)

Legend:
The data are expressed in frequency (f) and percentage (%). IIES-R: Impact of Event Scale-Revised. Cut-off point: 24 points, classified in≥ 24: Post-traumatic Stress Disorder (PTSD) is a clinical concern. It was observed that 67.59% of health professionals presented PTSD clinical alterations, mostly (55.66%) those who were not working on the COVID-19 frontline.

Table 2 presents the median values for age and IIES-R, FSFI (and its domains), and IIEF-5 scores, classified by whether they worked at the COVID-19 frontline.

A negative association between working at the frontline and sexual dysfunction was found among women. However, no significant differences were identified between the median scores in other compared variables, including men.

Table 2. Post-Traumatic Stress Disorder scale and sexual/erectile function among health professionals working in COVID-19 frontline compared to those working in face-to-face or remote clinical care (non-frontline)

Variables	COVID-19 frontline		Median		Min - Max		Quartile (25%, 75%)		IQR		p-value	
			Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
FSFI	PTSD	IES-R ≥ 24 (present)	18.7	**18.6**[a]	1.2 - 24	1.8 - 24.0	16.5 - 20.9	15.2 - 20.6	4.43	5.40	0.89	**<0. 001**
		IES-R < 24 (absent)	19.2	**19.9**[b]	1.2 - 23.7	1.2 - 24.0	15.7 - 21.4	16.7 - 21.8	5.70	5.12		
	In isolation with a partner	Yes	**19.1**[A]	19.4[a]	1.2 - 24	1.2 - 24.0	17.4 - 21.5	16.5 - 21.3	4.07	4.77	**<0.00**	**<0.001**
		No	**16.3**[B]	17.3[b]	1.2 - 23.4	1.8 - 24.0	8 - 21.5	9.5 - 19.6	12.3	10.1		
	Sexual activity	No sexual activity	8.0	10.4[c]	1.2 –16.9	1.2 - 21.3	5.7 - 14	4.88 - 16.6	8.3	11.80	**<0.00**	**<0.001**
		Suspended	16.7	15.0[c]	1.2 - 24	2.4 - 23.7	6.3 - 20	5.7 - 18.3	13.7	12.60		
		Present, with decreased frequency	18.8	18.5[b]	10.9 - 23.2	1.8 – 24	16.9 - 20	16.4 - 20.3	3.13	3.90		
		Present, no change in frequency	21.1	20.6[a]	10.6 - 24	10.3 - 24	19.1 - 22.5	18.8 - 22	3.35	3.22		
		Present, with increased frequency	18.4	20.8[a]	16.9 - 23.1	14 - 24	17.5 - 21.2	19 – 22	3.7	3		
	Sexual complaint	Never displayed	19.3[B]	20.1[a]	1.2 - 24	1.8 - 24	16.9 - 21.8	17.6 - 21.6	4.9	4.05	**0.01**	**<0.001**
		Previously presented	19.7[a]	19.0[b]	3 - 23.7	1.8 - 24	16.6 - 21.3	16.4 - 20.9	4.7	4.5		
		Currently present	17.4[A]	16.2[c]	1.2 - 24	1.2 - 24	14.6 - 18.4	12.6 - 18.2	3.8	5.6		
IIEF-5	PTSD	IES-R ≥ 24 (present)	22	23	15 - 25	10 - 25	18.3 - 24.0	20 - 24	5.75	4	0.12	0.43
		IES-R < 24 (absent)	24	22	15 - 25	10 - 25	20 - 24.3	19 – 24	4.25	5		
	In isolation with a partner	Yes	22	22	15 - 25	10 - 25	18.3 – 24	20 - 24	5.75	4	0.07	0.49
		No	24	22	22 - 25	10 - 25	23 - 24.2	19 - 24	1.25	5		
	Sexual activity	No sexual activity	24	23	23 - 25	13 - 25	23.5 - 24.5	19.3 - 24	1	4.75	0.36	0.94
		Suspended	24	22	23 - 25	10 - 25	23.8 - 24.3	19 - 23.8	0.5	4.75		
		Present, with decreased frequency	22	23	15 - 25	11 - 25	17 - 24	19.3 - 24.8	7	5.5		
		Present, no change in frequency	22	22	15 - 25	12 - 25	19 - 24	19.5 - 24	5	4.5		
		Present, with increased frequency	24	22	18 - 25	10 - 25	20 - 24	19 - 24	4	5		
	Sexual complaint	Never displayed	23	22[b]	15 - 25	10 – 25	18.5 – 24	19 - 23	5.5	4	0.9	**0.026**
		Previously presented	23	24[b]	16 - 25	13 - 25	19.5 – 24	20.5 – 25	4.5	4.5		
		Currently present	22.5	23[a]	16 - 25	10 - 25	21.0 - 24	22 - 24	3.25	2		

Legend:
[1] IIES-R: Impact of Event Scale-Revised, total score: 0 (lower impact) to 88 (higher impact)
[2] PTSD: Post-Traumatic Stress Disorder. Cut-off point: 24 points ≥24.
[3] FSFI Score total: minimum 2 (worst sexual function); maximum 36 (best sexual function); cut-off point: 26.55. §Sexual Dysfunction: <26.55.
[4] IIEF-5: International Index of Erectile Function, total score: minimum 5 (worst erectile function); maximum 25 (best erectile function). Cut-off point: 22. Erectile Dysfunction: <22
*Mann-Whitney, **Chi-squared, significance level: 5%.

There is an association between working at the frontline and sexual dysfunction among women. No difference was found between the median of scores for each compared group.

The FSFI score for women who were not working at the COVID-19 frontline, about IES-R classification, was lower in women with PTSD than without PTSD (FSFI=18.6 versus =19.9, respectively; p<0.001); in other words, there is a change in FSFI for women who were not working at the frontline but presented a clinical concern for PTSD during the pandemic. Not being in isolation with the partner had an influence over female sexual health, demonstrated by the observation that both frontline and non-frontline women had lower FSFI scores when compared to those who were in isolation with their partner (p=0.001).

Regarding sexual complaints, there was a statistically significant difference in FSFI scores for both frontline and non-frontline female professionals (p=0.01 and <0.00, respectively). Women at the frontline who had previously presented sexual complaints had higher FSFI scores than those who currently complain (FSFI=19.7 and 17.4, respectively). In non-frontline women, however, FSFI scores were different independently of sexual complaint history, and those who never presented complaints had the highest median for FSFI scores (20.1).

Considering sexual activity, there was a statistically significant difference in FSFI scores for both frontline and non-frontline professionals (p<0.00 in both). In frontline women, FSFI was higher in those who maintained regular sexual activity during the pandemic (21.1) than those who had decreased frequency (18.8). In non-frontline women, however, those who increased sexual activity during the pandemic had a higher FSFI score (20.8) in comparison to those who decreased or suspended sexual activity. In men, there was a significant difference for those who were not working at the frontline (p=0.02), as the median in IIEF-5 scores for those who previously presented sexual complaints (24) was

higher than those who currently complained (23). In other studied variables, no significant differences were found (Table 3).

Table 3. Comparison of the sexual/erectile function (Female Sexual Function Index – FSFI and International Index of Erectile Function – IIEF) between health professionals working or not in the COVID-19 frontline about IES-R, isolation with a partner, frequency of sexual activity and sexual complaints

Variables	Female 824 (82%)			Male 182 (18.0%)			Participants 1006 (100%)		
	Working at the frontline (f/%)								
	Yes 151 (15.01%)	No 673 (66.90%)	p-value	Yes 42 (4.17%)	No 140 (13.92%)	p-value	Yes 193 (19.18%)	No 813 (80.81%)	p-value
Age median (min-max)/(25, 75)	33 (22 - 60) / (28.5, 39)	32 (18 - 77) / (27, 39)	0.07*	32.5 (25 - 60) / (29.5, 42.75)	38 (19 - 69) / (28.75, 53)	0.38*	33 (22 - 60) / (29, 40)	32 (18 - 77)/(27, 41)	0.17*
IES-R[1] median (min-max)/(25, 75)	36 (2 - 81) / (17.5; 54.5)	37 (0 - 88) / (23, 5)	0.79*	24 (0 - 73) / (9, 38.75)	25.5 (0 - 78) / (14, 43.25)	0.35*	35 (0 - 81)/(16, 51)	35 (0 - 88)/(21, 49)	0.32*
PTSD[2] IES-R ≥ 24 (present)	18	17	0.23*	21.0	23.0	0.38*	19	19	0.24*
IES-R <24 (absent)	19.2	19.9	0.20*	24.0	22.0	0.12*	20.0	20.3	0.88*
IFSF[3] median (min-max)/(25, 75)	18.9 (1.2 - 24) / (16.25, 21.3)	18.9 (1.2 - 24) / (15.7, 21)	0.67*	---	---	---	---	---	---
Desire	3.6 (1.2 - 6) / (3.0, 4.8)	3.6 (1.2 - 6) / (3.0, 4.8)	0.17*	---	---	---	---	---	---
Arousal	2.7 (0 - 3) / (2.1, 3.0)	2.7 (0-3) / (2.1, 3.0)	0.53*	---	---	---	---	---	---
Lubrication	2.7 (0 - 3) / (2.1, 3.0)	2.7 (0 - 3) / (2.1, 3.0)	0.41*	---	---	---	---	---	---
Orgasm	3.6 (0 - 4) / (2.4, 3.8)	3.2 (0 - 4)/(2.4, 4.0)	0.93*	---	---	---	---	---	---
Satisfaction	3.6 (0 - 4) / (2.4, 4.0)	3.6 (0-4) / (2.4, 4.0)	0.99*	---	---	---	---	---	---
Pain	3.6 (0 - 4) / (2.4, 4.0)	3.6 (0 - 4) / (2.8, 4.0)	0.76*	---	---	---	---	---	---
Sexual dysfunction[§] (f/%)	151 (15.01%)	673 (66.9%)	**0.00****	---	---	---	---	---	---
IIEF-5[4] median (min-max)/(25, 75)	---	---	---	23 (15 - 25) / (19, 24)	22 (10 - 25) / (19, 24)	0.62*	---	---	---
Erectile dysfunction (f/%)	---	---	---	16 (1.59%)	53 (5.27%)	1.0**	---	---	---

IIES-R: Impact of Event Scale Revised. Cut-off point: 24 points, classified in: ≥24: Post-Traumatic Stress Disorder (PTSD) is a clinical concern.
FSFI total score: minimum 2 (worst sexual function); maximum 36 (best sexual function); Cut-off point: 26.55. §Sexual Dysfunction: <26.55.
IIEF-5: International Index of Erectile Function, total score: minimum 5 (worst erectile function); maximum 25 (best erectile function). Cut-off point: 22. Erectile Dysfunction: <22.
*Kruskall-Wallis, Dwass-Steel-Critchlow-Fligner, significance level.

DISCUSSION

According to the results presented above, and taking sexual activity as the object of the study, a fundamental element for assessing the quality of life of individuals, encompassing various aspects of human life, such as one's own identity, physical and emotional pleasure, and the ability to establish affective relationships, the impact of the coronavirus pandemic on the sexual function of the female health professionals who were not working on the front line treating individuals with COVID-19 participating in the study is clear. Furthermore, concerning male professionals, the pandemic, on the other hand, had an impact on PTSD without influencing their sexual activities.

The female sex may have been more affected, mainly because these are health professionals who, in practice, in addition to dealing with conflicts specific to their emotional and personal experiences, have experienced stressful situations in their work routine.

In this scenario, it is possible to

observe that the COVID-19 pandemic has led to an increase in the anxiety levels of both female and male health professionals and that this situation has negatively affected their sexual functions.

Bulut et al.[17], based on the assumption that health professionals fighting epidemics develop symptoms of PTSD, carried out a study to show how frequently and severely erectile dysfunction, one of the components of PTSD, was seen among health professionals during the COVID-19 outbreak. To do this, they applied the Impact of IES-R and the IIEF-5 to 159 male health professionals working in COVID-19 units and a control group of 200 people. The group of healthcare professionals was divided into subgroups according to occupation (doctor, nurse), age group (18-25, 26-30, >30), marital status, and work unit (Suspected Patients Area, Diagnosed Patients Area). Both PTSD and erectile dysfunction were seen at higher rates in the healthcare professional group ($p<0.001$). The median IIEF-5 scores of nurses, married individuals, and those working in the Diagnosed Patient Area were found to be higher ($p<0.001$, $p=0.014$, $p=0.011$, respectively). For the researchers, during the COVID-19 outbreak, healthcare workers were exposed to psychological trauma, and their sexual function was negatively affected.

Culha et al.[18] points out that during the COVID-19 outbreak, the psychological conditions of healthcare workers deteriorated. To corroborate their claim, the researchers conducted a study with the aim of examining changes in the sex lives of healthcare workers due to the COVID-19 outbreak in Istanbul, Turkey. To this end, they conducted an online survey between May 2 and 26, 2020, with 232 healthcare professionals working in a pandemic hospital. In addition to demographic data, they assessed pre and post-COVID-19 attitudes, as well as sexual functions (IIEF for men and Female Sexual Function Index for women), anxiety, and depression of the study participants. Dependent sample t-test, Mc Nemar test, and multivariate analysis were used. The study was completed with 185 participants in total. The health professionals' sexual desire (3.49 ± 1.12 vs. 3.22 ± 1.17; $p=0.003$), the weekly number of sexual intercourses/masturbation (2.53 ± 1.12 vs. 1.32 ± 1.27; $p<0.001$), the foreplay time (16.38 ± 12.35 vs. 12.02 ± 12.14; $p<0.001$), and the intercourse time (24.65 ± 19.58 vs. 19.38 ± 18.85; $p<0.001$) decreased compared to the pre-COVID-19 outbreak. In addition, participants demonstrated a preference for less foreplay ($p<0.001$), less oral sex ($p<0.001$), and anal sex ($p=0.007$) during COVID-19 and more non-face-to-face sexual intercourse positions ($p<0.001$).

When the factors affecting sexual dysfunction were analyzed as univariate and multivariate, sexual dysfunction proved to be significantly more common in men (OR = 0.053) and alcohol users (OR = 2.925). In conclusion, the researchers reiterate that, during the COVID-19 outbreak, health professionals' sexual desires have decreased, as well as the number of sexual relations, their foreplay times, and their sexual intercourse positions have changed to less face-to-face, indicating the negative impact that the pandemic has had on the performance of these professionals' job functions18.

For Neto et al.[19], the pandemic caused by COVID-19 has resulted in worldwide social isolation, leading to significant personal suffering, particularly among frontline healthcare workers. Considering that the relevance of such factors and their impact on the sexual function in this population has not been fully established yet, the researchers conducted a study to assess the effects of the pandemic on the sexual function of health professionals and medical students at a reference center for the treatment of COVID-19 in Brazil. The basis was a cross-sectional analysis of online questionnaires on sexual function sent to health professionals and medical students at the medical complex of the Hospital das Clínicas of the Faculty of Medicine of the University of São Paulo (HC-FMUSP). The questionnaire assessed the Total Sexual and Masturbatory Frequency before and during the pandemic, changes in libido, and sexual satisfaction with detailed questioning of demographic data and personal factors. An objective assessment of the sexual function was also made using the validated sexual quotient questionnaires. Differences in the frequency

of sexual intercourse, libido, and general sexual satisfaction were considered in a sample of health professionals who were particularly vulnerable to the effects of the pandemic. As a result, the researchers found that 1,314 responses were available with an average age of 37. A worsening of sexual satisfaction was reported by 44.5% of the participants, with the following associated factors: lower libido, lack of nightlife, greater frequency of masturbation, and isolation from the partner. Remaining sexually active and having a greater sexual frequency seemed to reduce the chance of a worsening of sexual function. A further deterioration of libido was reported by 37% and had several associated factors, including lack of nightlife, older age, and isolation from the partner, among others. Being male and sexually active was associated with a lower chance of reporting a lower libido. In conclusion, since a sharp drop in libido and overall sexual satisfaction was observed, although there was an increase in pornography consumption and masturbation frequency, it is clear that the impact of COVID-19 on the sexual health of this population should not be underestimated and should be further studied for possible future scenarios.

Also, considering that the adverse psychosocial effects of the COVID-19 pandemic on healthcare workers have increased worldwide, Güzel and Döndü20 set out to investigate the impact of healthcare workers' prolonged exposure to the COVID-19 outbreak on their sexual habits and functions. In a cross-sectional study involving a total of 263 healthcare workers who answered an online questionnaire between December 1, 2020, and January 31, 2021, with questions about demographic data, COVID-19 disease status, and sexual habits before and after COVID-19, sexual function and assessment of anxiety state, the researchers observed that, of the 240 participants included in the study, 124 were men and 116 were women. The average age of the participants was 40.18 ± 7. Compared to the pre-pandemic period, the level of sexual desire of healthcare workers ($p=0.000$), the weekly frequency of sexual intercourse ($p=0.001$), the duration of the foreplay ($p=0.000$), and the duration of the intercourse ($p=0.009$) decreased during the pandemic period. When the factors affecting the sexual dysfunction were assessed with multivariate logistic regression analysis, it was determined that the female gender (OR 0.312), the high anxiety score (OR 0.949), and a decreased quality social time spent with the spouse, or the partner were risk factors for the sexual dysfunction (OR 0.358). In conclusion, the studies cited corroborated the findings of this study, demonstrating the adverse effects of the pandemic on the sexual lives of health professionals. In this sense, providing psychological support to these professionals can improve their sexual habits and functions negatively affected by the COVID-19 outbreak, as well as their social life with their spouses or partners.

Among the limitations of this study is the fact that it was carried out through a questionnaire sent via social networks where the person may or may not have omitted legitimate information, even due to difficulty in understanding some questions, including the fact that it was anonymous, which, on the one hand, could guarantee the privacy of participants, since it was information of a sexual nature, but which, on the other hand, could be fragile in terms of ensuring that all respondents were health professionals, despite the Term of Free and Informed Consent (TCLE) to explain that it was intended for health professionals, in a self-declared manner. Furthermore, the sampling power was calculated after statistical analysis. On the other hand, access through social media can favor a greater sample size for online surveys. Addressing sexual function during a period when people were experiencing conflicting feelings and moments of fear and psychological pressure was unusual. The pandemic left this generation marked by emotional difficulties and its effects last until the present moment20. However, one of the positive points of this research was that the researchers were sensitive enough to give interested participants feedback on their findings in the questionnaire responses accompanied by basic support guidelines.

Given the results presented, and as future studies, it is suggested that the investigations be replicated compared to other moments of the COVID-19 pandemic or another pandemic event. Replication would be interesting, considering that the sum of factors related to emotional exhaustion, the collapse of the health system, and the number of cases and deaths may continue to impact health professionals, considering the duration of the pandemic and its late consequences.

CONCLUSION

Women working at the frontline presented lower sexual dysfunction, especially those who were in isolation with their partners and never presented sexual complaints. Men working out of the frontline with current sexual complaints presented higher erectile dysfunction than those who previously complained.

The COVID-19 pandemic has led to an increase in the anxiety levels of both female and male healthcare workers, and this has harmed their sexual functions.

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