

Coronavirus Pandemic

The impact of COVID-19 vaccination on the sexual health of male healthcare professionals

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Abstract

Introduction: The coronavirus disease 2019 (COVID-19) pandemic negatively affected the mental and sexual health of individuals, especially healthcare professionals. In this study, we aimed to investigate the changes in anxiety and sexual activity of male healthcare professionals following vaccination.

Methodology: This prospective cross-sectional and descriptive online survey was conducted between July 1, 2021 and November 1, 2021, involving a total of 170 healthcare professionals. Socio-demographic characteristics, pre- and post-vaccination anxiety and sexual activity levels of the participants were compared.

Results: There was a significant increase in only the intercourse times of the participants post vaccination ($p = 0.034$). The Beck anxiety inventory score decreased from median: 19 (minimum (min): 16, maximum (max): 47) before vaccination to median: 17, (min: 10, max: 43) after vaccination ($p < 0.001$). Likewise, Arizona Sexual Experiences Scale (ASEX) scores decreased after vaccination (median: 10, min: 5, max: 20) compared to before vaccination (median: 12, min: 5, max: 18) ($p < 0.001$). International Index of Erectile Function (IIEF) score also increased after vaccination (25.49 ± 6.50) compared to before vaccination (24.71 ± 7.10) ($p < 0.001$). Orgasmic function, sexual desire, intercourse satisfaction and overall satisfaction scores also improved ($p = 0.013$, $p < 0.001$, $p = 0.027$, $p < 0.001$).

Conclusions: Mental and sexual disorders increased with the COVID-19 pandemic. In addition to immunity, the vaccine also had positive effects on anxiety and sexual activity.

Key words: COVID-19; vaccine; sexual function; sexual dysfunction; sexuality.

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Introduction

In December 2019, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) was identified in China with a number of reported cases of pneumonia, and led to a pandemic (coronavirus disease 2019, COVID-19) [1]. The pandemic, restrictions on daily life were imposed all over the world because the virus was transmitted through respiratory droplets or direct contact with secretions of infected people [2]. During the pandemic, healthcare professionals experienced the highest exposure and mortality. It was reported that the rate of incidence of COVID-19 positive polymerase chain reaction (PCR) for healthcare professionals was 35.5%, the prevalence of hospitalization was 15.1% and the mortality rate was 1.5% in the first 6 months of the pandemic [3,4]. In another study, the mortality rate was 5.7% in the Eastern Mediterranean region [5]. In addition, recent studies have shown that older and male healthcare professionals are at a greater risk [6]. Although sufficient evidence is not available yet, the

virus was isolated in semen and vaginal fluid, and it has been stated that this negatively affected the sexual anxiety of healthcare professionals [7-9]. With the completion and implementation of vaccination, there are no studies that evaluate the sexual functionality and anxiety of male healthcare professionals after vaccination. In this study, we aimed to evaluate the sexual functionality and anxiety status of male healthcare professionals after receiving the COVID-19 vaccination.

Methodology

This prospective cross-sectional and descriptive online survey evaluated whether there was a change in sexual function and behavior of healthcare professionals during the course of ongoing vaccination in our country during the COVID-19 pandemic.

The study was conducted under the administration of the Institutional Review Board (IRB) numbered 2021/96 and with the approval of the local ethics

committee. Informed consent was obtained from all participants involved in the study. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Male healthcare professionals were contacted via their social media accounts (Facebook Messenger®, WhatsApp®) and e-mail addresses between 1 July 2021 and 1 November 2021 and an online survey link was sent to them. The Checklist for Reporting Results of Internet E-Surveys (CHERRIES) was used to improve the quality of web surveys [10]. The survey was conducted online so that participants could share their responses regarding their sexual lives and other information without feeling embarrassed, and was planned in such a way that individuals' identity information could not be queried. The survey included sexually active (at least once a week) healthcare professionals aged 18 years and over who participated in the survey voluntarily and who indicated that they had received 2 doses of CoronaVac® (Sinovac Life Sciences, China) + 1 dose of Pfizer-BioNTech® (BioNTech SE, Germany) or at least 3 doses of Pfizer-BioNTech® (BioNTech SE, Germany) vaccine. In line with the COVID-19 vaccine national implementation strategy of the Ministry of Health in Türkiye, healthcare professionals have been defined as the priority group in the COVID-19 vaccination program. As the first vaccine available in Türkiye, two doses of CoronaVac® (Sinovac Life Sciences, China) vaccine were administered with an interval of 1 month. Subsequently, with the active use of Pfizer-BioNTech® (BioNTech SE, Germany) vaccine in Türkiye, 3rd doses were optionally administered as Pfizer-BioNTech® (BioNTech SE, Germany) or CoronaVac® (Sinovac Life Sciences, China) vaccine. Vaccination was postponed in the case of COVID-19 pneumonia or

similar symptoms, but then efforts were made to complete optional vaccinations in line with the recommendations.

Participants who did not engage in sexual intercourse or declared that they were not sexually active, those who did not or incompletely received COVID-19 vaccination, those with a history of radical pelvic surgery, those who underwent pelvic radiotherapy, those with psychiatric disorders, and those who did not complete the questionnaire in full or gave incomplete responses were excluded from the study (Figure 1).

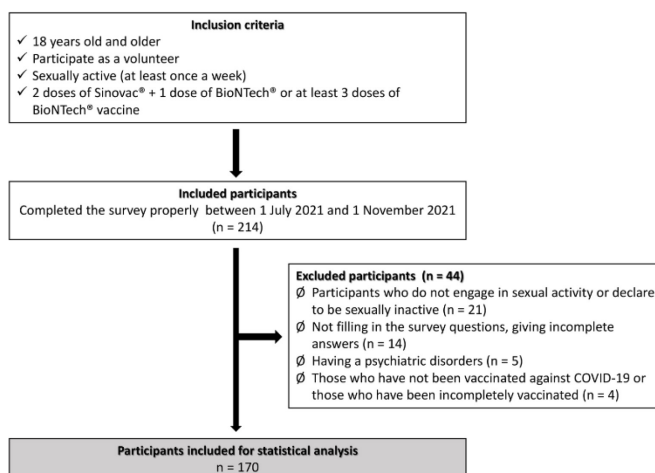
In the first part of the questionnaire, participants were informed about the research by clearly stating that their personal data would be kept confidential and would not be shared with third parties. In the second part, socio-demographic characteristics of the participants, the department of the healthcare professionals, existence of chronic or psychological disorders, COVID-19 disease history and the COVID-19 vaccination status were inquired. In the following parts, participants were surveyed about their sexual functionality and anxiety levels using validated surveys questioning pre- and post-vaccination periods individually.

The International Index of Erectile Function (IIEF), which was validated in Turkish in 2002, was used to assess the sexual functionality of the male participants [11]. IIEF is a 15-item survey that inquires the sexual functionality of males based on erectile function, orgasmic function, sexual desire, sexual satisfaction and general satisfaction subgroups [11,12]. A total score below 25 under the erectile function sub-section is defined as erectile dysfunction [12]. The Arizona Sexual Experiences Scale (ASEX) was also applied to the participants. ASEX is a user friendly 5-item rating scale that quantifies sex drive, arousal, penile erection, ability to reach orgasm and satisfaction from orgasm. Possible total scores range from 5 to 30, with the higher scores indicating more sexual dysfunction [13]. The Turkish validity and reliability study of the scale was performed by Soykan [14]. The Beck anxiety inventory (BAI), validated in Turkish, was used to evaluate the degree of anxiety [15,16]. BAI consists of 21 items and is scored on a scale from 0 to 63.

Statistical analysis

All data were analyzed using SPSS 18.0 (IBM, NY, USA). Visual (histogram) and analytical methods (Kolmogorov-Smirnov and Shapiro-Wilk tests) were used to assess the normality distribution of data. Normally distributed data were presented as mean and

Figure 1. Study flow diagram.



standard deviation values and percentages, while non-normally distributed data were presented as median, minimum (min.) and maximum (max.) values. Chi-square or Fisher's exact test (when Chi-square test assumptions did not hold due to low expected cell counts) was used to evaluate categorical data. Paired Student's t-test and McNemar test were used to evaluate changes before and after COVID-19 vaccination. Statistical significance was taken as $p < 0.05$.

Results

A total of 214 participants responded to the survey. Forty-four participants who complied with the exclusion criteria were excluded and a total of 170 participants were included in the evaluation. The mean age (minimum-maximum) of the study population was 36.91 ± 7.13 (21-60) years. The mean age of the participants' partners was 33.90 ± 6.54 (24-54) years. The mean body mass index of the participants was 26.48 ± 3.42 kg/m². Among the participants, 82.4% (140) were married, 44.7% (76) were smokers, 44.7% (76) consumed alcoholic beverages, 41.2% (70) suffered from COVID-19, and 65.9% (112) worked in a position where they dealt with COVID-19 patients first-hand. The basic characteristics of the participants are presented in Table 1.

Changes in foreplay time and intercourse time of the participants before and after vaccination were evaluated (Table 2). Statistically significant change was observed in the evaluation of foreplay time before and after vaccination, and a statistically significant increase was observed in intercourse time after vaccination ($p = 0.308$, $p = 0.034$, respectively). The median ASEX scores decreased after vaccination (median: 10, min: 5, max: 20) compared to before vaccination (median: 12, min: 5, max: 18) ($p < 0.001$). The changes in the

Table 1. Basic demographic characteristics of the participants.

Characteristics	n=170
Age (Years) (Mean ± SD)	36.91 ± 7.13
BMI (kg/m²) (Mean ± SD)	26.48 ± 3.42
Chronic disease status	
Yes n (%)	24 (14.1)
No n (%)	146 (85.9)
Marital status	
Married n (%)	140 (82.4)
Single n (%)	30 (17.6)
Smoking	
Yes n (%)	76 (44.7)
No n (%)	94 (55.3)
Alcohol use	
Yes n (%)	76 (44.7)
No n (%)	94 (55.3)
Passing COVID-19 disease	
Yes n (%)	70 (41.2)
No n (%)	100 (58.8)
Working in a position related to COVID-19 patients	
Yes n (%)	112 (65.9)
No n (%)	58 (34.1)
Healthcare professionals' position	
Doctor n (%)	128 (75.3)
Nurse n (%)	14 (8.2)
Radiology technician n (%)	8 (4.7)
Medical secretary n (%)	12 (7.1)
Others n (%)	8 (4.7)

BMI: body mass index.

participants' responses to the ASEX items before and after vaccination are presented in Figure 2.

While the median BAI score was 19 (min: 16, max: 47) before vaccination, it decreased to 17 (min: 10, max: 43) after vaccination and it was observed that this decrease was statistically significant ($p < 0.001$). IIEF score was 24.71 ± 7.10 before vaccination and 25.49 ± 6.50 after vaccination, orgasmic function score was 8.42 ± 2.58 before vaccination and 8.55 ± 2.56 after vaccination, sexual desire score was 7.41 ± 1.68 before vaccination and 7.67 ± 1.60 after vaccination, intercourse satisfaction score was 10.74 ± 3.69 before

Table 2. Changes in the duration of foreplay and coit duration of the participants before and after vaccination.

	Before vaccination n (%)	After vaccination n (%)	p
Foreplay time (min.)			
no foreplay	8 (4.7)	8 (4.7)	
less than 5 min.	44 (25.9)	38 (22.4)	
5-10 min.	82 (48.2)	88 (51.8)	0.308#
10-15 min.	20 (11.8)	20 (11.8)	
15-20 min.	4 (2.4)	4 (2.4)	
more than 20 min.	12 (7.1)	12 (7.1)	
Coit time (min.)			
less than 1 min.	6 (3.5)	6 (3.5)	
1-2 min.	12 (7.1)	12 (7.1)	
2-5 min.	38 (22.4)	30 (17.6)	0.034#
5-10 min.	72 (42.4)	78 (45.9)	
more than 10 min.	42 (24.7)	44 (25.9)	

Min: minute; #: Chi-square or Fisher's exact test (when Chi-square test assumptions do not hold due to low expected cell counts).

Table 3. International Index of Erectile Function (IIEF) scores and IIEF sub-parameters changes in male participants before and after vaccination.

	Before vaccination	After vaccination	<i>p</i>
International Index of Erectile Function (IIEF) score (mean ± SD)	24.71 ± 7.10	25.49 ± 6.50	< 0.001*
Orgasmic function (mean ± SD)	8.42 ± 2.58	8.55 ± 2.56	0.013*
Sexual desire (mean ± SD)	7.41 ± 1.68	7.67 ± 1.60	< 0.001*
Intercourse satisfaction (mean ± SD)	10.74 ± 3.69	10.94 ± 3.57	0.027*
Overall satisfaction (mean ± SD)	8.36 ± 1.67	8.57 ± 1.49	< 0.001*

*Paired Student's *t*-test.

vaccination and 10.94 ± 3.57 after vaccination, general satisfaction score was 8.36 ± 1.67 before vaccination and 8.57 ± 1.49 after vaccination. As shown in Table 3, a statistically significant increase was observed in all scores of IIEF parameters between before and after vaccination (before and after orgasmic function score change; *p* = 0.013, sexual desire score change *p* < 0.001, intercourse satisfaction score change *p* = 0.027, overall satisfaction score change *p* < 0.001).

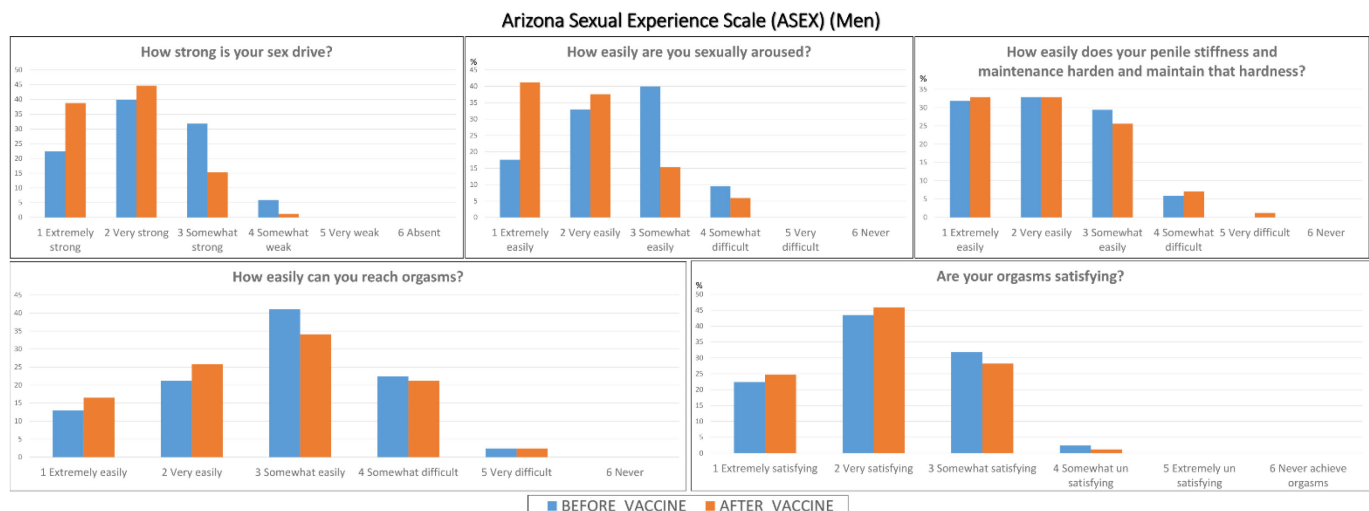
Discussion

The healthcare professionals all over the world experienced negative effects during the pandemic [3-6]. While protecting themselves, healthcare professionals also experienced negative occupational anxiety as they were afraid of transmitting the disease to their partners as carriers. Occupational anxiety may have an impact on physical and mental disorders [17]. Negative effects on anxiety levels of healthcare professionals were observed during the pandemic [8,9,18-20]. Anxiety and worries negatively affect sexual functionality [21]. In our study, we observed that this situation reversed with vaccination and that the anxiety scores decreased.

Following the urgent authorization for the use of Pfizer-BioNTech® (BioNTech SE, Rheinland-Pfalz, Mainz, Germany) COVID-19 vaccine, it was reported

that Google searches related to male reproductive problems and COVID-19 vaccine increased by 34.9% [22]. Although there was not sufficient data on the vaccine's effect on sexual functionality, it was reported that the COVID vaccine did not have any negative effect [23]. Studies on erectile dysfunction (ED) identified COVID infection rather than vaccination as a potential etiology of ED [24,25]. The pathophysiology is explained by penile endothelial damage, penile microvascular damage and the detection of COVID-19 particles in the corpus cavernosa tissue of infected patients after recovery [25-27]. There are rare studies evaluating male sexual status before and after vaccination. Díaz *et al.* showed that vaccination against COVID-19 was not associated with an increased risk of ED in a cross-sectional study conducted on vaccinated and unvaccinated males [28]. In a prospective observational study conducted by Yacoub *et al.* in postmenopausal females, it was reported that sexual functionality, quality of life and psychological aspects were positively affected after COVID-19 vaccination [29]. In the most up-to-date study, it has been stated that COVID-19 vaccination does not affect male sexual functions, including erectile function, orgasmic function, sexual desire, sexual satisfaction and general sexual satisfaction [30]. In this study, approximately

Figure 2. Variation of Arizona Sexual Experiences Scale (ASEX) subparameters before and after vaccination.



94.3% of individuals suggested that COVID-19 vaccination had no significant effect on male sexual function. Among the remaining (approximately 6%) individuals, 2-4% reported improvement in most sexual functions and another 2-4% reported decline in most sexual functions. In our study, although there was an improvement in IIEF parameters, a statistically significant increase was observed in the duration of sexual intercourse after vaccination with the improvement of ASEX and BAI scores. This may be due to a perception of safe sex life with the vaccine. Our study, which is the first study to investigate the effect of vaccination on sexual functioning of men with IIEF, ASEX and BAI scores, shows that there are positive changes in erectile function, orgasmic function, sexual desire, relationship satisfaction and general satisfaction after vaccination.

Limitations of the study

This study has several limitations. The survey did not inquire whether the participants had single or multiple partners. The decrease in social contact during the COVID-19 pandemic is likely to have affected people's multiple partner preferences. The effect of having COVID-19 pneumonia in the evaluation of sexual health after vaccination has not been examined in detail. The difference in age before and after vaccination may likely make a difference in men's sexual functioning and this was not explored in this study. The survey link was only sent to male healthcare professionals. Studying an isolated group limits the generalizability of the results. The number of participants was low. A similar study is needed with larger number of participants.

Conclusions

Healthcare professionals have been the most negatively affected group in terms of psychological and sexual health due to the COVID-19 pandemic. Vaccination led to positive improvements in anxiety and sexual functions and this needs to be noted as a further reliable aspect of the vaccine.

Data availability

The data sets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Authors' contributions

HYB: protocol development and research design, data collection and management, data analysis, manuscript writing/editing, supervision; AG: protocol development, data

collection, supervision; AB: protocol development and research design, data analysis, supervision.

Consent to publish

All participants included in this research gave written informed consent to publish the data contained within this study.

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