


COVID-19 and Male Sexual Functioning: A report of 3 Recovered Cases and Literature Review

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ABSTRACT: COVID-19 is a new global pandemic. It can affect multiple body systems and functions. However, the relationship between COVID-19 and male sexual activity did not yet get much consideration. Herein, we report the impact of COVID-19 on sexual function in 3 men who recovered from the disease. Compared with their condition before catching the infection, the men showed, in different degrees, a decline in all aspects of sexual function as assessed by the international index of erectile function. They started to develop premature ejaculation or exacerbate an already existing condition according to the premature ejaculation diagnostic tool scoring. Beck's depression inventory revealed deterioration of the men's moods up to severe depression. The sex-related hormones (testosterone-total and free, luteinizing hormone, follicle-stimulating hormone, prolactin, and estradiol) of these men were within normal levels. To the best of our knowledge, this is the first case report documenting deleterious changes in mood and several aspects of sexual functioning in males after recovery from the COVID-19 using validated measurement tools. Follow-up and psychological support of the recovered men may help mend their moods and consequently upgrade their sexual functioning.

KEYWORDS: COVID-19, sexual dysfunction, depression, premature ejaculation

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Introduction

Coronavirus disease 2019 (COVID-19) is a highly contagious disease caused by a novel coronavirus, currently named SARS-CoV-2.¹ The disease was considered a global pandemic by the World Health Organization last March 3, 2020 once it spread in 100 countries and affected more than 100 000 persons.² The common symptoms of COVID-19 include fever, dry cough, fatigue, and shortness of breath, but manifestations of multiple organs or systems have been reported, such as cardiovascular, urinary, gastrointestinal systems, and liver injury.^{3,4} COVID-19 has more than 84 million confirmed cases with about 1.8 million total deaths until January 3, 2021.⁵ Besides being a severe health crisis, COVID-19 is considered a social, economic, and political crisis that will affect all countries. Many restriction measures were imposed during this pandemic like social distancing between people to avoid close contact, wearing protective masks when getting in closed spaces, and even lockdown with the closure of most commercial services.⁶ Although protective measures help decrease the virus spread, people face a lifestyle change. COVID-19 puts a heavy psychological burden on populations due to the limitation of social interactions and long time stay at home.^{7,8}

Sexual activity is an integral part of living, and its success is increasingly recognized as an essential indicator of positive health and quality of life.⁹ On the contrary, poor self-rated health and chronic medical conditions are associated with decreased sexual capability, which has its negative reflections on man, family, and community.¹⁰

The literature review revealed a significant number of clinical studies investigating the influence of COVID-19 on several body organs and the application of many management

protocols.^{3,4} However, the impact of the disease on male sexual functioning did not receive much attention. The studies reporting how this function is changing under the COVID-19 are minimal, and much information is lacking.^{11,12} Accordingly, we got prompted to document the changes in several aspects of 3 men's sexual functions who recently recovered from COVID-19.

Case Histories

The reported patients (patient #1, patient #2, and patient #3) were 3 native males from the same prefecture (Beheira Prefecture, Egypt), working as food industry technician, lawyer, and driver, respectively. Any of them gave no history of alcohol or recreational drug intake. Table 1 showed the demographic features of the patients. Each patient had a single wife and several kids. The past medical history of the patients did not show any chronic debilitating diseases or medication intake. All claimed good sexual relations with their partners and denied any consultation of sexual problems or the usage of any medications or assisting tools to enhance their sexual activity.

Case 1

The first patient reported fever, shortness of breath, and dry cough. Nasal swab and polymerase chain reaction (PCR) examination revealed a positive result for SAR-CoV-2. Because the shortness of breath soon increased (oxygen saturation [PaO₂] = 83 mmHg), admission to the isolation hospital (Damanhoor, Beheira Prefecture, Egypt) was mandatory. The treatment protocol received by the patient during isolation



Table 1. Demographics, Sexual Function, and Depression in the Reported Patients.

PATIENT FEATURE	PATIENT # 1	PATIENT # 2	PATIENT # 3
Age (y)	36	27	43
Smoking	No	yes	no
education	High school	University	High school
Body mass index (BMI)	24.97 ^o	33.38 ^{oo}	34.48 ^{oo}
Frequency of intercourse/w -before [after]	2-3 [2-3]	4-5 [1]	3 [0]
Erectile domain score -before [after]	17** [17]**	22* [12]**	26**** [12]**
Orgasm domain score -before [after]	7 [6]	6 [4]	8 [5]
Desire domain score -before [after]	8 [6]	7 [4]	9 [4]
Intercourse satisfaction domain score -before [after]	9 [8]	7 [5]	12 [7]
Overall satisfaction domain score -before [after]	8 [8]	8 [4]	8 [5]
PEDT score-before [after]	15‡ [16]‡	13‡ [15] ‡	4‡ [11] ‡
Beck depression inventory score -before [after]	2 § [15] §§	7 § [33] §§§	1§ [13] §§

Abbreviations: PEDT, premature ejaculation diagnostic tool; -before [after] infection.

*Mild ED.

**Mild to moderate ED.

***Moderate ED.

****Normal with no ED.

‡Definite PE.

†No PE.

§Normal mode.

§§Mild mood disturbance.

§§§Severe depression.

^oNormal body weight.

^{oo}Obese.

included azithromycin, panadol, vitamins, calcium, revarospir, lactoferrin, bronchodilator syrup, and unictam. The patient received an oxygen mask for 7 days. Total stay in the hospital was 12 days and the patient improved. After getting 2 negative PCR with 24 hours in between, the patient returned to his house.

Case 2

The second patient felt the same symptoms as the first one, but without shortness of breath. After the diagnosis of COVID-19, the patient made self-isolation in his house for 14 days. The severity of the symptoms, luckily, did not increase. The patient received the same protocol of medical treatment as the first patient. The symptoms disappeared within 2 weeks, and the patient showed a negative PCR result 2 times with 24 hours in between.

Case 3

The third patient felt dry cough, fever, and sore throat. PCR was positive for COVID-19. There was no shortness of breath, and the patient made self-isolation in his house for 14 days. He received the same treatment protocol without a bronchodilator. By the end of the isolation period, the symptoms improved, and the PCR's double-checking was negative.

Two months after recovery, the data were directly taken during the patients' follow-up visits. Inquiry about income showed that it was the same as before the COVID-19 pandemic in the case of the first and the second patients but decreased by 30% in the third patient's case. The patients started to try sexual activity 10, 20, and 30 days after receiving their negative PCR results. The partners responded the same way as before the COVID-19, except the third patient partner who was less active and responding than before. The frequency of intercourse did not change with the first patient compared to the other 2 patients who reported declines (Table 1). About morning erection, the first patient denied any change in its frequency and rigidity while the other patients claimed to worsen.

Due to the national policy of lockdown, the patients reported staying home for 14, 10, and 14 hours per day. The sexual functioning of the patients before and after the COVID-19 was assessed. The patients filled the questionnaires of the International Index of Erectile Function (IIEF-15).¹³ This self-administered questionnaire comprises 15-point evaluating 5 pertinent domains of male sexual functioning. These include erectile function (Q1-5 and 15), orgasmic function (Q9-10), sexual desire (Q11-12), intercourse satisfaction (Q6-8), and overall satisfaction (Q13-14) domains. No validated Arabic version is currently available for the IIEF-15, but the Arabic-speaking patients could easily understand that questionnaire.¹⁴

According to the scores of erectile function domain (full score = 30), erectile dysfunction (ED) may be severe ED (1-10), moderate ED (11-16), mild to moderate ED (17-21), mild ED (22-25), and no ED (26-30). Full scores of the other domains are 10, 10, 15, and 10, respectively. Accordingly, the first and second patients had varying degrees of ED, while the third patient was free of ED before getting the infection. After recovery, the first patient did not show changes in his erectile power, while the other 2 patients worsened and revealed moderate ED (Table 1).

The other domains' scores of the patients seemed low in this present article before getting the COVID-19. To show clearly these low levels of the patients' scores, we compared the means of these scores with the means of the control group in Rosen et al¹³ original study from which the IIEF-15 was released for the first time. While our patients' mean scores were: 7, 8, 9.3, and 8 for orgasmic, desire, intercourse, and overall satisfaction domains, respectively, the Rosen et al¹³ controls' mean scores were 9.8, 7, 10.6, and 8.6. Interestingly, it was only the desire domain scores of our patients whose mean was higher than that of the compared controls. Later after recovery, all the patients' domain scores showed a decline compared with those before the infection. The decrease was slight in the first patient but more profound in the other 2 patients (Table 1).

Recently, premature ejaculation (PE) is considered the most common sexual dysfunction¹⁵ and is closely related to ED.¹⁶ Therefore, the presence or absence of premature ejaculation (PE) was checked in the patients using the Premature Ejaculation Diagnostic Tool (PEDT).¹⁷ This is a questionnaire including 5 questions linked to PE control, PE frequency, ejaculation with minimal stimulation, the distress of the patient, and his difficulty with the sexual partner. Questions are scored between 0 and 4, resulting in the lowest score of 0 and the highest score of 20. Although no validated Arabic version is available, so far, for the PEDT, the patients in 1 research study did not find it difficult to realize the questionnaire.¹⁸ Evolved from this scoring, the patients could have no PE (score \leq 8), probable PE (score 9-10), or definite PE (score \geq 11). Given that, the first and second patients, who nearly had the same scores before and after recovery of COVID-19, had definite PE. In the third patient's case, his score sharply elevated to change him from normal status to definite PE (Table 1). However, it may also be useful to document that the first and second patients had the life-long generalized early ejaculation. In contrast, the third patient had the acquired generalized type as devised by the most recent definition of ejaculatory disturbances introduced by the International Classification of Diseases for Mortality and Morbidity Statistics (11th Revision).¹⁹

Isolation, whether in hospital or house, has a strong association with depression.⁸ Depression, in turn, has a bidirectional relationship either with sexual dysfunction²⁰ or premature ejaculation.²¹ Therefore, the patients in this case study were

assessed for the existence and severity of depression using Beck Depression Inventory—Second Edition (BDI-II),²² the Arabic version²³ before and after recovery from the infection. This scale is a valid, self-administered 21-items scale. Each item has 1 of 4 answers with scores ranging from 0 to 3. Its second edition, released in 1996, is more reliable than the fourth edition of the revised Diagnostic and Statistical Manual of Mental Disorders.²⁴ According to the calculated score, a person could have a normal mood (1-10), mild mood disturbance (11-16), borderline depression (17-20), moderate depression (21-30), severe depression (31-40), and extreme depression (over 40). In this report, the scores of BDI-II of the 3 patients increased after the infection. Consequently, they changed from the normal mood category before the illness to have mild mood disturbance and severe depression after the recovery of COVID-19 (Table 1).

The general and genital examinations were irrelevant in the reported patients during the follow-up visits. The sex-related hormones of the patients were estimated in peripheral venous blood samples at 9:00 AM using an automated analyzer (Cobas e411, Roche Diagnostics, Mannheim, Germany). The assay included testosterone (T), free testosterone (FT), luteinizing hormone (LH), follicle-stimulating hormone (FSH), prolactin (PRL), and estradiol (E2). The patients showed normal levels of the estimated hormones, except the third patient, who delivered a higher level of PRL (Table 2). Random blood sugar was also assayed and showed normal levels in all the patients (Table 2).

Discussion

The present manuscript is a case report describing the sexual capability and mood condition of 3 men who recently recovered from the COVID-19 using 3 internationally-recognized validated questionnaires. In contrast to their situation before catching the disease, these men variably showed declined sexual function, tendency to commence PE or advance an actually-present one, and mood disturbance up to severe depression. However, all the patients revealed normal levels of sex-related hormones (testosterone-total and free, luteinizing hormone, follicle-stimulating hormone, prolactin, and estradiol). Although the most common presenting symptoms of COVID-19 are fever, cough, and fatigue, a wide range of symptoms could be associated with the infection like productive cough, hemoptysis, headache, shortness of breath, myalgia, and diarrhea.^{3,4} Luckily, the reported patients did not have a big collection of symptoms. However, the first patient, later in the disease's course, had shortness of breath, which was distressing and made the hospital admission a necessity.

In the current report, the patients showed low scores of the IIEF-15 domains before COVID-19, except that of the desire. In this context, we can not exclude or deny the possible effect of lockdown and social restrictions imposed by the national authority during the pandemic, which may lead to panic and

Table 2. The Blood Sugar and Sex-Related Hormonal Profile in the Reported Patients.

PATIENT FEATURE	PATIENT # 1	PATIENT # 2	PATIENT # 3	NORMAL LEVELS
Random blood sugar (mg/dL)	87	95	135	70-140
Total testosterone (ng/ml)	4.66	3.98	2.66	2.49-8.36
Free testosterone (pg/ml)	128	112	67	50-300
FSH (mIU/ml)	4.51	6.2	4.15	1.5-12.4
LH (mIU/ml)	7.15	5.4	7.12	1.7-8.6
Prolactin (ng/ml)	5.69	7.2	68.7	4.04-15.2
Estradiol (pg/ml)	41.3	38.2	18.1	7.63-42.6

Abbreviations: FSH, follicle-stimulating hormone; LH, luteinizing hormone.

risky feelings to catch the infection, and its negative impact on the sexual activity.²⁵ Concerning the high scores of desire domain, this is going parallel with that suggested by other researchers that the increased sexual desire is a suitable means to keep bond and alleviate mental stress during the pandemic restriction.²⁶ It is interesting to note that the reduction in the income of the third patient did not shift the different scores, before catching the infection, away from those of the other patients whose income did not change. Some researchers have reported income change to accompany high distress and depression⁷ and even declined sexual activity.²⁷

Studies reporting the changes in male sexual function during the lockdown of the COVID-19 pandemic are scarce. Mollaioli et al²⁸ used a set of psychometric questionnaires to assess mood, quality of the relationship, and sexual activity of both genders under the COVID-19 lockdown in a case-control, web-based study in Italy. These authors showed the low incidence of depression and anxiety in sexually active men during the lockdown, suggested the prophylactic part of dynamic sexual life concerning mental stress, and recommended using sexual functioning as a marker of psychological health during this tough time. Li et al²⁹ studied the impact of lockdown on men's sexual behavior in China, while Karsiyakali et al²⁷ evaluated the changes in sexual activity of both genders in Turkey under COVID-19. Both studies did not use validated questionnaires like IIEF-15, PEDT, or BDI-II, as was the case in this case report. Instead, the 2 studies depended only on online surveys to recruit data from their participants who were not COVID-19 patients. Li et al²⁹ did not report a change in sexual desire, sexual frequency, or sexual satisfaction although it is now known that the status of sexual function, as reported by the patient, is mostly underestimated, giving a lower prevalence than that estimated using validated questionnaires.³⁰ On the other hand, Karsiyakali et al²⁷ showed a decline in the frequency of intercourse/masturbation and sexual desire under the COVID-19 pandemic. The reduction was meaningful in terms of tobacco smoking, living as single, love experience with the same sexual partner, infertile couples, and unemployment.

After recovery, the patients showed more declines in the scores of all domains of IIEF-15 compared with the corresponding scores before the disease. The exception was only the score of the erectile function of the first patient, which kept the same (=17). The evident decline in erectile domain scores exacerbates the pre-existing ED (mild to moderate) in the second and third patients to have moderate ED. This amplification of ED accompanied the decrease in the frequency of intercourse and the quality of morning erection in these 2 patients. It also came in line with other researchers who raised concern about the decompensation/progression of pre-existing subclinical ED during COVID-19.²⁸ The decline in erectile quality in these reported patients may be related to the pandemic-associated psychological stress, which can prompt inefficient attempts in the first intercourses after recovery. These low-quality intercourses may result in immense pressure in the next times to establish a vicious cycle.³¹ Researchers now consider erectile function as a useful marker for cardiovascular health.³² This led some authors to acknowledge that "erectile function could also become extremely valuable as a quick and inexpensive first-line assessment of the pulmonary and cardiovascular complications for COVID-19 survivors."³³

Before catching COVID-19 and under the lockdown, the patients revealed normal moods. These good feelings may be related to the lifestyle of these patients living in the countryside in extended Arabic families, which gives mental support and enhances the sense of collective strength and influence in the community.³⁴ This coincides with other researchers who showed that sexual activity could decline in metropolitan areas more than in rural areas.²⁷ Besides, Egyptians now are using many social media having online social support, which has been explicitly launched to cope with the stress surrounding COVID-19.³⁵

After recovery, the patients reported dropped BDI-II scores with variable degrees of mood changes. This may be triggered by the bad experience with COVID-19, including the panic of getting infected, severe stress associated with the fever and shortness of breath, uncertainty about fate, sense of guiltiness

to transmit the infection to the partner and off-springs, and stigma in their living towns.³⁶ Perhaps the worst mode change was that in the second patient who suffered during this report preparation from severe depression. Some authors expected the increase of prevalence of depression in the general population with this pandemic, particularly with those who survived the infection.⁸ This severe depression in the second patient worsened his ED ranking (mild-moderate to moderate). The real mechanisms behind the common link between depression and ED are still unknown. However, it is suggested that depression may restrain parasympathetic nerves' activity, along which the inflow of blood into the penis and relaxation of its smooth muscle fibers will decline, stopping good tumescence and erection.²⁰ Depression is also associated with low sexual desire.²⁰ This was also accounted for in the present report, where the increase in scores of BDI-II was associated with the drop in the scores of the desire domain of the patients after recovery.

In this report, it was interesting to note that the first and the second patients did consult before for PE although their PEDT scores indicated that disorder before catching COVID-19. This lack of medical advice may come in line with Sansone et al,³⁷ who claimed that PE, in contrast to ED, is not appreciated by men as a real dysfunction of male sexual behavior that necessitates proper clinical management. After catching the infection, it was only the third patient who showed a remarkable difference in his PEDT scoring. Subsequently, his ejaculation pattern changed from the normal pattern of ejaculation to definite PE. This change could be due to the commencement of ED in this patient, who initially had an excellent erectile domain score. Still, later, this score dropped, putting him under a moderate ED category. Recently, researchers addressed a common association between ED and PE and reported that up to 38% of men with PE also complain of ED.¹⁶ This significant comorbidity may be attributed to the high sensitivity of the psychometric questionnaires applied for check-ups.³⁰ Also, this patient started to suffer mood disturbance after recovery, and also he was the only patient suffering from low income and having a less responsive partner, as seen above. The relationship between PE and depression may be bidirectional.²¹ Depression disturbs sexual function in males and couple's sexual relations which, in turn, can provoke mood changes developing to depression.²¹ However, the exact mechanism of the development of depression-associated PE has not been precisely interpreted. Mood changes were associated with a decline in orgasmic feeling, intercourse satisfaction, and overall satisfaction after recovery from COVID-19 in the reported patients. This coincides with other researchers who addressed that depression is associated with decreased domains of male sexual function.³⁸ To the best of our knowledge, the current study is the first clinical report indicating the harmful impact of COVID-19 on sexual performance in the recovered males and correlated that with their mood changes using appropriately validated psychometric tools.

The estimated sex-related hormones of the reported patients were within normal ranges, except PRL in the third patient, which was high. It is unclear if this level is elevated during the infection and kept after recovery, thus going in line with other studies^{11,12} or already high before the COVID-19. Follow-up and treatment of this patient may help elucidate the nature of his hyperprolactinemia. The literature review showed a few numbers of studies investigating male sex-related hormones in the era of COVID-19. A study from China addressed normal T and FSH levels but significantly high levels of LH and PRL and low T/LH and FSH/LH ratios in COVID-19 patients.¹¹ Another Chinese study investigated the sex-related hormones in COVID-19-recovered patients. It showed them within the normal reference ranges, except E2 and PRL, which were significantly higher than the corresponding levels in the controls.¹² This study's T/LH ratio did not also show a significant difference between the patients and the controls. The data discrepancy in these 2 studies may be attributed to the nature of the patients (in the infection stage¹¹ or during the recovery period¹²), the virulence of the virus, and the extent of virus spread.¹² The present report studied already recovered patients, and their disease courses were, luckily, short (12-14 days).

Conclusion

COVID-19 is associated with mood disturbance and altered sexual functioning in males. This report provides insight into the impact of COVID-19 on male sexual function, thus expanding the disease's clinical spectrum. Future studies have implications in improving our knowledge about the precise mechanism of COVID-19-associated sexual dysfunction in males, the natural history of this disorder, tailoring the best approach for its timely management, and minimizing the harmful impact of COVID-19 on male sexual life. Regular follow-up of the recovered patients is highly recommended to screen their physical and mental health and provide any psychological support that may help heal their mood alterations and enhance their sexual capabilities.

Author Contributions

N.S. contributed to the conception and design of the study, analysis, and interpretation of data, and drafting the article with final approval of its completed form. S.B. contributed to the design of the study, collection, analysis, and interpretation of data and drafting the article with final approval of its completed form.

Informed Consent

The patients have consented to their case information for publication purpose.

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