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# Prevalence of Erectile Dysfunction in Males Post COVID-19 Infection.

**Abdullah Luay[1], Essraa M. Al- Essawe[1], Ula Al- Kawaz[1]**

[1]High Institute of Infertility Diagnosis and Assisted Reproductive Technologies, Al Nahrain University, Baghdad, Iraq.

dr.abdalla.luay@gmail.com

ABSTRACT

Many men have reported erectile dysfunction as a consequence of COVID-19 infection. The underlying causes, whether related to hormonal changes or endothelial dysfunction, are not yet fully understood. This study aims to investigate the impact of COVID-19 on male sexual function and fertility, specifically focusing on erectile dysfunction. A cohort of 50 males who had no prior history of erectile dysfunction before contracting COVID-19 was assessed. The study analyzes the progression of these conditions over a 90-day period post-recovery from COVID-19, with a particular emphasis on age-related factors.

All males were confirmed infected with COVID-19. Comprehensive medical histories were obtained from all participants, and physical examinations were conducted. The International Index of Erectile Function (IIEF-5) questionnaire was employed to assess erectile dysfunction. Assessments were performed at three separate intervals, 30, 60, and 90 days after their recovery from COVID-19.

Participants consistently reported varying degrees of erectile dysfunction, which appeared to improve over time. Notably, the participants who reported erectile dysfunction tended to be older than those who did not, and this age-based distinction was highly significant ($p = 0.004$).

In conclusion, this study highlights the impact of COVID-19 infection on male sexual function, with age and the time post-recovery emerging as significant factors contributing to these effects.

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KEYWORDS

COVID-19, Erectile dysfunction, Age Factors, Sexual Dysfunction, Semen Analysis, SARS-CoV-2 Infections

## 1. Introduction

COVID-19 is a highly infectious viral virus that spreads rapidly over the world. The WHO revealed the new viral infection as COVID-19 in February 2020, and in March 2020, the WHO proclaimed COVID-19 a worldwide pandemic (WHO 2020 [10], Duman et al.,2021[12]). COVID-19 has glycoprotein spikes that bind strongly to angiotensin converting enzyme II (ACE 2), which itself is required for virus multiplication in the host organism. The high expression of ACE2 in gonadal cells makes them a big candidate of the virus. Prior to actually binding to ACE-2 receptors, viral spike proteins must be primed by cellular proteases, specifically transmembrane protease serine 2. (TMPRSS-2) (Hoffmann et al., [2]). Therefore, COVID-19 appears to affect cells and tissues that co-express ACE-2 and TMPRSS-2 (Hamming et al., [1]). Endothelial cells express the ACE-2 receptor and the TMPRSS-2 gene, which presumably answers why COVID-19 infection leads in widespread endothelial dysfunction. (Long et al., [5], Oran DP et al., [6]). Endothelial cells of damaged organs, such as the lungs, heart, and kidneys, have been found to contain COVID-19 viral components, according to electron microscopy. (Sansone et al., [8]. In light of these findings, it is possible that the erectile tissue in the penis, which is rich in endothelial-lined blood arteries, may also be affected by COVID-19 (Pons S et al., [7]), When it comes to diagnosing endothelium dysfunction, erectile dysfunction can be a useful biomarker. (Jannini et al., [4]). This study investigates the influence of COVID-19 on male sexual health, with a specific emphasis on erectile dysfunction with a particular focus on age-related factors.

## 2. Materials and Methods

Fifty Iraqi males were selected from the male clinic at the High Institute for Infertility Diagnosis and Assisted Reproductive Technologies, as well as from patients receiving treatment for COVID-19 in local hospitals in Iraq between August 2020 and May 2021. Permission was obtained from the Al-Karkh Health Directorate to access them

database and recruit willing participants. These males had no previous history of erectile dysfunction. Medical history was collected, and erectile dysfunction was assessed using the International Index of Erectile Function (IIEF-5) questionnaire. All volunteers provided informed consent a comprehensive medical history, and underwent a complete physical examination. The study group was observed and evaluated at three different time points: first at 30 days, then at 60 days, and finally at 90 days following their recovery from COVID-19. The data was analyzed using IBM SPSS Statistics for Windows, Version 23. The Kolmogorov-Smirnov test was employed to assess the normal distribution of the variables. McNemar's test was utilized to compare frequencies of qualitative events between different time points (2nd month versus 1st month, 3rd month versus 1st month or 3rd month versus 2nd month). Receiver Operator Characteristic (ROC) curve analysis was conducted to determine the cutoff value predictive of a positive Finding (Age). A significance level of $p \leq 0.05$ was considered.

## *3. Results*

The current study included 50 fertile males with COVID-19 with a mean age of 33.66 ± 6.00 years and an age range of 24 to 48 years. The frequency distribution of patients with COVID-19 according to age is shown in Figure (1), in which it is observed that 13 (26.0 %) males were between 24 and 29 years of age, 28 (56.0 %) of them were between 30 and 39 years of age and 9 (18.0 %) were between 40 and 48 years of age. The frequency distribution of patients with COVID-19 according to hospitalization is shown in Figure (2) the proportion of fertile men with COVID-19 with hospital admission was 4 out of 50, accounting to 8.0 %. The frequency distribution of patients with COVID-19 according to erectile dysfunction is shown in table (1). During the first month post-recovery, there were 13 (26.0 %) men with mild erectile dysfunction, and the proportion of those men was reduced.

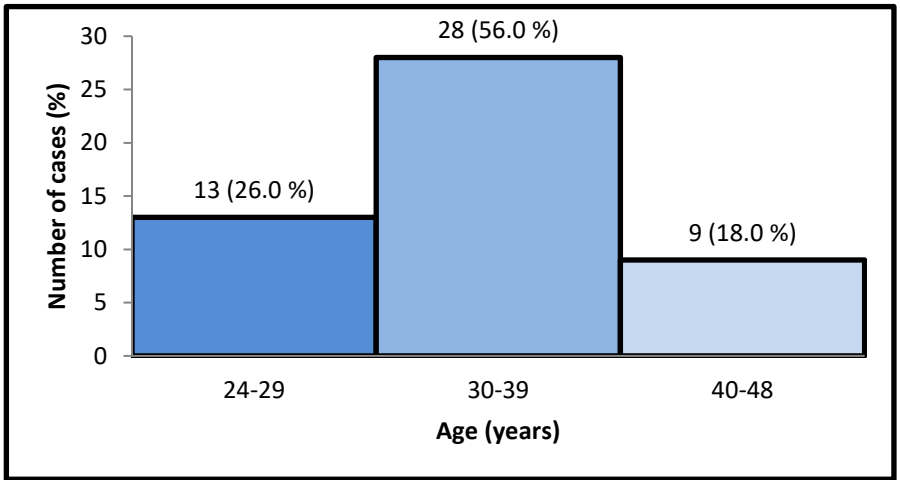


***Figure 1:*** Histogram showing the frequency distribution of patients according to age

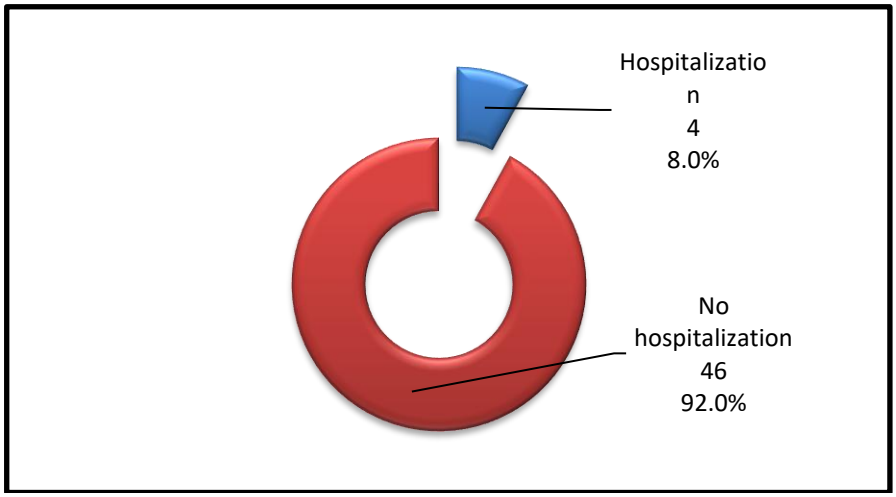


***Figure 2:*** Pie chart showing the frequency distribution of patients with COVID-19 according to hospitalization

At the second post-recovery month into, 5 cases only (10.0 %) in a highly significant manner (p = 0.008), and in the third-month post-recovery, the proportion of mild cases remained the same as the second month, 5 (10.0 %) with a highly significant reduction in comparison with first month (p = 0.008). On the other hand, the proportion of men with moderate erectile dysfunction during the first month was 11 (22.0 %), and it gets reduced to none at the second moth post-recovery, and only a single case of moderate erectile dysfunction was reported during the third-month post-recovery (2.0 %) and the reduction in moderate cases in comparison with the first-month post-recovery was highly significant (p = 0.002). Moreover, cases with severe erectile dysfunction during the first month were 13 (26.0 %) and get reduced during the second month to 8 cases only (16.0 %); the reduction was not significant (p = 0.062), even though this level is a borderline statistical level since it lies between 0.05 and 0.1. In the third month post-recovery, there were no more cases with severe erectile dysfunction. Comparison of mean age among fertile men according to the presence of erectile dysfunction and its severity is shown in Figure (3). This comparison showed that men with mild erectile dysfunction were no significantly older than men without erectile dysfunction, 31.46 ±3.64 years versus 30.31± 4.35 years, respectively ($p$ = 0.587), whereas men with moderate erectile dysfunction were older (37.09±6.14 years) than men without erectile dysfunction in a highly significant manner ($p$ = 0.004) and the same was observed with respect to men with severe erectile dysfunction, mean age of 36.31±6.88 and a level of statistical significance of ($p$ = 0.007). When receiver operator characteristic (ROC) curve analysis was carried out, as shown in Figure (4) and Table (2), a cutoff value of age of > 34 years was associated with 62.5 % sensitivity, 84.6 % specificity, and 77.1 % accuracy level in predicting moderate to severe erectile dysfunction in the first post-recovery month.

***Table 1:*** The frequency distribution of patients with COVID-19 according to erectile dysfunction

| Erectile Dysfunction | First month | | Second month | | *P* | Third month | | *P* |
|---|---|---|---|---|---|---|---|---|
| | ***n*** | **%** | ***n*** | **%** | | ***n*** | **%** | |
| No | 13 | 26 | 37 | 74 | Reference | 44 | 88 | Reference |
| Mild | 13 | 26 | 5 | 10 | 0.008 Mc HS | 5 | 10 | 0.008 Mc HS |
| Moderate | 11 | 22 | 0 | 0 | --- | 1 | 2 | 0.002 Mc HS |
| Severe | 13 | 26 | 8 | 16 | 0.062 Mc NS | 0 | 0 | --- |

***n*:** number of cases; **Mc**: McNemar test; **HS**: highly significant at $p \leq 0.01$; **NS**: not significant at $p > 0.05$

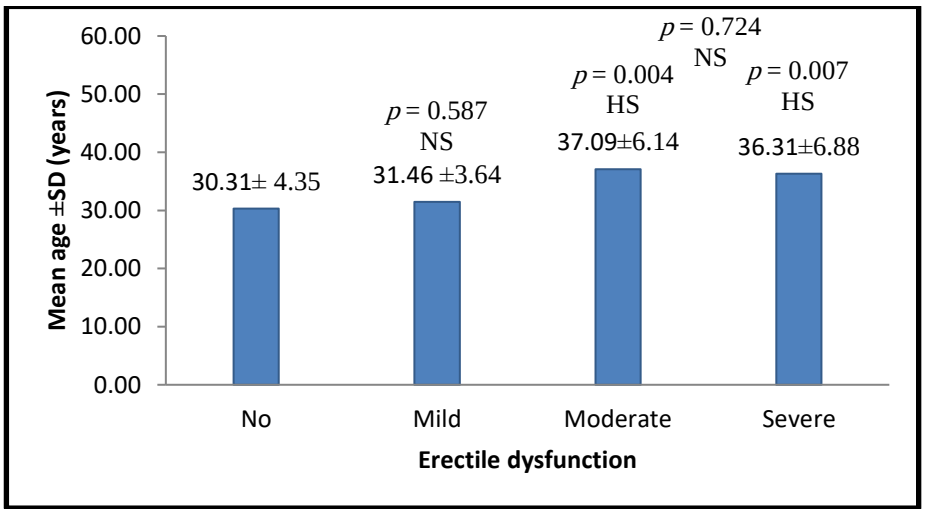


***Figure 3:*** Bar chart showing a comparison of mean age among fertile men according to the presence of erectile dysfunction and its severity

***Table 2:*** The characteristics of the Receiver operator characteristic (ROC) curve

| Characteristic | Value |
|---|---|
| Cutoff | > 34 years |
| AUC | 0.771 |
| 95 % CI | 0.630 to 0.878 |
| *p*-value | < 0.001<br>HS |
| Accuracy % | 77.1 |
| Sensitivity % | 62.5 |
| Specificity % | 84.6 |

**AUC**: area under the curve; **CI**: confidence interval; **HS**: highly significant at $p \leq 0.01$

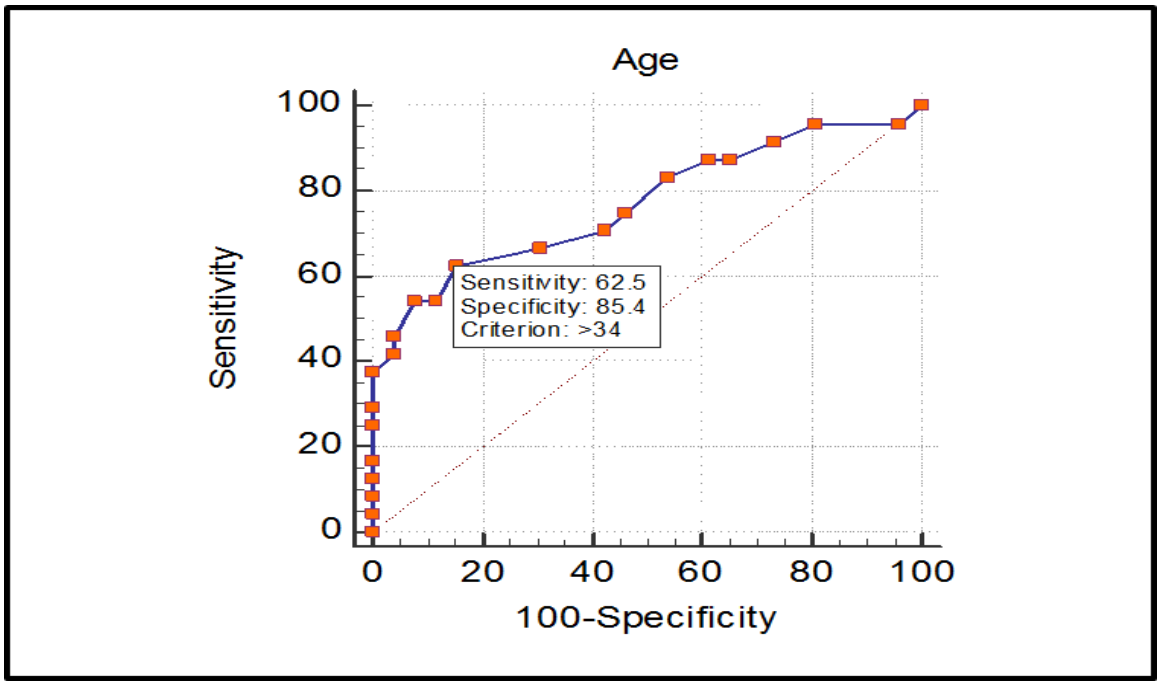


***Figure 4:*** Receiver operator characteristic (ROC) curve to find the age cutoff value that can predict moderate to severe erectile dysfunction in men with COVID-19 during the first post-recovery month with the best accuracy level.

## 2. Discussion

The findings of the current study were consistent with a study conducted by Sansone et al. [8], which concluded that erectile dysfunction post-COVID-19 infection may be influenced by endothelial dysfunction, subclinical hypogonadism, psychological distress, and impaired pulmonary hemodynamics. The potential value of erectile function as an early, cost-effective assessment of pulmonary and cardiovascular complications for COVID-19 survivors is suggested. In another study conducted by Sansone et al. [9], it was found that erectile dysfunction was reported by 28% of individuals post-COVID-19 infection. Erectile dysfunction is the most common male sexual health concern, with a prevalence of 13-28% among men aged 40-80 years, increasing with age (Ibarra et al., [3]). In the present study, the relationship between age and the severity of erectile dysfunction post-COVID-19 was investigated. It was observed that males with mild erectile dysfunction were not found to be significantly older than males who did not experience erectile dysfunction post-COVID-19. However, males with moderate erectile dysfunction were significantly older than those who did not report erectile dysfunction, and the same trend was noted for those with severe erectile dysfunction compared to those without erectile dysfunction, as demonstrated in Table 3. To the best of our knowledge, this is the first study in which age was used as a predictor for the severity of ED post-COVID-19. Receiver Operator Characteristic (ROC) curve analysis was carried out, as shown in Figure 4 and Table 2, revealing that an age cutoff of > 34 years was associated with 62.5% sensitivity, 84.6% specificity, and 77.1% accuracy in predicting moderate to severe erectile dysfunction in the first post-recovery month while valuable insights are offered by our findings. It was revealed that severe COVID-19 infection could be associated with erectile dysfunction (ED) as a complication in previously healthy individuals after recovery (Saad et al., [11]). A larger population and a longer-duration

study are required to comprehensively assess the impact of COVID-19 infection on male sexual health.

## Conclusions

COVID-19 infection impacts male sexual function by causing varying degrees of erectile dysfunction. The severity of these cases shows a correlation with age, indicating that age can serve as a predictive factor for the severity of erectile dysfunction following a COVID-19 infection.


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### Conflict of Interest

The authors declare no conflict of interest.

### Ethical Clearance

The study was approved by the Ethical Approval Committee.

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