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Assessment Of The Sexual Level Of Patients With Covid-19 Thorough Evaluation And Analysis Of Sperm And Reproductive Hormones

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Abstract

Since covid-19 has been shown to cause infertility in male patients, this study evaluated the sexual level of covid-19 patients using sperm and reproductive hormones. For the covid-19 patients, the semen volume was 2.1ml smaller than the healthy ones, while the sperm count was 67ml lower than non-covid-19. A substantial difference in total sperm number was found (36 for covid-19 patients and 103 for non-covid-19), with total sperm numbers of 125.33 for patients and 447.21 x106 for healthy. In other words, the percentage of motile sperm was 21.42 for sick and 55.26 for healthy. We discovered that covid-19 sperm have less than 33.84% overall motility than healthy sperm, while the normal morphology revealed for covid-19 patients showed 8.87 per cent less than non-covid-19. The difference between covid-19 and non-covid-19 testosterone is 130.2NG/DL, while the covid-19 patients had 3.7mIU/mL less FSH than non-covid-19 individuals, indicating that covid-19 reduces FSH. LH in covid-19 patients was 3.48UI/L lower than the non-covid-19 patients. As a result, we compared covid-19 and non-covid-19 patients' sex hormone profiles. Therefore, covid-19 has a deleterious effect on sperm properties. Finally, the study adds to the expanding clinical evidence on covid19's influence on male reproductive health. Future research should focus on the effect of covid-19 on female fertility.

Keywords: Covid-19, Infertility, Male sexual organ, Sperm, Hormones, Reproduction

Introduction

Infertility, sexual dysfunction, and sexual disorders in the male genital organ have been rising in recent years (Grover & Shouan, 2020). There are several possible causes of male infertility, including chronic health issues and lifestyle decisions. Oxidative stress also affects Leydig cells, reducing testosterone synthesis and causing germinal epithelium damage, inhibiting spermatogenesis. As a result, the disease-induced oxidative stress causes infertility in Covid-19 patients (Madjunkov et al., 2020). SARSCoV2 has been found in the sperm of male covid-19 patients, even those who have recovered, according to numerous research (Delle Fave et al., 2021; He et al., 2021; Koç & Keseroğlu, 2021; Lo et al., 2021; Tariq

et al., 2021; Vellingiri et al., 2020). To further understand Covid-19's influence on fertility, a few research looked at testicular endocrine functions and spermatogenesis. According to the study, patients with covid-19 have lower sperm counts because of sex hormone imbalances and poor sperm quality. It was determined that the virus had infected testicular tissue and that the testes had been severely damaged. Male fertility may be harmed if a virus-like covid-19 causes a rise in body temperature. 80% of covid-19 patients had prolonged temperature rises, according to studies (Markiewicz-Gospodarek et al., 2021; Patel et al., 2021; Piroozmanesh et al., 2021; Roychoudhury et al., 2021). Hormones control the entire male reproductive system. These substances operate as stimulants or regulators of the activity of cells or organs. Hormones such as luteinizing hormone (LH) and testosterone play a critical role in male reproduction (He et al., 2021). Luteinizing and follicle-stimulating hormones (LH). Located near the base of the brain, it is a vital part of a wide range of bodily functions. FSH is required for sperm production (spermatogenesis). In order for spermatogenesis to continue, LH stimulates the creation of testosterone. Various male features, including muscle mass and strength, fat distribution and distribution, bone mass, and sexual desire, are affected by testosterone levels (Ma et al., 2020). Steroidogenesis is a vital function of the testes. As a result, patients with covid-19 may have their gonadal function assessed using sex hormone levels. Serum testosterone (T) levels in critically ill guys are not commonly measured in clinical practice, making it difficult to determine their gonadal function. Two studies indicated that Covid-19 affected male reproductive hormones. Research has shown that people with covid-19 had lower hormone levels than those who were negative for the disease (Koç & Keseroğlu, 2021). Infection with covid-19 has been shown to cause testicular injury and infertility in men. Covid-19 viral attachment to ACE2 receptors can directly cause testicular degeneration, or an inflammatory and immunological response can indirectly cause it (Lo et al., 2021). Testosterone to LH ratio dropped after covid-19 infection, indicating that the Leydig cells' sensitivity to LH stimulation had been altered by covid-19 infection. The cytokine profile was also altered by Covid-19, which could impact male fertility. Research on the detection and persistence of viruses in sperm, such as covid-19, could be useful for clinical practice and public health (Best et al., 2021; Hashem et al., 2021; Li et al., 2022). Due to the findings of the influence of covid-19 on male infertility, this study evaluated the sexual level of patients treated with covid-19 by a thorough evaluation and analysis of sperm and reproductive hormones.

Methodology

Selection of patients

One hundred patients with reverse-transcription polymerase chain reaction (RT-PCR)-confirmed COVID-19 and 50 healthy people who were admitted to Al-Dewaniyah Hospital between April and October 2020.

Semen analysis: The sperms were examined by full automatic semen analyzer

Hormones levels assessment by ELISA: Hormones were examined by ELISA kits from CUSABIO China.

Results

Semen analysis

The semen volume was 2.1ml smaller than the healthy ones, while the sperm count was 67ml lower than non-covid-19. A substantial difference in total sperm number was found (36 for covid-19 patients and 103 for non-covid-19), with total sperm numbers of 125.33 for patients and 447.21 x10^6 for healthy. In other words, the percentage of motile sperm was 21.42 for sick and 55.26 for healthy. We discovered that covid-19 sperm have less than 33.84% overall motility than healthy sperm, while the normal morphology revealed for covid-19 patients showed 8.87 per cent less than non-covid-19.

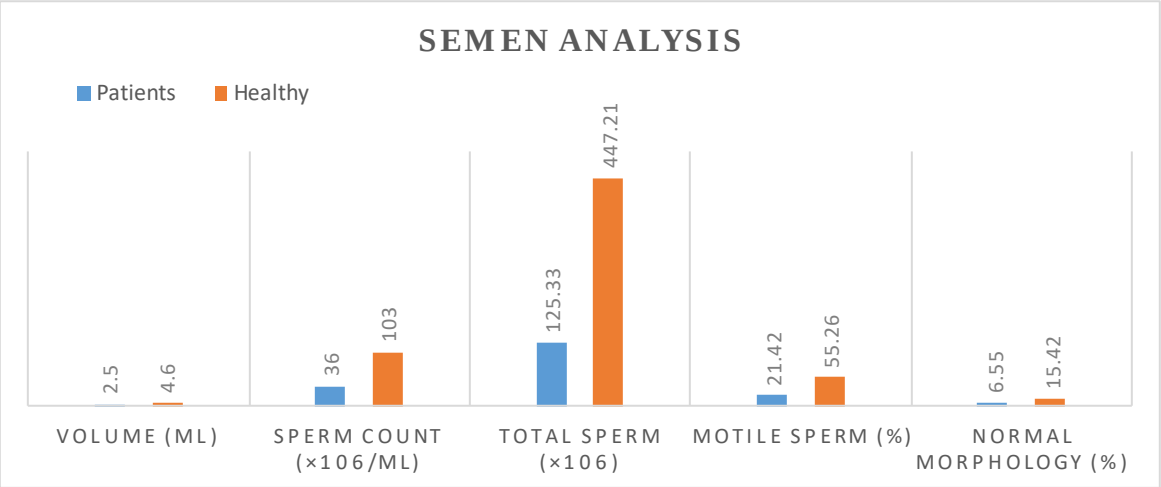

Figure 1: Semen Analysis of Covid-19 patients and healthy people

Hormones profile

The difference between covid-19 and non-covid-19 testosterone is 130.2NG/DL, while the covid-19 patients had 3.7mIU/mL less FSH than non-covid-19 individuals, indicating that covid-19 reduces FSH. LH in covid-19 patients was 3.48UI/L lower than the non-covid-19 patients. As a result, we compared covid-19 and non-covid-19 patients' sex hormone profiles.

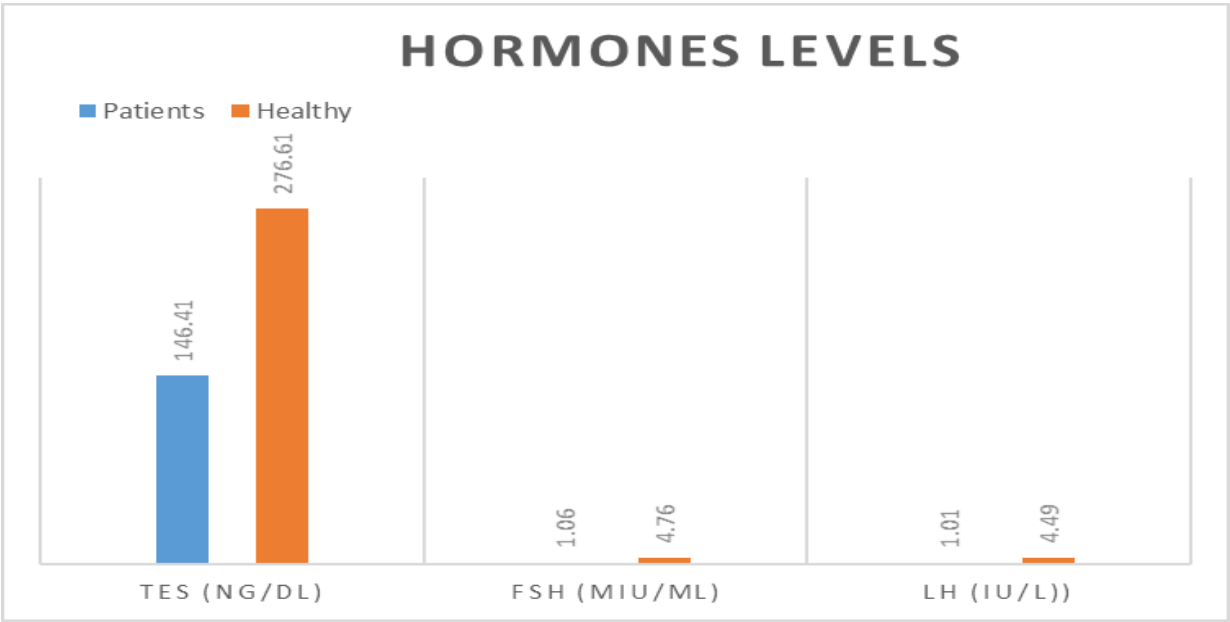

Figure 2: Hormones levels of Covid-19 patients and healthy people

Discussion

The analysis of the semen was presented in Figure 1, showing the effect of covid-19 on the male sperm, with variable results. The volume (ML), sperm count (x106ML), total sperm (x106), motile sperm (%), and normal morphology (%) reduced drastically in the patients compared to the healthy samples (Figure 1). In addition, the hormones levels of covid-19 patients and healthy was shown in Figure 2. The study showed a significant difference in the hormone level (T, LH, and FSH).

The semen volume (ML) showed 2.5ml for the patients and 4.6ml for the healthy samples. On the other hand, the semen volume for the patients was 2.1ml lesser than the healthy samples. The study was related to the study of He et al. (2021), who showed that covid-19 survivors have 0.2 ml less semen volume than non-covid-19 survivors. The study showed that the patients' sperm count was reduced by 67ml compared with healthy samples. The values for total sperm number was significantly between studies (36 for patients and 103 for healthy). The study was similar to the study of Lee et al. (2021), who had a pooled mean difference of 45.44ml of the sperm count. In addition, studies revealed that covid-19 patients and those that recovered from covid-19 have sperm counts of fewer than 45.4 106 per ejaculation. The study showed the total sperm of 125.33 for the patients and 447.21 x106, which showed that the total patient sperm has 321.88 x106 lesser to the healthy, which is similar to the study of Hashem et al. (2021). The motile sperm (%) showed a percentage of 21.42 and 55.26 for the patients and healthy, respectively. They showed that individuals extracted from covid-19 have less than 33.84 per cent total sperm motility than healthy. This was similar to the study of Patel et al. (2021), which revealed that recovery from covid-19 decreased progressive sperm motility by 1.73 per cent. Also, the normal morphology showed 6.55 per cent for the patients and 15.42 for the healthy, which indicated that the normal morphology of the patients is 8.87 per cent lesser than the healthy, which is similar to the study of Kirtipal et al. (2022).

The study showed that the testosterone recovered from covid-19 is lower than testosterone recovered from non-covid-19, with a difference of 130.2NG/DL. The testosterone of the covid-19 patients was presented to be 146.41 NG/DL while the healthy showed 276.61 NG/DL, which is similar to the findings of Li et al. (2022). The study also showed that the covid-19 patients had 3.7mIU/mL FSH lesser than the non-covid-19, which indicated that covid-19 harms the FSH. The study was similar to the study of Yang et al. (2021)**,** which revealed that covid-19 patients had 0.09 mIU/mL less FSH than non-covid-19 patients. The study showed the LH of the covid-19 patients (1.01UI/L) and non-covid-19 (4.49UI/L) with a difference of 3.48UI/L lower in the covid-19 patients. Similar cases were recorded in the study of Zafar et al. (2021).

According to the study of Louis et al. (2022), the covid-19 outbreak resulted in decreased sperm motility and a high sperm DNA fragmentation score in patients, with two patients having inferior sperm morphology and three experiencing impaired libido. In one instance, the morning erection was unsuccessful (Ma et al., 2020). Several data, however, indicate that people infected with covid-19

demonstrated a typical range of sperm parameters following infection. Following covid-19 infection, eight of the twelve individuals examined by Ma et al. (2020) exhibited normal sperm characteristics. In contrast, four covid-19 patients with less desirable sperm characteristics had an abnormally high sperm DNA fragmentation ratio. Pre-infection sperm motility testing revealed that two of the three guys infected with covid-19 exhibited an increase in overall motility (Ma et al., 2020). Bigger cohort research is required to determine the likely effects of covid-19 on spermatogenesis given the modest sample size and considerable biological changes in the qualitative attributes of semen.

Compared to non-covid-19 individuals, those with covid-19 showed significantly greater sex hormones. T, LH, and FSH ratios were lower in covid-19 patients than in the control group. Additionally, an enzyme called steroidogenic acute regulatory protein inhibits testosterone production. When T secretion is reduced, LH is produced, causing a temporary surge in T. Hormone level ratios that were negatively linked with covid-19 patients (Tian & Zhou, 2021).

According to the study of Hezavehei et al. (2021), ACE2 receptors are expressed abundantly in somatic and testicular germ cells, including Sertoli, Leydig, and seminiferous duct cells, as well as spermatogonia. As a result, infection with covid-19 may result in testicular injury and infertility.

There is a significant impact on sperm parameters, according to this study. The diagnosis of covid-19 resulted in a decrease in hormone levels. Similarly, Kirtipal et al. (2022) examined the effect of covid-19 on sperm parameters and hormone levels associated with sexual activity. In addition, the results of the semen analysis of 18 SARS-CoV-2 patients and 14 healthy males were compared in the study by Markiewicz-Gospodarek et al. (2021). The sperm concentration and motility of the control group were significantly higher (Markiewicz-Gospodarek et al., 2021).

As a result, our study confirms prior findings that a diagnosis of covid-19 has a significant effect on sperm motility. The current investigation discovered a decrease in sperm concentration following covid-19 diagnosis, although this difference was not statistically significant. Ma et al. (2020) conducted a separate study examining 273 healthy males and 119 covid-19 patients. Patients with covid-19 showed significantly higher LH levels and a significantly lower T/LH ratio when compared to those without covid-19 (Ma et al., 2020).

Conclusion

Male reproductive endocrinology studies could benefit from looking at the overall influence of covid-19 on the sperm parameter and male reproductive hormones. Covid-19 appears to have an effect on male fertility in preliminary investigations. Covid-19 was found to have a deleterious effect on sperm parameters in the current study. When diagnosed with covid-19, hormone levels dropped dramatically. Semen and sex hormones taken from covid-19 affected individuals are compared to those who have not contracted the disease. So covid-19 may worsen the semen characteristics used to assess infertility in males. Finally, our study adds to the expanding body of clinical evidence showing that covid19 positively impacts male reproductive health. Since covid-19 affects female fertility, future studies should investigate this issue.

References

Best, J. C., Kuchakulla, M., Khodamoradi, K., Lima, T. F. N., Frech, F. S., Achua, J., Rosete, O., Mora, B., Arora, H., Ibrahim, E., & Ramasamy, R. (2021). Evaluation of SARS-CoV-2 in Human Semen and Effect on Total Sperm Number: A Prospective Observational Study. The World Journal of Men's Health, 39(3), 489–495. https://doi.org/10.5534/wjmh.200192

Delle Fave, R. F., Polisini, G., Giglioni, G., Parlavecchio, A., Dell'Atti, L., & Galosi, A. B. (2021). COVID-19 and male fertility: Taking stock of one year after the outbreak began. Archivio Italiano Di Urologia, Andrologia: Organo Ufficiale [Di] Societa Italiana Di Ecografia Urologica E Nefrologica, 93(1), 115–119. https://doi.org/10.4081/aiua.2021.1.115

Grover, S., & Shouan, A. (2020). Assessment Scales for Sexual Disorders—A Review. Journal of Psychosexual Health, 2(2), 121–138. https://doi.org/10.1177/2631831820919581

Hashem, N. M., Abdelnour, S. A., Alhimaidi, A. R., & Swelum, A. A. (2021). Potential impacts of COVID-19 on reproductive health: Scientific findings and social dimension. Saudi Journal of Biological Sciences, 28(3), 1702–1712. https://doi.org/10.1016/j.sjbs.2020.12.012

He, Y., Wang, J., Ren, J., Zhao, Y., Chen, J., & Chen, X. (2021). Effect of COVID-19 on Male Reproductive System – A Systematic Review. Frontiers in Endocrinology, 12, 677701. https://doi.org/10.3389/fendo.2021.677701

Hezavehei, M., Shokoohian, B., Nasr-Esfahani, M. H., Shpichka, A., Timashev, P., Shahverdi, A., & Vosough, M. (2021). Possible Male Reproduction Complications after Coronavirus Pandemic. Cell Journal (Yakhteh), 23(4), 382–388. https://doi.org/10.22074/cellj.2021.7982

Kirtipal, N., Kumar, S., Dubey, S. K., Dwivedi, V. D., Gireesh Babu, K., Malý, P., & Bharadwaj, S. (2022). Understanding on the possible routes for SARS CoV-2 invasion via ACE2 in the host linked with multiple organs damage. Infection, Genetics and Evolution, 99, 105254. https://doi.org/10.1016/j.meegid.2022.105254

Koç, E., & Keseroğlu, B. B. (2021). Does COVID-19 Worsen the Semen Parameters? Early Results of a Tertiary Healthcare Center. Urologia Internationalis, 105(9–10), 743–748. https://doi.org/10.1159/000517276

Lee, W. Y., Mok, A., & Chung, J. P. W. (2021). Potential effects of COVID-19 on reproductive systems and fertility; assisted reproductive technology guidelines and considerations: A review. Hong Kong Medical Journal = Xianggang Yi Xue Za Zhi, 27(2), 118–126. https://doi.org/10.12809/hkmj209078

Li, X., Lu, H., Li, F., Zhang, Q., Wang, T., Qiang, L., & Yang, Q. (2022). Impacts of COVID-19 and SARS-CoV-2 on male reproductive function: A systematic review and meta-analysis protocol. BMJ Open, 12(1), e053051. https://doi.org/10.1136/bmjopen-2021-053051

Lo, S. P., Hsieh, T.-C., Pastuszak, A. W., Hotaling, J. M., & Patel, D. P. (2021). Effects of SARS CoV-2, COVID-19, and its vaccines on male sexual health and reproduction: Where do we stand? International Journal of Impotence Research, 1–7. https://doi.org/10.1038/s41443-021-00483-y

Louis, T. J., Qasem, A., Abdelli, L. S., & Naser, S. A. (2022). Extra-Pulmonary Complications in SARS-CoV-2 Infection: A Comprehensive Multi Organ-System Review. Microorganisms, 10(1), 153. https://doi.org/10.3390/microorganisms10010153

Ma, L., Xie, W., Li, D., Shi, L., Ye, G., Mao, Y., Xiong, Y., Sun, H., Zheng, F., Chen, Z., Qin, J., Lyu, J., Zhang, Y., & Zhang, M. (2020). Evaluation of sex-related hormones and semen characteristics in reproductive-aged male COVID-19 patients. Journal of Medical Virology, 10.1002/jmv.26259. https://doi.org/10.1002/jmv.26259

Madjunkov, M., Dviri, M., & Librach, C. (2020). A comprehensive review of the impact of COVID-19 on human reproductive biology, assisted reproduction care and pregnancy: A Canadian perspective. Journal of Ovarian Research, 13(1), 140. https://doi.org/10.1186/s13048-020-00737-1

Markiewicz-Gospodarek, A., Wdowiak, P., Czeczelewski, M., Forma, A., Flieger, J., Januszewski, J., Radzikowska-Büchner, E., & Baj, J. (2021). The Impact of SARS-CoV-2 Infection on Fertility and Female and Male Reproductive Systems. Journal of Clinical Medicine, 10(19), 4520. https://doi.org/10.3390/jcm10194520

Patel, D. P., Punjani, N., Guo, J., Alukal, J. P., Li, P. S., & Hotaling, J. M. (2021). The impact of SARS-CoV-2 and COVID-19 on male reproduction and men's health. Fertility and Sterility, 115(4), 813–823. https://doi.org/10.1016/j.fertnstert.2020.12.033

Piroozmanesh, H., Cheraghi, E., Naserpoor, L., Aghashahi, M., & Jannatifar, R. (2021). The Effect of COVID-19 Infection on Sperm Quality and Male Fertility. Jentashapir Journal of Cellular and Molecular Biology, In Press. https://doi.org/10.5812/jjcmb.115390

Roychoudhury, S., Das, A., Jha, N. K., Kesari, K. K., Roychoudhury, S., Jha, S. K., Kosgi, R., Choudhury, A. P., Lukac, N., Madhu, N. R., Kumar, D., & Slama, P. (2021). Viral pathogenesis of SARS-CoV-2 infection and male reproductive health. Open Biology, 11(1), 200347. https://doi.org/10.1098/rsob.200347

Tariq, J., Chatterjee, T., Andreoli, L., & Gupta, L. (2021). COVID-19 and fertility—At the crossroads of autoimmunity and thrombosis. Rheumatology International, 41(11), 1885–1894. https://doi.org/10.1007/s00296-021-04977-2

Tian, Y., & Zhou, L. (2021). Evaluating the impact of COVID-19 on male reproduction. Reproduction, 161(2), R37–R44. https://doi.org/10.1530/REP-20-0523

Vellingiri, B., Jayaramayya, K., Iyer, M., Narayanasamy, A., Govindasamy, V., Giridharan, B., Ganesan, S., Venugopal, A., Venkatesan, D., Ganesan, H., Rajagopalan, K., Rahman, P. K. S. M., Cho, S.-G.,

Kumar, N. S., & Subramaniam, M. D. (2020). COVID-19: A promising cure for the global panic. The Science of the Total Environment, 725, 138277. https://doi.org/10.1016/j.scitotenv.2020.138277

Yang, M., Wang, J., Chen, Y., Kong, S., & Qiao, J. (2021). Effects of SARS-CoV-2 infection on human reproduction. Journal of Molecular Cell Biology, 13(10), 695–704. https://doi.org/10.1093/jmcb/mjab025

Zafar, M. I., Yu, J., & Li, H. (2021). Implications of RNA Viruses in the Male Reproductive Tract: An Outlook on SARS-CoV-2. Frontiers in Microbiology, 12, 783963. https://doi.org/10.3389/fmicb.2021.783963