

A Systematic Review on the role of untreated inflammation of the genital tract in SARS COV 2 transmission

*Emmanuel Ifeanyi Obeagu¹ <https://orcid.org/0000-0002-4538-0161>, Godfred Yawson Scott², Felix Amekpor², Amaechi Chukwudi Ofodile³ and Chidimma Maureen Chukwueze⁴

¹Department of Medical Laboratory Science, Kampala International University, Uganda.

²Department of Medical Diagnostics, Kwame Nkrumah University of Science and Technology, Ghana.

³Department of Medical Laboratory Science, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria.

⁴Department of Medical Laboratory Science, Enugu State University of Science and Technology, Enugu State, Nigeria

Abstract

Covid-19 infections really created a lot of threat to the human life globally. Serious Health issues have been brought on by COVID-19 in people all around the world. It causes multiorgan dysfunction with a respiratory focus. The body activates a variety of immune cells, including macrophages, once it determines that these viral proteins are harmful. It has been observed that SARS-CoV-2 infection might affect the respiratory, cardiovascular, digestive, and urinary systems.

Keywords: Covid-19, inflammation, genital tract, immunity

Introduction

Serious Health issues have been brought on by COVID-19 in people all around the world. It causes multiorgan dysfunction with a respiratory focus. According to Sun et al., COVID-19 patients had coronavirus viral ribonucleic acid (RNA) in many organs. SARS-CoV-2 was recently found in semen samples, which raises the prospect that paternal infection could be passed on to offspring (Li *et al.*, 2020). ACE2, a target for SARS-CoV-2 infection, is primarily abundant in the human corpus cavernosum, testis, and prostate, according to current bioinformatic findings (He *et al.*, 2021).

The male genital tract is a target organ for a number of viral diseases, which could have negative effects on people, their kids, and demography (Verrienti et al., 2022). The severe acute respiratory

Citation: Obeagu, E.I., Scott, G.Y., Amekpor, F., Ofodile A.C. and Chukwueze, C.M. (2023). A Systematic Review on the role of untreated inflammation of the genital tract in SARS COV 2 transmission. Madonna University Journal of Medicine and Health Sciences. 3 (1): 19-24.

syndrome coronavirus (SARS-CoV-2) has quickly spread among people, resulting in a global pandemic. The coronavirus disease 2019 (COVID-19), which is brought on by this virus, can quickly result in mortality due to severe acute respiratory syndrome and acute bilateral interstitial pneumonia (Sharma *et al.*, 2021). The importance of identifying all potential viral transmission pathways cannot be overstated in the effort to stop the spread of this epidemic and to appropriately notify the public about the necessary safety precautions (He *et al.*, 2021). In addition to the normal and well-known droplet-based respiratory mode of transmission, the oral-fecal route because of gastrointestinal virus involvement should also be taken into consideration (Louis *et al.*, 2022). Additionally, the immunological privilege of the male reproductive tract and sexual transmission could both significantly contribute to the spread of an infectious disease (Verrienti *et al.*, 2022).

The female reproductive system has reportedly been impacted by a number of viruses that have been known to cause epidemics and have previously infected humans (He *et al.*, 2021). Therefore, a number of researchers looked for SARS-CoV-2 receptors in female reproductive organs as well as other indirect effects of the virus on female reproduction (Sun *et al.*, 2020). In one study, a woman's vaginal fluid tested positive on days 7 and 20 after infection after initially testing negative at the onset of symptoms. To protect the next generation from the devastating SARS-CoV-2, it is crucial to comprehend the risk of maternal to fetal transfer (Sharma *et al.*, 2021).

COVID-19 Infection

The vast family of viruses known as Orthocoronaviridae that includes coronaviruses typically causes mild to severe upper respiratory tract infections, such as the common cold (Gupta *et al.*, 2020; Okorie *et al.*, 2022; Hassan *et al.*, 2022; Obeagu, 2022). The coronavirus family has been the cause of several extremely contagious worldwide epidemics during the past few decades. The SARS-CoV-1 outbreak in China in 2003 and the Middle East Respiratory Syndrome coronavirus (MERS-CoV) outbreak in Saudi Arabia in 2012 were the two most major ones (Louis *et al.*, 2022). The most current coronavirus outbreak, which started in December 2019, is primarily characterized by symptoms of severe pneumonia and abrupt hypoxic respiratory failure (Li *et al.*, 2020). The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was later identified by the International Virus Classification Commission in February 2020 as the causative pathogenic agent of this outbreak (Sun *et al.*, 2020). This information was obtained through additional genomic sequencing analysis. The coronavirus disease 2019 (COVID-19), which is the name given to the illness brought on by SARS-CoV-2, has subsequently spread around the world (Gupta *et al.*, 2020). More people have died as a result of COVID-19 than from its two predecessors, SARS-CoV-1 and MERS-CoV, combined. Asymptomatic or subclinical infection to severe pneumonia with respiratory failure and possibly death are all possible clinical presentations of SARS-CoV-2 infection (Gupta *et al.*, 2020). Most COVID-19 individuals have mild to moderate disease (about 80%), 15% progress to severe disease (about 15%), and 5% have a critical state (about 5%) that necessitates hospitalization (Guan *et al.*, 2020). Particularly, senior people with underlying chronic

Citation: Obeagu, E.I., Scott, G.Y., Amekpor, F., Ofodile, A.C. and Chukwueze, C.M. (2023). A Systematic Review on the role of untreated inflammation of the genital tract in SARS COV 2 transmission. *Madonna University Journal of Medicine and Health Sciences*. 3 (1): 19-24.

disorders like cardiovascular issues, diabetes, and emphysema are more prone to developing severe disease conditions as well as passing away (Louis *et al.*, 2022).

Frequent symptoms of COVID-19 patients include fever, dry cough, dyspnea, sore throat, and weariness (Sharma *et al.*, 2021). In addition, stomach pain, vomiting, and diarrhea are thought to be less frequently reported symptoms (Guan *et al.*, 2020). However, some COVID-19 patients may present with vague or unusual symptoms, delaying testing, identification, and isolation (Jung *et al.*, 2017). The likelihood of developing these atypical symptoms rises with advanced age and pre-existing comorbidities, but the mechanism behind these atypical presentations is still poorly understood (Jung *et al.*, 2017).

Angiotensin-converting enzyme 2 (ACE2) receptors and the SARS-CoV-2 spike protein interact to enhance viral entrance into host cells (Guan *et al.*, 2020). The central nervous system, the gastrointestinal tract, the kidneys, the heart, and the reproductive system are all potential targets for SARS-CoV-2 direct invasion (Gupta *et al.*, 2020).

Covid-19 and Inflammation

Since the 1960s, coronaviruses have been recognised as human pathogens. They are single-stranded RNA viruses that have a crown-like appearance (Fliesler, 2022). SARS-CoV-2 is an enveloped non-segmented positive-sense RNA virus which is the cause of the COVID-19 pandemic and makes mammalian hosts susceptible to infection (UCL, 2022).

The body activates a variety of immune cells, including macrophages, once it determines that these viral proteins are harmful (Morelli *et al.*, 2021). These immune cells create cytokines and chemokines, which are pro-inflammatory substances (Stanley *et al.*, 2020). To create effective treatment plans for severe COVID-19, it is imperative to comprehend how SARS-CoV-2 proteins trigger pronounced inflammatory reactions at the cellular level (Vivanti *et al.*, 2020).

Recently, Scientists at Boston Children's Hospital have discovered that SARS-CoV-2 may activate inflammasomes, which are big molecules that start a chain reaction of inflammatory reactions that results in cell death (Fliesler, 2022). They discovered that certain antibodies that are produced during infection but not after immunisation might occasionally cause more serious inflammation (Fliesler, 2022).

Theoretically, this means that the antibodies we produce to combat COVID-19 may increase inflammation (Shen *et al.*, 2020). More encouragingly, the scientists discovered that antibodies produced in response to mRNA COVID-19 vaccinations by healthy individuals did not promote infection of monocytes in the laboratory (Shen *et al.*, 2020). According to (Wang and Xu, 2020) study, the antibodies produced by the vaccination don't adhere to CD16 receptors as well. As a result, when persons who have received the vaccination are exposed to COVID-19, their monocytes may not pick up the virus, protecting them (Wang and Xu, 2020).

Role of untreated inflammation on the genital tract in covid-19

Clinically speaking, COVID-19 has a wide range of potential symptoms and consequences (Sawa and Akaike, 2022). These include asymptomatic carriage, flu-like symptoms such coughing, fever,

Citation: Obeagu, E.I., Scott, G.Y., Amekpor, F., Ofodile A.C. and Chukwueze, C.M. (2023). A Systematic Review on the role of untreated inflammation of the genital tract in SARS COV 2 transmission. Madonna University Journal of Medicine and Health Sciences. 3 (1): 19-24.

generalised weakness, myalgia, pneumonia-like traits, and respiratory failure requiring mechanical ventilation (Sawa and Akaike, 2022). In the interim, researchers worked globally on a variety of goals, including as the investigation of viral measures and the discovery and validation of diagnostic techniques for the early detection of afflicted individuals (Chadchan *et al.*, 2020).

So far, contact with COVID-19-affected people and respiratory droplets have been the two main routes of viral infection (Sawa and Akaike, 2022). SARS-CoV-2 can spread by the fecal-oral route, conjunctival secretions, flatulence (farts), sexual transmission and vertical transfer from the mother to foetus, among other possible mechanisms of transmission (Vivanti *et al.*, 2020).

Substantively, organs with high ACE2 or TMPRSS2 expression are more susceptible to infection (Pan *et al.*, 2013). Currently, it has been observed that SARS-CoV-2 infection might affect the respiratory, cardiovascular, digestive, and urinary systems (Stanley *et al.*, 2020). Sexual activity may be a likely means of transmission of SARS-CoV-2 through direct contact with bodily fluids of infected people (Stanley *et al.*, 2020). Because the gastrointestinal system may continue to shed the viral RNA, it is anticipated that some sexual practices may even result in different methods of transmission (Stanley *et al.*, 2020).

Interestingly, the SARS coronavirus has been linked to numerous organ dysfunction, including orchitis and testicular inflammation in humans (Pan *et al.*, 2013). The transplacental transmission of SARS-CoV-2 was shown by Vivanti *et al.* in a baby with neurological impairment. SARS-CoV-2 RNA has been found in semen and vaginal discharge, and coronaviruses are known to induce abnormalities in spermatogenesis.

Wang and Xu demonstrated that spermatogonia, Leydig cells, and Sertoli cells were the main sources of ACE2 enrichment. Stanley *et al.* discovered the expression of ACE2 in myoid cells, spermatogonial stem cells, and Leydig cells as a result. Furthermore, (Sawa & Akaike, 2022) demonstrated that Leydig cells and cells in the seminiferous ducts both have high levels of ACE2 expression.

In regards to the co-expression of ACE2 and TMPRSS2 in human testicles, Stanley *et al.* study found no evidence of this co-expression in testicular cells or sperm, and there was no correlation between the expression of ACE2 and TMPRSS2 in any of the annotated cell types or testicular cells in general.

Jing *et al.* (2020) found angiotensin-converting enzyme 2 mRNA transcripts in the ovaries of women in reproductive age and postmenopausal women. According to Jing *et al.* research, ACE2 is primarily expressed in the ovary and is expressed at a reasonably high level in oocytes, vagina and the uterus.

Conclusion

Covid-19 infections really created a lot of threat to the human life globally. It causes multiorgan dysfunction with a respiratory focus. The body activates a variety of immune cells, including macrophages, once it determines that these viral proteins are harmful.

References

Citation: Obeagu, E.I., Scott, G.Y., Amekpor, F., Ofodile A.C. and Chukwueze, C.M. (2023). A Systematic Review on the role of untreated inflammation of the genital tract in SARS COV 2 transmission. Madonna University Journal of Medicine and Health Sciences. 3 (1): 19-24.

- Guan, W., Ni, Z., Hu, Y., Liang, W., Ou, C., He, J., Liu, L., Shan, H., Lei, C., Hui, D. S. C., Du, B., Li, L., Zeng, G., Yuen, K.-Y., Chen, R., Tang, C., Wang, T., Chen, P., Xiang, J., ... for 2019-nCoV, on behalf of C. M. T. E. G. (2020). *Clinical characteristics of 2019 novel coronavirus infection in China* (p. 2020.02.06.20020974). medRxiv. <https://doi.org/10.1101/2020.02.06.20020974>
- Gupta, A., Madhavan, M. V., Sehgal, K., Nair, N., Mahajan, S., Sehrawat, T. S., Bikdeli, B., Ahluwalia, N., Ausiello, J. C., Wan, E. Y., Freedberg, D. E., Kirtane, A. J., Parikh, S. A., Maurer, M. S., Nordvig, A. S., Accili, D., Bathon, J. M., Mohan, S., Bauer, K. A., ... Landry, D. W. (2020). Extrapulmonary manifestations of COVID-19. *Nature Medicine*, 26(7),
- Hassan, A. O., Obeagu, E. I., Ajayi, D. T., Tolulope, A. A., Madekwe, C. C., Madekwe, C. C., Ikpenwa, J. N. and Nakyeyune, S. (2022). COVID 19 Omicron: The Origin, Presentation, Diagnosis, Prevention and Control. *Asian Journal of Research in Infectious Diseases*, 11(1), 25-33. <https://doi.org/10.9734/ajrid/2022/v11i130303>
- 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.
- Jung, Y. J., Yoon, J. L., Kim, H. S., Lee, A. Y., Kim, M. Y., & Cho, J. J. (2017). Atypical Clinical Presentation of Geriatric Syndrome in Elderly Patients With Pneumonia or Coronary Artery Disease. *Annals of Geriatric Medicine and Research*, 21(4), 158–163.
- Li, D., Jin, M., Bao, P., Zhao, W., & Zhang, S. (2020). Clinical Characteristics and Results of Semen Tests Among Men With Coronavirus Disease 2019. *JAMA Network Open*, 3(5), e208292.
- 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).
- Obeagu, E.I. (2022). COVID 19: Factors Associated with Implementation and Practice of Covid-19 Prevention. *International Journal of Advanced Multidisciplinary Research*. 9(9): 37-42. DOI: <http://dx.doi.org/10.22192/ijamr.2022.09.09.004>
- Okorie, N., Adeniran, O. C., Adimabua, O. P., Obeagu, E. I. and Anastasia, E. E. (2022). Pathological Changes among *Norvegicus Rattus* Exposed on Novel Smoked *Bambusa Vulgaris* (Bamboo) Leaf: Cigarette Substitute during COVID-19 Lockdown in Nigeria. *Journal of Advances in Medical and Pharmaceutical Sciences*, 24(7), 30-39.

Citation: Obeagu, E.I., Scott, G.Y., Anekpor, F., Ofodile, A.C. and Chukwueze, C.M. (2023). A Systematic Review on the role of untreated inflammation of the genital tract in SARS COV 2 transmission. *Madonna University Journal of Medicine and Health Sciences*. 3 (1): 19-24.

- Sharma, I., Kumari, P., Sharma, A., & Saha, S. C. (2021). SARS-CoV-2 and the reproductive system: Known and the unknown..!! *Middle East Fertility Society Journal*, 26(1), 1.
- Sun, J., Zhu, A., Li, H., Zheng, K., Zhuang, Z., Chen, Z., Shi, Y., Zhang, Z., Chen, S., Liu, X., Dai, J., Li, X., Huang, S., Huang, X., Luo, L., Wen, L., Zhuo, J., Li, Y., Wang, Y., ... Li, Y. (2020). Isolation of infectious SARS-CoV-2 from urine of a COVID-19 patient. *Emerging Microbes & Infections*, 9(1), 991–993.
- Verrienti, P., Cito, G., Maida, F. D., Tellini, R., Cocci, A., Minervini, A., & Natali, A. (2022). The impact of COVID-19 on the male genital tract: A qualitative literature review of sexual transmission and fertility implications. *Clinical and Experimental Reproductive Medicine*, 49(1), 9. <https://doi.org/10.5653/cerm.2021.04511>
- Fliesler, N. (2022, April 6). *How COVID-19 triggers massive inflammation*. Boston Children's Answers. <https://answers.childrenshospital.org/covid-19-inflammation/>
- Jing, Y., Run-Qian, L., Hao-Ran, W., Hao-Ran, C., Ya-Bin, L., Yang, G., & Fei, C. (2020). Potential influence of COVID-19/ACE2 on the female reproductive system. *Molecular Human Reproduction*, gaaa030. <https://doi.org/10.1093/molehr/gaaa030>
- Pan, P.-P., Zhan, Q.-T., Le, F., Zheng, Y.-M., & Jin, F. (2013). Angiotensin-Converting Enzymes Play a Dominant Role in Fertility. *International Journal of Molecular Sciences*, 14(10), 21071–
- Sawa, T., & Akaike, T. (2022, January 20). *Viruses: What triggers inflammation in COVID-19?* ELife; eLife Sciences Publications Limited. <https://doi.org/10.7554/eLife.76231>
- UCL. (2022, April 12). *How Covid-19 triggers massive inflammation revealed*. UCL News. <https://www.ucl.ac.uk/news/2022/apr/how-covid-19-triggers-massive-inflammation-revealed>
- Wang, Z., & Xu, X. (2020). ScRNA-seq Profiling of Human Testes Reveals the Presence of the ACE2 Receptor, A Target for SARS-CoV-2 Infection in Spermatogonia, Leydig and Sertoli Cells. *Cells*, 9(4), 920. <https://doi.org/10.3390/cells9040920>

Citation: Obeagu, E.I., Scott, G.Y., Anekpor, F., Ofodile, A.C. and Chukwueze, C.M. (2023). A Systematic Review on the role of untreated inflammation of the genital tract in SARS COV 2 transmission. *Madonna University Journal of Medicine and Health Sciences*. 3 (1): 19-24.
