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Interpretation of Detection SARS Cov-2 in Semen

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ABSTRACT

Background: The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a virus with a high virulence which cause SARS-CoV-2, a disease with potentially dangerous implications for human health and pandemic. The involvement of other organs in the spread of this virus is still being debated. Considering the presence of (Angiotensin Converting Enzyme-2 (ACE-2) and Transmembrane Serine Protease 2 (TMPRSS2) in the reproductive organs including male reproduction,the male reproductive system possiblity for spreading SARS-CoV-2 should be studied.
Reviews: Five studies were reveal the presence of SARS-CoV2 in semen. The reported results are inconsistent. Some of these studies also used unclear methods and procedures, which led to bias in the final results. Ongoing studies are needed to confirm the definite findings before specific recommendations can be made for further management.
Summary: There is no definite interpretation of whether SARS-CoV-2 spreads through semen, but protection is still needed when it comes into contact with the semen.

Keywords: SARS-CoV-2, Transmission, Interpretation, Semen, Sperm, Male Reproductive

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INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a virus with a high virulence which cause COVID-19, a disease with potentially dangerous implications for human health and pandemic. It is known that the coronavirus is transmitted through respiratory droplets. SARS-CoV-2 has been detected in various biological samples, such as feces, urine, and blood.[1,2] The binding capability to the angiotensin-converting enzyme-2 (ACE-2) and Transmembrane Serine Protease 2 (TMPRSS2) in human cells which is expressed in multiple organ systems may explain the presence of SARS-CoV-2 in these biological fluids.[3] ACE-2 and TMPRSS2 are expressed in the testis. The ACE-2 receptors is exist in spermatogonia Sertoli Cell and Leydig cells.[4] In addition, previous reports suggested that other corona viruses, like the SARS coronavirus, could cause orchitis.[5] Moreover, testicular pain had been reported as a presentation of COVID-19.[6] Human Protein Atlas database (http://www.proteinatlas.org/) showed that the ACE2 protein had high expression levels in the testis, seminal vesicle.[7] TMPRSS2 protein is also express in epididymis, seminal vesicle, and prostate.[7]

It is a big question of whether SARS-CoV-2 may present in semen. It is important to reveal the presence of SARS-CoV-2 in semen to determine the possibility the transmission during natural conception, intrauterine insemination or in vitro fertilization to the spouse or infecting the healthcare practitioner, hospital labor, and environment. Several studies have been made and need to be appraised in order to make a general conclusion.

The aim of this review is to determine the presence of SARS-CoV-2 RNA in semen of males with an active or previous history infection of SARS-CoV-2 RNA.

METHODS

This review articles was performed by searching and screening systematically of articles with titles and abstracts from PubMed and Google Scholar from inception to June, 9th 2020. Text word searches were conducted for the following search segments: “semen”, “sperm”, “SARS-CoV-2”, “COVID-19”, and “Coronavirus”. We then reviewed the full articles and applied our selection criteria. We complemented our search by reviewing the bibliographies of selected articles to identify additional articles that were missed in our initial search.The articles have been selected by inclusion and exclusion criteria. The inclusion criteria in this study were articles published until June 9th 2019, written in English, available and accessible to the entire article. Only original article reporting the observation of SARS-CoV-2 RNA in semen or sperm would be included.

RESULTS

According to the flow chart (Figure 1), we initially obtained 104 study articles through a primary database search using keywords. Twenty-four articles from Pubmed and 64 articles from Google Scholar. Ninety-nine articles were excluded because did not match what was expected. Five articles were included in the criteria to be used as a literature review regarding the detection of SARS-Cov 2 in semen.The five articles reviewed came from various populations such as China, Germany, and Italy.

The five studies included in this review were case reports (n = 1), cross sectional (n = 1), cohort (n = 2), and descriptive study (n = 1). Further explanation regarding the results of the research review is listed in the table 1.

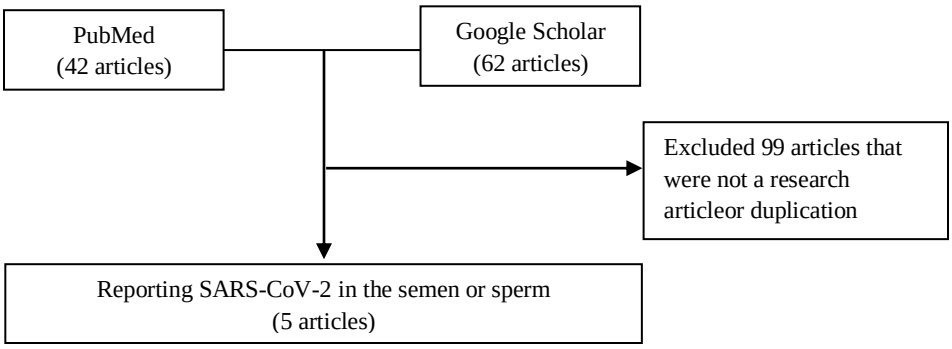

Figure 1. Literature review tracing scheme

Table 1. List of studies investigated the SARS-CoV-2 RNA in semen

Author	Study design	Size	laboratory confirmation for COVID-19	SARS-CoV-2 RNA in semen			SARS-CoV-2 antibody detection in semen
				Method	Acute phase	Recovery phase	
Li et al[8]	Cohort Study	6	positive result for SARS-CoV-2 in real-time reverse transcriptase–polymerase chain reaction assay (RT-PCR) of nasal and pharyngeal swabs	Not clear	4/15	2/23	NA
Holtmann et al[9]	Cohort study	34	positive swap result and/or positive Immunoglobulin IgA and IgG	RT-PCR	0/2	0/18	ELISA
Pan et al[10]	Cross sectional study	34	positive result for SARS-CoV-2 in quantitative RT-PCR assay of nasal and pharyngeal swabs	qRT-PCR	0/3	0/31	NA
Paoli et al[11]	Case report	1	positive result for SARS-CoV-2 in qRT-PCR of pharyngeal swabs	RT-PCR	NA	0/1	NA
Songet al[12]	Descriptive Study	12	Positive result for qRT-PCR of pharyngeal swab or antibody (IgM or IgG)	RT-PCR	NA	0/12	NA

DISCUSSION

The explanation about the attempts to avoid virus contamination from non-semen sources during collection only presence in Song's study. The process included passing urine, washing hands and penis with soap, drying hands and penis, and then ejaculating the semen into a sterile and wide-mouthed container.[12] There is still possibility of droplet contamination during masturbation. We recommend the volunteer to use face mask during masturbation for future studies.

Holtmann's study used native and washing semen sample for identification SARS-CoV-2, however it is not clear which sample were presented in the result. Washing process separates seminal plasma from spermatozoa. It has been proven before that sperm washing can reduce virus levels in the post-wash sperm.[13,14]

Due to ethical issues, generally the studies enrolled recovered or mild symptoms patients

only. Various studies have shown the viral load to be related to the severity of symptoms. Song's study could report one mild symptom patient positive viral RNA in pharyngeal swab. It is interesting that Li's study involved patient with severe symptoms.[8]

We didn't find any explanation about how the research teams ensure the staff who handle the semen were health and not infected by SARS-CoV-2 RNA. If the staff that manipulated specimens got infected, there's a possibility that the semen samples could have been contaminated by asymptomatic PCR-positive biologists/technicians. Ongoing studies are needed to confirm these findings before specific recommendations can be made.

Considering a close contact during sexual intercourse, it is recommended to have a sexual abstinence during acute phase of COVID-19. Intercourse using condom should be considered for patient who are in recovery phase until more data confirm the absence the SARS-CoV-2 RNA in semen. It is difficult to forbid man to do masturbation. As the biological fluid spill and disposal should follow the manual handle of biological fluid, it is recommended to dispose the semen to the toilet during masturbation.

Good laboratory practices should be strictly applied when handling sperm/seminal fluid in the andrology laboratory. This advice includes the use of class II safety cabinets, which gives protection to the specimen handled as well as the operator performing the work and additional measures to protect the specimens from laboratory staff (e.g., use of goggles, N95 mask, gown/coveralls, and gloves)—who might be asymptomatic for SARS-CoV-2.

Technicians/biologists should, ideally, be tested by PCR and/orblood antibody testing before resuming activities, and only staff with negative results should perform laboratory duties.

CONCLUSION

Until now, there is no an appropriate study yet that can be used as a reference regarding the presence of SARS-CoV-2 RNA in semen. Nevertheless, the protection is still needed when contact with the semen of SARS-CoV-2 positive male, in order to make a proper conclusion of your review.

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