



Semen and viruses: significance during the transmission of infections

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Viral infections may trigger significant public health problems, and semen can be considered a vital transmission route with potential evolutionary advantages [1]. Xie et al. [2] recently published a meta-analysis showing that the susceptibility of semen parameters to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection could lead to marked impairments of male reproductive function. Thus, additional efforts should be made to study the long-term effects of COVID-19 infection and other infections on male reproduction.

In concordance, two viral infections, Chapare hemorrhagic fever [3] and Marburg virus disease [4], highlighted in recent publications, have both been closely associated with semen and have the possibility of sexual transmission. Chapare virus [3] was observed in the semen of a patient 86 days after symptom onset. Despite not testing for Marburg virus [4] in the semen, there is evidence that it persists in the testes of nonhuman primates and disrupts the blood-testis barrier [5]. Similarly, 27 viremia causing viruses have been detected in human semen [6], with others (SARS-CoV-2 [7], dengue [8], and monkeypox viruses [9]) potentially to be added to the list. Some reports have been in survivors long after disease recovery [8, 10], and indeed with disastrous effects on sperm quality and human fertility.

Viral infections lead to multiple health problems that force scientists to understand the impact of these viruses on the physiological processes essential for the maintenance of homeostasis and survival of the human race. Since viruses can infect the tissues of the reproductive tract and semen, they trigger significant negative consequences in terms of organ integrity, disease development, changes in sperm quality, and disruption of the endocrine system. Furthermore, there is also the latent possibility of being able to be transferred through semen to another person. There are multiple examples of these negative interactions between virus and semen quality: (a) Influenza virus infection has been reported to impact sperm DNA negatively; (b) Zika virus infection can alter spermatogenesis and cause direct damage to sperm and the testes; (c) HIV infection induces the decline of conventional seminal parameters, even sperm morphology and motility are impaired with disease progression; (d) Human papillomavirus adversely effects sperm parameters (abnormal count and reduction of motility) and leads to DNA fragmentation; (e) Hepatitis viruses is associated with alterations of conventional semen parameters such as reduced motility, abnormal morphology, and lower sperm count; (f) Human parvovirus has been associated with disruption of spermatogenesis; (g) Ebola virus can cause disruption of the blood-testis barrier; (h) Herpes simplex virus is associated with reduction of sperm motility; (i) Human cytomegalovirus has been shown to impair sperm parameters [11–13].

These evidences suggest that there is need to evaluate the potential of semen as a “deliverer” of infections, and that testing for viruses in semen as an essential means of transmission should be mandated.

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Declarations

Conflict of interest The authors declare no competing interests.

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