COVID-19 Vaccine and Male Fertility

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As world is going through the COVID-19 pandemic, the mass vaccination of newly approved vaccines for COVID-19 has begun around the world. There has been some concern among the vaccine recipients regarding the potential effect of vaccine on male fertility. Does COVID-19 affect the male reproductive health? Does COVID-19 vaccine impair the sperm parameters?

As angiotensin-converting enzyme 2 (ACE2) receptors plays a key role in pathogenesis of COVID-19. So, the cells which show high level of ACE2 expression can be a target and directly damaged by the virus[1]. Many research studies have shown that high expression level ACE2 is detected in testicular cells, like seminiferous duct cells, spermatogonia, Leydig cell and Sertoli cells[1,2]. This expression of ACE2 testicular cells is related to age[2]. In a study, the expression was found to be highest in patients aged 30, which was higher than the patients who in their twenties, whereas it was lowest in 60-year-old patients[2]. This might indicate that young male patients are at higher risk of testicular damage by COVID-19 than older patients.

Another possibility of testicular damage has also been hypothesized which is mediated by secondary immunological and inflammatory response, which is elevated during the severe viral infection in the testicles due to high load of virus in blood stream leading to testicles. COVID-19 infection could decrease also male fertility through various pathogenic mechanisms, like increasing oxidative stress and increasing the DNA methylation and fragmentation. There can be direct damage to the Leidig cells and spermatocytes through ace enzyme.

Furthermore, the persistence of high temperature during active viral infection in blood can damage the blood-testis barrier (BTB) thereby leading to entry of viruses in seminiferous tubules. This supports that testicular infection due to SARS-CoV-2-induced orchitis might damage BTB and allow the shedding of virus into semen. So, theoretically, there is a possibility that COVID-19 infection can damage the testicular cells being the potential target for infection and subsequently leading to infertility.

A number of clinical trials have been done to determine the safety of these vaccines, but, their impact on male fertility has not been investigated yet. Some of the studies have found the significant negative impact of SARS-CoV-2 infection on sperm parameters. COVID-19 affects sexual function and sexual activity. A study from China has reported the reduced sexual activity in 37% of those surveyed, during the early in the pandemic. In that study 44% have reported a decrease in the number of sexual partners[3]. On the other hand, minimal change in sexual activity was suggested in a study from Bangladesh, India, and Nepal. The first report of the impact of SARSCoV-2 infection on semen parameters came from Holtmann and others[4]. They found that semen parameters were impaired in the patients after a moderate infection whereas; mild infection was less likely to cause this effect.

There have been very few studies regarding the impact of COVID-19 vaccine of sperm parameters. In conducted studies the results are also not reliable as sample size of the study is small; the population is hetergenous, a lot of variables have to consider for evaluating of male fertility. In a study, the effect of two mRNA vaccines, BNT162b2 (Pfizer-BioNTech) and mRNA-1273 (Moderna) was studied on sperm parameters before and after the COVID-19 vaccination in 45 volunteers between 18 to 50 years of age. No significant decrease was observed in any of the sperm parameters after 2 doses of COVID-19 mRNA vaccine[5]. Similar results were seen in another study conducted on 43 male patients after vaccination with BNT162b2 vaccine. It was suggested that as the vaccine contain only mRNA and not the live virus, it would be unlikely to impact the sperm parameters by vaccine.

In a post from Society for Male Reproduction and Urology (which is a professional group of American Society for Reproductive Medicine) on 9th January, 2021 published that there are no data about the impact of the COVID-19 vaccine on male or female fertility. Only about 16% of men experienced fever after second dose of Pfizer/BioNtech COVID-19 vaccine during the clinical trial which might have caused temporary declines in sperm production which would be similar to or less than if the individual experienced fever from developing COVID-19 or for other reasons.

So unless new conclusive data is published, there is no definitive data to support possibility of direct testicular damage due to virus invasion of due to inflammatory response in response to binding of SARS-COV2 virus to ACE2 receptors. As far as COVID-19 vaccination is concerned,

there is no significant data that is does affect sperm whereas SARS-CoV-2 infection does impair sperm. Follow-up investigative studies have to be conducted for evaluation of male fertility.

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