

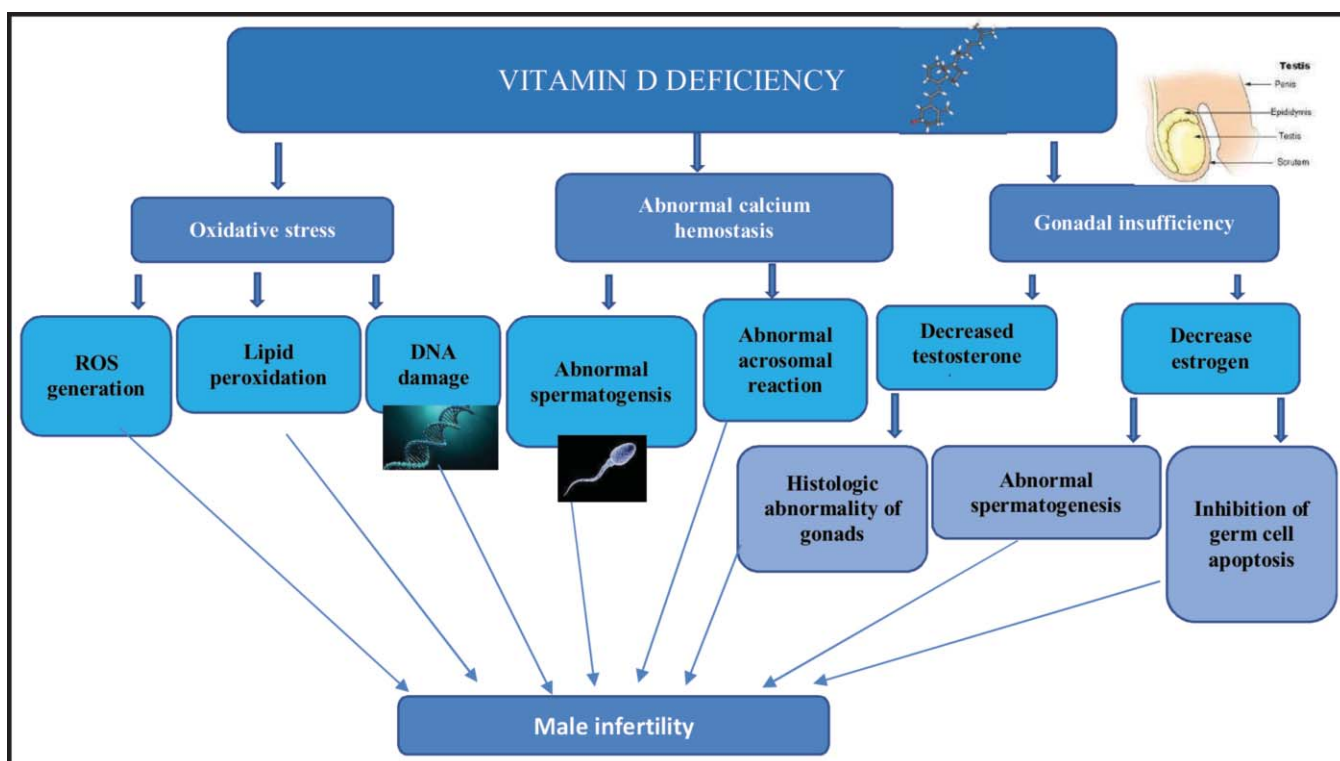
Oxidative stress, vitamin D deficiency and male infertility: An under-looked aspectMaheen Shahid,¹ Syeda Amrah Hashmi,² Rehana Rehman³

Madam, infertility is a known source of distress among couples worldwide. This agony significantly stems from the concern of not having an identifiable cause leading to infertility. With male factors accounting for 20-30% of the total causes of infertility,¹ a thorough evaluation of both the partners is done.

Upon evaluation, Vitamin D deficiency was noticed

deficiency decreases male fertility by contributing to oxidative stress and gonadal insufficiency, disrupting spermatogenesis, affecting sperm morphology and normal calcium haemostasis.²

Oxidative stress, caused by an imbalance between oxidative and antioxidative mechanisms, is believed to be a well-known mechanism underlying idiopathic male



significantly in males coming to infertility centres. However, its functions and how it impacted reproduction was not known until the research led to the discovery of Vitamin D Receptor (VDR) in many organs of the male reproductive tract. It is now known that vitamin D

infertility. Reproductive health professionals and researchers fittingly started searching for antioxidants to combat this imbalance. A study concluded that adding vitamin D to a cryopreserved semen sample reduced oxidative stress and resulted in better fertility outcomes.³ Animal trials have shown that Vitamin D supplementation reduced oxidative stress and improved semen DNA integrity.⁴

As Vitamin D exerts its effects by binding to Vitamin D receptors, it was noted that vitamin D receptor null

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mutant mice had a significant reduction in successful reproductive outcomes due to gonadal insufficiencies. Reduced levels of oestrogen and testosterone were seen along with low sperm count, reduced motility, abnormal spermatogenesis and histological abnormalities in testes of mutant mice. These insufficiencies were attributed to a decreased CYP2R1, CYP27B1 and CYP24A1 expression, lower aromatase activity, secondary to suppression of CYP19 gene and calcium supplementation improved fertility in such cases.⁵

There is limited human data available on how Vitamin D deficiency causes gonadal insufficiency, which is important to maintain normal reproductive physiology. More studies are needed to clarify the role of vitamin D in gonadal physiology. Considering the importance of Vitamin D on reproductive functions, its role in causing Oxidative stress and gonadal dysfunction, we suggest randomized control trials in pre-pubertal phase. In the case of positive association, new therapeutic approaches

such as Vitamin D supplementation can be initiated as one of the treatment options, which is not only cost-effective but non-invasive as well. Besides, more emphasis can be given to using vitamin D as a preconception supplement for not only females but males as well.

References

1. Agarwal A, Mulgund A, Hamada A, Chyatte MR. A unique view on male infertility around Reprod Biol Endocrinol. 2015; 13:37.
2. Lerchbaum E, Obermayer-Pietsch B. Vitamin D and fertility: a systematic review. Eur J Endocrinol. 2012; 166:765-78.
3. Moghadam MT, Fard YA, Saki G, Nikbakht R. Effect of vitamin D on apoptotic marker, reactive oxygen species and human sperm parameters during the process of cryopreservation. Iran J Basic Med Sci. 2019; 22:1036-43.
4. Jeremy M, Gurusubramanian G, Roy VK. Vitamin D3 treatment regulates apoptosis, antioxidant defense system, and DNA integrity in the epididymal sperm of an aged rat model. Mol Rep Dev. 2019; 86:1951-62.
5. Jensen MB. Vitamin D and male reproduction. Nature Rev Endo. 2014; 10:175.

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