



# From ‘Anti-Sterility’ to ‘Antioxidant’ to ‘Anti-Sterility’: Redirecting Vitamin E Researches towards the Old Forgotten Interest



Siti Syairah Mohd Mutalip\*

Faculty of Pharmacy, Universiti Teknologi MARA Puncak Alam Campus, Malaysia

\*Corresponding author: Siti Syairah Mohd Mutalip, Faculty of Pharmacy, Universiti Teknologi MARA (UiTM) Puncak Alam Campus, Selangor 42300, Malaysia

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## Abstract

The initial discovery of vitamin E was first documented in 1922 through the finding of a particular ‘anti-sterility substance-X’ that was necessary for reproduction. Following the discovery, the interest on this substance-X was on rise with earlier studies conducted on the need for the substance-X in reproduction. Substance-X was later found and named as vitamin E. Unfortunately, over the decades; the trends of the studies involving vitamin E have been directed towards the interest on its antioxidant properties. As a result, the initial interest on vitamin E as the anti-sterility substance has been forgotten. To-date, most study reports emphasized on the antioxidant activity and reports on the role of vitamin E in male and female factor infertility are limited. This paper intended to summarize on all of the reported benefits of vitamin E in reproduction from in vivo studies conducted using laboratory animal models, which could possibly be extended to treasure more of its importance in future clinical use.

**Keywords:** Vitamin E; Reproduction; Anti-sterility

## Vitamin E

Vitamin E is one of the types of vitamin that is not produced by the body and has to be taken orally from exogenous supply. It is found in a number of foods and plants, ranging from edible oils, wheat, rice bran, barley, oat, coconut, palm and annatto [1,2], rye, amaranth, walnut, hazelnut, poppy, safflower, maize and the seeds of grape and pumpkins. Besides, vitamin E derivatives have also been detected in human milk [3] and palm date (Phoenix canariensis) [4].

Numerous reports on the health benefits of vitamin E are widely available; however the reports of focused benefits on reproductive health are still scarce despite its nearly-100-years of discovery. Initial attempts have been made in search of new knowledge on vitamin E and reproduction, with the first ever documented report was by the founders themselves. Evans and Bishop was the first persons who reported on the finding of a particular ‘anti-sterility

substance-X’ that was necessary for reproduction in 1922 [5]. Following that, the need for vitamin E in reproduction was also reported by Barrie [6] from the observations in which feeding with vitamin E deficient diet developed uterine discoloration in rats. Unfortunately from then on, studies on vitamin E have been directed towards its antioxidant properties, making it becomes a very popular lipid-soluble antioxidant.

Researches on vitamin E and reproductive health have re-emerged decades later. Scientific investigations are being actively conducted, redirecting the focus on vitamin E towards its initial interest in reproduction. Most of the current studies are emphasizing on the effects and mode of actions by vitamin E in alleviating the risks of being infertile, as well as the risks of having birth defects using laboratories animal models. The outcomes from the current studies are as summarized in Table 1.

**Table 1:** Summary on the current studies on the effects of vitamin E on reproduction \*TOC – tocopherol, TCT – tocotrienol.

No.	Types of Vitamin E	Effects/Mechanism of Action	References
1.	Annatto $\delta$ -TCT	Supplementation with annatto-TCTs in pregnant Wistar rats showed no adverse effects, no increase in embryo lethality and no reduction in foetal body weight.	[7]

2.	Palm-TCT	Co-administration with 5mg/kg body weight (bw) of nicotine and 60mg/kg of tocotrienol-rich fraction (TRF) increased the pregnancy outcome to 83.3% in rats. About 25.68% of the embryos were developed into 2- and 4-cell stage in rats treated with both nicotine and TRF.	[8]
3.	$\gamma$ -TCT	Supplementation with $\gamma$ -TCT in nicotine-induced mice reduced the detrimental effects of nicotine on the ultra structure of the oocytes.	[9]
4.	Palm-TCT	Numbers of abnormal embryos reduced following supplementation with 90mg/kg and 120mg/kg of TCT in corticosterone (CORT)-treated mice.	[10]
5.	$\gamma$ -TCT	Co-administration with $\gamma$ -TCT improves the embryonic development in nicotine-induced mice.	[11]
6.	Annatto $\delta$ -TCT and soy $\alpha$ -TOC	Supplementation with annatto $\delta$ -TCT and soy $\alpha$ -TOC exerted the anti-survival effects in pre implantation embryos of nicotine-treated female mice.	[12-15]
7.	soy $\alpha$ -TOC	Supplementation with soy $\alpha$ -TOC minimized the adverse effects of nicotine in the histological structures of ovaries and the uteruses.	[16]

## Conclusion and Future Direction

Studies on vitamin E and reproduction are being actively conducted and these are actually contributing to the effort of redirecting the interest of vitamin E studies on the reproductive health. As summarized in the paper, the vitamin E has been shown to exert beneficial effects against the reproductive-related disorders. However, many future studies are still needed to gain better understanding on the role and mechanisms of actions of vitamin E on the reproductive health before it can be considered for clinical use as an anti-sterility drug.

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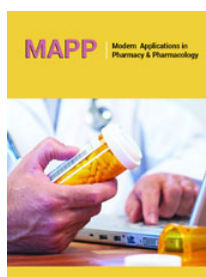
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