Contribution ID: **155** Type: **Poster**

Stinging Nettle and Male Fertility: A Context-Dependent Paradox

Abstract

Urtica dioica (Stinging nettle) has long been employed in traditional medicine for its numerous pharmacological qualities, which include anti-inflammatory, antioxidant, and reproductive health benefits. Phytochemical studies show that nettle is particularly rich in phenolic compounds and flavonoids, which contribute to its strong radical scavenging and reducing properties. Several in vitro and in vivo studies have shown that these components serve as the biochemical foundation for the plant's bioactivity. However, recent experimental work has revealed seemingly contradicting roles for *U. dioica* in male reproductive physiology, raising significant questions concerning its context-dependent activities.

One line of evidence, obtained from isolated rat prostate tissue and mouse mating research, shows that aqueous leaf extracts of *U. dioica* work as P2X1-purinoceptor antagonists, significantly reducing ATP-induced smooth muscle contractions. A significant decrease in male fertility resulted from this disruption of sperm transport, indicating a possible use of contraceptionIn contrast, research using a nicotine-induced reproductive damage model in mice show that hydroalcoholic extracts of *U. dioica* enhance sperm parameters, raise blood testosterone levels, and improve testicular histology in a dose-dependent manner. These protective effects are linked to the extract's antioxidant and anti-inflammatory properties, which reduce the oxidative stress caused by nicotine exposure.

Reconciling these opposing conclusions emphasizes *U. dioica*'s dual nature. In healthy, physiologically normal systems, nettle's purinoceptor antagonism may reduce fertility by restricting sperm transport. Conversely, under oxidative or toxicological stress, its phytochemical content provides protection and restores reproductive function. The extraction process, dosage, and experimental model all influence these results, highlighting the bioactivity's complexity.

Taken together, these reports indicate that *U. dioica* plays a unique role at the intersection of reproductive suppression and protection. Rather than being contradictory, the available data highlights the significance of biological context in shaping the consequences. Future research should seek to distinguish between the situations under which nettle acts as a context-based contraceptive and a fertility enhancer, providing clarity for both clinical uses and the safe use of this widely available medicinal plant.

Keywords: *Urtica dioica*, stinging nettle, male fertility, purinoceptor antagonism, oxidative stress, reproductive health

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Track Classification: Biological Sciences