

Systematic review of carnitine's role in PCOS: Insights into fertility and metabolic health.

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Introduction

Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder affecting women of reproductive age, characterized by hyperandrogenism, anovulation, and polycystic ovarian morphology [1]. Its pathogenesis involves a complex interplay of hormonal imbalances, insulin resistance, and inflammatory pathways [2].

Carnitine, a naturally occurring compound involved in fatty acid metabolism, has garnered attention for its potential therapeutic role in managing PCOS due to its antioxidant and metabolic regulatory properties [3].

Its impact on insulin resistance is particularly notable, as studies indicate improved insulin sensitivity and reduced hyperinsulinemia in participants receiving carnitine [4]. This is crucial since insulin resistance is a core component of PCOS, contributing to metabolic dysfunction and exacerbating reproductive symptoms [5].

In the context of fertility, carnitine has demonstrated promising effects. Research highlights its ability to enhance ovulatory function, with some studies reporting increased ovulation rates and improved menstrual regularity among women with PCOS [6]. These effects are attributed to carnitine's role in modulating mitochondrial function and reducing oxidative stress, which are critical factors in ovarian health [7].

Lower inflammatory markers, such as C-reactive protein and interleukins, have been observed with carnitine supplementation, potentially mitigating long-term cardiovascular risks associated with PCOS [8].

Despite these promising findings, the heterogeneity of study designs, dosages, and sample sizes underscores the need for standardized clinical trials to establish optimal protocols for carnitine use [9]. Additionally, while carnitine appears safe and well-tolerated, its long-term effects remain insufficiently explored [10].

Conclusion

Carnitine supplementation emerges as a potential adjunct therapy for managing PCOS, offering benefits in metabolic health and reproductive outcomes. By addressing insulin resistance, oxidative stress, and inflammation, carnitine contributes to a holistic approach in PCOS management. Future research should focus on refining dosage regimens and understanding the mechanisms underlying carnitine's therapeutic effects to maximize its clinical utility.

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