

Effectiveness of L-Carnitine, L-Acetyl-Carnitine and N-Acetyl-Cysteine in Male Idiopathic Asthenozoospermia

Introduction

- ➔ Around 50% of infertility cases in childless couples are due to male factors, and about 44% of infertile men have idiopathic infertility, characterised by unclear pathogenesis and no evidence-based treatment.
- ➔ LC supports sperm energy metabolism and motility, with higher LC and LAC levels linked to improved sperm function.
- ➔ NAC acts as a potent antioxidant, improving sperm motility and concentration, enhancing the acrosome reaction and reducing ROS and DNA oxidation.

Objective

- ➔ To assess the effectiveness of LC/LAC and NAC in improving sperm parameters in men with idiopathic asthenozoospermia.

Study details

A meta-analysis was conducted in accordance with the PRISMA guidelines.



Inclusion criteria

- ➔ Men with idiopathic male infertility treated with LC/LAC or NAC



Total studies analysed

- ➔ Seven randomised controlled trials with 621 patients

Results



LC/LAC vs. placebo

- ➔ Sperm motility
↑ 9.48% ($p = 0.03$)
- ➔ Normal morphology
↑ 4.89% ($p = 0.006$)
- ➔ Sperm concentration
↑ 11.17 million/mL ($p = 0.25$)
- ➔ Ejaculated volume
↑ 0.13 mL ($p = 0.25$)



NAC vs. placebo

- ➔ Sperm motility
↑ 4.69% ($p < 0.0001$)
- ➔ Normal morphology
↑ 1.68% ($p = 0.0002$)
- ➔ Sperm concentration
↑ 3.8 million/mL ($p < 0.00001$)
- ➔ Ejaculated volume
↑ 0.69 mL ($p = 0.002$)

Sperm motility

- ➔ LC/LAC did not show a significant effect on sperm concentration (Figure 1).

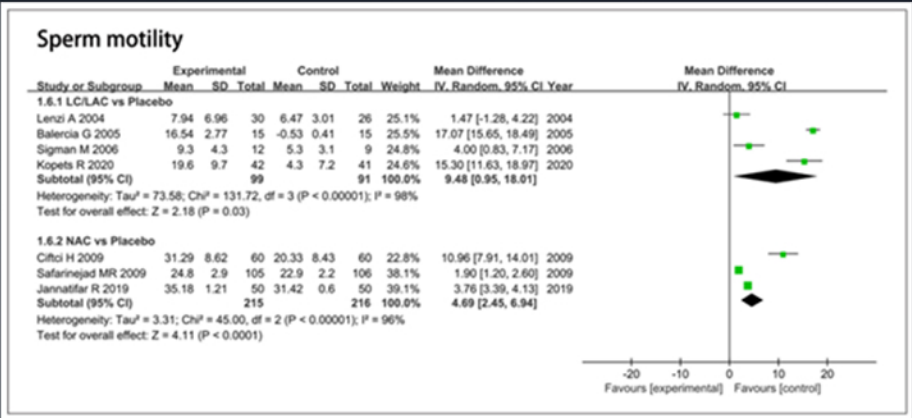


Figure 1. Forest plot showing results for the sperm motility.

LAC: L-acetyl-carnitine; LC: L-carnitine; SD: Standard deviation; IV: Inverse variance; CI: Confidence interval; df: Degrees of freedom.

Normal morphology

- ➔ Both supplements led to significant improvements in sperm morphology (Figure 2).

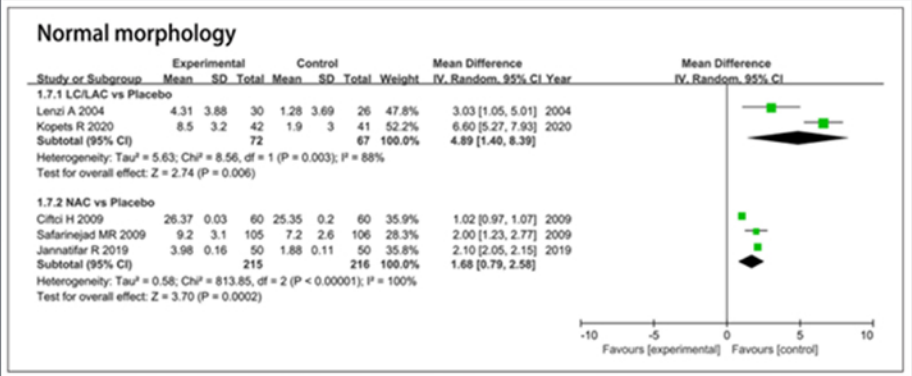


Figure 2. Forest plot showing results for the normal morphology.

LAC: L-acetyl-carnitine; LC: L-carnitine; SD: Standard deviation; IV: Inverse variance; CI: Confidence interval; df: Degrees of freedom.

Sperm concentration and ejaculate volume

- ➔ NAC showed a significant increase in sperm concentration and ejaculate volume (Figure 3).
- ➔ LC/LAC did not show significant effects on sperm concentration.

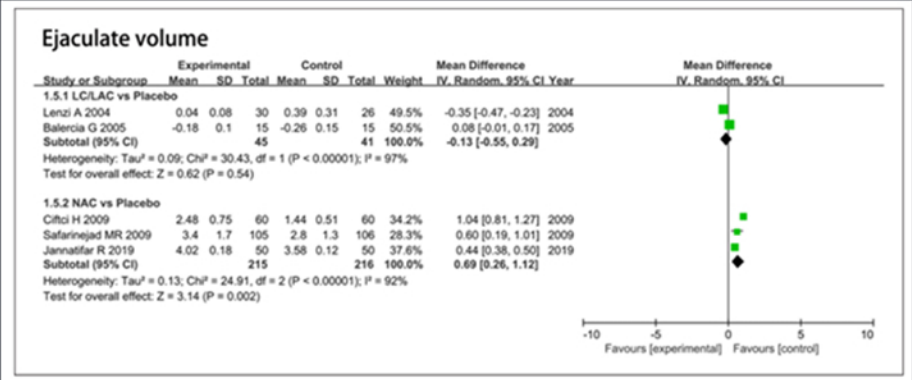


Figure 3. Forest plot showing results for the ejaculate volume.

LAC: L-acetyl-carnitine; LC: L-carnitine; SD: Standard deviation; IV: Inverse variance; CI: Confidence interval; df: Degrees of freedom.

NAC on serum hormones

- ➔ No significant difference was observed in the levels of testosterone, luteinising hormone, follicle-stimulating hormone and prolactin.

Conclusion

Both NAC and LC/LAC significantly improved sperm motility and morphology. NAC, in particular, showed a notable effect on sperm concentration and ejaculate volume, without effecting serum hormone levels.

Abbreviations

LAC: L-acetyl-carnitine; LC: L-carnitine; NAC: N-acetyl-cysteine; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Reference

Wei G, Zhou Z, Cui Y, et al. A meta-analysis of the efficacy of L-carnitine/L-acetyl-carnitine or N-acetyl-cysteine in men with idiopathic asthenozoospermia. Am J Mens Health. 2021;15(2):15579883211011371.

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