Clinical Trial

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Oral administration of l-carnitine improves the clinical outcome of fertility in patients with IVF treatment

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Abstract

Age-dependent decline of mitochondrial function has been proposed to be a main cause of decline of embryo quality. Then, l-carnitine plays important roles in reducing the membranous toxicity of free-fatty acids by forming acyl-carnitine and promoting β-oxidation, preventing cell damage. Recent research revealed that l-carnitine played important roles in vitro in oocyte growth, oocyte maturation and embryo development. However, such beneficial effects of l-carnitine in vivo have yet to be verified. The effect of oral l-carnitine supplementation on embryo quality and implantation potential was examined. A total of 214 patients were included in this study. They all previously received in vitro fertilization-embryo transfer (IVF-ET) and failed to conceive. Then they were administered l-carnitine for 82 days on average and underwent IVF-ET again. There were no significant differences in the total number of retrieved oocytes, and their maturation and fertilization rates between before and after l-carnitine administration. The quality of embryos on Days 3 and 5 after insemination was improved following l-carnitine administration ($p < .05$) in cycles after l-carnitine administration compared with previous cycles. Healthy neonates were born after IVF-ET following l-carnitine administration. Our data suggested that oral administration of l-carnitine to fertility patients improved the developmental competence of their oocytes after insemination.

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Review

J Assist Reprod Genet 2020 Oct;37(10):2377-2387.

Does coenzyme Q_{10} supplementation improve fertility outcomes in women undergoing assisted reproductive technology procedures? A systematic review and meta-analysis of randomized-controlled trials

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Abstract

Objective: Increased oxidative stress has been identified as a pathogenetic mechanism in female infertility. However, the effect of specific antioxidants, such as coenzyme Q_{10} (CoQ_{10}), on the outcomes after assisted reproductive technologies (ART) has not been clarified. The aim of this study was to systematically review and meta-analyze the best available evidence regarding the effect of CoQ_{10} supplementation on clinical pregnancy (CPR), live birth (LBR), and miscarriage rates (MR) compared with placebo or no-treatment in women with infertility undergoing ART.

Methods: A comprehensive literature search was conducted in PubMed (MEDLINE), Cochrane, and Scopus, from inception to March 2020. Data were expressed as odds ratio (OR) with 95% confidence intervals (CI). The I^2 index was employed for heterogeneity.

Results: Five randomized-controlled trials fulfilled eligibility criteria (449 infertile women; 215 in CoQ_{10} group and 234 in placebo/no treatment group). Oral supplementation of CoQ_{10} resulted in an increase of CPR when compared with placebo or no-treatment (28.8% vs. 14.1%, respectively; OR 2.44, 95% CI 1.30-4.59, p = 0.006; I^2 32%). This effect remained significant when women with poor ovarian response and polycystic ovarian syndrome were analyzed separately. No difference between groups was observed regarding LBR (OR 1.67, 95% CI 0.66-4.25, p = 0.28; I^2 34%) and MR (OR 0.61, 95% CI 0.13-2.81, p = 0.52; I^2 0%).

Conclusions: Oral supplementation of CoQ_{10} may increase CPR when compared with placebo or no-treatment, in women with infertility undergoing ART procedures, without an effect on LBR or MR.

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Review

Trends Endocrinol Metab 2020 Aug;31(8):570-579.

Breakthroughs in the Use of Inositols for Assisted Reproductive Treatment (ART)

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Abstract

It is well known that myo-inositol (MI) and D-chiro-inositol (DCI) are insulin-sensitizing agents, and MI is of proven utility in polycystic ovary syndrome (PCOS). In addition, MI plays a pivotal role in the physiology of reproduction, and has beneficial effects on the development of oocytes, spermatozoa, and embryos. By contrast, DCI has little effect on spermatozoa, but high concentrations in the ovary can negatively affect the quality of oocytes and the blastocyst. Overall, the evidence in the literature supports the beneficial effects of MI in both female and male reproduction, warranting clinical use of MI in assisted reproductive treatment (ART).

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Clinical Trial

J Ovarian Res 2015 Jun 12;8:37.

Myo-inositol therapy for poor-responders during IVF: a prospective controlled observational trial

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Abstract

Background: The overall incidence of poor ovarian response in IVF cycles has been reported to be between 9 and 24%. The management of these patients remains a significant challenge in assisted reproduction. The aim of the present study was to evaluate the effect of myo-inositol (MI) on ovarian function in poor responders undergoing ICSI.

Methods: The study is a prospective controlled observational trial, that involved 72 poor responders included in an ICSI program and divided into two groups; group A: 38 patients who have been assuming MI (4 g) + folic acid (FA) (400 μg) for the previous 3 months before the enrollment day; group B: 38 patients assuming FA (400 μg) alone for the same period. COH was carried out in the same manner in the two groups. The main goal was the assessment of oocytes retrieved number and quality; secondary endpoints were the Ovarian Sensitivity Index (OSI: n° oocytes retrieved/total Gonadotropins units × 1000), oestradiol levels on the day of hGC, fertilization rate, implantation rate, ongoing pregnancy rate.

Results: There was no significant difference between the two groups regarding oestradiol level, but total rec-FSH units were significantly lower ($p = 0.004$) and M2 oocytes rate significantly higer ($p = 0.01$) in group A. The ovarian sensitivity index was higher, reaching a statistical significance ($p < 0.05$), in the group of patients pre-treated with MI, showing an improvement in ovarian sensibility to gonadotropin.

Conclusions: Our results suggest that MI therapy in poor responders results in an increased of the number of oocytes recovered in MII and of the gonadotropin Ovarian Sensitivity Index (OSI), suggesting a MI role in improving ovarian response to gonadotropins. Therefore MI seems to be helpful in "poor responders" undergoing IVF cycles.

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Randomized Controlled Trial

Transl Res 2013 Mar;161(3):189-95.

Antioxidant supplementation reduces endometriosis-related pelvic pain in humans

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Abstract

We previously suggested that women with endometriosis have increased oxidative stress in the peritoneal cavity. To assess whether antioxidant supplementation would ameliorate endometriosis-associated symptoms, we performed a randomized, placebo-controlled trial of antioxidant vitamins (vitamins E and C) in women with pelvic pain and endometriosis. Fifty-nine women, ages 19 to 41 years, with pelvic pain and history of endometriosis or infertility were recruited for this study. Patients were randomly assigned to 2 groups: vitamin E (1200 IU) and vitamin C (1000 mg) combination or placebo daily for 8 weeks before surgery. Pain scales were administered at baseline and biweekly. Inflammatory markers were measured in the peritoneal fluid obtained from both groups of patients at the end of therapy. Our results indicated that after treatment with antioxidants, chronic pain ("everyday pain") improved in 43% of patients in the antioxidant treatment group ($P = 0.0055$) compared with the placebo group. In the same group, dysmenorrhea ("pain associated with menstruation") and dyspareunia ("pain with sex") decreased in 37% and 24% patients, respectively. In the placebo group, dysmenorrhea-associated pain decreased in 4 patients and no change was seen in chronic pain or dyspareunia. There was a significant decrease in peritoneal fluid inflammatory markers, regulated upon activation, normal T-cell expressed and secreted ($P \leq 0.002$), interleukin-6 ($P \leq 0.056$), and monocyte chemotactic protein-1 ($P \leq 0.016$) after antioxidant therapy compared with patients not taking antioxidants. The results of this clinical trial show that administration of antioxidants reduces chronic pelvic pain in women with endometriosis and inflammatory markers in the peritoneal fluid.

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