HP-13: Cyclodextrin- Vitamin E improves human spermatozoa motility and attenuates diabetes-mediated oxidative in high HbA_{1c} conditions

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Subject description: Hyperglycemia is known to cause male reproductive impairment through diverse mechanisms. Indeed, the development of oxidative stress in parallel to the wide distribution of advanced glycation end products in the reproductive tract of diabetic men may be a key role in male infertility. However, one of the rational strategies to prevent this effect is to increase the scavenging capacity of antioxidants in sperm.

Objectives: The aim of the current study is to evaluate the protective effect of Vitamin E loaded in cyclodextrin (CD-Vit E) on human mature spermatozoa exposed *in vitro* to diabetic plasma with high HbA_{1c} levels.

Methods: Blood plasma from diabetic patients (N= 10) with high HbA_{1c} levels (≥10%) was co-incubated with ten normozoospermic semen samples pre-treated with CD-Vit E. The sperm quality was determined by the assessment of sperm motility using Computer Assisted Semen Analysis (CASA), and the oxidative status was determined by measuring malondialdehyde (MDA) levels, using the thiobarbituric acid reactive substances assay.

Results and discussion: The results showed that all of the sperm progressive movements (moderate progressive: 13.29 ± 1.79% and rapid progressive: 3.58 ± 0.58%) decreased considerably after 30 min of incubation with diabetic plasma. Interestingly, the pre-treatment with CD-Vit E (0.25 mg/ml) reported an effective improvement in all sperm motility (27.86 ± 1.71% and 11.21± 1.88% for moderate and rapid progressivity, respectively). Also, an outstanding decrease in immobile cells was observed in CD-Vit E group (30.54 ±3.72 %). In parallel, lipid peroxidation increased dramatically in the diabetic group (0.91 ± 0.04 nmol MDA/10^8 SPZ) and reduced after treatment with CD-Vit E (0.16 ± 0.02 nmol MDA/10^8 SPZ).

Conclusion: these data indicated that diabetic plasma at high HbA_{1c} levels impaired mature spermatozoa motility by the increase of its oxidative status. While CD-Vit E has a potent protective effect as an antioxidant agent in the improvement of sperm quality in diabetic men.

Keywords: cyclodextrin-vitamin E, hyperglycemia, high HbA_{1c} levels, sperm motility.