

OUTER DENSE FIBERS ABNORMALITIES IN SPERMATOOZOA OF IOAT PATIENTS AND THEIR RELATION TO OXIDATIVE STRESS AND SPERM MOTILITY

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Introduction & Objectives: Human Spermatozoa are characterized by certain features that differentiate them from simple flagella. One of these features is the presence of outer dense fibers (ODFs). ODFs are nine fibers surrounding axoneme in the midpiece and extend to variable length through the principal piece. They represent about 30% of the protein portion of human spermatozoa and accordingly they are affected by any pathology that can affect protein content of spermatozoa as in the case of oxidative stress (OS). ODFs are thought to have a role in sperm motility and support. In this study we detect the abnormalities in outer dense fibers in iOAT patients and correlate these abnormalities with measurements of Carbonyl Protein which is the most recent reliable and stable indicator for oxidative stress. Moreover we correlate these results with the percentage of forward progressive sperm motility and the percentage of midpiece anomalies to find the relation between OS, ODFs anomalies and sperm function.

Material & Methods: 20 patients with iOAT syndrome (group 1) and 10 normal subjects with proven fertility, as controls, (group 2) were included in this study. Carbonyl Protein was measured by ELISA as an indicator for oxidative stress. Semen analysis was done according WHO parameters. Abnormalities of outer dense fibers were determined by transmission electron microscopy (TEM).

Results: Sperm parameters showed a statistically significant difference between iOAT patients and normal controls. CP values were significantly higher in iOAT patients than in normal controls ($p < 0.001$). A highly significant difference was found between iOAT patients and normal controls regarding abnormalities in outer dense fibers ($p < 0.001$). Abnormalities in Outer dense fibers have been found to be positively correlated with CP values ($r^2 = 0.851$) and MP anomalies ($r^2 = 0.431$) and negatively correlated with forward progressive motility ($r^2 = -0.762$).

Conclusions: In our study, we found a higher percentage of ODFs anomalies in iOAT patients than in normal controls. Abnormalities in ODFs are positively correlated with CP values which may indicate the effect of OS as underlying pathology for those anomalies. Moreover, ODFs anomalies are correlated positively with midpiece anomalies and negatively with progressive sperm motility. This correlation indicates the possible role of ODFs in sperm functions. Interestingly, ODFs anomalies, found in our study, were always associated with anomalies in the outer doublets tubules (ODs) of the axoneme. This may lead to the thinking that both ODFs and ODs are structurally and functionally related.

THE RELATIONSHIP BETWEEN THE SEMEN PARAMETERS, SEMEN REACTIVE OXYGEN SPECIES AND THE SPERM APOPTOSIS RATE OF INFERTILE PATIENTS

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Introduction & Objectives: To explore the effect of percentage of sperm apoptosis and reactive oxygen species (ROS) on the semen parameters of the infertile patients.

Material & Methods: 92 infertile male patients including 32 varicoceles, 30 leukocytospermic and 30 other infertile sperm samples were obtained and 10 IVF sperm samples as control. The sperm parameters were detected by computer assisted sperm analysis (CASA). The sperm apoptosis rate were assessed using AnnexinV/PI staining. The ROS levels in seminal plasma were detected by TBA methods.

Results: There was a significant negative correlation between the sperm apoptosis rate and sperm concentration ($r = -0.792$, $P = 0.004$, < 0.01), also with sperm motility ($r = -0.463$, $P = 0.043$, < 0.05). The sperm apoptosis rate in varicoceles and leukocytospermic group increased significantly compared with control (10.32 ± 4.16) vs. (12.98 ± 5.23) vs. (3.35 ± 1.33), $P_1 = 0.037$, $P_2 = 0.028$, < 0.05 . The level of seminal plasma ROS in varicocele group increased significantly compared with control (14.17 ± 5.03) vs. (3.23 ± 1.45), $P = 0.032$, < 0.05 . The level of seminal plasma ROS in leukocytospermic group increased significantly compared with controls (19.88 ± 7.62) vs. (3.23 ± 1.45), $P = 0.006$, < 0.01 . There was a significant negative correlation between the sperm apoptosis rate and the level of seminal plasma ROS in leukocytospermic group ($r = 0.573$, $P = 0.041$, < 0.05).

Conclusions: The percentage of sperm apoptosis is negatively related with sperm concentration and motility. The increasing of sperm apoptosis rate and the level of seminal plasma ROS in varicocele and leukocytospermia could be one of the causes of male infertility. The increasing of sperm apoptosis rate could be led by the high level of seminal plasma ROS in leukocytospermia.

EFFICACY OF COENZYME Q10 SUPPLEMENTATION ON SEMEN PARAMETERS, SPERM FUNCTION AND REPRODUCTIVE HORMONE PROFILES IN INFERTILE MEN: A DOUBLE BLIND, PLACEBO-CONTROLLED, RANDOMIZED STUDY

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Introduction & Objectives: Worldwide, approximately one in 10 couples is infertile and approximately half of this is due to male factors. Because the etiology and pathogenesis are still not fully understood, a significant proportion of male infertility is considered idiopathic and is usually accompanied by oligoasthenoteratospermia. Modern medicine has made several advances in the diagnosis, treatment and prevention of infertility. However, the vast majority of infertile men with idiopathic oligoasthenoteratospermia have remained untreated. These men are prone to receive a number of empirical therapies. Nevertheless, no drug therapy has proved to be clearly beneficial for idiopathic oligoasthenoteratospermia. Our aim was to determine the efficacy of coenzyme Q10 (CoQ10) supplementation on semen parameters, sperm function, and reproductive hormone profiles in infertile men.

Material & Methods: Two hundred-twelve infertile men with idiopathic oligoasthenoteratospermia, were randomly assigned to receive 300 mg orally CoQ10 (group 1, $n = 106$) daily or similar regimen of placebo (group 2, $n = 106$) during a 26-week period followed by a 30-week treatment free phase. Two semen analyzes, acrosome reaction test, immunobead test for antisperm antibody, and determination of the resting levels of the luteinizing-hormone (LH), follicle-stimulating hormone (FSH), prolactin (PRL), testosterone, and inhibin B, were done for all participants. Blood and seminal plasma concentrations of total CoQ10 were also assessed.

Results: Significant improvement in sperm concentration and motility was evident with CoQ10 therapy (both $P = 0.01$). Using the Kruger classification sperm morphology evaluation revealed an increase in the percent of normal forms in CoQ10 group ($P = 0.07$). A positive correlation were found between treatment duration with CoQ10 and sperm count ($r = 0.46$, $P = 0.03$), as well as sperm motility ($r = 0.45$, $P = 0.04$), and sperm morphology ($r = 0.34$, $P = 0.04$). The CoQ10 group had a significant decrease in serum FSH and LH at 26-week treatment phase (both $P = 0.03$). By the end of treatment phase, percentage of acrosome reaction increased from 14 ± 8 , and 15 ± 8 , to 31 ± 11 , and 16 ± 10 , in CoQ10, and placebo groups, respectively ($P = 0.01$).

Conclusions: CoQ10 supplementation definitely improved semen parameters. Further studies are needed, however, to draw final conclusion and for the evaluation of CoQ10 supplementation in pregnancy rate.

THE EFFECTS OF INTENSIVE, LONG-TERM TREADMILL RUNNING ON REPRODUCTIVE HORMONES, HYPOTHALAMUS-PITUITARY-TESTIS AXIS, AND SEMEN QUALITY: A RANDOMIZED CONTROLLED STUDY

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Introduction & Objectives: There is little argument that physical activity is beneficial for one's health. Indeed, increasing the amount of physical activity is associated with extensive health improvement. However, strenuous exercise represents a physical stress that challenges homeostasis. In response to this stressor, the endocrine and nervous system are known to react and participate in the maintenance of homeostasis and the development of physical fitness. Regardless of the many known health benefits of exercise, there is a body of evidence suggesting that endurance exercise is associated with some health problems. This study is designed to determine the effects of intensive, long-term treadmill running on reproductive hormones, hypothalamus-pituitary-testis (HPT) axis, and semen quality.

Material & Methods: A total of 286 subjects were randomly assigned to moderate-intensity exercise [$\sim 60\%$ maximal oxygen uptake (VO2 max); group 1, $n = 143$], and high-intensity exercise ($\sim 80\%$ VO2 max, group 2, $n = 143$) groups. The two groups exercised for 56 weeks in five sessions per week, each session lasting 120 min. This was followed by a 36-week low-intensity exercise recovery period. All subjects underwent complete physical examination and routine semen analysis. Blood samples were drawn from each participant for the determination of the levels of the following hormones: luteinizing-hormone (LH), follicle-stimulating hormone (FSH), prolactin (PRL), testosterone (T), free testosterone (FT) inhibin B, and sex hormone binding globulin (SHBG). The HPT axis was assessed using gonadotropin releasing hormone (GnRH) and human chorionic gonadotropin (hCG) tests.

Results: After 24 weeks of exercise, subjects exercising with high-intensity demonstrated significantly declined semen parameters compared those exercising with moderate-intensity ($P = 0.03$). Serum T, and FT, were begun to decrease, and serum SHBG, was begun to increase at the end of 12-week with both moderate and high-intensity exercises. The serum LH, and FSH concentrations decreased below the baseline level at 12-week in both groups ($P = 0.07$ in group 1, and $P = 0.03$ in group 2). Both groups had blunted LH and FSH responses to GnRH. There were significant negative correlation coefficients between moderate and high-intensity exercises and LH ($r = -0.45$, $P = 0.02$; and $r = -0.79$, $P = 0.001$, respectively), and FSH ($r = -0.48$, $P = 0.02$; and $r = -0.78$, $P = 0.001$, respectively) responses to GnRH. Serum T responses to hCG were significantly correlated with type of exercise ($r = -0.75$, $P = 0.01$). These parameters improved to their pre-exercise level during the recovery period.

Conclusions: We concluded that long-term strenuous treadmill exercises have a deleterious effect on serotonin reproduction in middle aged men, which is reflected in impaired semen parameters and hypogonadotropic hypogonadism state.