Effect of 655 nm diode LASER irradiation on human sperm cell motility and ROS (Reactive Oxygen Species) production

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Context: Sperm motility is an effective parameter in male fertility and it depends on energy consumption. Low-level LASER irradiation could increase energy supply to the cell by producing of ATP.

Objective: To evaluate how the low level LASER irradiation affects the human sperm motility and ROS production.

Methods: Sperm motilities are assessed by means of Computer-Aided Sperm Analysis, and ROS levels are evaluated by chemiluminescence technique; all according to the WHO 2010 manual. Data analysis was performed using SPSS software and GEE analysis, and statistical significance was set at P<0.05.

Patients: 25 human semen samples of asthenospermic patients (25-45 years old) with appropriate volume (>= 4ml). The patients were referred to the Royan infertility Center for the first time. They were seeking for infertility treatment and had received no medication before. All samples were treated for routine Semen Analysis according to the WHO 2010 manual.

Interventions: Semen specimens were divided into 4 equal portions, irradiated by 655nm diode GaInAlP LASER with varying doses as: 0 (control), 4, 6 and10 j/Cm2. At the time of 0, 30, 45 and 60 minutes following irradiation, sperm motilities and ROS levels are assessed in all samples.

Main Outcome Measures: LASER irradiation could increase sperm motility but it did not have any significant effect on ROS production in sperms

Results: Sperm motility of the control groups significantly decreased after 30, 45 and 60 min of irradiation time, while in the irradiated groups remained constant or slightly increased. Significant increases have been observed in dose of 10j/cm2 at the time of 60 minutes. ROS levels in irradiated groups slightly increased in comparison to control groups, but it was not significant.

Conclusions: These results suggest that irradiating human sperms with 655nm diode laser can improve their progressive motility which may be related to increasing of energetic efficiency. The maximum effect appears on dose of 10 J/cm2, and at the time of 60 minutes after irradiation. The results of ROS levels assessment showed that LASER irradiation did not have harmful effects like oxidative stress on sperm cells.