INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print), 2222-5234 (Online)
http://www.innspub.net
Vol. 13, No. 3, p. 105-108, 2018

RESEARCH PAPER OPEN ACCESS

Laser increased fertilization by enhance the motility of human sperm

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Key words: Laser, Human sperm, motility, fertilization.

http://dx.doi.org/10.12692/ijb/13.3.105-108 Article published on September 07, 2018

Abstract

To evaluate how the Low Level Laser (LLL) irradiation has influence on human sperm motility, and the velocity of human spermatozoa which was calculated by means of multiple exposure photography. 50 semen samples were chosen from men of infertility; the volunteers were of age of 25-32-year. Semen samples were stored in formalin-saline for evaluation of concentration and sperm morphology, sperm concentration greater than 200 × 106/mL, and ejaculate volume greater than 5.0 ml. Samples were divided into five groups: a control group without laser irradiation, the other four samples groups were irradiated by an aluminum gallium indium phosphide laser diode with a wavelength of 910 nm, with 10, 12,14,18,20 min respectively, all samples were subjected for analysis using computer-assisted sperm analyzer. It was noticed that and after each dose of laser irradiation, sperm velocity and mobility were increased. Increasing of sperm velocity was due to Laser light stimulates non-motile live spermatozoa.

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Introduction

Laser beams were introduced into the medical field of assisted human reproduction in the late 1970s, 1980s and 1990s (Tuli *et al.*, 1981; Abvakhitoova, 1982; Jeyendran *et al.,* 1984; Friedmann *et al.,* 1991) lasers began to be used in the treatment of infertility. Every sperm cell consists of a head (acrosome) where DNA concentrate in it, followed by a short neck containing mitochondria and a thin tail (flagellum), which is responsible for the motility of the cells. (Rasul, 2000) An important study was carried out to evaluate how the low-level laser irradiation affects the human sperm motility of infertile patients.

The samples were irradiated by 910-nm Ga-As laser of 1cm beam diameter and with 50mwpower,operating temperature of 0-38^{o}C irradiation with varying doses and it was found that sperm motilities are assessed by means of computer-aided sperm analysis (Evenson and Jost, 2000), the common cause of male infertility is a low sperm count; however, some men are infertile because of poor sperm motility, amount (concentration) and quality (Foote and Kaprotht, 2002), the total motility of spermatozoa, which refers to the fraction of sperm that displays any type of movement, has decreased in the last decades. (Aires *et al.,* 2003) also it was observed that Low-level laser irradiation could increase energy supply to the cell by producing (ATP) adenosine and the moving speed of a spermatozoon depends upon energy supply. (Muino *et al.*, 2008).

Later, (Kadirvel, 2009; Yazdi and Bakhshi 2010; Akhter *et al.,* 2011) study the sperm mobility and they clearly evidenced that human sperm motility as well as velocity can be improved by He-Ne laser irradiation. Later, Irradiating human sperms with low-level 910-nm diode laser can improve their progressive motility depending on both laser density and post-exposure time. Sperm motility is known as an effective parameter in male fertility, and it depends on energy consumption (Garg *et al.,* 2015).
This study was carried out to find a way to improve the sperm mobility and concentration to find a certain route to treatment to infertility.

Materials and methods

In this study 50 semen samples were randomly selected from men of infertility, the volunteers were of age of 25-32-year, the semen was collected and performed according to the health and safety criteria, the semen samples were prepared for physical and morphological analysis and stored in formalin-saline the semen was at the 30th percentile in motility and the concentration was greater than 200 × 106/mL, and ejaculate volume greater than 5.0 ml.

Samples were divided into five groups: a control group without laser irradiation, the four remaining groups were subjected to a laser irradiation dose of 20joules/4cm2 area, Irradiation was performed in petri-dishes of 10 mm containing 2 ml of semen the four samples group were irradiated by an aluminum gallium indium phosphide laser diode with a wavelength of 910 nm, with 10, 12,14,18,20 min respectively and all the samples were subjected to computer analysis. Then (5 µL) of semen was placed in a pre-warmed (37^{o}C) Makler chamber (depth 10 in µm) and then (Sperm Class Analyzer, Micro optic, Barcelona, Spain) was used to analyzed for sperm motion. The motility characteristics were analyzed immediately after thawing and four hours of incubation at 37^{o}C. Four microscopic fields were analyzed in each sample using a phase-contrast microscope (Nikon, Tokyo, Japan). (Firestone *et al.,* 2012; Karu, 2012)

Results

Low-power laser in four different dose and 15min shows increasing in sperm motility as depicted in Table 1, these increases was compared with respect to the control group that was not radiated with laser.

Discussion

As it is clear from Table 1, the therapy shows a significant increasing of the sperms motility and also improves the quality of the motility in treated samples, also it was noticed that there are decreasing in the percentage of the sperm immobility after treatment, time has significantly affected the total and the progressive in motility in the present study, time

has a significant effect on other characteristics of sperm movement.

The main parameters to be taken into account when a living tissue or cells irradiated are the wavelength which eventually effect the output of the power and the dose because it has consequences on cell contains especially the chromophores so when the power increased, time must be deceased to delivered a suitable amount of energy to the treated sample. (Sansone *et al.,* 2000; Dreyer, *et al.,* 2011).

Table 1. Describe the increasing in sperm motility after laser irradiation with laser for duration time of 15min continuously.

Speed of 0(control) no laser	Speed of 10J/cm2	Speed of 12g/cm2 irradiation	Speed of 16j/cm2 irradiation	Speed of 18/cm2min irradiation	Speed of 20j/cm2 irradiation
25±2 m/sec	26.6 m/sec	27 m/sec	32.4 m/sec	33.7 m/sec	34.2 m/sec

The present study showed that using Low Level Laser (LLL) will increase the speed of the sperm without doing any damage by stimulation the mitochondria of the cell to released the ATP, and then give power to the sperm that in turn increased the fertility because, the infertility is related with sperm.

Conclusion

It was concluded that Low Level Laser (LLL) may apply a valuable effects in the sperm motility and make it was more effective than depending upon dose and time.

The number of spermatozoa was counted in 10 squares with the help of manual counter grid was located with 200X magnification under a phase contrast microscope.

Also the dose is important to do different effects this study showed that the LLL might be the future way to testified the viability of the sperms.

Conflict

No conflict of interest.

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