Iraqi Laser Scientists Journal (ILSJ)/ www.ilsj-online.org
Vol . 1, Issue 3; Pp; 15 -20 2019

Original article

Utilization of diode laser therapy with wavelength 904nm during pregnancy: A preliminary study

*****Dunnia A. Barakat, ******Gesoon Al–Abbas & *******Zahra J.M.A. Al-Timimi
*College of Science – Al- Qadisiyah University, **Dept. of Computer – Al- Muthanna University & ***Laser Physics - College of Science for Women, Babylon University, Iraq

Abstract

The wide use of laser in medicine and surgery make it a well - known tool in all fields of medicine, which lead the physicians to put quires whether it may have side effects on the body as a whole and on the gestation and the fetus especially. The purpose of the being study is to explore the accessible confirmation to delimit the protection of laser therapy during the pregnancy and supporting of utilising the diode laser when selected in the therapy of cases followed the gestation.

Twenty-eight local adult females' rabbits employed in the present study, they were preserved naturally, furthermore formerly divided into four groups. For each group seven rabbits. The laser sours used was a diode laser with wavelength 904 nm, Continuous operations, power density ($2X10^{-3}$ watt/mm^2). The period of radiation was 15 min/session by direct contact of the window of the laser sours to the area of the pelvis.

The $1^{st.}$ group radiated during the $1^{st.}$ week of gestation after the copulation directly, $2^{nd.}$ group radiated at the beginning of the $2^{nd.}$ week of gestation, $3^{rd.}$ group radiated at the beginning of the $3^{rd.}$ week of gestation and $4^{th.}$ group was radiated at the beginning of $4^{th.}$ week of gestation. The average length of gestation for the females rabbits employed in this study was between 29–32 days and they gave birth to 2–6 litters in a sex average between males and females.

The outcomes revealed that the laser irradiation didn`t create any side effect or clinical symptoms during the period of a whole gestation. It was found that the laser radiation didn`t elongate or shorten the course of gestation, on the reverse it remains at its normal limits. In addition, the numbers of litters remain at normal limits. There were no abortions or abnormalities in the litters. The percentage of males compared with females outlive at normal values.

A conclusion can be progressed that the diode laser is innocuous enough to be applied if needed to treat pregnant females throughout the period of gestation externally any fear of abortion or deformities.

Keywords: Diode Laser, Gestation, Irradiation, Pelvis, Litters

To cite this article: Dunnia A. Barakat, Gesoon Al–Abbas & Zahra J.M.A. Al-Timimi; Utilization of diode laser therapy with wavelength 904nm during pregnancy: A preliminary study Iraqi Laser Scientists Journal . Vol. 1, Issue 3; Pp;15- 20, 2019.

Introduction

Till the last few years, most of the lasers used in medicine and surgery were of the high powers, practiced for controlling the bleedings, vaporization, cutting the tissues, but their high costs restricted their usage except in cases which can`t be replaced, notwithstanding that a new generation of lasers modulated to invade the clinics of the physicians, (1).

The current production of the laser highlighted with economical costs and low power, non–invasive, express no novelties in the nature of the tissues or their temperatures, (2). They have a wide spectrum of applications, so as freeing the pain, intensifying healing, reducing the inflammatory, and their

reactions. These kinds of lasers called Cold Laser (CL) or Low-Level Laser (LLL), (3).

Diode laser was one of these lasers and used to treat gynaecological cases like acute Salpingo-oophoritis, spontaneous infection, ovarian inflammatory, Chlamydia trachomatis. It minimises the inflammatory effects and the doses of the antibiotics and the demand for surgery,(4&5).

Vibrations from femtosecond lasers practiced to break the links among the proteins of the microorganisms in a process called (impulsive stimulated-Raman scattering), the authors revealed that this technique deactivates the resistant viruses, killed the bacteria while leaving the cells unharmed,(6&7).

A study by Katsumi Sasaki and his colleagues,(8) explain the laser treatment of interstitial cystitis which is a debilitating urological disorder with irritable voiding symptoms, by (Ga.Al.As.) diode laser 830nm in a continues mode. The protocol of the treatment was done by applying the laser beam on the shoulders, neck, marginal scapulae, ankles, and lumbar region once weekly with a 20 min session. By the $5^{th.}$ session , the patients could sleep at night for two hours, with a decrease in the intervals of urination from (5 minutes - two hours) within the $2^{nd.}$ week of the treatment. After 2 months from the treatment period, the patients stopped all the medications, (8).

An expanding number of studies are designating that LLL Therapy sources, may significantly promote the pregnancy percentages of even women who have been disappointed with other assisted reproduction medications like vitro fertilization, (9&10).

The mechanisms of LLLT or CLT for fertility included much processing so as enhancing the mitochondrial activity & ATP production, increasing the blood flow, control inflammation, decrease oxidative damage, and Co Q10 – synergistic, (11).

Unto recently, Western procreative medicine has declared that ageing & declining egg quality is an unchangeable process. Nonetheless, ground-breaking experimentation with LLLT accompanied in Denmark & Japan is establishing that it may be possible to intensify the quality of the eggs, reducing down the ageing process and improving the fertility in both women & men, (12&13).

Researches determine that LLLT employed on acupuncture points over the ovaries seems to improve the mitochondrial activity &ATP generation and benefit store duce oxidative deterioration, (14&15).

Notwithstanding the above, due to the inadequacy of a general appearance about the influences of the LLL, primarily the diode laser on the gestation. The current study was aimed to highlight preliminary the effects of the diode lasers on the gestation in female rabbits and the ability to disseminate their usage in other animals and add it could be used in women to dissipate the fears associated the using of these lasers to treat diseases, which may accompany the gestation

Methodology

Twenty-eight local breed adult female rabbits with average ages of (6 months– 1 year) adopted in the current study. They were serviced naturally depending upon the needs of study and according to its demands. Ovulation is apt to occur within the range of (9-13) hours. However, generally, it takes place about 10 hours following mating.

The animals divided into four groups depending upon their fulfillments. The laser sours used for irradiation was diode laser[1] with wavelength 904nm, continuous operation, power density ($2X10^{-3}$ watt/mm^2) and the period of radiation was 15 min/session by direct.

[1] Russian-Polish Joint Venture, Moskovesky; Polish 9 bldg. 3,Novoslobodskaya Str., 103030, Moscow- Russia.

The 1st. group radiated during the 1st. week of gestation after the copulation directly, 2nd. group radiated at the beginning of the 2nd. week of gestation, 3rd. group radiated at the beginning of the 3rd. week of gestation and 4th. group radiated at the beginning of the 4th. week of gestation.

The first three groups were radiated for (15 days) while the 4th.group didn`t continue the period of radiation, because of the parturition took place (9–12) days from the date of the beginning of radiation.

The length of gestation was between (29–32) days and gave birth to (2–6) litters in an average between males and females. One of the animals in the 3rd. group and two of the 4th. group were excluded after 2 weeks from time starting study in reason of palpation and (X-rays examination) showed that they were not pregnant.

Results

Sequences obtained from the animals in the different groups revealed that the diode laser irradiation didn`t generate any side effect or clinical symptoms regard with general appearance during the whole period of gestation. It was determined that the laser radiation didn`t elongate or shorten the course of gestation, on the reverse, it remains at its normal limits, also the number of the litters remain at the normal limits, there were no abortion or abnormalities in the litters, the percentage of the males compared with females remain at normal values. The Tables below present the outcomes obtained from the animals in each group.

Table 1: Results obtained from 1st. group.

No.	*Date of copulation*	*Date of parturition*	*Length of gestation*	*Period of radiation 1st. week*	*No. of litters*	*Males*	*Females*
1.	12/3	11/4	31	12/3 - 26/3	4	3	1
2.	17/3	15/4	30	17/3 - 31/3	6	3	3
3.	25/3	22/4	29	25/3 - 8/4	3	2	1
4.	29/3	29/4	32	29/3 - 12/4	4	1	3
5.	3/4	3/5	31	3/4 - 17/4	2	0	2
6.	7/4	7/5	31	7/4 - 21/4	4	2	2
7.	15/4	15/5	31	15/4 - 29/4	5	3	2

Table 2: Results obtained from 2nd. group.

No.	*Date of copulation*	*Date of parturition*	*Length of gestation*	*Period of radiation 1st. week*	*No. of litters*	*Males*	*Females*
1.	19/4	19/5	31	25/4 - 9/5	5	3	2
2.	22/4	23/5	32	28/4 - 12/5	4	2	2
3.	26/4	26/5	31	2/5 - 16/5	4	2	2
4.	30/4	28/5	29	6/5 - 20/5	5	2	3
5.	2/5	1/6	31	8/5 - 22/5	6	2	4
6.	7/5	7/6	32	13/5 - 27/5	3	2	1
7.	11/5	10/6	31	17/5 - 31/5	6	4	2

Table 3: Results obtained from 3rd. group.

No.	*Date of copulation*	*Date of parturition*	*Length of gestation*	*Period of radiation 1st. week*	*No. of litters*	*Males*	*Females*
1.	16/5	13/6	29	29/5 - 12/6	5	2	3
2.	22/5	21/6	31	4/6 - 18/6	4	1	3
3.	30/5	29/6	31	13/6 - 27/6	4	3	1
4.	2/6	3/7	32	16/6 - 30/6	5	2	3
5.	6/6	6/7	31	20/6 - 4/7	3	2	1
6.	17/6	17/7	31	1/7 - 15/7	2	2	/
7.	/	/	/	/	/	/	/

Table 4: Results obtained from 4th group.

No.	*Date of copulation*	*Date of parturition*	*Length of gestation*	*Period of radiation 1st. week*	*No. of litters*	*Males*	*Females*
1.	25/6	25/7	31	15/7 - 29/ 7	6	4	2
2.	29/6	27/7	29	19/7 - 2/8	2	1	1
3.	3/7	2/8	31	23/7 - 6/8	4	2	2
4.	7/7	7/8	32	27/7 - 10/ 8	3	1	2
5.	19/7	18/8	31	8/8 - 22/8	3	2	1
6.	/	/	/	/	/	/	/
7.	/	/	/	/	/	/	/

Discussion

Results acquired from this study, detected that the irradiation of the female rabbits with diode lasers pulse-type in the various stages of gestation was safety, it caused no side effects; no abortion during gestation, no malformations for the fetuses and fetus used during pregnancy after parturition you can use offspring. 80% of the parturition took place within the period of 31 days, which is near from the normal date of gestation. These outcomes are agreed with many studies on the effects of low-energy laser therapy processing. The ratio of male to female offspring was 51.01%. It is approximately normal in the rabbit as compared with the results which obtained by (16&17).

Throughout the total prenatal evolution period, both embryo and fetus are so radiosensitive. The degree of radiation effects is highly dependents on the developmental stage. In comparison with other radiation, the death of embryo occurs at a dose of o.2 Gy and higher, while malformations are only noted in so rare cases when genetic preparations exist, experimental information with mammals revealed that a dose of radiation about 0.2 Gy increases the risk of deformation, (18&19).

The embryo in a human is more resistant for radiation than those of mice and rabbits. If the embryo is exposed to radiation during the first stages of the fetal period so, organic generation founds growth and developmental malformations, (20&21). During the early stages of fetogenesis 8-15 weeks, the grown central nervous system is extremely sympathetic for radiations,(22).

The outcomes of the current study coincided with the studies got by a team of authors who practiced the fractional CO_2 to estimate its efficacy in the treatment of (vulvovaginal atrophy) in postmenopausal women,(23). They revealed that this was conceivable and triggered a meaningful advancement in the symptoms via enhancing vaginal health, with no complexities or side impacts on the ability of gestation & parturition,(23). This endures at normal values. Another team used the likewise laser to disperse the (uretic stone) at the 24–35 weeks of gestation without any complexity, (24).

Conclusions

There are comparatively several contraindications for LLLT application and several of them are dependent preferably than absolute. A higher of clinical experience and accurate patient preference when considering LLLT should be minimize the hazards.

Throughout this system, various wavelengths and outputs of LLL are connected directly to the targeted area. The tissue then absorbs the beam light. Red and near-infrared light cause a reaction, furthermore the damaged cells react with a physiological response that encourages regeneration.

Surface tissue is regularly treated with wavelengths between (600-700) nm while for deeper penetration tissues; wavelengths between (780-950) nm are practiced.

Low-Level Laser Therapy for fertility is an innovative clinical practice. This technique is powerful, painless, safe, and non-invasive. This technology is principally exciting for those women who have

venerable maternal age including poor ovarian function and uterine lining problems.

Bibliography

1. Ihsan, F.R. Mohammed , Nuha, S. Al- Mustawfi & Mohammed, S. AL – Iedani, (2016) Laser Diode Enhances Autologous Cartilage Graft's Expansibility, Al – Kindy Col. Med. J. Vol. 12, No. 12 . Pp; 118 – 121**.**
2. Zahara AT (2018) Clinical Evaluation of Scalpel Er: YAG Laser 2940nm and Conventional Surgery Incisions Wound After Oral Soft Tissue Biopsy, Bangladesh Med Res Counc Bull ; 43: 149.
3. Agostinis P, Berg K, Cengel KA, et al. (2011) Photodynamic therapy of cancer: An update, CA Cancer J Clin ; 61: 250–281.
4. Houssein HAA, Jaafar MS, Ali Z, et al. (2011) Study of Hematocrit in Relation with Age and Gender Using Low Power Helium - Neon Laser Irradiation, IFMBE Proceedings; 463–466.
5. Freshney I (2001) Application of cell cultures to toxicology, Cell Biol Toxicol ; 17: 213–230.
6. Medrado AR a P, Pugliese LS, Reis SR a, et al. (2003) Influence of low level laser therapy on wound healing and its biological action upon myofibroblasts, Lasers Surg Med ; 32: 239–244.
7. Freudiger, C. W., Min, W., Saar, B. G., Lu, S., Holtom, G. R., He, C. & Xie, X. S. (2008). Label-free biomedical imaging with high sensitivity by stimulated Raman scattering microscopy. Science, 322(5909), 1857-1861.
8. Wei L, Hu F, Shen Y, et al. (2014) Live-cell imaging of alkyne-tagged small biomolecules by stimulated Raman scattering. Nat Methods ;11: 410–412.
9. Sasaki K, Ohshiro T, Fujii S, et al. (2007) Case report: Lllt for interstitial cystitis using an 830 NM gaalas diode laser. Laser Ther ; 16: 219–223.
10. Anders JJ, Lanzafame RJ, Arany PR (2015) Low-Level Light/Laser Therapy Versus Photobiomodulation Therapy. Photomed Laser Surg ; 33: 183–184.
11. Al Timimi Z, Jaafar MSM, Zubir M, et al. (2011) Photodynamic therapy and Green Laser blood Therapy. Glob J Med Res ; 11: 22–28.
12. Zahra'a A-T (2014) Assessment of the impacts of 830 nm Low Power Laser on Triiodothyronine (T3), Thyroxine (T4) and the Thyroid Stimulating Hormone (TSH) in the Rabbits. J Med Sci Clin Res ; 2: 2902–2910.
13. Martelli FS, Fanti E, Rosati C, et al. (2016) Long-term efficacy of microbiology-driven periodontal laser-assisted therapy. Eur J Clin Microbiol Infect Dis ; 35: 423–431.
14. Vladimirovich Moskvin S, Ivanovich Apolikhin O (2018) Effectiveness of low level laser therapy for treating male infertility. BioMedicine ; 8:7.
15. Jassim Mohammed Al Timimi Z, Saleem Ismail Alhabeel M (2019) Laser Dental Treatment Techniques, Prevention, Detection and Management of Oral Cancer. IntechOpen ; 1–16.
16. Orzack SH, Stubblefield JW, Akmaev VR, et al. (2015) The human sex ratio from conception to birth. Proc Natl Acad Sci ; 112: E2102–E2111.
17. Thogerson CM, Brady CM, Howard RD, et al. (2013) Winning the Genetic Lottery: Biasing Birth Sex Ratio Results in More Grandchildren. PLoS One ; 8: e67867.
18. Elgazzar AH, Kazem N (2015) Biological Effects of Ionizing Radiation, The Pathophysiologic Basis of Nuclear Medicine, Cham . Springer International Publishing ; 715–726.
19. Begg AC, Stewart FA, Vens C (2011) Strategies to improve radiotherapy with targeted drugs.Nat Rev Cancer ; 11: 239–253.

20. Mohammed IFR, Kaka LN (2007) Promotion of Regenerative Processes in Injured Peripheral Nerve Induced by Low-Level Laser Therapy. Photomed Laser Surg ; 25: 107–111.

21. Azzam EI, Jay-Gerin J-P, Pain D (2012) Ionizing radiation-induced metabolic oxidative stress and prolonged cell injury. Cancer Lett ; 327: 48–60.

22. Valentin J (2003) Biological effects after prenatal irradiation (embryo and fetus). Ann ICRP ; 33: 1–206.

23. Pieralli A, Fallani MG, Becorpi A, et al. (2016) Fractional CO_2 laser for vulvovaginal atrophy (VVA) dyspareunia relief in breast cancer survivors. Arch Gynecol Obstet ; 294: 841–846.

24. Eder SE (2018) Early effect of fractional CO2 laser treatment in Post-menopausal women with vaginal atrophy. LASER Ther ; 27: 41–47.