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RESEARCH ARTICLE

Evaluation of the effects of low-intensity laser radiation in treatment of chronic salpingo-oophoritis in women

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ABSTRACT

Background: The paper presents the data of an evaluation of low-intensity infrared laser radiation in the treatment of women with chronic salpingo-oophoritis (CSO). **Aims and Objective:** The research was aimed to determine effects of low-intensity laser radiation (LILR) in the treatment of CSO in women based on individual sensitivity, interleukin (IL) blood levels, and clinical success rates of the treatment. The research object included 74 women of reproductive age. **Materials and Methods:** The evaluation of the treatment was performed based on a study of blood serum individual sensitivity to a selected mode of laser radiation, blood cytokine levels (IL - 1β, 4, 6), and clinical success rates of the treatment. **Results:** The effects of LILR in women with CSO are aimed at inhibiting the production of inflammatory mediators following the activation of quantum absorption and generation of secondary radiations and a bio-energetic resonance. **Conclusion:** Women's body being highly sensitive to infrared laser radiation substantially increases clinical success rates of the treatment compared to the treatment without laser therapy (pain relief, reducing a number of disease recurrences, reducing obstruction of the fallopian tubes).

KEY WORDS: Chronic Salpingo-oophoritis; Low-intensity Laser Radiation; Cytokines; Interleukins

INTRODUCTION

Chronic salpingo-oophoritis (CSO) is one of the most common chronic inflammatory diseases of the uterine appendages. Due to its unexpressed clinical manifestations, longer duration, frequent recurrences, complications, such as adhesive processes in the small pelvis, defects of the body's immunological responsiveness, it is hard to evaluate the treatment for CSO and make a prognosis for the disease.[1-7]

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Besides obstruction, manifestations of an inflammatory damage of the fallopian tubes also include mechanisms of the ciliary secretory and muscle activity, which can eventually lead to tubal factor infertility or ectopic pregnancy.[8-10] A anti-inflammatory drug therapy has remained the main method of the treatment, mostly aimed at bacterial flora than damaged tissue structures.[11]

The use of preformed physical factors is reasonably considered a leading measure among the complex of pathogenetic therapeutic measures against chronic inflammation of the uterine appendages. The laser therapy, in particular low-intensity laser radiation (LILR), has become widely used among other physical factors of the treatment.[12] LILR has an anti-inflammatory effect, improves metabolic processes, enhances tissue regeneration, reduces sensitization, has immunomodulating properties,[13-15] which allows to consider LILR a reasonable method against CSO. At the same time,

an objective evaluation of irradiation results, insufficiently explored in CSO treatment, is considered essential in LILR therapy.[16,17]

MATERIALS AND METHODS

The research object included 74 women of reproductive age divided into two groups based on the treatment methods: 40 women with CSO received the drug therapy (Group I) and 34 women with CSO received the drug and magneto-laser therapy (Group II). A diagnosis in women with CSO was verified based on general clinical data, an ultrasound study of the pelvic organs, and hysterosalpingography.

The laser therapy was performed using semiconductor low-intensity infrared laser equipment Mustang-2000 with a magnetic nozzle of 50 mT. The laser therapy technique is contact, stable in projection zones of the uterine appendages and the uterus on the anterior abdominal wall, as well as in acupoints in the lumbosacral region. Radiation head LO2, pulse repetition rate - 80 Hz in sessions 1-2 and 9-10, 1,500 Hz in other sessions (3-8), pulse strength was 6-8 W, dose density was 200-240 mJ/cm^2, moderate compression of soft tissues with an exposure to the area of the uterus and uterine appendages - 128 s per zone, in acupoints - 30 s per point.[18-20]

The drug therapy was made according to clinical pathways to treat inflammatory diseases in the uterine appendages including the prescription of broad-spectrum antibiotics and antifungal drugs.

The research methods included defining blood serum (BS) individual sensitivity to laser radiation according to the method by Davydova et al.;[17] defining interleukin (IL) levels - 1β, 4, 6 in BS, using the enzyme immunoassay method, with Multiskan analyzer and sets produced by VECTOR-BEST (Russia). Clinical success rates of the treatment included pain relief, disease recurrences, and complications. Statistical processing of the data was performed with Statistika-6.0 software.

RESULTS

The first stage of the research was aimed at determining the sensitivity to laser radiation in women from Group II. *In vitro* BS tests have shown in Table 1 that by the end of the radiation exposure the patients demonstrate a significant increase in optical parameters compared to the values of the pre-exposure period. Thus, the BS refractive index significantly increases ($P < 0.01$), and consequently, the surface of optically active structures increases up to 75.0 ± 6.5% ($P < 0.01$).

A change to the index of BS optical density upward by more than 30% was regarded high sensitivity, 15-29% - satisfactory and <15% - low sensitivity. As far as this index is concerned, 21 women (61.7%) demonstrated high sensitivity to laser exposure, 11 women (33.3%) demonstrated satisfactory sensitivity, and 2 women (5%) demonstrated low sensitivity.

Table 1: Optical indexes of BS sensitivity to LILR in women with CSO (Group II)

Analyzed research periods	Statistical parameters	Analyzed indexes	
		BS optical density, U	Surface of optically active structures in BS, %
Pre-exposure period, (*n*=34)	M±m	1.133±0.004	41.6±6.9
Post-exposure period, (*n*=34)	M±m	1.346±0.005	75.0±6.5
	P_{2-1}	<0.01	<0.01

CSO: Chronic salpingo-oophoritis, BS: Blood serum, LILR: Low-intensity laser radiation

As far as the values of the cytokine system (IL) are concerned, at the treatment end, there was the following picture (Table 2), so, in this period in Group I, women had a significant decrease in IL-6 blood levels compared to the pre-treatment time, while IL-1β and IL-4 blood levels did have significant changes ($P > 0.05$). In this period, in Group II, women had a significant decrease in IL-1β, IL-6 levels in comparison with both the pre-treatment time ($P < 0.01$), and the data from women in Group I ($P < 0.05$) while IL-4 value did not have significant changes ($P > 0.05$).

Clinical success rates for women with CSO also differed significantly depending on the therapy methods (Table 3). Thus, in Group I, pain relief occurred in 52.5% cases, while in Group II, it occurred in 88.24% cases. Accordingly, minor abdominal and back pains occurred in 47.5% and 11.76% of cases, respectively. Within a year, the disease recurred more often in Group I (27.5%), whereas in Group II, it recurred in 14.7%. No complications, such as obstruction of the fallopian tubes, amounted respectively to 75.5 and 97.1%. Partial obstruction of one or both fallopian tubes was observed in 17.5% women in Group I and 2.9% in Group II. Fallopian tube obstruction was observed in 7.5% of cases in Group I, but such cases were not registered in Group II.

DISCUSSION

The research has shown that selected exposure modes of LILR in women with CSO are adjusted and dosed, suggesting obvious pathogenetic effects of infrared radiation. On the other hand, need to determine the individual sensitivity to LILR depends on the fact that with the increased and prolonged exposure to this radiation the development of the compensatory-adaptive reactions may change for the negative effect on cell structures.

Table 2: Values of BS IL levels in women with CSO, depending on treatment methods

Analyzed groups and periods of research	Statistical parameters	Analyzed indexes		
		IL-1β, pg/ml	IL-6, pg/ml	IL-4, pg/ml
Pre-treatment period (*n*=74)	M±m	3.23±0.22	4.31±0.26	1.46±0.134
Group I in the period of the treatment end (*n*=40)	M±m	3.00±0.180	3.20±0.261	1.48±0.134
	P_{2-1}	>0.05	<0.05	>0.05
Group II in the period of the treatment end (*n*=34)	M±m	2.10±0.160	2.60±0.250	1.52±0.121
	P_{3-1}	<0.01	<0.01	>0.05
	P_{3-2}	<0.05	<0.05	>0.05

BS: Blood serum, IL: Interleukin, CSO: Chronic salpingo-oophoritis

Table 3: Clinical success rates for treatment of women with CSO

Rates	Analyzed groups	
	Group I, (*n*=40)	Group II, (*n*=34)
	Abs. (%)	Abs. (%)
Pain relief		
No pain	21 (52.50)	30 (88.24)
Minor pain	19 (47.50)	4 (11.76)
Severe pain	-	-
Disease recurrences		
No	29 (72.50)	29 (85.29)
Single	10 (25.00)	5 (14.71)
Two or more recurrences	1 (2.50)	-
Complications		
No	30 (75.00)	33 (97.06)
Partial obstruction of the fallopian tubes	7 (17.50)	1 (2.94)
Obstruction of the fallopian tubes	3 (7.50)	-

CSO: Chronic salpingo-oophoritis

The efficiency of LILR therapy in women with CSO is also confirmed by the results of changing dynamics of cytokine inflammatory mediator levels in blood, namely, a more marked decrease in levels of proinflammatory IL-1β, 6 in Group II than in Group I. The activation of the cytokine system is related to mechanisms that cause an inflammation process in the uterine appendages. These mechanisms include prolonged tissue hypoxia, impaired microcirculation, autoimmune processes, and activation of inflammation cellular effects.

Finally, the use of LILR in the treatment of CSO in women leads to a more favorable outcome of the disease such as the reduced number of disease recurrences and complications compared to traditional medication treatment.

CONCLUSION

The use of LILR in the treatment of CSO appears to be a factor that affects the cellular mechanisms of inflammation and allows to influence aggressive factors in the case of inflammation, hypoergosis of cellular elements, and hence, total tissue hypoxia due to enzymes more actively absorbing LILR quanta and due to generation of secondary radiations and an appearance of the bioenergetic resonance and spectrum memory of liquid media.

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