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Research Article

Effect of Laparoscopic Ovarian Cauterization on Zn, Fe and Mg Serum Level in PCO's Patient

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Abstract

Background: Many researches have been performed on the serum trace element in the PCOS (Polycystic Ovary Syndrome) women till now. Due to the fact that second line of treatment of infertility in PCOS is LOC (laparoscopic ovarian cauterization), it was mined that LOC may improve infertility through changing serum trace elements like; Fe, Zn and Mg.

Methods: This is a comparative before-and-after study that was done in case and control groups. Control group includes 30 women with unexplained infertility that diagnostic laparoscopy was done for them. Case group includes 30 PCOS women with infertility not responded to medication that laparoscopic ovarian cauterization was done for them. Before operation in both groups, serum Fe, Mg and Zn were measured and 3 months after operation were rechecked.

Results: The findings clarify that serum Fe level is higher in case group before LOC and reveals a significant decrease in case group before-and-after LOC ($P<0.001$). Serum Mg level is not significantly different between two groups at baseline and after LOC ($P>0.05$). Serum Zn level in case group is lower than control group ($p=0.032$) and reveals a significant increase in serum Zn level before-and-after LOC in case group ($p=0.002$).

Conclusion: Serum Fe levels are higher in women with PCOS that after LOC decreased. serum Mg level is not significantly different between two groups at baseline and after LOC. serum Zn level in case group is lower than control group and a significant increase occurs in serum Zn level after-LOC in case group.

Keywords: PCOS, LOC, Fe, Mg, Zn

Introduction

PCOS is conceivably one of the most usual endocrine disorders in women of reproductive age, affecting 5% to 10% of women worldwide. This familial disorder appears to be inherited as a complex genetic trait [1]. It is determined by a coalition of hyperandrogenism (either clinical or biochemical), chronic anovulation, and polycystic ovaries, and is mostly attached with insulin resistance and obesity [2].

PCOS receives great attention because of its high propagation and possible reproductive, metabolic, and cardiovascular consequences. It is the most prevalent reason of anovulatory infertility, hyperandrogenism and hirsutism in developed countries [3,4].

Ismail Guler, et al. (2014) assessed the rate of serum zinc levels as an etiologic and prognostic factor in patients with polycystic ovarian syndrome by insulin resistance [5]. They selected 53 Women with polycystic ovarian syndrome including insulin resistance and 33 healthy controls and checked serum zinc levels. They considered that mean zinc levels is meaningfully lower in patients with polycystic ovarian syndrome than healthy controls.

Insulin resistance has been recommended to be one of the key underlying mechanisms of PCOS that leads to chronic hyper insulinemia which results in abnormal ovarian androgen metabolism, impairs follicle growth, and alters gonadotropin retort. Molecular and cellular researches have established numerous roles of zinc in insulin synthesis, secretion, and signaling and the resulting actions of insulin on metabolism. It has been described that insulin resistance was related to diminish insulin-

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mediated glucose transport, advising a post-receptor defect. The genetic abnormalities in the adjustment of insulin recipient phosphorylation cause an increased insulin-independent serine phosphorylation and decreased insulin-dependent tyrosine phosphorylation, leading to diminished insulin allergy and compensatory hyperinsulinemia in PCOS. Zinc has a regulatory impress in phosphorylation signaling of insulin, which is alike to post-binding defect in insulin action that is characteristic of PCOS [5].

Ozkaya, et al. (2010) in Suleyman Demirel University, Isparta, Turkey appraised the effects of multivitamin and mineral supplementation on Lipid Peroxidation (LP), reduced Glutathione (GSH), Glutathione Peroxidase (GSH-Px), vitamin A, vitamin C and vitamin E contents in serum and follicular liquid. A series 56 paired Follicular Fluid (FF) and serum samples of patients (aged 28.8±3.2 years) were gotten from women who underwent IVF (in vitro fertilization). They used three groups in their study in which, the first group was the control group (n = 13) and they received placebo (candy) and, the second group (n = 30) constituted the IVF group and they also got the placebo. In addition, the third group (n = 26) consumed oral multivitamin and mineral tablets daily for 45 days before serum and FF collection. They realized that LP (lipid peroxidation) levels in serum and FF of patients undergoing in IVF were increased. Serum vitamins A and C and GSH-Px values in FF diminished. 45 days of multivitamin and mineral supplementation resulted in a reduction in FF and serum LP levels but serum GSH, vitamins C and E doping, and GSH-Px and vitamin C doping in FF were amplified by the supplementations. Ovulation is one of the most exhibitive and impellent events in the reproductive process. The contribution of free radicals in female infertility is less identified. It has been proposed that oxidative stress might disport a role in infertility. Responsive Oxygen Species (ROS) are shaped within follicle, especially during the ovulatory procedure.

The inordinate production of ROS and oxidative stress may result in an increased risk of poor oocyte quality. ROS leads to damage of DNA or other momentous structures such as proteins and cell membranes. Dissociation of the follicular wall through ovulation can be modeled as a short inflammatory manner. An increment in various substances in the follicle near the time of ovulation can enforce oxidative stress.

These free radical generating agents contain histamine, bradykinim, angiotensin, Prostaglandins (PG), eicosanoids, proteolytic enzymes, nitric oxide, and superoxide. Diminished levels of glutathione peroxidase (GSH-Px) are described in the Follicular liquid (FF) of women with unexplained infertility. There is also indication to advise that antioxidant vitamins and enzymes in FF act on the ovary to modify its function [6].

According to the literature we excavated that LOC may improve infertility through the alteration serum trace elements like; Fe, Zn and Mg. in the present study we intend to appraise the effect of LOC on Zn, Fe and Mg serum level in PCO's patient.

Methods

This is a comparative before-and-after study which appraises the effect of laparoscopic ovarian cauterization on Zn, Fe and Mg serum level in PCO's patient. This study was done in case and control groups. The patients were selected in mother and Child Hospital outpatient clinic of gynecology and Motahari clinic of gynecology affiliated to Shiraz University of medical science between April and September 2016. Control group includes women in the age range of 18-35 years old with unexplained infertility that diagnostic laparoscopy was done for them. Case group includes PCOS women in the age range of 18-35 years old with infertility not responded to medication that laparoscopic ovarian cauterization was done for them. 30 patients with unexplained infertility and 30 PCOS infertile patients were selected that candidate for laparoscopic ovarian cauterization. Diagnosis of PCOS is made by criteria of androgen excess (Rotterdam) and PCOS society (AE-PCOS).

Rotterdam criteria

1. Oligoovulation or anovulation
2. Clinical and/or biochemical signs of hyperandrogenism
3. Polycystic ovaries and exclusion of other etiologies (congenital adrenal hyperplasia, androgen-secreting tumors, Cushing's syndrome)

In both groups before operation, serum Fe, Mg, Zn was measured by calorimetry and then, 3 months after operation was rechecked. Results in both groups, before and after laparoscopy (diagnostic in control group and laparoscopic ovarian cauterization in case group) were compared. Also in case group, we measured FBS, AMH, LH, FSH, Free Testosterone, BMI, and correlation between these factors and serum Fe, Mg, Zn was calculated. Further, BMI in control groups (body mass index) was calculated. The patients, who become pregnant and don't do blood test after operation, were excluded. Statistical analyses were done by using Spss 21 software program. We used paired test, and independent t-test to compare the mean of continuous variable between two groups. Correlation coefficients were calculated using Pearson's correlation test. We required Kolmogorov-Smirnov test for assessing normality.

Results

Effect of laparoscopic ovarian cauterization on Zn, Fe and Mg serum level in PCO's patient Statistical Analysis:

Statistical analyses were done by using spss 21 software program. We used paired test, and independent t-test to compare the, man of continuous variables between two groups. Correlation coefficients calculated using Pearson's correlation test. We required Kolmogorov-Smirnov test for assessing normality (Tables 1-5).

Discussion

Mean of BMI was significantly higher in case group than control group. The same results were drawn by Farnaz Sohrabvand, et al. [7]. Evaluation of variations of serum Fe level in each group revealed a significant decrease in case group and

	Case Mean ISD	Control Mean ISD	t-value (df)	p-value
Age	28.4 ± 3.87	28.67 ± 4.11	.258 (58)	.797
BMI	25.12 ± 1.8	24.06 ± 1.99	2.163 (58)	.035

The results of Independent t-test for comparing age and BMI of patients between two groups are presented in Table 1.
The table shows that the mean age of patients is not significant between groups, but the mean of BMI is significantly higher is case than control group (p = 0.035).

Table 1: Demographic characteristics of two groups.

	Case Mean ISD	Control Mean ISD	t-value* (df)	P-value
Before OP	100.43 ± 31.44	73.47 ± 31.27	3.33 (58)	0.02
After OP	61.27 ± 21.08	72.33 ± 31.04	-1.615(58)	0.11
t-valuet (df) **	9.5(29)	1.64 (29)		
P-value	0.000 (< 0.001)	0.11		

*Independent t-test between two groups.
**Paired t-test within each group.
The results of independent t-test and paired t-test for comparing the mean of serum Fe level between and within two groups have been shown in Table 2. The table shows that serum Fe level is significantly different between two groups at baseline (before- LOC: p=0.02) and it is higher in case group before LOC. It is not significantly different in case and control group after Loc. (p = 0.11). Evaluation of variations of serum Fe level in each group by paired test reveals a significant decrease in case group before and after LOC (P < 0.001) and it is not significant difference in control group (P = 0.025) from before to after.

Table 2: The evaluation of the serum Fe level between and within groups.

	Case Mean ISD	Control Mean ISD	t-value (df)*	P-value
Before OP	2.34 ± 0.18	2.29 ± 0.17	1.04 (58)	0.303
After OP	2.31 ± 0.17	9.86 ± 23.35	1.77 (58)	0.082
t-valuet (df)**	0.713 (29)	1.77 (29)		
P-value	0.482	0.087		

*Independent t-test between two groups
**Paired t-test within each group
The results of independent t-test and paired t-test for comparing the mean of serum Mg level between and within two groups have been shown in Table 3.
The table shows that serum Mg level is not significantly different between two groups at baseline and after LOC (P > 0.05). Evaluation of variations of serum Mg level from before LOC to after-LOC does not show significant differences in each group (P > 0.05).

Table 3: The evaluation of the serum MG level between and within groups.

	Case Mean ISD	Control Mean ISD	t-value (df)*	P-value
Before OP	78.27 ± 19.48	88.43 ± 16.20	-2.198 (58)	0.032
After OP	88.63 ± 15.09	86.53 ± 10.68	0.622 (58)	0.536
t-valuet (df)**	-3.39 (29)	0.836 (29)		
P-value	0.002	0.410		

*Independent t-test between two groups
**Paired t-test within each group
The results of independent t-test and paired t-test for comparing the mean of serum Zn level between and within two groups have been shown in Table 4.
The table shows that serum Zn level is significantly different between two groups at baseline. There is show that serum Zn level in case group is lower than control group (p = 0.032). After LOC serum Zn level is not significantly different between two groups (p > 0.05), but it reveals that there is a significant increase in serum Zn level from before-LOC to after-LOC in case group (p = 0.002).There is not a significant difference in control group from before to after LOC.

Table 4: The valuation of the serum Zn level between and within groups.

significant difference wasn't observed in control group from before to after ,that seems to be due to the correction of pattern of menstruations after LOC in case group. Similarly, Faranak Sharifi et al. [8] showed that serum ferritin levels increased in women with PCOS without considering their BMI, CRP and insulin resistance. This might be due to oligomenorrhea and less blood loss in this population.

About mg and Zn

Ismail Guler et al. [5] like us, concluded that the mean zinc levels were found to be significantly lower in patients with polycystic ovarian syndrome than healthy controls. Zinc deficiency may play a role in the pathogenesis of polycystic ovarian syndrome and may be related with its long-term metabolic complications. Pourteymour Fard Tabrizi, et al. [9] showed that Concentrations of the Zn, Cr and Mg serum were significantly lower in PCOS women compared to the healthy controls. The result in zinc serum

	FSH	LH	AMH	FBS	Free. Testosterone
Fe-before	r = 0.191 P = .144	r = 0.430** P = 0.001	r = 0.344** P = 0.007	r = 0.058 P = 660	r = 0.380** P = 0.003
Fe-after	r = 0.108 P = 0.412	r = -0.147 P = 0.261	r = -0.121 P = 0.355	r = -0.267* P = 0.039	r = -0.038 P = 0.770
Mg-before	r = -0.125 P = 0.342	r = 0.055 P = 0.676	r = 0.167 P = 0.201	r = 0.124 P = 0.345	r = 0.079 P = 0.548
Mg- after	r = 0.026 P = 0.843	r = -0.182 P = 0.163	r = -0.108 P = 0.409	r = -0.164 P = 0.210	r = -0.015 P = 0.908
Zn-before	r = -0.309* P= 0.016	r = -0.330* P = 0.010	r = -0.241 P = 0.064	r = -0.133 P = 0.312	r = -0.198 P = 0.130
Zn-after	r= -0.285* P= 0.027	r = -0.082 P = 0.532	r = -0.100 P = 0.445	r = 0.012 P = 0.930	r = 0.178 P = 0.174

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
r = Pearson's correlation coefficient
P= p-value
The results of Pearson's correlation test between Fe, Mg and Zn factors with FSH, LH, AMH, FBS and free-testosterone factors, in case group, have been presented in Table 5.
The table shows a significant correlation between Fe- before with LH, AMH, and Free testosterone, between Fe-after with FBS, and between Zn-before with FSH, LH factor and between Zn-after with FSH.

Table 5: Pearson's correlation test between two groups of factors in case group.

level is similar to ours. Also, their results for Mg serum level were different with our results that may be due to difference between age ranges, number of patients and measurement method. Their study was done on 50 PCOS women and 50 healthy subjects in which, serum concentrations of Zn, Cr and Mg were estimated by a flame atomic absorption spectrophotometer and the age range of 20-45 years.

Farnaz Sohrabvand, et al. [7] calculated Serum zinc level in infertile women with and without polycystic ovary syndrome. Unlike us, results did not show a significant difference between case group and control group for serum Zinc levels. The study was performed in 100 infertile women of age range 20-45 years. The difference may be due to laboratory errors and differences in sample size, age range.

Based on research about serum trace elements (such as Zinc, Copper, Iron, Chromium,...) concentrations in Patients with Type 2 diabetes mellitus, for example in Shiraz University [10], the results showed that the mean values of zinc, copper, and chromium were significantly lower in the serum of patients with diabetes as compared to the control subjects. Also, deficiency of some essential trace elements may play a role in the development of diabetes mellitus. Their result in zinc serum level is similar to ours in PCOS women before LOC. One of the limitations of this study is that lab was not done on a particular day of the menstrual cycle besides; statuses fasting of patients were not considered. We recommend broader study with more number of patients, calculation of homa index, measurement of trace serum level on a particular day of the menstrual cycle and the same fasting state.

Conclusion

According to this research, it sees that LOC may change serum trace element level, i.e. Fe, Mg and Zn in PCO patients that further investigation is needed to prove the effect of serum trace element on infertility.

References

1. Alexander EK, Marqusee E, Lawrence J, et al. Timing and magnitude of

increases in levothyroxine requirements during pregnancy in women with hypothyroidism. *N Engl J Med*. 2004;351(3):241-249.

2. Klein RZ, Sargent JD, Larsen PR, et al. Relation of severity of maternal hypothyroidism to cognitive development of offspring. *J Med Screen*. 2001;8(1):18-20.
3. Zakarija M, Garcia A, McKenzie JM. Studies on multiple thyroid cell membrane-directed antibodies in Graves' disease. *J Clin Invest*. 1985;76(5):1885-1891.
4. Zakarija M, McKenzie JM. Thyroid-stimulating antibody (TSAb) of Graves' disease. *Life Sci*. 1983;32(1-2):31-44.
5. Ismail G, Ozdemir H, Ahmet T, et al. Zinc and Homocysteine Levels in Polycystic Ovarian Syndrome Patients with Insulin Resistance. *Biol Trace Elem Res*. 2014;158(3):297-304.
6. Ozkaya MO, Nazıroglu M. Multivitamin and mineral supplementation modulates oxidative stress and antioxidant vitamin levels in serum and follicular fluid of women undergoing in vitro fertilization. *Fertil Steril*. 2010;94(6):2465-2466.
7. Sohrabvand F, Shirazi M, Shariat M, et al. Serum zinc level in infertile women with and without polycystic ovary syndrome. *Tehran Univ Med*. 2013;71(3):157-163.
8. Sharifi F, Mazloomi S, Mousavinasab N. High Serum Ferritin Concentrations in Polycystic Ovary Syndrome Is Not Related to Insulin Resistance. *IJDO*. 2011;3(2):47-53.
9. Pourteymour Fard Tabrizi F, Sadaghiani M, Alipoor B, et al. Minerals status in women with polycystic ovary syndrome. 3rd congress on trace elements, Kashan. 2012
10. Basaki M, Saeb M, Nazifi S, et al. Zinc, copper, iron, and chromium concentrations in young patients with type 2 diabetes mellitus. *Biol Trace Elem Res*. 2012;148(2):161-164.