Correlation between Mg and some hormones in polycystic ovary syndrome patients

Al– Kotobe MF, Abeer A. Al – Hadidy, Dept. of. Physiology – Tikrit university / college of Medicine

Abstract:

Infertility is one of the important medical problem in our society. Female infertility has many causes, one of these is due to increase in androgens level specially in women with polycystic ovary syndrome. The study has been done in the infertile center at AL- Batool hospital in Mosul and public health laboratory in Mosul from November 2002 to March 2003. Seventy infertile women with thirty normal women as control. All the studied women are residents in mosul and the surrounding areas, they were from different age groups. Nearly all infertile women have shown the same symptoms, like hair growth in the face, harsh voice irregular menstrual cycle with high Testosterone, LH level, no changes in FSH of patients with PCOS. Our study demonstrates that POCS patients have lower Mg level than control with highly negative correlation with Testosterone and LH, by minividas technique.

Introduction

Magnesium is the fourth most abundant cation in the body **(1)** and the second most abundant intracellular cation after Potassium **(2).** Mg is a critical cation and cofactor in numerous intracellular processes **(3),** an important membrane stability agent, required for structural integrity of numerous intracellular proteins and nucleic acids**(1,2),** substrate or cofactor for important enzyme such as adenosine triphosphatase, guanosine triphosphatase, adenylate cyclase and guanylate cyclase, required cofactor for the activity of over three hundred other enzyme **(3),** a regulator of ion channels, an important intracellular signaling molecule and a modulator of oxidative phasphorylation **(4).** Mg is intimately involved in nerve conduction, muscle contraction **(3),** potassium transport, and calcium channels.

Polycystic ovary syndrome (PCOS) is one of the most common hormonal disorder in women of reproductive age **(5,6,7,8)** affecting up to 10% of population **(9).** The exact cause of PCOS is unknown **(10)** certainly a miscommunication occurs among the hypothalamus, pituitary gland, ovaries and fatty tissues (11,12). PCOS associated with infertility, insulin resistance **and** obesity **(7,8) .** Women with PCOS are known to have high incidence of hypertension and cardiovascular diseases **(5).**

The aim of this study is to evaluate the relation of Mg with Testosterone FSH and LH in Poly cystic ovary syndrome patients .

patients and methods

The material of this study consisted of a total number of (70) married women in the reproductive age. Their age ranged between 18 to 45 years. The women included in this study were classified in two groups as follows:

Thirty women were healthy, married and fertile, They were taken from normal women accompanying the infertile patients attending the infertility unit. This group served as a control. Complete history and clinical examination were carried out according to special form designed for this purpose. Fourty women were included in this study complaining of infertility with PCOS as group two.

All the women included in this study attending the infertility unit at AL- Batool hospital and the public health laboratory in Mosul from November 2002 to of March 2003.

The patients were examined first by a gynecologist who conducted a clinical examination to rule out any abnormality and to refer suitable patients for this study.

The serum levels of testosterone, FSH, LH, and Magnesium were determined. The blood samples were drawn in the follicular phase from day 2 to day 8 of the menstrual cycle, at

9.00 – 12.00 am. The hormones (Testosterone, FSH, LH) assay by minividas. The serum level of Mg was determined by the colorimetric method.

Results

During the period of the study a total of 70 women attending from different areas to the center of infertility unit of AL- Batool hospital and public health laboratory in Mosul from November 2002 to March 2003.

The patients were divided into two groups, one have hypertestosteronemia with PCOS and they are compare with normal health as control as shown in Table **(1).**

The level of serum Testosterone . in group 2 hypertestosteronemia with PCOS is 1,79 + 0.12 ng/ml is significant higher than control (0.5 + 0.02) ng/ml ($p < 0.05$) .

While the value of FSH show no significant differences in both groups.

The value of LH in group 2 is (8.99 + 0.35) mlU/ml and it is significant higher than control group1 4.22 + 0.15 mlU/ml ($p< 0.05$), while the value of Mg in (PCOS) is (0.94 + 0.009) mmol/l, it is significant lower than control (0.99 + 0.01) mmol/l ($p<0.05$) as shown in table **(1).**

Also the correlation between Mg and testosterone in patients is highly negative ($P <0.0001$) $r = - 0.835$.

While the correlation between Mg and LH is negative significant relationship ($r= - 0.657$) ($P <0.001$).

Discussion

Testosterone level is increasing significantly high in groups of women with (hypertestosteronemia women with PCOS). This finding is in agreement with the finding of previous study **(13)** shows that women with PCOS have raised serum Testosterone and LH concentrations and enlarged ovaries **(14),** also find that PCOS women have higher serum level of free Testosterone and this level is usually no more than twice the upper normal range.

Increasing of Testosterone level associated with normal LH, ovarian over production of androgens **(14),** and at a base line women with PCOS had higher LH pulse response to GnRH, this higher LH lead to hyperplasia of the theca cells and increased androgens production **(16).** On the other hand hyperandrogenemia in PCOS associated with hyperinsulinemia and insulin resistance together with increase LH **(9,17)** . There are many studies indicating that androgens can induce hyperinsulinemia, however most of the evidence supports hyperinsulinemia as primary factor, thus any disorder in insulin action precedes the increase in androgens by binding to IGF-I receptors in the ovary **(15,16,17),** activation of these receptors by insulin can lead to increased androgen productin by theca cells. Moreover increased insulin inhibits the hepatic synthesis of SHBG (18). Insulin directly inhibits (IGFBP-I) in the liver, permitting greater local activity of IGF-I in the ovary. Therefore, insulin and LH appear to be key hormones in stimulation of androgens **(7)**.

Nestler et al **(19)** found that insulin is augment LH-induced testosterone production by human ovarian thecal cells. Eagleson et al **(20)** found the relative roles of hyperinsulinemia and LH stimulation on the etiology of the abnormalities of ovarian steroidgenesis and excess androgen production .There is no significant difference between FSH in control group and other. This finding in agreement with Yen**(21)** .They found that the serum FSH, prolactin, endomaterial thickness were not different from these of control group .LH level is increased significantly in group2, this could be attributed to the low levels of SHBG, that probably facilitate tissue uptake of free adrogens leading to oestrone **(15),** the oestrone positive feedback on the central nervous system-hypothalamic-pituitary unit induce in appropriate gonadotropin secretion .The estrogen stimulate GnRH synthesis and in the hypothalamus causing preferrntial LH release by the pituitary gland, this estrogen may also increase GnRH by decreasing hypothalamic dopamine, the increased in LH secretion stimulates thecal cells to produce excess androgens**(15)**.

Mg in group2 is decreased significantly . this may be due to hyperinsulinemia, Insulin resistance, available research suggests an associated between decreasing Mg and insulin resistance **(22),** this decrease in Mg is related with insulin sensitivity in all subjects studied **(3,23).**

In present study the PCOS is associated with reduce in the level of Mg and high serum

contain of testosterone, LH with no change in FSH level .

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Table (1): the serum levels of testosterone, FSH, LH and Mg in the patients with PCOS and control group

Parameters	**Mean + SE**	
	Group1	**Group2**
Testosterone ng/ml	0.51 + 0.02 a	1.79 + 0.12 c
FSH miu/ml	5.20 + 0.16 a	5.66 + 0.23 a
LH µmol	4.22 + 0.15 a	8.99 + 0.35
Mg mM	0.99 + 0.01 a	0.94 + 0.009 b

Means with different letters horizontally has significant difference according to Duncan test at p 0.05.
Group1 : control
Group2 : hypertestosteronemia women with PCOS