

Relationship between Serum Estrogen, Magnesium and Body Mass Index In premature Ovarian Failure Women in Tikrit City/ Iraq .



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ABSTRACT

This study was conducted to evaluate serum estrogen, magnesium level and body mass index of 30 women with premature ovarian failure and 30 women as control group attended to emergency department/ Tikrit teaching hospital in Tikrit City. Their ages ranged between 40-48 years. The samples collection started from October /2012 till January /2013. The results showed that serum estrogen level of premature ovarian failure women was statistically significantly $P < 0.05$ lower than in control group. Also the mean serum magnesium in premature ovarian failure women was significantly lower than in normal group $p < 0.01$. This study showed that body mass index in patient women was significantly higher when compared with control group $p < 0.05$.

Introduction:

Premature ovarian failure refers to menopause that occurs before age 40 years, and early menopause refers to menopause that occurs at or before age 45 years, both ranges being well below the median age of natural menopause (age 51 years) (1,2). Premature ovarian failure or early menopause can be spontaneous or induced; if induced, it can be due to medical interventions such as chemotherapy or surgical interventions such as bilateral oophorectomy (3). While the hormonal milieu is quite different for women with spontaneous premature ovarian failure (4). Regardless of cause, women who experience estrogen deficiency at an age well before the median age of natural menopause are now recognized to be at increased risk for premature morbidity and mortality. The risk of adverse outcomes increases with earlier age at the time of menopause. Some of the adverse outcomes may be prevented by estrogen treatment initiated after the onset of menopause. Premature ovarian failure (POF), also now referred to as primary ovarian insufficiency (5) or primary ovarian dysfunction is a syndrome of amenorrhea (6).

Low sex steroid levels and elevated gonadotropin levels among women younger than age 40 years. POF is most frequently idiopathic but may also be due to autoimmune disorders, genetic causes, infections or inflammatory conditions (7, 8). Estrogen is a sex hormone that increases the rate that body tissues and bone absorb magnesium from the blood (9). As estrogen levels decrease as a woman ages the risk of osteoporosis and heart disease greatly increases (10, 11, 12). Magnesium is an essential nutrient mineral needed for healthy and functioning body. Estrogen deficiency may cause loss of tissues magnesium. During menopause estrogen levels are starting to decline which means magnesium levels are also dropping (13). Depleted estrogen levels can result in increased LDL and decreased HDL which may in turn lead to obesity and increase BMI (14).

The aim of this study is to evaluate the changes in serum estrogen, magnesium level and body mass index in premature ovarian failure women compared with normal women.

Materials and methods

Two groups of women were enrolled in this study. Group 1 consisted of 30 premature ovarian failure women which were previously diagnosed by physicians. Group 2 consisted of 30 control women. Their ages were ranged between (40–48) years. They attended the emergency department of Teaching Tikrit hospital in Tikrit city/Iraq. Blood samples were collected from both groups and centrifuged for 15 minutes at 3000

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rpm and the serum was separated and stored at 4°C for analysis.

Biochemical Assay:

1. **Determination of serum estrogen.:** Serum estrogen level was assayed according to the kit and device mini VIDAS (15).
2. **Magnesium level estimation.:** Serum magnesium level was assayed according to the kit and Heth & Khayam-Bashi method method (16).
3. **Body mass index:** Weight status was determined by using the body mass index (BMI) which can be obtained by dividing weight in Kilogram by height in meter squared (17) .

Statistical analysis:

The results were expressed as mean \pm SD. Students t-test was used to compare differences in means between 2 groups, P value less than ($p < 0.05$), ($p < 0.01$) is regarded as statistically significant (18) .

Results

Serum estrogen level was evaluated in premature ovarian failure woman and normal women. The serum estrogen in patients was significantly lower than that the control group ($p \leq 0.05$) which was (80.911 ± 10.375), (124.743 ± 6.403) pg/ml as shown in figure 1 .

Also results in figure 2 showed that the mean of serum magnesium value in patients women (0.96 ± 0.164) mmol/l was significantly lower than the .Control group ($p \leq 0.01$) which was (1.71 ± 0.175) mmol/l.

The body mass index was measured in this study , the result indicated that the mean of body mass index in patients groups was significantly higher than the control group ($p < 0.05$) which was(28.104 ± 1.231), (24.188 ± 1.855) kg/m² respectively, as showed in figure 3.

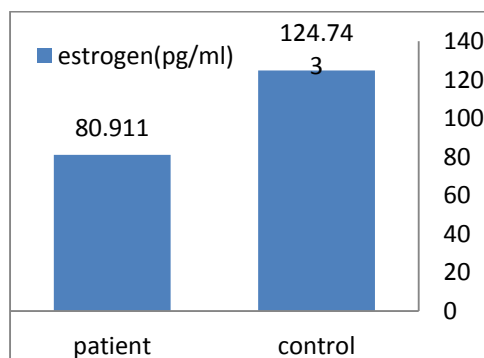


Figure (1): Estrogen level in premature Ovarian Failure Women and control.

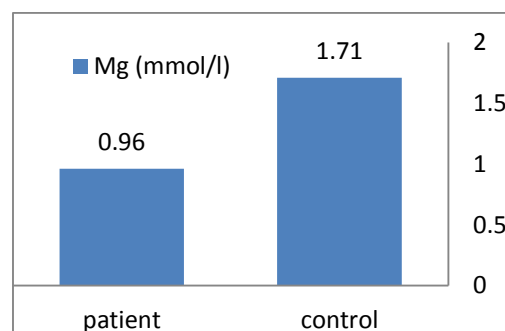


Figure (2): comparison of magnesium level between patients and control women.

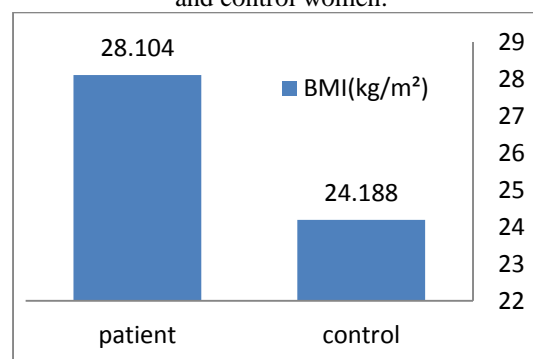


Figure (3): Body mass index level in premature Ovarian Failure and control women.

Discussion

Evidence suggests that most premature ovarian failure women have ovaries stopped to egg production and her body slowly starts gradual decreasing in making of the both hormones estrogen and progesterone (19,20).

As the ovaries become less function and produce less of this hormone accordance with(21). Young women with premature ovarian failure have estrogen deficiency for more years than do naturally menopausal women, thereby resulting in a significantly higher risk for bone loss and cardiovascular disease (22).

Menopause characteristic by low estrogen levels as ovaries stopped producing estrogen (8). estradiol concentrations were found to be significantly positive with HDL-cholesterol. This explains why the premenopausal women are more protected against atherosclerosis and coronary heart diseases . Estrogen exerts protective effects on the cardiovascular system, including total cholesterol- and low density lipoprotein (LDL) cholesterol- lowering (23).

It is impossible to consider estrogen and progesterone in isolation from other hormones and from precursors like cholesterol and magnesium all steroid hormones are created from cholesterol in a hormonal cascade cholesterol cannot be synthesized without magnesium and cholesterol is a vital component of hormones (24) .

Low level of estrogen in blood stream can lead to problem like weight gain, increase LDL and decrease HDL which may turn lead to obesity accordance with (25). An often overlook factor that may contribute to premature ovarian failure is Magnesium. Mg is responsible for many biochemical processes within the bone. Magnesium is essential for the conversion of vitamin D to its biologically active form (26). Estrogens enhancement of magnesium utilization and up take by soft tissues and bone may explain resistance of young women to heart disease and osteoporosis (27). Estrogen increases the rate that body tissues and bone absorbed magnesium from the blood (28).

Another factor that found to be associated with premature ovarian failure from this study is body mass index. Most studies of fertility and body mass index have focused on women's health. Those reporting public health have found that lower, or higher body mass index are significantly associated with infertility (29). As may be through an indirect regulation by sex hormone binding globulin (SHBG). As SHBG declines, free estradiol should increase. Therefore, in response to decreased SHBG, follicle-stimulating hormone levels may decrease to lower total estradiol production by the ovaries(30). Low estrogen levels that occur with menopause are associated with loss of subcutaneous fat and gain of visceral fat. As women approach menopause, their estradiol levels decrease. They then no longer have protection from abdominal weight gain (31). the present data revealed an inverse correlation between serum estradiol level and BMI(32).

Our study shows a significant relation between estrogen , magnesium levels and body mass index in premature Ovarian Failure Women .Amor studies may be needed involved many sites in our country with wide sample is necessary to provide basic answers for POF patient's question.

References.

1. North American Menopause Society. (2007). Menopause practice: A Clinician's Guide. 3rd. Cleveland, OH: North American Menopause Society;
2. Jacobsen, B.K., Heuch, I., and Kvale, G., (2003). Age at natural menopause and all-cause mortality: a 37-year follow-up of 19,731 Norwegian women. *Am J Epidemiol.* 157:923–929.
3. Rocca, W.A., Shuster, L.T., Grossardt, B.R., Maraganore, D.M., Gostout, B.S., and Geda, Y.E., (2009). Long-term effects of bilateral oophorectomy on brain aging: unanswered questions from the Mayo Clinic Cohort Study of Oophorectomy and Aging. *Women's Health (Lond Engl)* 5:39-48.
4. Nelson, L.M., (2009). Clinical practice. Primary ovarian insufficiency. *N Engl J Med.* 360:606–614.
5. Panay, N., and Kalu, E., (2009). Management of premature ovarian failure. *Best Pract Res Clin Obstet Gynaecol.* 23:129–140.
6. Santoro, N., (2003). Mechanisms of premature ovarian failure. *Ann Endocrinol* 64:87–92.
7. Alexander, E., and Knight, K., (2005). 100 Questions & Answers About Menopause. Sudbury, MA: Jones and Bartlett publisher.
8. Francis, S., Greenspan, MD., FACP David, G., and Gardner, MD., (2004). Basic and Clinical Endocrinology 7th. Edition P: 314-320.
9. Gallagher, JC., (2007). Effect of early menopause on bone mineral density and fractures. *Menopause.* 14:567–571.
10. Kalantaridou, SN., Naka , KK., Papanikolaou, E., Kazakos, N., Kravariti, M., and Calis, KA. (2004). Impaired endothelial function in young women with premature ovarian failure: normalization with hormone therapy. *J Clin Endocrinol Metab.* 89:3907–3913.
11. Atsma, F., Bartelink , ML., Grobbee, DE., and van der Schouw, YT., (2006). Postmenopausal status and early menopause as independent risk factors for cardiovascular disease: a meta-analysis. *Menopause.* 13:265–279.
12. "Journal of Reproductive Medicine";(2007). Menstrually Related Migraine: Breaking the Cycle in Your Clinical Practice; Silberstein & Goldberg;
13. Lokkegaard, E., Jovanovic, Z., Heitmann, B.L., Keiding, N., Ottesen, B., and Pedersen, A.T., (2006). The association between early menopause and risk of ischemic heart disease: influence of hormone therapy. *Maturitas.* 53:226–233.
14. HAMERS, N ., SMITZ, J. L., and HOIR, A., (2001). Interet des controles externes de la qualite dans le suivi des performances des trousses illustre par un exenple du immunoanal. *Biol.Spec* 16:419-422.
15. Young, D.S.,(1995). Effect of Drugs on clinical laboratory test, 4th Ed.p:3-410 to 3-414.
16. World health organization. (1995). physical status: report of a WHO expert conittee.world health Tech Rep Ser 854:1-452.
17. Snedecor, G.W., and Cochran, W.G., (1978). 6th ed. Statistical methods the IOWA STATE Univ. press. USA,
18. Nelson, LM. (2009). Clinical practice. Primary ovarian insufficiency. *N Engl J Med* 360:606.
19. Groff, AA, Covington, SN., Halverson LR, (2005). Assessing the emotional needs of women with spontaneous premature ovarian failure. *Fertil Steril* . 83:1734.
20. Beck-Peccoz P, Persani L (2006). "Premature ovarian failure". *Orphanet J Rare Dis* 1: 9.

- doi:10.1186/1750-1172-1-9. PMC 1502130. PMID 16722528
21. Archer, DF., (2009). Premature menopause increases cardiovascular risk. *Climacteric* 12 Suppl 1:26-31.
22. Parhami, F., Basseri, B., Hwang, J., Tintut, Y., Demer, LL., (2002). High-density lipoprotein regulates calcification of vascular cells. *Circ Res*, 91:570-576.
23. King, MW., (2002). Cholesterol and Bile Metabolism: Biosynthesis of Cholesterol, Regulation of Cholesterol Synthesis Indiana State Univ, School of Medicine.
24. Harvey, (2005). *Biochemistry: 3rd Edition*, Baltimore: Lippincott, pp. 235-238.
25. NAMS, (2007). Continuing Medical Education Activity. *Menopause*. 14:555.
26. Rosanoff, A., Seelig, MS., (2004). Comparison of mechanism and functional effects of magnesium and statin pharmaceuticals. *J Am Coll* 23: 5015-5055.
27. Risco, F., and Traba, M L., (2004). Bone specific binding sites for 1, 25(OH) 2D3 in magnesium deficiency. *J Physiol Biochem Sep*; 60 (3): 199-203.
28. Goldsmith, N.F., (1971). Physiologic relationship between magnesium and the female reproductive apparatus. Serum magnesium variations in normal subjects; the effect of estrogen on magnesium distribution. *Proc First Intl Sympos Mg*, Ed J Durlach, Vittel, France 1:439-458, .
29. Norman, RJ., Noakes, M., Wu, R., Davies, MJ., Moran, L., Wang, JX., (2004). Improving reproductive performance in overweight /obese women with effective weight management. *Hum Reprod Update*. 10:267-80.
30. Steen, B., Estrogen controls lipolysis by up-regulating $\alpha 2A$ -adrenergic receptors directly in human adipose tissue through the estrogen receptor α . Implications for the female fat distribution. *J Clin Endocrinol Metab* (2004) 89:1869.
31. Tworoger, SS., Eliassen, AH., Missmer, SA., Baer, H., Rich-Edwards, J., and Michels, K.B., (2006). Birth weight and body size throughout life in relation to sex hormones and prolactin concentrations in premenopausal women. *Cancer Epidemiol Biomarkers Prev* Dec; 15(12):2494-2501. doi: 10.1158/1055-9965.EPI-06-0671.
32. Potischman, N., (1996). Reversal of relation between body mass and endogenous estrogen concentrations with menopausal status. *J Natl Cancer Inst* 88:756.

تقييم الاستروجين ومغنيسيوم المصل ومعامل الكتلة الحيوية في النساء المصابات بفشل المبيض المبكر في مدينة تكريت / العراق

مادلين قاسم عباس عماد حمودي عبد الله

الخلاصة

تضمنت الدراسة تقييم مستوى الاستروجين والمغنيسيوم في مصل 30 امرأة مصابة بفشل المبيض المبكر و 30 امرأة كمجموعة ضابطة ممن راجعوا قسم الطوارئ / في مستشفى تكريت التعليمي في مدينة تكريت تراوحت أعمارهن ما بين 40 - 48 سنة . وكذلك تضمنت الدراسة تقييم معامل الكتلة الحيوية للجسم . تم جمع عينات الدم من كلا المجموعتين للفترة مابين شهر تشرين أول 2012 لغاية كانون الثاني 2013 . أشارت نتائج الدراسة الحالية إلى إن مستوى الاستروجين في مصل النساء المصابات بفشل المبيض المبكر انخفض انخفاضاً معنوياً عن المجموعة الضابطة ($P \leq 0.05$) أيضاً أشارت النتائج إلى انخفاض معدل قيم المغنيسيوم معنوياً في مصل النساء المصابات بفشل ($P \leq 0.01$) المبيض المبكر مقارنة مع مجموعة السيطرة . أشارت النتائج أيضاً إلى ارتفاع معامل الكتلة الحيوية للنساء المريضات مقارنة مع نساء السيطرة وكانت ($P \leq 0.05$) .