

The Role of CTX-II , Dyslipidemia , Vitamin D in Polycystic Ovary Syndrome

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Abstract

This study aimed to study the serum measurement of clinical value of type II collagen (CTX-II) in syndrome of polycystic ovary in women and indicator as osteoarthritis disease marker analyzed in future levels with a recent available immune enzyme-linked sorbent assay (ELISA) kit. For increasing sensitivity test, the protocol was modified. Levels of CTX-II increased significantly as well total protein, while decrease vitamin D and difference in lipid profile were practical between the patients compared with healthy women's. The obtained results suggested the monitoring interest of the serum CTX-II for the OA development in patients of polycystic ovary syndrome in women and the relevance of the analysis of multiple time point for this biomarker.

Keyword: CTX-II- Biomarkers- OA Osteoarthritis- Polycystic ovary syndrome- Dyslipidemia.

Introduction

Syndrome of polycystic ovary (PCOS) is a hard condition with characteristics of prominent levels of androgen, irregularities of menstrual and/or small cysts on either ovaries or both ⁽¹⁾. This disorder might be of ovaries morphological polycystic or hyper androgenemia predominantly biochemical. Hyper androgenism, is a PCOS clinical hallmark result of inhibition of follicular progression, ovaries microcysts, , changes in menstrual and ovulation ⁽²⁾. Investigations proposed that (5% to 10%) females of age 18 - 44 years are PCOS affected, rendering it the most well-known abnormality of endocrine among females of reproductive age in U.S.A. ⁽³⁾. Women looking for assistance from professionals in health care to address issues of excessive hair growth, obesity, acne, infertility, and amenorrhea most of the times receive a PCOS diagnosis and have cancer of endometrial at higher rates, TIIDM, dyslipidemia and cardiovascular disease ⁽⁴⁾.

PCOS pathophysiology involves defects primary in insulin secretion and action, ovarian function, and the

hypothalamic–pituitary axis. Although the unknown cause of PCOS, PCOS has been connected to obesity and insulin resistance ⁽⁵⁾. There are 3 most well-known elements with PCOS associated i.e. irregularities of ovulation, androgen levels enhancement, and problems of cystic ovaries with elevated androgen levels and ovulation take place in most PCOS women ^(24, 26). Furthermore, alopecia, hirsutism, and acne are directly associated with elevation levels of androgen and the ovaries prevalence of polycystic on pelvic ultrasound more than 70% in PCOS patients ⁽⁶⁾.

After diagnosing PCOS, investigations prove that patients over 50% have diabetes or pre-diabetes, and there is risk increasing of hypertension, myocardial infarction (MI), dyslipidemia, osteoarthritis sleep apnea, anxiety, depression, and endometrial cancer. Furthermore, PCOS pregnant women should be noticed for increasing miscarriage rates, pre-eclampsia, premature delivery, and gestational diabetes ⁽⁷⁾. Osteoarthritis defined as a disease with developing articulate cartilage destruction and by changes pathologically in the subchondral bone and synovial membrane · OA, the destruction will result in losing the 2 major components, type II collagen and proteoglycans, rendering them choice markers in determining metabolism of cartilage ⁽⁸⁾. Peptide of C-telo of collagen type II (CTX-II) is marker most studied ⁽⁹⁾. Increasing levels were documented in OA patients

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in comparison to subjects of asymptomatic or without OA signs ⁽¹⁰⁾. A significant association have shown between CTXII concentration and OA radiographic development ⁽¹¹⁾. The goal of this investigation was to study the serum measurement of clinical value of CTX-II in polycystic ovary syndrome patients and correlated with physiological assessment that give indicator to development of Osteoarthritis in future.

Methodology

Serum specimen was collected from patient with infertile Polycystic Ovary patients (n = 45) and healthy patient (n=45) at AL-Sader laboratory of Medical city in Najaf Province, AL-Najaf Health Directorate / Ministry of Health /Iraq. The average of the patient's age was (32.81±51) years. All reagents and specimens should be at a temperature of room before use. Reagents mixed in soft way with no foaming. No interruption should take place once the protocol started Tests of biochemical were performed at Biology laboratories. in this study was CTX-II protein (MBS2507692), vitamin D3 (MBS773966) , HDL (MBS170439) , VLDL(MBS265004), total protein (MBS2540455) and LDL (MBS162140) My Bio Source Company USA in Origin .

Statistical Analysis

Statistical analyses of all result were carried out by the help of Graphpad prism version 5) software statistical package using t-test (with p value at level of significant less than 0.05) to compare values of result between groups .

Results

The result show an increase of significant for protein of collagen matrix Type II figure(1) in patient with Polycystic Ovary(mean± Std. Error 3.98+0.67) compare control group (mean± Std. Error 2.62+0.71) which that may be cause by the extracellular adhesion molecule is soluble from the cartilage surface component. Enable the binding of cartilage cells to type II collagen in the absence of serum, thereby increasing protein externally, we conclude that direct interaction between cartilage cells and type II collagen occurs through other adhesion mechanisms of cell surface proteoglycans such as membrane-bound heparin sulfate in progressive age ⁽¹²⁾. Few studies revealed a significant relation between concentration of CTXII and OA radiographic development ⁽¹³⁾. Recently, urinary levels predictive value of CTX-II for cartilage losing was assessed

through MRI ⁽¹⁴⁾.

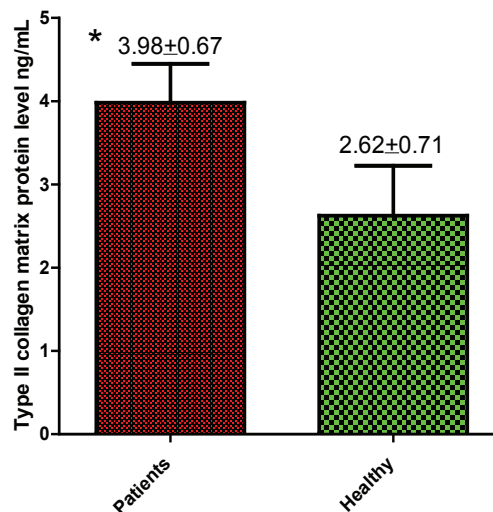


Figure 1: levels of Type II protein collagen matrix protein in patients comparison to Healthy group

These results was show a decrease of vitamin D3 in patient with Polycystic Ovary (mean± Std. Error 12.5±0.17) compare control group (mean± Std. Error 24.4±0.91) figure (2), Probably Vitamin D deficiency may be associated with populations with extensive skin coverage, especially in women in Iraq. There is a large body of proof the importance of vitamin D in reproductive function because VDRs have been detected in placenta, the endometrium and ovary ⁽¹⁵⁾. Deficiency of Vitamin D is associated with deregulation of Ca, which participates in the follicular arrest development in PCOS women resulting in dysfunction fertility and menstrual ⁽¹⁶⁾. Some study on PCOS women with and undergoing fertilization *in vitro* (IVF), they found that the women who achieved pregnancy exhibited significantly higher levels of follicular fluid of 25(OH)D and each ng/ml elevate in follicular fluid 25(OH)D elevated the likelihood for pregnancy achievement by 7% ⁽¹⁷⁾. Moreover, deficiency of 25(OH)D was related with rates of lower development for pregnancy and follicle after clomiphene-citrate stimulation in PCOS women, suggesting a possible vitamin D supplementation role in PCOS infertile women who undergo stimulation of ovarian ⁽¹⁸⁾.

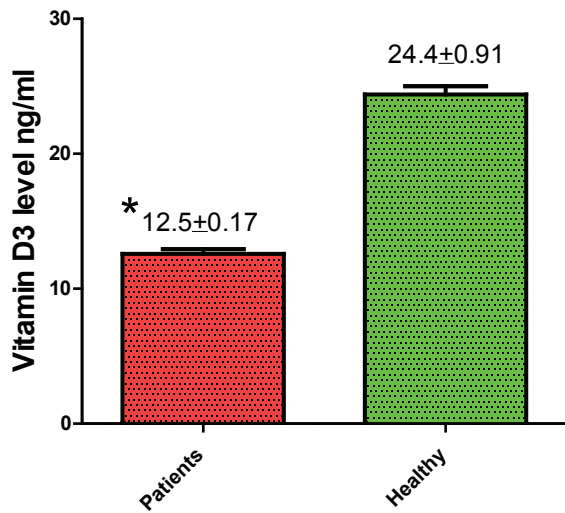


Figure 2: levels of vitamin D3 in patients comparison to Healthy group

These results show an increase in total protein in patients with Polycystic Ovary (mean± Std. Error 8.01±1.34) compared to the control group (mean± Std. Error 6.65±0.98) (Figure 3). Probably by understanding the general protein alterations, not only of advantage for PCOS pathogenesis mechanism elucidating, but also easing for discovering the specific biomarkers and sensitive that are closely linked to diseases. Protein quantitative analysis in serum with array protein provides useful data for clinical practice, i.e. individualized treatment and accurate medical that is according to protein screening. Five hundred proteins were examined by array of protein in samples of serum collected from rectal cancer where the OPG expression was elevated which was associated with the patient's survival of rectal cancer after chemotherapy (19)

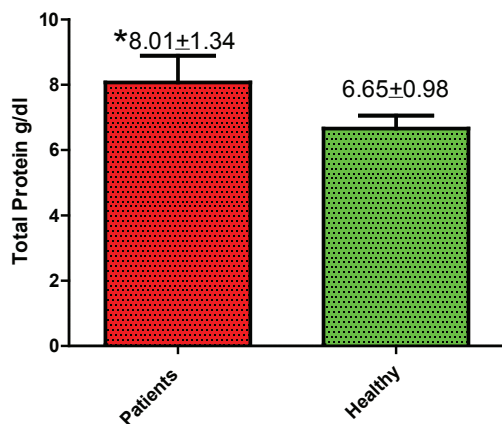


Figure 3: levels of total protein in patients comparison to standard group

The results revealed an increasing level of significant in LDL level in patient with polycystic (mean± Std. Error 118±0.64); control group (mean± Std. Error 44.4±0.26) (Figure 4), also the result shows a decrease in significant level in HDL level in patient polycystic (mean± Std. Error 39.4±1.14); control group (mean± Std. Error 49.4±2.41) (Figure 5), suggests that the level of LDL, HDL, insulin, glucose, apolipoprotein A1, and lipoprotein a, in female with and without PCOS do not show any significant differences (20). Similarly, Jahanfar *et al.*, in a study aimed at evaluating the genetic and environmental factors affecting lipids among twins, found no significant difference (21). The research concluded that the serum CTX-II in women with PCOS may appear to have symptoms of Osteoarthritis and thus it is considered to be a vital reliable evidence in the news of the occurrence of this disease in PCOS women.

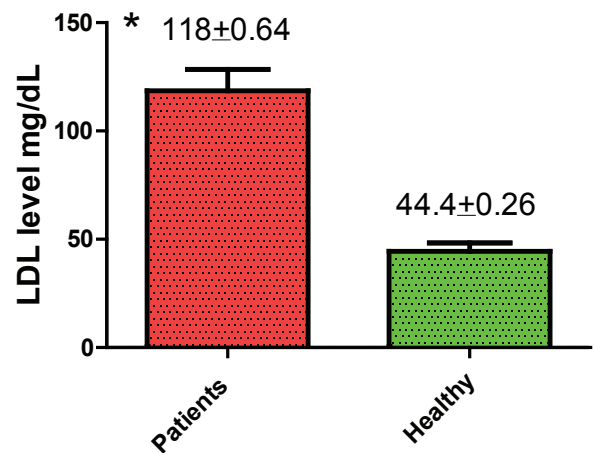


Figure 4: levels of LDL in patients comparison to Healthy group

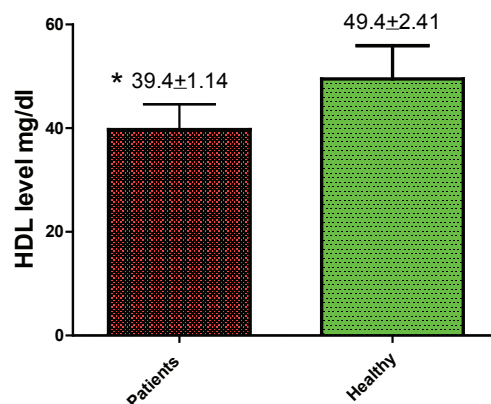


Figure 5: levels of HDL in patients comparison to Healthy group

Results proved a significant enhancement of VLDL level in patient (mean± Std. Error 29 ± 2.34) ; control group (mean± Std. Error 20 ± 2.64) figure(6) , Disturbances in metabolic are famous clinical syndrome characters, especially, dyslipidemia which is very well-known abnormality metabolic in PCOS female with a prevalence of up to 70% (22,23). Resistance of insulin is a key PCOS pathophysiology and dyslipidemia in PCOS women may be therefore in accordance with that detected in the insulin resistant case: decreasing levels of apolipoprotein (Apo) A-I, and high-density lipoprotein-cholesterol (HDL-C), and increased levels of ApoB, triglycerides (TG) and very low-density lipoprotein(24, 25, 26).

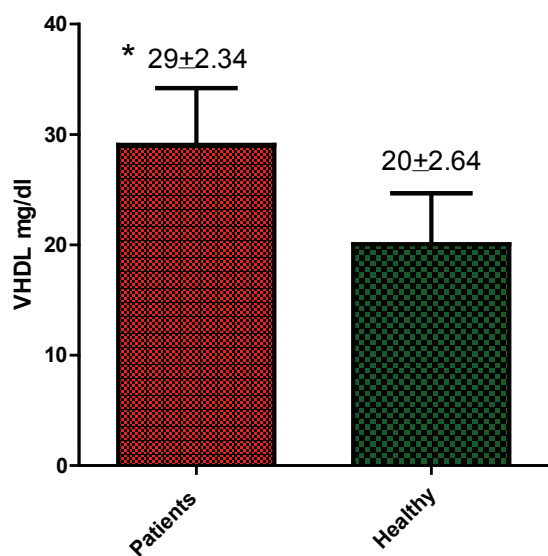


Figure 6: levels of VLDL in patients comparison to Healthy group

Conclusion

The research has a goal of examining the clinical value of the serum which was measured type II collagen (CTX-II) in the Polycystic ovary syndrome in the women and indicator as a marker of the (OA)disease of future levels. An important percentage increased in CTX-II levels , and the total protein but a decrease occurred in vitamin D and with a change in lipid profile which was in practical status between the patients compared with healthy women.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: Non

Funding: Self-funding

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