

Effect of Vitamin D, Metformin on Metabolic Syndrome in Polycystic Ovarian Syndrome Patient

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Abstract:

Polycystic ovary (PCO) is the most common hormonal disturbance disease that characteristic by anovulation, oligo-ovulation and increase androgen male hormone and presence small ulcers in ovary.

This study aims to find the effects of vitamin D and Metformin on FBS, Insulin, Cholesterol, HDL, LDL, TG and VLDL for Patients Receiving them.

Two sets were used, the first set (G1) includes 14 patients aged range between 18 to 30 years old, which divided into two classes, the first class before treatment referred as (G1-A) and the second class after received vitamin D alone 4001.U the dose was a once daily for about 3 months referred to as (G1-B). Similarly, the second set (G2) also divided into two classes, the first class includes 14 patients their aged ranged between 19 to 30 years old before treatment referred to as (G2-A) and the second class after received (500 mg) metformin three time daily) for about 3 months to as (G2-B).

Results showed that there are significant pre and post treatment mean difference for fasting blood sugar, insulin resistance, cholesterol, HDL, LDL, TG, VLDL for patient that receiving vitamin D alone; so the study shows significant effect of vitamin D on fasting blood sugar and insulin resistance level. In second group that taken metformin alone, also there are significant pre and post treatment mean difference for fasting blood sugar, insulin resistance, cholesterol, HDL, LDL, TG and VLDL. Metformin reduced hyperglycemia primarily as a result of reducing glucose production by the liver (hepatic gluconeogenesis) and the metformin significantly decrease in serum insulin resistance, whereas metformin appear no significant effect on testosterone level.

Key words: polycystic ovary, testosterone hormone, vitamin D, metformin.

تأثير فيتامين D وميتفورمين متلازمة الأيض لدى المرضى المصابين بتكيس المبايض

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تكيس المبايض هو من الأمراض الشائعة يحصل نتيجة اضطرابات هرمونية ويتميز بظهور أعراض عديدة منها عدم الإباضة وقلتها وكذلك زيادة في الهرمون الذكري ووجود أكياس صغيرة عديدة على المبيض.

تضمنت الدراسة مجموعتين، المجموعة الأولى ويرمز لها (G1) تتضمن 14 مريضة تتراوح أعمارهن بين 18-30 سنة، وقسمت المجموعة الى صنفين الأول قبل أخذ العلاج رمز له (G1-A) والصنف الثاني تم إعطاؤهم علاج فيتامين- د وبجرعة 400 وحدة يوميا لمدة ثلاث أشهر رمز له (G1-B). المجموعة الثانية ويرمز لها (G2) تتضمن 14 مريضة تتراوح أعمارهن بين 19-30 سنة، وقد قسمت المجموعة الى صنفين الأول قبل إعطائهم العلاج يرمز لها (G2-A) والصنف الثاني تم إعطاؤهم علاج Metformine ملغم ثلاث مرات يوميا (1500 ملغم) لمدة ثلاث اشهر يرمز لها (G2-B).

أظهرت النتائج وجود فرق معنوي في المجموعة الأولى والتي يتناول فيها المرضى من النساء دواء (فيتامين D) كذلك تم ملاحظة نقصان معنوي في مستوى السكر الدموي، مقاومة الأنسولين ومستوى الدهون الضارة في الدم (TG)، النساء واللاتي يستخدمن دواء (Metformin) وحده لوحظ وجود فرق معنوي في مستوى السكر الدموي ومقاومة الأنسولين وكذلك نقصان معنوي في مستوى الدهون الضارة (TG, VLDL, LDL and Cholestrol) وإرتفاع معنوي في مستوى الدهون المفيدة (HDL).

الكلمات المفاتيحية: تكيس المبايض، هرمون التسترون، فيتامين D ، متفورمين.

Introduction:

Poly Ovarian Cysts is well known disease that imbalance the women's hormones that results in changes in outlook. Indeed these changes are negative and unwanted that leads towards serious health problems such as heart disease Most woman with poly ovarian cysts grow many small cysts on their ovaries.

Poly cystic ovarian syndrome contains the word i.e. cysts which are not harmful but results in unbalancing of the hormones. There is estimation for the patients suffering from polycystic ovarian syndrome between 5-10 % of female ages from 18-45 years^[1].

About 40 % patients with polycystic ovarian syndrome have sisters who have it and about 20% Of patient carrying polycystic syndrome have mothers who had polycystic ovarian syndrome^[2,3].

Pathogenesis of Polycystic ovarian syndrome: A complete understanding of the underlying pathophysiology of polycystic ovarian syndrome still needs research, because of the heterogeneity of this disorder. Following are the multiple underlying path physiologic mechanisms^[4]. Several studies have been done, resulted in several theories to explain the pathogenesis of polycystic ovarian syndrome, hypothalamic pituitary dysfunction, hyper insulinemia and insulin resistance, ovarian and adrenal hyper androgenisms.

This study aims to find the effects of vitamin D and Metformin on FBS, insulin, cholesterol, HDL, LDL, TG and VLDL for patients receiving them.

Materials and Method:

Selected patients were divided into four subgroups according to type of treatment received. The first group (G1) includes 14 patients aged range from (18-30) years, which divided into two classes, the first class before treatment referred as (G1-A) and the second class after received vitamin D alone (4001.U) once daily for about 3 months referred to as (G1-B).

The second group (G2) also divided into two classes, the first class includes 14 patients their aged ranged from (19-30) years old before treatment referred to as (G2-A) and the second class after received (500 mg) Metformin three times daily for about 3 months to as (G2-B). Blood samples 8-10 ml were assembled from those patients and healthy volunteers by using disposable syringes blood samples were collected in tubes without anticoagulants and left for 15 minutes at room temperatures to clot after that, the blood samples centrifuged at 3000xg for 15 minutes. Then, the serum isolated and divided into aliquots using eppendorf tubes and kept at (-20°C) until time of use. Table (1) shows types of chemicals that are used in this study.

Table-1: The chemicals used in the study

No.	Kit	company	Origin
1	Insulin	Tosoho	Japan
2	Testosterone	Tosoho	Japan
3	Total cholesterol	Biolabo	France
4	Triglyceride	Biolabo	France
5	HDL	Biolabo	France

Results:

Many samples have been tested to find mean differences of study variables for patients receiving vitamin D. From the results it is clear that there is a significant pre and post treatment mean differences for FBS, Insulin, Cholesterol, HDL, LDL, TG and VLDL as shown in table-2. Similarly to find mean differences of Study variables for patients receiving Metformin, many samples have been tested and the results showed there is a significant pre and post-treatment mean differences for FBS, insulin, cholesterol, HDL, LDL, TG and VLDL as shown in table-3. Also results shows there was a lowest FBS mean for Metformin group in comparison with other groups as shown in figure-1. As well there was lowest insulin mean for mix group in comparison with other groups as shown in figure-2.

In addition tests showed there is a highest level of testosterone recorded with vitamin D in comparison with other groups as shown in figure-3. Besides there were low cholesterol mean for Metformin group in comparison with other groups as shown in figure-4. Also, there were nearly same effect of treated as shown in figure-5. Similarly the lowest reading of LDL has been witnessed with Metformin group in comparison with other groups as show in figure-6. Additionally; there was a low triglyceride means for vitamin D and Metformin groups in comparison with mix group. Figure-7 illustrated the effect of all treated groups on triglyceride. At last there was a high VLDL mean for mix group in comparison with other groups. Figure-8 shows the effect of all treated groups on VLDL.

Table-2: Mean differences of study variables for patients receiving vitamin D

Variable		Mean± SD	Test value	P value
FBS	Pre-Treatment	4.32± 0.51	2.651 ^a	0.020*
	Post-Treatment	4.87± 0.96		
Insulin	Pre-Treatment	17.53± 15.37	2.347 ^b	0.019*
	Post-Treatment	18.57± 15.05		
Testosterone	Pre-Treatment	55.65± 23.32	1.852 ^b	0.064
	Post-Treatment	65.65± 40.32		
Cholesterol	Pre-Treatment	4.87± 0.46	3.613 ^a	0.003*
	Post-Treatment	4.43± 0.42		
HDL	Pre-Treatment	1.31± 0.36	16.830 ^a	<0.001*
	Post-Treatment	1.76± 0.43		
LDL	Pre-Treatment	3.28± 0.61	4.915 ^a	<0.001*
	Post-Treatment	2.51± 0.51		
TG	Pre-Treatment	1.09± 0.30	6.769 ^a	<0.001*
	Post-Treatment	0.85± 0.26		
VLDL	Pre-Treatment	0.20± 0.07	1.958 ^b	0.050*
	Post-Treatment	0.19± 0.19		

*p value 0.05 is significant

^a: Paired t-test for normally distributed data, ^b: Wilcoxon test for not normally distributed data

Table-3: Mean differences of study variables for patients receiving Metformin

Variable		Mean± SD	Test value	P value
FBS	Pre-Treatment	4.44± 0.62	11.074 ^a	<0.001*
	Post-Treatment	3.60± 0.55		
Insulin	Pre-Treatment	28.21± 27.32	3.297 ^b	0.001*
	Post-Treatment	21.36± 20.63		
Testosterone	Pre-Treatment	32.73± 10.39	1.605 ^b	0.109
	Post-Treatment	45.36± 37.45		
Cholesterol	Pre-Treatment	4.11± 0.35	7.863 ^a	<0.001*
	Post-Treatment	3.32± 0.36		
HDL	Pre-Treatment	1.24± 0.27	3.138 ^a	0.008*
	Post-Treatment	1.49± 0.30		
LDL	Pre-Treatment	2.73± 0.15	3.626 ^a	0.003*
	Post-Treatment	2.38± 0.37		
TG	Pre-Treatment	1.10± 0.39	3.331 ^b	0.001*
	Post-Treatment	0.79± 0.37		
VLDL	Pre-Treatment	0.24± 0.07	6.227 ^a	<0.001*
	Post-Treatment	0.16± 0.05		

*p value 0.05 is significant

^a: Paired t-test for normally distributed data, ^b: Wilcoxon test for not normally distributed data

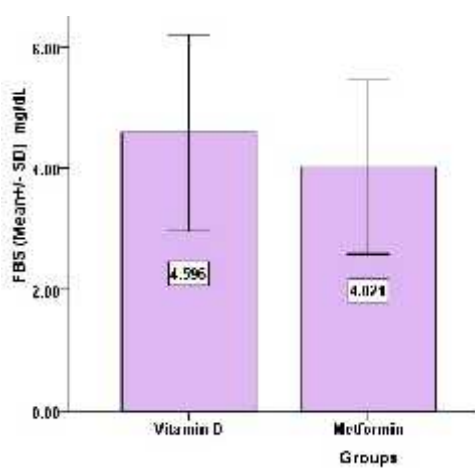


Figure-1: Mean differences of FBS by study groups.

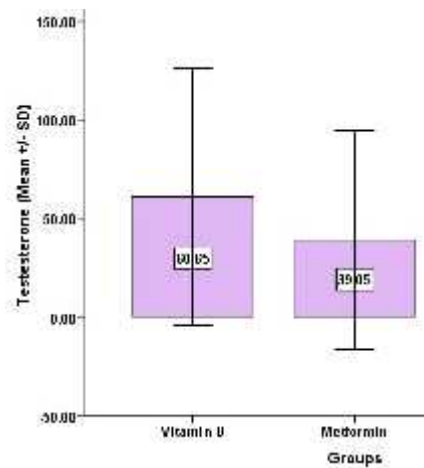


Figure-3: Mean differences of testosterone by study groups.

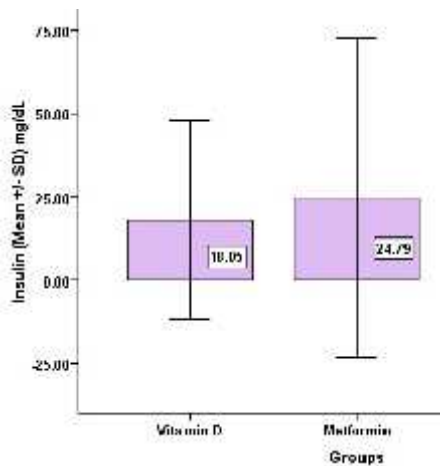


Figure-2: Mean differences of insulin by study groups.

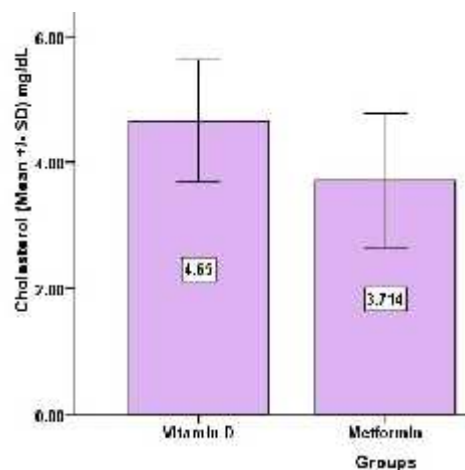


Figure-4: Mean difference of cholesterol by study groups.

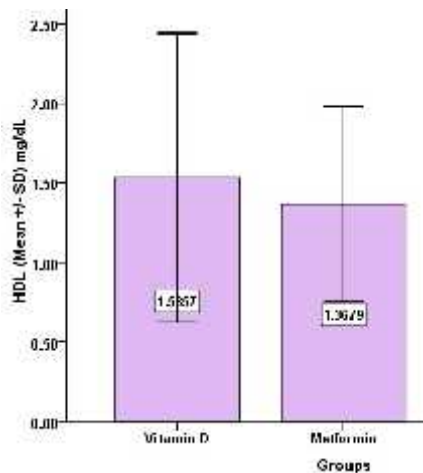


Figure-5: Mean difference of HDL by study groups.

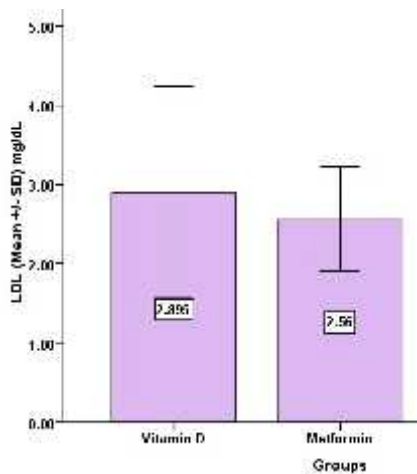


Figure-6: Mean difference of LDL by study groups.

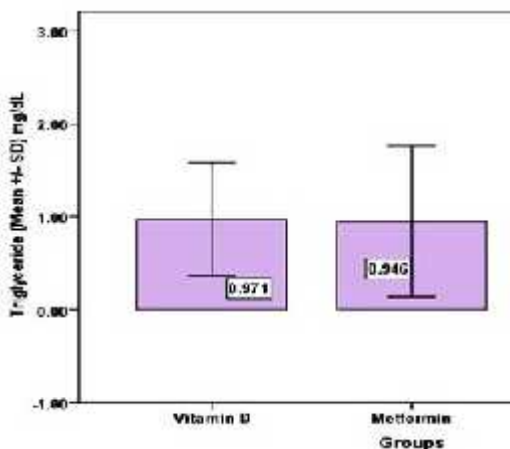


Figure-7: Mean difference of TG by study groups.

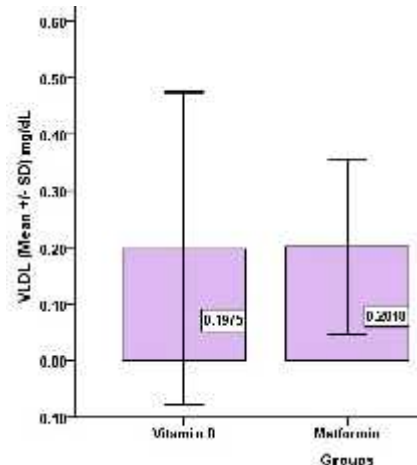


Figure-8: Mean difference of VLDL by study groups.

Discussion:

Results, showed that there are significant decline in fasting blood sugar in treatment group, these result agree with^[5]. So; Metformin reduce hyperglycemia primarily as a result of reducing glucose production by the liver (hepatic gluconeogenesis)^[6].

Also, the effect of metformin on insulin level in our study was significantly decreased in serum insulin resistance and these result is agree with^[7].

Whereas; Metformin appear no significant effect on testosterone level in this study and this result appear no significant effect of Metformin on testosterone in pre and post treatment and this disagree with^[8]. Also, the effect of vitamin D on study group in this study result shows significant effect of vitamin D on fasting blood sugar and insulin resistance level, this result agree from^[9]. The study disagrees with^[10]. It is appeared no effect of vitamin D on insulin resistance.

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