Association of serum vitamin d level and polycystic ovarian syndrome

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Abstract

Background: Women with Polycystic Ovaries (PCO) frequently suffer from metabolic disturbances. Accumulating evidences suggests vitamin D association with endocrine and metabolic disturbances.

Objective: To assess the prevalence of hypovitaminosis D in polycystic ovarian syndrome and association with subfertility, hirsutisom, menstrual irregularity and weight gain.

Methodology: Study Design: Case control study. Study Settings: Conducted at department of Obstetrics & Gynaecology, Sheikh Zayed Hospital, Rahim Yar Khan from 1st February to 31st July 2015. Total 100 patients were included in the study. Among 100, 50 cases who were diagnosed as polycystic ovarian disease and 50 were control who did not suffer from PCOS. All of them underwent serum vitamin D level and its association with above mentioned were recorded and analyzed, by using SPSS version 16.

Results: Among 100 cases, 84% have vitamin D level <20ng/ml, while controls shows 70% of the person with low vitamin D level. Mean serum vitamin D level was found to be 16.9ng/dl. Subfertility (P=0.01), Obesity (P=0.04), Menstrual irregularity (P=0.01) and Hirsuitism (P=0.02), all show statistically significant association with hypovitaminosis.

Conclusion: Lower 25OHD levels are associated with obesity, menstrual dysfunction, lower pregnancy rate in PCOS. However, this is an area which requires further investigation.

Keywords: Vitamin D, PCOs, Subfertility

Introduction

Polycystic Ovaries Syndrome (PCOS) has become the most common endocrinological disorder in women especially in Asian countries.[1] This disorder is characterized by oligomenrorrhea, hirsutism and acne due to hyperandrogenism, which also leads to anovulatory subfertility,[1] and the presence of polycystic overies on ultrasound. The main pathophysiology of this syndrome is insulin resistance. Moreover, there is evidence that vitamin D levels affect metabolism of glucose and insulin.[2,3] The risk factor for impaired glucose tolerance is low vitamin D level, which leads to exacerbation of its symptoms.[2]

Many studies have investigated vitamin D levels of the women with PCOS and its association with insulin and glucose metabolism,[4,5] however in previous studies this association was attenuated after adjusting increased BMI of the patients and ethnicity.[6,7] There is an inverse relationship between vitamin D levels and disturbed metabolism in PCOS patients, which can lead to hirsutism, menstrual irregularities and subfertility.[7,8,9]

There is also association between vitamin D receptor gene polymorphism and risk of PCOS and its metabolic and endocrine manifestations.[4,5,8] Genetic variations in vitamin D receptors can lead to the development of PCOS as well as impaired insulin metabolism in women with PCOS.[10]

Most of previous studies are done in caucasian women.[8-10] Our study is focused on low vitamin D levels in this area of Pakistan. Furthermore, in our study we have investigated the vitamin D levels of the women and clinical manifestations of PCOS.

Methodology

This case control study was conducted at Obstetrics & Gynaecology Department of Sheikh Zayed Hospital, Rahim Yar Khan from 1st February to 31st July 2015.

We recruited 50 patients as cases with polycystic ovarian disease diagnosed with help of serum FSH, LH level and ultrasonography findings, and 50 women were included as controls who have no features of PCOS. All of them were checked for 25 hydroxy vitamin D (25 OHD) levels (>20ng/ml

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taken as normal) and the symptoms of hirsutism, subfertility menstrual abnormality and weight gain were recorded through a pre-designed performa. Data is analyzed with SPSS version 16. Chi square test is applied for association of symptoms with vitamin D level P-value <0.05 was taken as significant. Frequency of low vitamin D level and its mean value was also calculated. Ethical approval was sought from institutional review board.

Results

Total 100 women were included in the study, out of which 50 were labeled as cases who were diagnosed as PCOS after fulfilling the inclusion criteria for the diagnosis, and 50 women were labeled as controls who has no features of PCOS. Out of these 50 cases, 42 had low vitamin D levels (84%) and among controls 35 had low level (70%) i.e. <20ng/dl (Table-I).

Mean serum vitamin D level among the whole study group (including both cases and controls) were noted as 16.9ng/dl and mean age was 28±4.7 years.

As long as symptoms association with low vitamin D_3 level is concerned they show statistically significant association (P-value <0.05) as shown in Table-II.

Table I: Association of serum vitamin D and PCOS

Groups	Low level (<20ng/dl)	Normal level (>20ng/dl)	Total	P-value
Cases (PCOS)	42	08	50	0.096
Control (No PCOS)	35	15	50	
Total	77	23	100	

Table II: Symptoms Association with Hypovitaminosis D

Symptoms	Low level	Normal level	P-value
Subfertility	33	1	0.01
Weight gain	58	6	0.04
Menstrual abnormality	50	6	0.01
Hirsutism	25	2	0.02

Discussion

PCOS is the common endocrine disorder affecting the women of reproductive age in which the prevalence is 5-10% in general population,[10] while in Asian women the prevalence is 52%,[4] which shows that ethnicity is involved at genetic level in the development of PCOS and its related metabolic disturbances as well as impaired insulin metabolism and development of diabetes.

The common deficiency in women with PCOS is vitamin D deficiency, which leads to the symptoms of PCOS,[11] this deficiency can lead to metabolic disturbances such as acne, hirsutism, menstrual irregularities, insulin resistance and subfertility.[12-15]

Many studies have previously suggested the role of low vitamin D levels and PCOS, however further meta analysis are required to draw a definite relationship due to inconsistent findings from different studies.[16-18]

In our study, the serum concentration < 20ng/dl was found in 84% of the patients vitamin D levels which is comparable to a previous study where it was 67.85%.[11] Another study conducted by the Wehr E also showed the prevalence of vitamin D deficiency in PCOS as 72.8%.[12]

As compared to the previous studies where average vitamin D levels were 11.31ng/dl, our study showed vitamin D levels 13.3ng/dl which is comparable to the most of the studies having mean value <20ng/ml.[13-16]

As long as the subfertility and menstrual irregularities are concerned, there is increasing evidence that vitamin D levels modulate sex hormone's effects on uterus, ovary and fallopian tubes.[17-19] In addition, vitamin D deficiency is also associated with deregulation of sex steroid hormone metabolism, which leads to the follicular arrest, subfertility and menstrual irregularities.[11]

The results regarding relationship of low vitamin D levels with infertility and menstrual irregularities in our study are statistically significant, which is consistent with several studies correlating the low vitamin D levels in PCOS with these problems.[16-18]

When we evaluated the weight gain in association with low vitamin D levels in PCOS, again the results were statistically significant (P value 0.04) which is consistent with other studies showing same relationship of vitamin D levels and obesity in PCOS.[13,15]

In our study, hirsutism was significantly associated with the levels of vitamin D (P value 0.02) which is

not consistent with findings in other studies.[11,12] Other studies showed positive relationship with low vitamin D levels and hirsutism, but it is no longer significant when adjusted against BMI.[11,12] Wehr et al showed that relationship between Sex Hormone-Binding Globulin (SHBG) and vitamin D status of the patient was no longer significant if BMI is controlled. It showed that obesity was a common determinant for both SHBG and 25OHD. This is because hirsutism is caused by low levels of SHBG which is caused by obesity.

Conclusion

In consistent with several observational studies lower 25OHD levels are associated with menstrual irregularities, obesity, hirsutism and unsuccessful pregnancy outcome. However, further investigations are required to assess this relationship. This may require well designed studies with larger sample size.

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