ORIGINAL ARTILE

Determine the Frequency of Vitamin D Deficiency in Patients with Polycystic Ovarian Syndrome

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ABSTRACT

Aim: To determine the frequency of vitamin D deficiency in women with polycystic ovarian syndrome.
Study design: Cross-sectional observational study
Place and duration of study: Department of Obstetrics & Gynaecology, Muhammad College of Medicine, Peshawar from 1st October 2019 to 31st March 2020.
Methods: One hundred and seven patients of polycystic ovarian syndrome between ages 18 to 42 years were enrolled in this study. Patient´s detailed demographics including age, body mass index, duration of disease and waist circumference were recorded after taking informed consent. Serum 25-hydroxyvitamin D level <20 ng/ml was considered as deficiency of vitamin D.
Results: Twenty four (22.43%) patients were <25 years old, 43(40.19%) were between 25 to 30 years, 20 (18.69%) had age range of 31 to 35 years and 20(18.69%) were above 35 years. 63(60.75%) patients werehaving BMI <30 kg/m^2 while 44 (39.25%) patients had BMI >30kg/m^2. Deficiency of vitamin D found in 70 patients (65.42%), 18(16.82%) patients had vitamin D insufficiency and 19(17.76%) patients had vitamin D level >30 ng/ml
Conclusion: Frequency of vitamin D deficiency was very high in patients with polycystic ovarian syndrome.
Keywords: Frequency, Vitamin D deficiency, Polycystic ovarian syndrome

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in women of reproductive age, presenting in up to 18% of this population[1]. It is characterized by the presence of polycystic ovaries, menstrual dysfunction, infertility and biochemical (elevated androgens) and clinical (weight gain, hirsutism, acne) hyperandrogenism. It is also associated with an increased incidence of cardiovascular disease, type 2 diabetes, dyslipidemia and impaired glucose tolerance. Obesity and insulin resistance are closely linked to the development of PCOS and its clinical features[2].

Polycystic ovarian syndrome is the most common cause of anovulatory infertility in women.[3] A number of studies have demonstrated associations between vitamin D levels and various PCOS symptoms, including insulin resistance, infertility and hirsutim[2]. Vitamin D is thought to influence the development of PCOS through gene transcription, and hormonal modulation influencing insulin metabolism and fertility regulation[4,5].

Vitamin D has been well-known for its function in maintaining calcium and phosphorus homeostasis and promoting bone mineralization. There is some evidence that in addition to sex steroid hormones, the classic regulators of human reproduction, vitamin D also modulates reproductive processes in women and men. Vitamin D deficiency is common in women with polycystic ovarian syndrome, almost 67-85% of women with PCOS having serum concentrations of 25-hydroxy vitamin D (25OHD) <20 ng/ml[6].

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There is accumulating evidence that vitamin D plays an important role in reproductive function. Vitamin D deficiency is associated with calcium deregulation, which contributes to impaired follicular development in women with PCOS and results in menstrual and fertility dysfunction[7,8]. Studies have shown that women with PCOS mostly have insufficient vitamin D levels, and vitamin D replacement therapy may have a beneficial effect on insulin resistance (IR) in women with PCOS. People with higher levels of this vitamin are 40% less likely to develop diabetes[9,10]. The present study was conducted to determine frequency of deficiency of vitamin D in women with polycystic ovarian syndrome.

MATERIALS AND METHODS

This cross-sectional observational study was conducted at Department of Obstetrics & Gynaecology, Muhammad College of Medicine, Peshawar from 1st October 2019 to 31st March 2020. A total of 107 patients of polycystic ovarian syndrome between ages 18 to 42 years were enrolled. Patient's detailed demographics including age, body mass index, duration of diseases, and waist circumference were recorded after taking written consent. Diabetic patients, patients with acute renal failure, liver failure patients, patients with pelvic inflammatory disease, pregnant women, patients on vitamin D supplementation and patients with hypertension were excluded.5 ml of blood sample was taken from each patient to examine the level of 25-hydroxy vitamin D. 25OHD level $\geq$30 ng/ml considered sufficient, 20-29 ng/ml considered as insufficient and <20ng/ml was considered as deficiency of vitamin D. All the data was analyzed by SPSS version 24. Chi-square test was done to examine the association between body mass

index and vitamin D deficiency. P-value <0.05 was taken as statistically significant.

RESULTS

Among all the 107 patients, 24(22.43%) patients<25 years old, 43(40.19%) were between ages 25 to 30 years, 20(18.69%) had age range of 31 to 35 years and 20 (18.69 %) were having age above 35 years. 63 (60.75%) patients were having BMI <30 kg/m^2 while 44(39.25%) patients had BMI >30kg/m^2. 49 (45.79%) patients had disease duration <2 years and 58(54.21%) were having disease duration of more than 2 years. Mean systolic BP was 104.31±11.04 mmHg and mean diastolic BP was 72.02±5.26 mmHg. Mean waist circumference was 86.42±10.49 cm (Table 1)

According to the 25-hydroxy vitamin D level, deficiency of vitamin D was found in 70 patients (65.42%), 18(16.82%) patients had vitamin D insufficiency and 19 (17.76%) patients had vitamin D level >30 ng/ml (Table 2).Patients with BMI ≥ 30 kg/m^2 had high rate of vitamin D deficiency (42 out of 44, 95.45%) as compared to patients with BMI <30 kg/m^2 (38 out of 63, 60.32%), a significant association was found between higher BMI and vitamin D deficiency with p-value <0.001 (Table 3).

Table 1: Demographical information of the patients

Variable	No.	%
Age (years)		
<25	24	22.43
25 -30	43	40.19
31 -35	20	18.69
>35	20	18.69
Body Mass Index (kg/m^2)		
<30	63	60.75
>30	44	39.25
Disease duration (years)		
> 2	49	45.79
<2	58	54.21
Systolic BP (mmHg)	104.31±11.04	
Diastolic BP (mmHg)	72.02±5.26	
Waist Circumference (cm)	86.42±10.49	

Table 2: Frequency of vitamin D levels among all the patients

Variables	No.	%
Vitamin D deficiency (< 20ng/ml)	70	65.42
Vitamin D insufficiency (21-29ng/ml)	18	16.82
Vitamin D sufficient (>30 ng/ml)	19	17.76

Table 3: Association between vitamin D deficiency and BMI

BMI	Vitamin D Deficiency	No Deficiency	P-value
<30 (kg/m^2) n=63	38 (60.32)	25 (59.68)	<0.001
>30 (kg/m^2) n=44	42 (95.45)	2 (4.55)	

DISCUSSION

Hypovitaminosis D is connected to the onset of chronic diseases and that the deficiency may interfere with the normal physiology of the human body.[11]We conducted present study to determine the frequency of vitamin D deficiency in women with polycystic ovarian syndrome. In this regard 107 patients with polycystic ovarian syndrome were analyzed. Majority of patients 43 (40.19%) werebetween 25 to 30 years followed by 24 (22.43%) with ages<25 years, 20 (18.69%) had age range between 31 to 35 years and 20 (18.69 %) were above 35 years. These results were comparable to many of previous studies in which majority of patients (40% to 55%) were between 25 to 30 years.[12,13]

In our study 63 (60.75%) patients were having BMI <30 kg/m^2 while 44 (39.25%) patients had BMI >30kg/m^2. A study conducted by Parikh U et al[14] reported in their study that 46% patients had BMI <25 and 54% had BMI >30 kg/m^2. 49 (45.79%) patients had disease duration <2 years and 58 (54.21%) were disease duration above 2 years. Mean systolic BP was 104.31±11.04 mmHg and mean diastolic BP was 72.02±5.26 mmHg. Mean waist circumference was 86.42±10.49 cm. A study by Jameel et al[15] regarding frequency of vitamin D deficiency in PCOS women reported that mean disease duration was 2.5±1.2 years

In present study we detected deficiency of vitamin D in 70 patients (65.42%), 18 (16.82%) patients had vitamin D insufficiency and 19 (17.76%) patients had normal level. These results showed similarity to many of previous studies in which patients with PCOS were highly associated with vitamin D deficiency and frequency of vitamin D deficiency detected in 60% to 85% in PCOS patients.[16,17] A study conducted by Mogilli et al[18] reported that 70.3% patients with PCOS had vitamin D deficiency, 20.3% had vitamin D insufficient and only 9.4% had sufficient vitamin D. Keshavarz et al[19] reported that the frequency of vitamin D deficiency in PCOS women was 79%.

We found that patients with BMI ≥ 30 kg/m^2 had high rate of vitamin D deficiency (95.45%) as compared to patients with BMI <30 kg/m^2(60.32%), a significant association was found between higher BMI and vitamin D deficiency with p-value <0.001. These results showed similarity to some previous studies in which obese patients were more prone to have vitamin D deficiency as compared to patients with normal BMI.[16,20] However, some of studies demonstrated that there was no significant correlation between obesity and vitamin D deficiency with p-value >0.05.[13,21]

CONCLUSION

Normal vitamin D level help an individual to avoid a number of common diseases including diabetes, infertility, metabolic syndrome and can helps to reduce the mortality rate associated with severe diseases. We concluded from this study that frequency of vitamin D deficiency was 65.42% in patients with polycystic ovarian syndrome and patients with higher BMI had higher frequency of vitamin D deficiency.

REFERENCES

1. Bozdag G., Mumusoglu S., Zengin D., Karabulut E., Yildiz B.O. The prevalence and phenotypic features of polycystic ovary syndrome: A systematic review and meta-analysis. Hum Reprod 2016;31:2841–55.
2. Lizneva D., Suturina L., Walker W., Brakta S., Gavrilova-Jordan L., Azziz R. Criteria, prevalence, and phenotypes of polycystic ovary syndrome. FertilSteril2016;106:6–15.
3. CoutoAlves A, Valcarcel B, Mäkinen VP, Morin-Papunen L, Sebert S, Kangas AJ, et al. Metabolic profiling of polycystic

ovary syndrome reveals interactions with abdominal obesity. Int J Obes (Lond) 2017;41:1331–40.
4. Alvarez JA, Ashraf A. Role of vitamin D in insulin secretion and insulin sensitivity for glucose homeostasis. Int J Endocrinol 2010. 2010:ID351385.
5. Lin MW, Wu MH. The role of vitamin D in polycystic ovarysyndrome. Indian J Med Res 2015; 142(3): 238-40.
6. Moini A, Shirzad N, Ahmadzadeh M, Hosseini R, Hosseini L, Sadatmahalleh SJ. Comparison of 25-hydroxyvitamin D and calcium levels between polycystic ovarian syndrome and normal women. Int J FertilSteril2015;9:1–8.
7. Rashidi B, Haghollahi F, Shariat M, Zayerii F. The effects of calcium-vitamin D and metformin on polycystic ovary syndrome: a pilot study. Taiwan J Obste tGynecol 2009;48:142–7.
8. Dabhani KIA, Tsilidis KK. Prevalence of Vitamin D deficiency and Association with metabolic syndrome in a Qatari population. Nutr Diabetes 2017; 7(4): e263.
9. Grundmann M, Versen-HoynckFV. Vitamin D roles in women'sreproductive health? Reprod Biol Endocrinol 2011;9(4): 177-9.
10. George PS, Pearson ER, Witham MD. Effect of vitamin D supplementation on glycaemic control and insulin resistance: A systematic review and meta-analysis. Diabet Med 2012; 29: e142–e150.
11. Lappe JM. The role of vitamin D in human health. J Evidence-Based Complementary Alternative Med 2011; 16(1): 58-72.
12. Kim JJ, Choi YM, Chae SJ, et al. Vitamin D deficiency in women with polycystic ovary syndrome. ClinExpReprod Med 2014;41(2):80-85.
13. Lumme J, Sebert S, Pesonen P, et al. Vitamin D levels in women with polycystic ovary syndrome: a population-based study. Nutrients 2019;11(11):2831.
14. Parikh U, Sanghvi J. Study of estimation of level of vitamin D3 in patients of polycystic ovary syndrome and their correlation. Int J Med Health Res 2018; 4(1) 67-70.
15. Jameel R, Kamran A, Jaffri SA, Sultan S. Frequency of vitamin D deficiency in women with polycystic ovarian syndrome. J Soc Obstet Gynaecol Pak 2019; 9(3):153-7.
16. Hanif QA, Qamar S, AslamP, Omar H, Mustafa N, Masood S. Association of vitamin D deficiency with polycystic ovarian syndrome. Pak Armed Forces Med J 2019; 69(2): 241-4.
17. Hanif F, Naveed AK, Rahim A. Vitamin D level in unmarried females with polycystic ovarian syndrome. JIIMC 2016; 11(2): 57-61.
18. MogiliKD, Karuppusami R, Thomas S, Chandy A, Kamath MS, Tk A. Prevalence of vitamin D deficiency in infertile women with polycystic ovarian syndrome and its association with metabolic syndrome - A prospective observational study. Eur J Obstet Gynecol Reprod Biol 2018;229:15-9.
19. Keshavarz MA, Moradi S, Emami Z, Rohani F. Association between serum 25(OH) vitamin D and metabolic disturbances in polycystic ovary syndrome. Netherlands J Med 2017; 75(5): 13-9.
20. Lakshman LR, Pillai BP, Lakshman R, Kumar H, Sudha S,Jayakumar RV. Comparison of vitamin D levels in obese andnonobese patients with polycystic ovarian syndrome in a SouthIndian population. Int J Reprod Contracept Obstet Gynecol 2013;2(3): 336-43.
21. Eftekhar M, Mirhashemi ES, Molaei B, Pourmasumi S. Is there any association between vitamin D levels and polycystic ovary syndrome (PCOS) phenotypes?. Arch EndocrinolMetab 2020, 64(1): 11-6.