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ORIGINAL ARTICLE

Vitamin D Insufficiency in Patients Admitted to a Tertiary Care Hospitals Due to Polycystic Ovary Syndrome

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ABSTRACT

Aim: The purpose of this research was to study vitamin D deficiency in women with polycystic ovary syndrome.
Study Design: Cross-sectional study
Place and Duration: Department of Gyne & Obs King Abdullah Teaching Hospital Mansehra and Gulnawaz teaching Hospital Bannu during from August 2022 to March 2023.
Materials & Methods: In this research, 176 women with polycystic ovarian syndrome between the ages of 20 and 40 participated. Patients' data including age, body mass index, illness duration, parity and residency were recorded once they gave their permission. Vitamin D insufficiency was defined as a serum 25-hydroxyvitamin D level <20 ng/ml. SPSS 22.0 was used to analyze the data.
Results: In our study majority of the patients 70 (39.8%) were aged between 26-30 years, followed by 31-35 years 50 (28.4%) patients. Mean BMI of the patients was 29.23±7.55 kg/m^2. We found that 120 (68.2%) patients had vitamin D deficiency.
Conclusion: For individuals diagnosed with polycystic ovarian syndrome, the rate of vitamin D insufficiency was significantly greater than what was anticipated, as indicated by the outcomes of this research.
Keywords: Polycystiv Ovarian Syndrome, Vitamin D Deficiency, Tertiary Care

INTRODUCTION

Approximately 18% of women of reproductive age are affected with PCOS, rendering it the most prevalent endocrine illness among the population[1] Women with polycystic ovary syndrome (PCOS) frequently exhibit polycystic ovaries, irregular menstruation, infertility, and both biochemical and clinical hyperandrogenism. Polycystic ovary syndrome (PCOS) is associated with cardiovascular disease, type[2] diabetes, dyslipidemia, and poor glucose tolerance. Obesity and insulin resistance significantly contribute to the development of PCOS.[3] Consequently, PCOS is the predominant cause of infertility in women. Both classical and nonclassical tissues, including the ovary, may get advantages from the pleiotropic effects of vitamin D on several intracellular regulatory systems.[4] One article states, "Vitamin D supplementation may represent an appealing, cost-efficient, and safe therapeutic option for PCOS." Lean mass augmentation, regulation of insulin levels by vitamin D consumption, and enhancement of insulin sensitivity occur.[5]

Obesity results in distinct metabolic consequences compared to leanness. Research on Vitamin D and body composition in relation to PCOS in India is scarce. Recently, researchers have concentrated on the potential metabolic dysregulation associated with PCOS and vitamin D deficiency.[6-8]

In several research, including cross-sectional and case-control studies[9,10], individuals with PCOS had reduced vitamin D levels relative to healthy controls, while other studies indicated no significant difference.[11,12] Inconsistencies in results may stem from variations in sample size and methodological choices, or from diverse case characteristics such as patients' age, BMI, skin color, dietary habits, or levels of physical activity and exercise. Obesity is linked to a decrease in 25-hydroxyvitamin D levels, as stated in[13]. Reduced amounts of vitamin D-binding protein in obese PCOS patients elevate the probability of these individuals exhibiting low vitamin D levels in their bloodstream. The likelihood of vitamin D deficiency rises in individuals with PCOS who possess an elevated body mass index (BMI).

Obesity, particularly abdominal obesity, adversely affects insulin sensitivity in individuals with PCOS, especially in women[14]. It is conceivable that this association is not attributable to PCOS, but rather to obesity; this has to be confirmed. Research indicates that a deficit in vitamin D may play a role in the onset of insulin resistance in women with PCOS. A meta-analysis of randomized clinical trials indicates that short-term vitamin D therapy decreased insulin resistance, total cholesterol, and LDL-C levels in the bloodstream. Fifteen

This study focused on vitamin D insufficiency in women with polycystic ovarian syndrome (PCOS).

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MATERIALS AND METHODS

This cross-sectional/observational study was conducted at Department of Gyne & Obs King Abdullah Teaching Hospital Mansehra and Gulnawaz teaching Hospital Bannu during from August 2022 to March 2023.

A total of 176 women with polycystic ovarian syndrome between the ages of 20 and 40 were included in this research. After obtaining written permission, variables such as age, BMI, illness duration, and waist circumference were collected for each patient. Individuals with diabetes, acute renal failure, liver failure, pelvic inflammatory disease, pregnancies, vitamin D supplementation, and hypertension were excluded from this research. Diabetic patients were also eliminated.

To measure 25-hydroxy vitamin D, 5 ml of blood was drawn from each subject. 25OHD levels > 30 ng/mL were deemed adequate, while those between 20 and 29 ng/mL were deemed inadequate, and those below 20 ng/mL were deemed vitamin D deficient. SPSS 22.0 was used to analyse the whole dataset. Tables were used to record percentages and frequencies. Vitamin D insufficiency and obesity have been linked using a chi-square test. Statistical significance was defined as a P-value of 0.05 or below.

RESULTS

In our study majority of the patients 70 (39.8%) were aged between 26-30 years, followed by 31-35 years 50 (28.4%) patients, 30 (17.04%) patients were aged between 21-25 years and 26 (14.8%) were >35 years of age(.fig 1)

Mean BMI of the patients was 29.23±7.55 kg/m^2. Mean disease duration of the patients was 2.2±4.71 years. Mean waist circumference of the cases was 84.14±11.34 cm Mean systolic BP was 107.13±8.51 mmHg and mean diastolic BP was 74.6±8.51 mmHg. (Table 1)

We found that 120 (68.2%) patients had vitamin D deficiency, insufficiency found in 24 (13.6%) patients and sufficient

amount of vitamin D >30 ng/mL found in 32 (18.2%) cases. (figure 2)

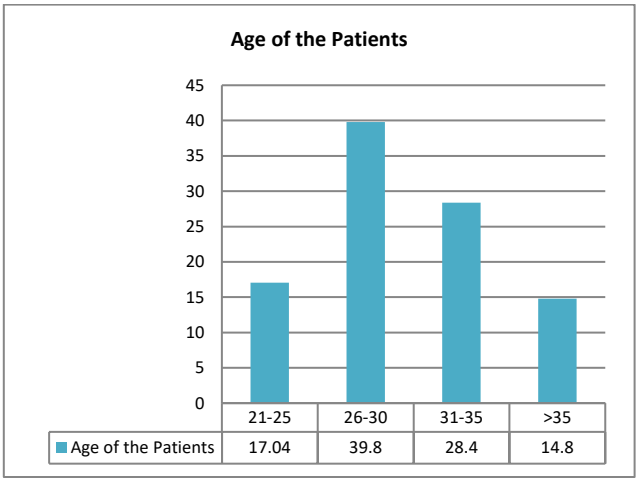

Figure 1: Distribution of age with enrolled women

Table 1: Enrolled patients had detailed demographics

Variables	Mean	Std
Mean BMI (kg/m^2)	29.23	7.55
Mean Disease duration (years)	2.2	4.71
Mean circumference (cm)	84.14	11.34
Mean Diastolic BP (mmHg)	74.6	8.51
Mean Systolic BP (mmHg)	107.13	8.51

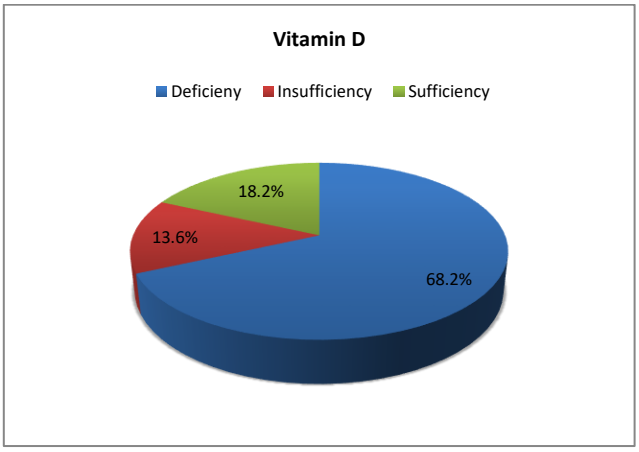

Figure 2: Association of vitamin D deficiency among all the patients

Among 120 patients of vitamin D deficiency 104 (86.7%) patients had BMI >25kg/m^{2}and 16 cases had BMI <25kg/m^2.(table 2)

Table 2: BMI and vitamin D deficiency

Variables	Frequency	Percentage
BMI		
<25kg/m^2	8	13.3
>25kg/m^2	52	86.7

DISCUSSION

Women with polycystic ovary syndrome are more prone to vitamin D deficiency.[16] Numerous studies have shown a correlation between vitamin D deficiency and the metabolic abnormalities observed in women with polycystic ovary syndrome (PCOS). It is rather common for PCOs to participate. A deficiency in vitamin D leads to insulin resistance, elevated blood pressure, and biochemical irregularities in total cholesterol, CRP, triglycerides, and LDL and HDL levels in the blood.[17]

Our study comprised 176 women, with the bulk of patients, 70 (39.8%), aged between 26-30 years, followed by 50 (28.4%) patients aged 31-35 years, 30 (17.04%) patients aged 21-25 years, and 26 (14.8%) patients over 35 years of age. These findings were analogous to prior investigations.[18,19] The average BMI of the patients was 29.23±7.55 kg/m². The average illness duration among the patients was 2.2±4.71 years. The average waist circumference of the patients was 84.14 ± 11.34 cm. The mean systolic blood pressure was 107.13±8.51 mmHg, while the mean diastolic blood pressure was 74.6±8.51 mmHg. Adiposity, as quantified by BMI, and vitamin D levels in women with PCOS have been extensively researched. Despite its lack of accuracy, BMI is frequently utilized to assess obesity. Numerous studies indicate an adverse association between vitamin D levels and BMI.[17,20]

Women with PCOS exhibited a higher likelihood than their counterparts of having 25(OH)D levels below 30 ng/mL, occurring 72.8 percent of the time. Approximately 75% of participants in the research had 25(OH)D levels below the acceptable threshold of 50 nmol/l.[21] Observational studies indicate that low levels of 25(OH)D are associated with obesity and elevated cardiovascular disease risk factors, indicating that vitamin D deficiency may aggravate the symptoms of PCOS. A multiple regression analysis of our data indicated a correlation between low vitamin D levels and HOMA-IR and SHBG levels in patients with PCOS. In women with polycystic ovarian syndrome, vitamin D insufficiency has been linked to insulin resistance.[22] In a study of individuals with PCOS, HOMA-IR was identified as a more significant independent risk factor for vitamin D deficiency in women than SHBG. Despite low 25(OH)D levels, some individuals with PCOS may not exhibit the condition. Their findings indicate that women with PCOS who were vitamin D deficient did not see improvements in insulin sensitivity or resistance following vitamin D therapy.[23] In the present investigation, vitamin D deficiency was identified in 120 patients (68.2 percent), insufficiency in 24 patients (13.6 percent), and adequate levels in 32 patients (18.2 percent).

86.7% of the 120 patients with vitamin D deficiency were overweight, with just eight cases exhibiting a BMI below 25 kg/m². The BMI was correlated with vitamin D levels as measured by dual energy x-ray absorptiometry (DEXA); however, the PCOS group exhibited lower vitamin D levels compared to the control group, while having a higher BMI than the control group. Other evidence indicates that PCOS correlates with decreased vitamin D levels, even in the absence of additional risk factors.[25] Women with untreated PCOS had reduced vitamin D levels compared to the control group, even after adjusting for age and BMI.[26]

CONCLUSION

An person with a healthy amount of vitamin D is less likely to develop diabetes, infertility, or metabolic syndrome, all of which have high death rates. The incidence of vitamin D insufficiency in individuals with polycystic ovarian syndrome was found to be 68.2%. A greater incidence of vitamin D insufficiency was also seen in individuals with higher BMI.

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