INTRODUCTION

Polycystic ovarian syndrome (PCOS) consists of hyperandrogenic chronic anovulation, uterine bleeding dysfunction and distorted ovarian morphology.¹ PCOS is the leading disorder of reproductive age group. It is seen in 10% of diseases of females and is most common endocrine disorder.² The characteristic features of PCOS are obesity, impaired glucose metabolism and insulin resistance which are commonly seen in patients of metabolic syndrome. It is the leading reason of anovulatory infertility among women. Insulin resistance is present in approximately 60-75% of females with PCOS.³

Women with PCOS present with findings of metabolic disturbances.⁴ It is shown that altered glucose tolerance and insulin resistance (IR) with compensatory hyperinsulinemia are key features seen in 30–40% of PCOS patients.⁵ It is also found that 10% of these patients develop type II diabetes mellitus. Recent data suggests that the main causative factor causing insulin resistance in PCOS patients is adipose tissue dysfunction. It is seen in 95% of obese females. However the occurrence insulin resistance in lean females having PCOS is not uncommon.⁶

The features such as alteration in lipid profile, occurrence of hypertension, obesity, enhanced risk of infertility, endometrial carcinoma, type II diabetes mellitus and cardiovascular disease (CVD) in women helps in making diagnosis of PCOS.⁷ It has been found that PCOS patients have vitamin D deficiency thus substantiate the fact that vitamin D has some connection between insulin resistance and PCOS.⁸ The present study was conducted to assess correlation of vitamin D with metabolic parameters in women diagnosed with PCOS.

MATERIALS & METHODS

This study was conducted in the department of gynecology. It comprised of 60 women with PCOS in the age range of 18-45 years. Inclusion criteria were premenopausal females and patients with normal thyroid profile. Exclusion criteria were pregnant women, patients on vitamin D therapy and those not giving consent. The study was explained to patients and their written consent was taken. Ethical clearance was obtained from institute ethical committee prior to start the study.

Patient data such as name, age, etc. was recorded. Patients were divided into 2 groups. Group I were PCOS patients with vitamin D deficiency (25OHD <30 ng/mL) (45) and group II were normal PCOS patients (25OHD >30 ng/mL) (15). Group I were further divided into 3 sub groups. Group I a were mild (25 OHD 10-20 ng/mL), group I b were moderate (25 OHD 5-10 ng/mL) and group I c were severe (25 OHD <5 ng/mL). There was non-significant difference in body weight, BMI, waist circumference (WC), hip circumference, body fat, waist hip ratio (WHR), fasting glucose, fasting insulin, HOMA-IR, total cholesterol (TC), triglyceride (TG), LDL, HDL, LH and FSH in all groups. There was no correlation of body composition, lipid parameters, glycemic indices and hormonal parameters with 25 OHD (P> 0.05).

Abstract

Background: The present study was conducted to assess correlation of vitamin D with metabolic parameters in women diagnosed with Polycystic ovarian syndrome (PCOS).

Materials & Methods: This study was conducted on 60 women with PCOS in the age range of 18-45 years. Assessment of Height, weight, BMI, body fat (%) = Body fat mass (kg)/body weight (kg) × 100 was done. Hematological and biochemical parameters such as blood glucose, lipid profile, 25OHD, insulin, luteinizing hormone (LH) and follicle stimulating hormone (FSH) were performed. Group I patients were vitamin D deficient (25OHD <30 ng/mL) (45) and group II were normal PCOS patients (25OHD >30 ng/mL) (15). Group I patients were further divided into 3 sub groups. Group I a were mild (25 OHD 10-20 ng/mL), group I b were moderate (25 OHD 5-10 ng/mL) and group I c were severe (25 OHD <5 ng/mL). There was non-significant difference in body weight, BMI, waist circumference (WC), hip circumference, body fat, waist hip ratio (WHR), fasting glucose, fasting insulin, HOMA-IR, total cholesterol (TC), triglyceride (TG), LDL, HDL, LH and FSH in all groups. There was no correlation of body composition, lipid parameters, glycemic indices and hormonal parameters with 25 OHD (P> 0.05).

Conclusion: Authors found Hypovitaminosis D was common in patients with PCOS. There was no correlation of metabolic parameters with 25OHD.
examination was done. Assessment of Height, weight, BMI, body fat (%) = Body fat mass (kg)/body weight (kg) × 100 was done. Hematological and biochemical parameters such as blood glucose, lipid profile, 25OHD, insulin, luteinizing hormone (LH) and follicle stimulating hormone were performed. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

| Parameters          | Group I           | Group II (15)       |
|---------------------|-------------------|---------------------|
| Vitamin D deficiency| Normal            | Normal              |
| 25OHD level         | <30 ng/mL         | >30 ng/mL           |

Table I shows that group I patients were vitamin D deficient (25OHD <30 ng/mL) (45) and group II were normal PCOS patients (25OHD >30 ng/mL) (15).

Table II Assessment of metabolic parameters

| Parameters          | Group I         | Group II         |
|---------------------|-----------------|------------------|
| Body weight (Kg)    | 74.1 ± 4.1      | 67.4 ± 4.1       |
| BMI (Kg/m²)         | 31.2 ± 4.1      | 27.2 ± 4.1       |
| WC (cm)             | 75.2 ± 4.1      | 75.2 ± 4.1       |
| Hip circumference (cm) | 89.2 ± 4.1      | 90.1 ± 4.1       |
| Body fat (%)        | 38.1 ± 4.1      | 34.6 ± 4.1       |
| WHR (N)             | 0.9 ± 0.1       | 0.9 ± 0.1        |
| Fasting glucose (mg/dL) | 94.2 ± 4.1       | 90.4 ± 4.1       |
| Fasting insulin (μ IU/mL) | 16.1 ± 4.1      | 14.8 ± 4.1       |
| HOMA-IR (N)         | 3.8 ± 0.1       | 3.5 ± 0.1        |
| TC (mg/dL)          | 181.2 ± 4.1     | 173.2 ± 4.1      |
| TG (mg/dL)          | 138.1 ± 4.1     | 130.5 ± 4.1      |
| LDL (mg/dL)         | 143.5 ± 4.1     | 142.2 ± 4.1      |
| HDL (mg/dL)         | 47.2 ± 4.1      | 41.2 ± 4.1       |
| LH (IU/L)           | 35.2 ± 4.1      | 36.6 ± 4.1       |
| FSH (IU/L)          | 6.5 ± 0.1       | 6.1 ± 0.1        |

Table II shows that the mean body weight in group I was 74.2 kg and in group II was 67.4 kg. BMI in group I was 30.2 Kg/m² and in group II was 25.6 Kg/m², waist circumference was 78.2 cm in group I and 75.2 cm in group II, hip circumference was 89.6 cm in group I and 90.1 cm in group II, body fat was 39.6% in group I and 34.6% in group II, waist hip ratio was 0.9 in group I and 0.9 in group II, fasting glucose was 94.2 mg/dL in group I and 88.2 mg/dL in group II, fasting insulin was 15.8 μ IU/mL in group I and 16.2 μ IU/mL in group II, HOMA-IR was 3.8 in group I and 3.5 in group II, total cholesterol (TC) was 182.2 mg/dL in group I and 173.2 mg/dL in group II, triglyceride (TG) was 138.5 mg/dL in group I and 130.5 mg/dL in group II, LDL was 143.5 mg/dL in group I and 142.2 mg/dL in group II, HDL was 47.2 mg/dL in group I and 41.2 mg/dL in group II, LH was 35.8 IU/L in group I and 18.8 IU/L in group II and FSH was 6.7 IU/L in group I and 6.1 IU/L in group II.

Table III Correlation between 25-hydroxy Vitamin D and parameters

| Parameters          | Group I         | Group II         |
|---------------------|-----------------|------------------|
| % of body fat       | -0.142          | 0.12             |
| BMI                 | -0.018          | 0.13             |
| WC                  | -0.35           | 0.43             |
| WHR                 | -0.131          | 0.25             |
| TC                  | -0.042          | 0.52             |
| TG                  | 0.104           | 0.91             |
| HDL                 | -0.125          | 0.16             |
| LDL                 | -0.068          | 0.43             |
| Fasting insulin     | -0.052          | 0.23             |
| HOMA-IR             | -0.072          | 0.55             |
| LH                  | -0.15           | 0.56             |
| FSH                 | -0.119          | 0.61             |

Table III shows that there was no correlation of body composition, lipid parameters, glycemic indices and hormonal parameters with 25 OHD (P> 0.05).

DISCUSSION

Polycystic ovary syndrome (PCOS) is the most common endocrinopathy in female of reproductive age. It has high mortality and morbidity. It is suggested that the connection between vitamin D and PCOS develops from the endocrine pathways affected in PCOS like sex hormone synthesis and expression, and improves insulin sensitivity. Studies have documented that vitamin D administration may be helpful, economical and effective in women diagnosed with PCOS. They found improvement in lean mass, regulation of insulin release, altered insulin receptor expression, and improves insulin sensitivity. The present study was conducted to assess correlation of vitamin D with metabolic parameters in women diagnosed with PCOS.

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In present study, group I patients were vitamin D deficient (25OHD <30 ng/mL) (45) and group II were normal PCOS patients (25OHD >30 ng/mL) (15). Based on 25 OHD level, group I a patients were mild (25 OHD 10-20 ng/mL), group I b were moderate (25 OHD 5-10 ng/mL) and group I c were severe (25 OHD <5 ng/mL). Each sub group had 15 patients.

We found no significant difference in body weight, BMI, waist circumference (WC), hip circumference, body fat, waist hip ratio (WHR), fasting glucose in all groups. The mean body weight in group I was 74.2 kg and in group II was 67.4 kg, BMI in group I was 30.2 Kg/m² and in group II was 25.6 Kg/m², waist circumference was 78.2 cm in group I and 75.2 cm in group II, hip circumference was 89.6 cm in group I and 90.1 cm in group II, body fat was 39.2% in group I and 34.6 %, waist hip ratio was 0.9 in group I and 0.9 in group II, fasting glucose was 94.8 mg/dL in group I and 88.2 mg/dL in group II.

Kumar et al14 included 100 patients to assess correlation of vitamin D level with metabolic parameters. 90 patients had 25OHD deficiency. There was mean age of 28.6 ± 6.3 years, body mass index of 30.4 kg/m² and body fat of 39.1%. Hypovitaminosis D was seen more in younger and obese patients. It was found that patients with hypovitaminosis D had a higher BMI, low- high-density lipoprotein, calcium and elevated testosterone as compared to patients with normal 25OHD patients. There was no correlation of metabolic parameters with 25OHD.

We found that fasting insulin was 15.8 μ IU/mL in group I and 16.2 μ IU/mL in group II, HOMA-IR was 3.8 in group I and 3.5 in group II, total cholesterol (TC) was 182.2 mg/dL in group I and 179.2 mg/dL in group II, triglyceride (TG) was 138.5 mg/dL in group I and 130.5 mg/dL in group II, LDL was 143.5 mg/dL in group I and 142.2 mg/dL in group II, HDL was 47.2 mg/dL in group I and 41.2 mg/dL in group II, LH was 35.8 IU/L in group I and 18.8 in group II and FSH was 6.7 IU/L in group I and 6.1 IU/L in group II. We found no significant difference in fasting insulin, HOMA-IR, total cholesterol (TC), triglyceride (TG), LDL, HDL, LH and FSH in both groups.

We observed that there was no correlation of body composition, lipid parameters, glycemic indices and hormonal parameters with 25 OHD (P> 0.05). Lumme et al15 conducted a study in 4523 females and found that all patients had same 25(OH)D level with and without self-reported PCOS (50.35 vs. 48.30 nmol/L). Patients who self-reported PCOS presented with a higher body mass index (BMI), increased insulin resistance, and low-grade inflammation and testosterone levels compared to controls. Authors found a positive association between total 25(OH)D levels in self-reported PCOS.

CONCLUSION
Authors found Hypovitaminosis D was common in patients with PCOS. There was no correlation of metabolic parameters with 25OHD.

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