



A COMPARATIVE STUDY OF PREVALENCE OF VITAMIN D DEFICIENCY IN ADOLESCENT GIRLS AND ITS CORRELATION WITH PCOS

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ABSTRACT **Background:** Prevalence of polycystic ovary syndrome (PCOS) is increasing particularly among the female adolescents and young women. **Objective:** This study was designed to determine the correlation of vitamin D deficiency with PCOS. **Methods:** This is cross sectional study, which included 120 adolescent girls (10-19 yrs), of whom 60 had PCOS and 60 were non-PCOS controls. Serum 25(OH) D was measured. Anthropometric components, endocrine, metabolic components were determined in PCOS subjects. **Results:** Mean 25 (OH) D was significantly lower in PCOS (22.2 ± 8.01) than non-PCOS adolescent girls (27.54 ± 5.3). Prevalence of vitamin D deficiency in PCOS adolescent girls was 78.3% & prevalence of vitamin D deficiency in non PCOS adolescent girls was 18%. Vitamin D deficient PCOS adolescent girls had significantly higher BMI and waist circumference. **Conclusion:** Our results suggested that Serum 25(OH) vit D was significantly lower in PCOS than non PCOS adolescent girls. Lower level of vit D was also seen in overweight & obese girls.

KEYWORDS : Polycystic ovary syndrome, Vitamin-D, Calcium, Adolescent girls.

INTRODUCTION

Vitamin D plays a physiologic role in reproduction including ovarian follicular development and luteinization via altering anti-müllerian hormone (AMH) signaling, follicle-stimulating hormone sensitivity and progesterone production in human granulosa cells. (Irani M et al., 2014)[2].

It also affects glucose homeostasis through manifold roles through vitamin D receptor (VDR) in pancreatic β -cells and skeletal muscle, the expression of 1- α -hydroxylase enzyme, and the presence of a vitamin D response element in the human insulin gene promoter. (Alvarez JA et al., 2010).

Recently, many studies have used Categorization of vitamin D status Plasma 25-OH vit D concentration (Holick MF et al, 2011)[1].

- Severe deficiency (<10 ng/ml [25 nmol/L]);
- deficiency (<20 ng/ml [50 nmol/L]);
- insufficiency ($20-29$ ng/ml [$51-74$ nmol/L]); and
- normal level (sufficiency) (≥ 30 ng/ml [>75 nmol])

The prevalence of severe vitamin D deficiency (50% of the population worldwide) in adolescents is considerably high in Middle-east and Southeast Asia. (Soliman et al, 2014).

Vitamin D deficiency among adolescents is an emerging public health priority as adolescence marks a period of rapid growth and onset of the reproductive phase. Evidence suggests adolescent girls are prone to deficiency as compared to boys. (Moore et al., 2004)[3]; (Rockell et al, 2005); (Saintonge et al, 2009)[4].

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in women of reproductive age (Bozdag, G et al, 2016).

It is commonly related to features of metabolic syndrome, including obesity, impaired glucose metabolism, and insulin resistance (IR) (Couto Alves, A., 2017)(5) and is one of the main causes of anovulatory infertility (El Hayek, S et al, 2016).

The prevalence of vitamin D deficiency in women with PCOS is about 67-85 per cent, with serum concentrations of 25(OH)D <20 ng/ml. (Thomson RL et al. 2012)[2]. Indeed, the nuclear receptor for vitamin D (VDR) is expressed in several tissues, including the ovaries, suggesting a regulatory function.

However the correlation between vitamin D deficiency and PCOS is less clear. Recent observational and randomized control trials have attempted to investigate this issue, but there remains limited guidance for vitamin D supplementation to improve fertility & metabolic disturbances. Vitamin D might also have beneficial effects to the insulin responsiveness and androgen levels in PCOS

MATERIALS AND METHODS

A comparative Cross Sectional Study Design analytical study including total 120 adolescent girls was conducted in the Obs. & Gynae. Dept. of GSVM Medical College Kanpur from November 2019 to September 2021.

Among these 60 girls who had been diagnosed with PCOS based on Rotterdam criteria were included. This criteria consists of different clinical manifestations of both oligo-ovulation or hyperandrogenism (clinical or laboratory), including hirsutism, acne, elevated testosterone, as well as morphologic view of PCOS in ovarian sonography. 60 adolescent girls who reported in OPD with complaints not suggestive of PCOS were included in this study as a control group. Girls having thyroid disorders, chronic liver disease, known parathyroid disorder, malabsorption syndrome, on ATT, anti-epileptics, steroids, having virilizing tumors, diabetes mellitus were excluded. 3 ml sample of blood was taken from all participants, promptly centrifuged, sera separated, and kept frozen at -80° C until used.

Working Proforma

PARTICULARS
Name
Age
Age of menarche
Diet (vegetarian / non-vegetarian)
Habitat (rural / urban)
Occupation / Socioeconomic status
Education
Menstrual history
Past history of hypertension, diabetes, tuberculosis
Family history of hypertension, obesity, diabetes
General examination
General condition
Vitals: Pulse rate, respiratory rate, blood pressure
Edema
Pallor
Systemic examination like cardiovascular system, central nervous system and gastrointestinal system
Body mass index
Waist circumference
Investigations: Routine
Haemoglobin
Blood group
Urine (sugar, albumin)
Blood sugar (fasting & PP)
HIV/HCV/HbsAg/VDRL

SPECIFIC
OGTT
Serum 25 (OH) Vitamin D
Liver function test
Kidney function test
S.TSH
S. LH
S. FSH
S. Prolactin
S. testosterone
Pelvic ultrasound

Data Analysis

Statistical analysis of data was conducted by using SPSS software (version 25.0; SPSS). Data presented as mean $\pm$ SD. For comparison of percentages and proportions chisquare test was used, p-value. Categorical variables were presented as number and percentage. Analytical analysis was carried out by using the Chi-square for comparing categorical variables.

Data was analyzed using appropriate statistical tools.

OBSERVATION AND RESULTS

Comparative Evaluation Of Vitamin "d" Levels In Different Age Group In Both Tthe Groups

Vitamin	N=120											
D levels	10-<13 Years				13-<16 Years				16-19 Years			
	Group I		Group II		Group I		Group II		Group I		Group II	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
≥ 30 ng/ml	0	0%	2	3.3 %	5	8.3 %	6	10%	8	13.3 %	12	20%
20-29 ng/ml	0	0%	1	1.6 %	3	5%	14	23.3 %	8	13.3 %	14	23.3 %
<20 ng/ml	0	0%	0	0%	8	13.3 %	5	8.3 %	28	46.6 %	6	10%
Total	0	0%	3	4.9 %	16	26.6 %	25	41.6 %	44	73.2 %	32	53.3 %
P value	NA				0.04448				0.0005119			

Table 1; Among total adolescent girls (n=120) who have below optimal level of vitamin D were between 16-19Yrs of age .chi-square statistics is 15.15 & P value is <0.0005 in 16-19 yrs of age in both the group. It is statistically significant(P value<0.05).

Comparative Evaluation Of Vitamin D Level With BMI In Both The Groups

BMI (kg/m2)	Vitamin "D" Level(ng/ml) (N=120)											
	≥ 30 ng/ml				20-29 ng/ml				<20 ng/ml			
	Group I		Group II		Group I		Group II		Group I		Group II	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Underweig ht(<18)	0	0%	3	5%	0	0%	2	3.3 %	0	0%	0	0%
Normal (18-24)	10	16.6 %	17	28.3 %	3	5%	24	40%	11	18.3 %	11	18.3 %
Overweigh t(25-29.9)	2	3.3 %	0	0%	8	13.3 %	3	5%	24	40%	0	0%
obese(>30)	1	1.6 %	0	0%	0	0%	0	0%	1	1.6 %	0	0%
Total	13	21.5 %	20	33.3 %	11	18.3 %	29	48.3 %	36	59.8 %	11	18.3 %
P value	0.005803				0.01253				0.004898			
X2	10.30				8.76				10.64			

Table 2; Among group 1(PCOS) adolescent girls ,71.7% of obese or overweight having below optimal level of vitamin D. Chi square statistics is 2.806.The P value is o.o2.

The result is significant (p<0.05). Among group 2(non PCOS) adolescent girls ,most of them have BMI in normal range, among them 23.3% of having below optimal level of vitamin D . Chi square statistics is 5.545.The result is not significant (p value>0.05)

Table 3; shows majority of vitamin D deficient patient having high and very high waist circumference in group 1 & normal waist circumference in group 2. It is statistically not significant(p value >0.05).

Comparative evaluation of Vit. D level with waist Circumference in Both Group

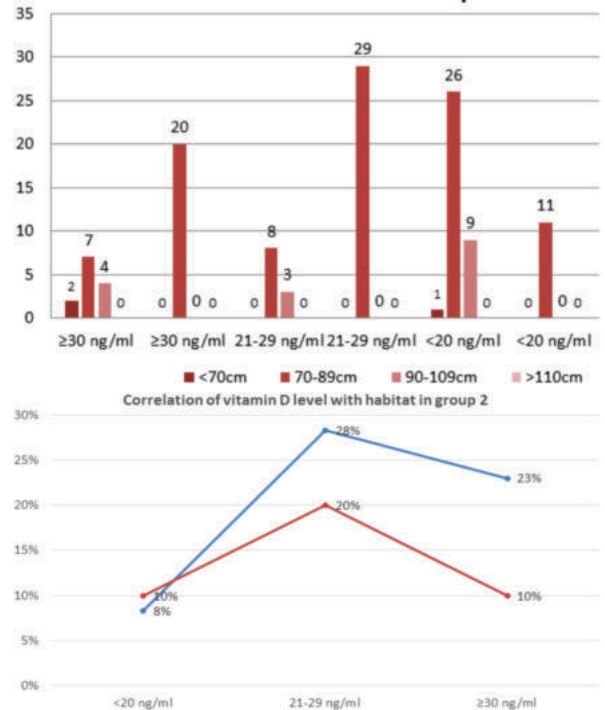


Table 4;Showing prevalence of vitamin D deficiency in urban population is 75% & in rural population is 61% in group 2 patients. Chi square statistics is 1.826.it is statistically not significant(P value>0.05)

CONCLUSION

The present study was a cross sectional study design conducted in department of Obstetrics & Gynaecology at GSVM Medical College, Kanpur. The present study aimed to evaluate the prevalence of vitamin D deficiency in adolescent girls & its correlation with PCOS. It included 120 adolescent girls were enrolled from OPD .Among these 60 adolescent girls who had been diagnosed with PCOS based on Rotterdam criteria & 60 were non PCOS adolescent girls.

Prior studies have shown PCOS to be a risk factor for vitamin D insufficiency, high BMI, and metabolic syndrome, which coincide with metabolic disturbances in PCOS. Women with PCOS with a high BMI have more insufficient 25(OH)D levels compared with their normal-BMI counterparts

The salient observation of present study is-

1. Majority of patients in our study were between 16-19 yrs of age.
2. Majority of patients in group 1(PCOS) having BMI in overweight and normal range & in group 2 in normal range. The bioavailability of vitamin D might decrease when sequestered to adipose tissue, explaining the negative association between BMI and vitamin D levels, and the differences between the two groups
3. Majority of vitamin D deficient adolescent girls were of lower middle class.
4. Prevalence of vitamin D deficiency in adolescent girls is 78.3%,while only 21.7% having optimal level of vitamin D.
5. Prevalence of vitamin D deficiency in group1(PCOS)adolescent girls is 78%,while only 22% having optimal level of vitamin D.
6. Prevalence of vitamin D deficiency in group 2(non-PCOS)adolescent girls is 66%,while only 33% having optimal level of vitamin D.
7. Vitamin D-deficient PCOS patients had significantly higher body mass index (BMI) and waist circumference.
8. In our study no association was found between particular age group & vitamin D deficiency.
9. High prevalence of vitamin D deficiency among adolescent girls of urban population.

Finally, the potential relationship between vitamin D and PCOS requires further investigation, since vitamin D deficiency has been continuously proposed to increase the risk of insulin resistance and T2DM, which is also a core pathophysiology of PCOS. ,Multi-center

randomized controlled trials with large sample sizes are needed to explore the metabolic role of vitamin D supplementation in women with PCOS.

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