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EXPLORE THE IMPACT OF VARYING VITAMIN D3 DOSES ON WOMEN SUFFERING FROM POLYCYSTIC OVARY SYNDROME AND INFERTILITY

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Abstract:
PCOS (polycystic ovarian syndrome), the most frequent hormonal condition in reproductive-age women, is the most common. Having polycystic ovaries, anovulation, and clinical and/or biochemical signs of high testosterone describe the disease. Few foods naturally contain fat-soluble vitamin D3. A supplement may help if required. Its extensive impacts are due to its steroid hormone status. High or low vitamin D3 levels in women with polycystic ovaries and those who have trouble becoming pregnant are the focus of this investigation.
Our study found that vitamin D3 levels in infertile women drop significantly compared to healthy controls, stratified by age. Compared to healthy persons in particular age groups, polycystic ovarian syndrome females had a statistically significant increase in vitamin D3 levels. Vitamin D3 levels are similar in PCOS and infertile women. Our study found that vitamin D3 levels in women who cannot conceive and those with polycystic ovary syndrome (PCOS), whether high or low, may regulate ovulation and improve fertility.

Keywords: Infertile women; Infertility; PCOS; Polycystic ovary syndrome; Vitamin D3.

Introduction

The most common endocrine disorder in femeal of childbearing age is polycystic ovarian syndrome (PCOS) (1). Ovulatory dysfunction, the results of a clinical trial, and/or biological data of hyperandrogenism, and polycystic ovaries all contribute to the heterogeneous syndrome (2).

Emotional morbidity may be a result of the clinical signs of polycystic ovary syndrome (PCOS), issues like hirsutism, alopecia,and acne (caused by hyperandrogenism in PCOS femail), obesity, and infertility are all associated with this syndrome (3); having a low standard of living., a lack of confidence, marital and societal strife, and diminished sexual function have all been linked to polycystic ovary syndrome (PCOS) in women. (4). Mood and anxiety disorders that PCOS women are more likely to experience, and they can have a damaging effect

on sexual functioning (5). Improper endometrial expression of adhesion proteins is linked to infertility diseases like polycystic ovary syndrome (PCOS) (6). During the menstrual cycle's proliferative stage, expression of the nuclear hormone receptors ER and PR for estrogen and progesterone is increased in the fertile endometrium and then decreases after ovulation, when progesterone levels increase. However, higher ER and PR expression in infertile PCOS patients causes changes in the expression of ER- and PR-regulated proteins important for implantation (7).

Vitamin D, a fat-soluble vitamin that can only be found in a few food sources but is easily supplemented, is essential for health but is difficult to obtain in food alone. Because it is a steroid hormone, it can affect many different bodily functions. Vitamin D's fundamental effects on the metabolism of calcium and bone are just the beginning. It also has a role in influencing cell formation, neuromuscular and immune function, and decreasing inflammation (8). A lack of vitamin D increases the likelihood of developing high blood pressure, diabetes, and cancer (9). Evidence is mounting that VD insufficiency contributes to the pathophysiology of IR and the metabolic syndrome in PCOS syndrome (8).

The traditional areas of vitamin D's action in the body (the bone, kidney, and intestine) have been expanded upon in the past decade (10). Anti-Müllerian hormone (AMH) (11), follicle-stimulating hormone (12), estradiol (13), and progesterone (14) are only some of the hormones that vitamin D has been shown to affect. Vitamin D insufficiency was also connected to a higher risk of PCOS. Possible mechanisms linking vitamin D and breast cancer risk include actions on LH, sex hormone-binding globulin, testosterone, insulin resistance, and aromatase gene expression by vitamin D receptors (13-15).

The purpose of this research is to find out if polycystic ovary syndrome and infertility are linked to high or low levels of vitamin D3.

1. Materials And Methods.

- Sample gathering and methodology:

The research was carried out at the Infertility Center between the dates of February 1 and the end of April 2021, and it included a total of 30 female participants. Of these, 15 were diagnosed with primary infertility, which was the focus of the investigation, while the other 15 were healthy mothers who already had at least one child. The information was collected through the use of a questionnaire that was developed specifically for the research project. This questionnaire included questions regarding the participants' ages, occupations, marital histories, regularity and history of menstruation, genetic diseases, BMI, and the type of treatment that was utilized for infertility. Additionally, the percentage of vitamin D was determined through the use of Roche Diagnostics' Cobas e411 instrument.

- Statistical Analysis:

The data was tabulated and processed using SPSS (Statistical Package for the Social Sciences) V.20 for Mac. This software was used to analyze the data. The findings of quantitative research

are often reported in the form of a percentage or a frequency distribution. When the p-values were lower than 0.05, (16), statistical significance was judged to have been achieved.

3. Results and Discussion:

Table (1): The mean concentration of Vitamin D3 levels among females with infertility and control group according to age groups.

Age / Variables	Case study	Age group: (15-25years)	Age group: (26-35 years)	Age group: (Above 36 years)	LSD value
		Mean ± SD	Mean ± SD	Mean ± SD	
Vitamin D3	Controls	20.33 ± 3.44 B	16.5 ± 5.56 A	16.20 ± 3.70 A	0.923
	Infertile Women	10.2 ± 7.23 A	9.75 ± 4..92 A	11.2 ± 3.54 A	

Data = Mean ± S.D.
Different letters vertically of data are denote to significant different ($p<0.05$).
Similar letters vertically of data are denote to non-significant different ($p>0.05$).

In Table (1): a control group of women in age (15-25 years) a significant difference was observed when compared with infertile women. While There was no discernible difference in the other age group. Given the importance of vitamin D3 in the opportunity to obtain high-quality embryos and transfer them to the blastocyst stage, it is necessary to provide adequate levels of vitamin D3 at both the level of the ovary and the endometrium (17). Vitamin D3 deficiency is associated with preeclampsia (18) and endometriosis (19), PCOS (20), and miscarriage (21). Researchers have found that insufficient amounts of vitamin D3 lead to decreased fertility, higher pregnancy difficulties, and uterine hypoplasia. (22) Both Rudick and coworkers' analyses yield findings that are consistent with ours (23, 24). They conflict with the findings of the two Iranian research (25, 26). Also, deficiencies in vitamin D3 in women affect the production of hormones such as testosterone, and thus this causes hypoactive sexual disorders (27). Vitamin D3 receptors play a regulatory role in reproductive physiology, and if there is a deficiency in the level of vitamin D3 this can cause an impact on the functions of female and sexual organs (28). The researcher has found that infertile women with low levels of vitamin D3 have a higher prevalence of female sexual impotence than women with a normal vitamin D3 level. All sexual areas are affected by low d3 levels (29).

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Table (2): The mean concentration of Vitamin D3 levels among females with Polycystic ovaries and control group according to age groups.

Age / Variables	Case study	Age group: (15-25years)	Age group: (26-35 years)	Age group: (Above 36 years)	LSD value
		Mean ± SD	Mean ± SD	Mean ± SD	
Vitamin D3	Controls	20.33 ± 3.44 B	16.5 ± 5.56 A	16.20 ± 3.70 A	1.254
	Polycystic ovaries	24.6 ± 6.18 A	35.2 ± 3.39 A	43.6 ± 1.49 A	

Data = Mean ± S.D.
Different letters vertically of data are denote to significant different ($p<0.05$).
Similar letters vertically of data are denote to non-significant different ($p>0.05$).

In Table (2): control group of women in age (15-25 years) a significant difference was observed when compared with Polycystic ovaries of women. While there was no discernible difference in the other age group. Whereas, the results of this study are in agreement with (30), When people of the same race and family history are studied together, researchers find that the age range of the tongue determines the effect of age on vitamin D levels (31,32). The expression of vitamin D receptors may impact vitamin D levels (33). changes in the genetic composition of vitamin D receptors are associated with changes in the expression of many genes involved in lipid and glucose metabolism. The presence of polymorphism in the receptors (34) is linked to an increased susceptibility to developing PCOS. This association may be attributed to the impact of insulin and testosterone levels (33, 35, 36). PCOS is a polygenic condition that is often associated with metabolic problems (18). Studies have shown that Vitamin D may possess anti-inflammatory characteristics and have a positive impact on glucose metabolism (37). Nevertheless, within the PCOS group, elevated levels of D were not shown to be correlated with reduced levels of hs-CRP. We must determine if this factor is responsible for the reduced incidence of cardiovascular disease (CVD) seen in women with polycystic ovary syndrome (PCOS) (38). While our results are fundamentally inconsistent with the results of previous research (39, 34, 40), a decrease in this vitamin can cause an imbalance in the regulation of calcium, and this leads to an increase in follicles stopping, and consequently, menstrual disorders and fertility in women with PCOS (40).

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Table (3): The mean concentration of Vitamin D3 levels among females with Polycystic ovaries and Infertile Women according to age groups.

Age / Variables	Case study	Age group: (15-25years) Mean ± SD	Age group: (26-35 years) Mean ± SD	Age group: (Above 36 years) Mean ± SD	LSD value
Vitamin D3	Infertile Women	10.2 ± 7.23 A	9.75 ± 4.92 A	11.2 ± 3.54 A	0.841
	Polycystic ovaries	24.6 ± 6.18 A	35.2 ± 3.39 A	43.6 ± 1.49 A	

Data = Mean ± S.D.
Different letters vertically of data are denote to significant different ($p<0.05$).
Similar letters vertically of data are denote to non-significant different ($p>0.05$).

In Table (3): There is no significant difference when measuring the level of vitamin d3 in both women with PCOS and infertile women compared to each other because vitamin d3 has been observed to have the same effect on the formation of follicles as well as ovulation and other reproductive processes in women as the receptors for this vitamin are present in each of placenta, fetal membranes, uterus, oviduct, and ovaries how much was stated in previous research (41, 42).

4. CONCLUSION

It is possible to draw the conclusion that the levels of vitamin D3 in cases of infertility and polycystic ovary syndrome (PCOS) will have an effect on fertility rates. This is because vitamin D3 regulates the ovulation process and increases the likelihood of a successful pregnancy. This is true regardless of whether the levels are elevated or decreased.

5. Declaration of generative AI and AI-assisted technologies in the writing process:

During this study, the writers used [chat GPT] to rephrase the references. After utilizing this tool, the writers examined and modified the text as appropriate and bear full responsibility for the content of the publication.

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