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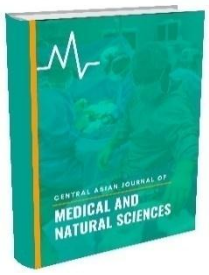

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Role of Selected Vitamins in Women with Polycystic Ovarian Syndrome -Thi-Qar Governorate –Iraq

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Key words: Polycystic ovarian syndrome, Vitamin A, Vitamin B6, Vitamin D3, and Vitamin E.

Abstract:

Background: The enigma surrounding PCOS makes it a convoluted and multifarious condition. To tackle it, doctors usually prescribe a variation of lifestyle changes, including exercise, eating modifications, and vitamin/mineral intakes. It looks like Vitamin D has an eminent role in shaping the ovaries' follicle development. Plus, Vitamin B can diminish inflammation by degrading homocysteine as well as apparently limiting fertility chances and doubling the risk of miscarriages. Vitamin A is a must-have for sight, plus it's good for the reproductive system. Vitamin E helps shut down oxidation and keep physiological systems in check– both of which are key for reproductivity...

Objectives: Assessment the level of vitamin D3, B6, A, and vitamin E among studied groups.

Materials and Methods: We studied a big group from July 2021 to August 2022. This was split between a case group of 60 women with PCOS and a control group of 60 healthy reproductive-types. We took place at Bint Al-Huda Hospital in Nasiriya City, Thi-Qar governorate, plus one private gynecologist clinic. To get answers, we checked what vitamins were floating around their bodies and analyzed the data with heavy statistical testing.

Results: Often, the bodies of women with PCOS are bigger than fertile women. And, when it comes to pregnancy, there's a notable decrease among those with PCOS. We made sure to look into other variables too– like age, vitamin D3 levels, vitamin B6 levels, and vitamin A levels. But these factors were all the same regardless of PCOS status. The only exception was vitamin E... which actually showed up in higher concentrations for those with PCOS...

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Conclusions: Regarding the vitamins D3, B6, and A, this recent study reveals no significant variations. However, intriguingly, there are notable disparities found in the case of vitamin E.

1. INTRODUCTION

Back in '35, Stein and Leventhal took a hard look at Polycystic Ovarian Syndrome. This medical affliction is marked by an abundance of male hormones. It causes problems like menstrual dysfunction, infertility, obesity, hirsutism, acne– the list goes on[1]. What's worse is that these pesky symptoms can actually lead to life-threatening diseases like diabetes and metabolic disorder. Not only that, but they make people more prone to developing mental illnesses such as anxiety and sleep apnea as well[2].

Vitamin D3 (1,25-dihydroxyvitamin D)

Vitamin D has an immense effect on human granulosa cells– reshaping progesterone production, FSH sensitivity, and AMH signaling. But that's not all; it also takes part in glucose balance through its receptors found in β-cells and skeletal muscles, as well as its enzyme 1-α-hydroxylase which can convert 25(OH)D to 1,25-dihydroxyvitamin D. Scientists even discovered a vitamin D response element inside the promoter of the insulin gene [3].

Vitamin B6 (Pyridoxine)

Vitamin B6, or pyridoxine, is a huge help to our bodies when it comes to metabolizing proteins, fats, and carbs [4]. Unfortunately, when an imbalance arises between reactive oxygen species (ROS) and the body's antioxidant defense mechanisms, oxidative stress can lead to fertility issues [5,6]. This is where homocysteine metabolism kicks in; it needs certain B vitamins like folate plus Vitamins B6 and B12 in order to keep functioning properly [7]. High plasma homocysteine levels because of dietary methionine can cause major cardiovascular and reproductive issues for people with PCOS [8]. The link between homocysteine and cardiovascular issues has been well-established. We suspect this is due to a range of biological issues like haphazard endothelial systems, oxidative overloads, inflamed blood vessels, augmented smooth muscle proliferation, and trigger-happy clotting factors. Homocysteine – an essential amino acid – could be the main culprit [7].

Vitamin A (Retinoid)

Retinol, otherwise known as Vitamin A, is a fat-soluble vitamin with a plethora of functions. Its metabolites—retinoids, retinoic acid—are essential for things like antioxidant activity and steroid metabolism [9,10]. Perhaps surprisingly, the source of this benefactor depends on whether it's derived from animals or plants. Retinoid comes from animals while provitamin A carotenoids hail from plants. Fascinatingly, gene expression related to retinoic acid synthesis varies depending on PCOS in theca interna cells. Obese women suffering from PCOS? Their gonadal and adrenal hormones are all messed up [11]. But why? Well, research has shown that higher levels of retinol-binding protein 4 (RBP4) and 17β estrodiol might have something to do with it. Plus, this gene appears to be activated by weight gain and unstable glucose metabolism [2].

Vitamin E (α-Tocopherol)

Back in 1922, Evans & Bishop made a notable breakthrough when they began exploring the interesting properties of Vitamin E - also known as tocopherol. It's classified as a fat-soluble vitamin with powerful antioxidant capabilities. This can have major implications for the reproductive system; scientists have discovered that it helps counter oxidative damage from free radicals and regulates cells membranes stability. Additionally, research has revealed its positive impact on women struggling with

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unexplained infertility - Vitamin E has been linked to thicker endometrial walls and improved oocyte quality, particularly because of its anticoagulant & antioxidant power[12,13].

2. MATERIALS AND METHODS

From July 2021 to August 2022, a study was conducted in Nasiriya City, Thi-Qar governorate, involving 120 Iraqi women who sought medical care at Bint Al-Huda Hospital and a private gynecologist clinic.

Patients Population

We spoke with 120 ladies– sixty who suffered from PCOS and the other sixty not having the condition. They had to fall within the age span of 20-45. We also wanted to get data regarding body mass index, infertility history, pregnancies, family history of PCOS, and places of residence too. In the end, this allowed us to gain a better insight into the different effects of PCOS.

METHODS

5 mL of blood was taken from each woman in the control group and those with PCOS, gathered by venipuncture with a 10 mL disposable syringe. The samples were left to congeal for 15 minutes at room temp before being spun around at 3000 rpm in a centrifuge for 10 minutes. For our experiment, we harvested serum and stowed it away in a freezer at -20 Celsius. When the time was right, we whipped out the Enzyme-Linked Immunosorbent Assay (ELISA) Kits from Bioassay Technology in China to test our samples for vitamins D3, B6, A and E..

STATISTIC ANALYSIS

We crunched the numbers using SPSS version 23.0 and Microsoft Excel 2010, then displayed our findings with the mean ± standard deviation (mean ± SD). To compare groups, we used a one-way ANOVA test; values at $P<0.05$ were considered statistically significant.

3. RESULTS

Demographic characteristic

Statistics indicate that BMI is remarkably higher in women with PCOS than those with healthy fertility ($p < 0.05$). There's nothing remarkable regarding age, though; no noteworthy distinction between either group was observed ($p > 0.05$). Check Table 1 for more information..

Table -1: Demographic Characteristic

Characteristics	Case-group (60) Mean± SD	Control-group (60) Mean ±SD	*P-value*
BMI (kg/m2)	25.162±3.304	22.682±4.855	0.001
Age (years)	26.367±3.231	27.150±4.539	0.278
Gravidity	0.583±0.720	2.050±1.692	0.001
Type of infertility-n (%) Primary Secondary	36(%) 24(%)	0.0	
Duration of infertility(years)	2.917±1.369	0.0	
Residence-n(%) Urban Rural	38(%) 22(%)	40(%) 20(%)	
Family history of PCOS- Yes/No	45/15	18/42	

- ANOVA test

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Table-2: Vitamins level for studied groups

Vitamins	Group	Mean	S. D	*P-value*
Vit.D3 (nmol/L)	Case	15.03	4.49	0.584
	Control	22.66	4.23	
Vit.B6 (nmol/L)	Case	263.84	43.53	0.216
	Control	192.85	51.02	
Vit. A (ng/ml)	Case	46.88	25.17	0.398
	Control	65.85	20.48	
Vit. E (nmol/L)	Case	12.50	7.65	0.001
	Control	6.32	4.63	

- ANOVA test

4. DISCUSSION

It's no secret that hormonal problems in women of childbearing age can be problematic for conception– PCOS being the most popular culprit. This phenomenon mostly comes down to ovulation irregularities[14].

It's been an issue for a while now, the abundance of Vitamin D deficiency in PCOS patients [15,16]. Research has even pinpointed a relationship between this and insulin sensitivity markers. Studies have unearthed that through supplementing Vitamin D, insulin responsiveness increases, and androgen levels decrease in PCOS ladies with a VD dearth. Nevertheless, it doesn't seem to have the same effect on non-PCOS women who are Vitamin D deficient [17]. So, it's important to get a sense of how much Vitamin D3 women with PCOS have if they're going to get proper treatment [18]. Mehmet Kulhan and team did a study that supports our own in the same way—there wasn't much deviation in terms of Vitamin D3 levels. [19]

Vitamin B6 is one of the most potent water-soluble nutrients out there, aiding in cognition and neurotransmitter performance. It also keeps homocysteine at a healthy level, an amino acid that courses through blood vessels [20]. PCOS can disrupt hormones, leading to anxiety, irritability, and despondency – but B6 comes to the rescue by helping generate serotonin aka the "happy chemical". It's been proven again and again in test after test [21,22]. Exploring the irregularity of PCOS, scientists have seen a direct co-relation between insulin resistance and heightened levels of homocysteine. What's more, vitamins B6, B12 and folic acid all play a part in regulating homocysteine [23,24].

Theca cells in PCOS might be producing too much androgen as a result of the different levels of expression of genes that make retinoic acid. To explore this theory, Wood et al. observed an increase in the production of these genes in theca cells from people with PCOS [25]. This all-trans retinoic acid, which is necessary for gonads to function correctly for both sexes, may have something to do with this phenomenon. It's a known fact that theca cells in PCOS patients convert more all-trans retinoic acid than other individuals. This, in turn, suggests that vitamin A (retinol) levels are incredibly important when examining someone with PCOS [19].

Vitamin E has been a game-changer for folks suffering from PCOS. When given the supplement, their hormone levels evened out--testosterone and luteinizing hormone lowered while progesterone and follicular stimulating hormone rose. That's not all, either: insulin resistance, cholesterol, low density lipoprotein and triglyceride levels dropped too [26]. Plus, vitamin E supplementation was also shown to reduce oxidative stress in PCOS cases by a lot. If that wasn't enough, an 8-week co-treatment of coenzyme q10 and vitamin E got SHBG concentrations to go up in patients with PCOS [27]. A recent study unveiled impressive effects when taking a combo of vitamin E (400 IU) and omega-3 (1000 mg) for 12 weeks in women suffering from PCOS . It dramatically improved their insulin resistance as well

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as androgen levels [28]. A lack of vitamin E can bring a slew of negative results, like infertility, eclampsia, miscarriage, fetal intrauterine growth restriction, and other pregnancy-related conditions [29,30]. Plus, it affects semen quality too [31].

PCOS is a real mixed bag. Some folks experience infertility, others have issues with their hormones and metabolism. But much of the research done on nutrients and supplementation only focuses on the metabolic side of things. This review here? It looks at vitamins and what kind of levels they're at in women living with PCOS.

CONCLUSION

The current study showed that women with PCOS had significantly increased BMI and vitamin E (alpha-tocopherol) levels compared to controls. However, this study showed no significant differences between vitamin groups [D3, B6 and A] in women with PCOS compared to controls.

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Consent to participate: All participants signed a written informed consent before participating in the study.

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