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ESTIMATION OF SOME BIOCHEMICAL PARAMETERS IN IRAQI INFERTILE WOMEN WITH POLYCYSTIC OVARIAN SYNDROME

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Annotation:

Background:

Polycystic Ovary Syndrome is the biggest hormonal disorder among of-age women. That said, this condition's effects could result from a perfect storm of environmental and genetic causes and show up differently in each person. The good news is, many sufferers have seen success by incorporating lifestyle changes into their lives– like eating healthier, exercising, getting lots of sleep, and reducing stress. For those with more serious cases, specific vitamins and supplements can also do wonders...

Objective: This study aims to estimate and compare infertile women with PCOS focused on demographic characteristic and level of inhibin B, magnesium, and calcium with fertile healthy women.

Materials and methods: We ran an experiment between July 2021 and December 2022 to figure out the levels of inhibin B, magnesium, and calcium in women. To do this, we studied sixty participants with PCOS and compared them to sixty healthy fertile women in Nasiriya City-Thi -qar Governorate. After collecting the data and crunching the numbers, we came to the conclusion that these substances can really play a role in fertility...

Results: Significant decrement in levels of inhibin B, magnesium, and calcium for women with PCOS (case-group) as comparing to fertile healthy women (control-group).

Conclusions: Among the groups studied, there were notable variations in the quantities of Magnesium, Inhibin B, and Calcium levels.

Key words: Polycystic ovarian syndrome, Inhibin, Magnesium, and Calcium.

1. INTRODUCTION:

Affecting millions of childbearing-aged women, Polycystic ovary syndrome (PCOS) is the most common cause of ovulation issues, hyperandrogenism, and infertility. It's a real bummer for those afflicted– up to seven percent of all women [1].

At a symposium held in Rotterdam, Netherlands on May 1 2003, the European Society of Human Reproduction and Embryology (ESHRE) and American Society for Reproductive Medicine (ASRM) identified the criteria for polycystic ovarian syndrome (PCOS). For a diagnosis to be accurate, two key components must be present: firstly, irregular or absent ovulation; secondly, signs of excessive male hormones either through physical symptoms or blood tests– plus multiple cysts visible on an ultrasound scan of the ovaries. [2].

Biochemical factors and polycystic ovarian syndrome

1. Inhibin B

Members of the transforming growth factor β (TGF-β) superfamily, inhibins, consist of two parts linked together with disulfide bonds. These two components are an α-subunit and either a βA-subunit or a βB-subunit, leading to the creation of inhibin A or inhibin B respectively [3-4].

"The menstrual cycle is linked with the production of Inhibin in the ovary. This hormone then stimulates chemical reactions in both male and female reproductive organs, namely Sertoli cells and Granulosa cells of the testes and ovary respectively. Inhibin B is commonly seen during the follicular phase, where levels surge up front and steadily decrease as time progresses. A second unpredictable peak occurs during the middle of the luteinizing hormone peak and quickly dissipates afterward, leaving behind a lingering low level until the luteal phase is over. [5].

2. Magnesium

Mg, otherwise known as magnesium, is more than just an essential nutrient—it's practically a miracle mineral. It's abundant in our ecosystem, found in plants and animal sources, even our drinking water [6,7]. If you're looking for dietary sources of the stuff, reach for fiber-rich foods like leafy greens, whole grains, beans, nuts and seeds [8]. In addition to being involved with 300+ metabolic processes, it also helps regulate glucose production by binding to ATP molecules [9]. Magnesium gives us life in more ways than one! This mineral is a heavy hitter when it comes to metabolic processes, involving itself in over 300 enzyme reactions. It also facilitates energy production through glycolysis and oxidative phosphorylation– either by forming the Mg-ATP complex or acting as a catalyst [7-8]. On top of all that, magnesium functions as a natural calcium channel blocker and helps keep electrolyte levels balanced. Plus, it's a key player in regulating cell membrane excitability [10,11].

3. Calcium

Oestoporosis is a nasty disease that causes bones to weaken and fracture more easily. It's primarily caused by a lack of calcium for extended periods of time, which means the body can't perform functions as normal. Calcium is key to muscle movement, sending nerve signals, clotting blood, keeping your heart thumping, building strong bones and teeth, and keeping cell fluids balanced. This is especially true during growing times like childhood and pregnancy, or when breastfeeding. That's why it's important to get the right nutrition from a healthy diet– including all the necessary vitamins and minerals– so you don't miss out on valuable calcium. The term 'calcium' traces its roots all the way back to Latin – specifically, 'calas,' which means lime. The Romans, evidently, had a good grip on lime-making (they called it CaO) [12]. So, yeah, calcium is pretty ancient.

Twice during the menstruation cycle, estradiol skyrockets to its max, first happening right before LH secretion and ovulation, and then again during the luteal phase. When estrogen levels increase, it leads to a decrease in calcium levels, which can cause the parathyroid hormones to increase and prevent hypocalcemia [13].

According to science, when our body disregards insulin, it's likely to create a surplus of the stuff. This ups the output of male hormones straight from the ovaries and decreases a specific kind of protein in the blood dubbed sex hormone binding globulin. In result, more free testosterone is circulating. Moreover, due to increased insulin and androgens, ovarian follicles are affected in terms of their development and growth rate. Further studies even point that calcium and vitamin D might impact hormone production within both gonads and adrenal glands – evidenced by the drop of circulating androgens. [14]..

2. MATERIALS AND METHODS

Between July 2021 and December 2022, 120 Iraqi women joined us in a case-control study. Alongside that, we studied up on a gynecologist's private clinic. What we discovered was astounding!

A survey was conducted on an age group of 20-45 year old women in which the 120 investigates had a vast demographic. Half were diagnosed with Polycystic Ovary Syndrome while the other half, miraculously, weren't. We got down to the nitty gritty by drilling into things like BMI, infertility type & duration, gravidity, whereabouts and any family history of PCOS..

METHODS

Getting the samples for our research was no small feat. We stuck with venipuncture and drew out 5ml of blood using a 10ml syringe. Then, we let them rest for 15 minutes to clot; after that, they were spun in a centrifuge at 3000 rpm for 10 minutes and the serum was stored in the freezer at -20C until it was time to analyze it for Inhibin B, magnesium, and calcium..:

Determination of serum inhibin B hormone:

By using an enzyme-linked immunosorbent assay (ELISA).

Determination of serum magnesium concentration (Mg):

method principle:

In an alkaline medium, magnesium and Calmagite come together to create a lovely shade of red. By introducing chelating agents and detergents, the pesky interference from calcium and proteins is eradicated. The more magnesium found in the sample, the richer and more vibrant the color becomes[15].

Determination of serum calcium (ca) concentration:

method principle:

In alkaline medium, a colored complex is formed when calcium in the sample reacts with methylthymol blue. This complex, which can be measured via spectrophotometry, includes hydroxyquinoline to prevent magnesium interference.[16].

STATISTIC ANALYSIS

For our statistical analysis, we turned to SPSS version 23.0 and Microsoft Excel 2010. After crunching the numbers, we found that the results could be expressed as mean plus or minus standard deviation. Finally, to compare our groups, we utilized one-way analysis of variance (ANOVA), and a P value lower than 0.05 was considered significant.

3. RESULTS

There are 120 participants women, 60women with PCOS (case-group) compared with 60 healthy fertile women (control group).

Demographic characteristic

The BMI of women with PCOS shows a noticeable increase (P<0.05) when compared to that of healthy fertile women. Age does not display any significant distinction (p > 0.05) between the two groups. The majority of couples involved in this study suffer from primary infertility. In terms of family history of PCOS, the case group shows a higher value in comparison to the control group. This information is clearly demonstrated in table -1..

Table-1- Demographics of the Study Population

Characteristics	Case-group (60) Mean± SD	Control-group (60) Mean ±SD	*P-value*
BMI (kg/m2)	25.162±3.304	2.682±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

Table-2- Serum levels of Inhibin -B, magnesium, and calcium for studied groups.

Biochemical parameters	Case-group (60)		Control- group (60)		P-value
	Means	S.D	Means	S.D	
Inhibin-B (pg/ml)	72.706	9.82	125.163	116.16	0.001
Mg (mmol/L)	2.095	0.51	2.655	0.31	0.0002
Ca (mmol/L)	2.267	0.54	2.716	0.22	0.0006

- ANOVA test

4. DISCUSSION:

Both female granulose and male sertoli cells secrete inhibin, a protein that plays a significant role in negating the release of FSH from the pituitary gland in response to FSH. It is abundantly found in both

follicular fluid and seminal plasma. Levels of inhibin B in the bloodstream vary depending on the phase of the menstrual cycle [17]. Concentration of inhibin B gradually increases during the early follicular phase and reaches its peak simultaneous to the decline in FSH, resulting in the characteristic pattern of mono-ovulation in women with normal ovulation [18].

Signs of androgen excess, such as male pattern hair loss and B. acne, are indicative of PCOS, along with abnormal uterine bleeding. Reduced quality of life can be attributed to infertility, hirsutism, anxiety, depression, menstrual irregularities, acne, and hair loss. Clinical conditions, like PMS and dysmenorrhea, suggest that magnesium deficiency plays a significant role in women's health [19].

Hair loss in women may be improved by taking magnesium, as it plays a role in protein formation, cell growth, and division [20]. In addition, magnesium is believed to have a beneficial effect on depression and can improve overall quality of life [19]. Studies have shown that supplementation with magnesium can help alleviate depression in both diabetic and non-diabetic individuals [21, 22]. A recent study by Jaripur M et al. (2022) found that women with PCOS who took magnesium supplements experienced a significant improvement in their overall quality of life [19].

Besides causing infertility, PCOS is a key factor in the elevated chances of developing serious health concerns like endometrial cancer, stroke, and cardiovascular disease. Moreover, PCOS also leads to a host of everyday symptoms such as hirsutism, hair loss, acne, and irregular menstrual cycles[23]. The disorder can also result in insulin resistance, increasing the likelihood of developing type 2 diabetes and more severe symptoms [24]. Overall, vitamin D aids in preventing diseases, depression, osteoporosis, and supports optimal bone health. In addition to promoting bone health, calcium has been found to have preventative properties when it comes to diabetes, high blood pressure, and cancer. It has been observed that individuals with PCOS often have a lack of vitamin D, which can lead to increased insulin resistance and other PCOS symptoms [25]. Studies have revealed that both vitamin D and calcium offer benefits to women with PCOS. Through supplementation, this research displayed the positive impact of calcium and vitamin D on weight loss, the maturation of follicles, the regulation of menstruation, and the improvement of excessive levels of male hormones in infertile women with PCOS [26]..

CONCLUSION

This current study displays significant increment in BMI for women with PCOS as comparing to control group. Significant differences decrement *(p-value<0,05)* in levels of the following biochemical parameters (Inhibin-B, magnesium, and calcium) in women with PCOS as comparing to control group.

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Consent to participate: All participants received written permission to participate in the study before participating.

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