Research Article

INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

ANALYSING EFFICACY AND ASSESSMENT OF VITAMIN D LEVEL AND THYROID PROFILE TO DETERMINE THE INTENSITY OF FEMALE INFERTILITY

Dr. Prafull Kumar Badriprasad Chavhan,[1] Dr. Deba Dulal Biswal[2*]

[1]Assistant Professor, Department of General Medicine, Saraswati Institute of Medical Sciences, Hapur, Uttar Pradesh

[2*]Assistant Professor, Department of General Medicine, Santosh Medical College & Hospital, Ghaziabad, Uttar Pradesh

Address for correspondence

Dr. Deba Dulal Biswal

Email id: manisasbiswal@yahoo.com

How To Cite: Chavhan PB, Biswal DD. Analysing Efficacy and Assessment of Vitamin D Level and Thyroid Profile to Determine the Intensity of Female Infertility. International Research Journal of Pharmacy. 2016; 7:12:146-149

DOI: 10.7897/2230-8407.0712161

==========

ABSTRACT

Background: Thyroid dysfunction is a significant factor in the evaluation of infertility since it is linked to increased morbidity, lower fecundity, anovulatory cycles, and menstrual irregularities.

Aim: The purpose of this study was to analyze female infertility by measuring blood levels of vitamin D and thyroid profile.

Methods: Infertility was diagnosed based on the medical history of the individual who was unable to conceive after a year of regular sexual activity in individuals who did not have any concomitant systemic disorders such as diabetes, hypertension, or cardiovascular diseases. Thyroid and vitamin D profiles were measured in 96 fertile controls and 48 infertile females in the research.

Results: The values of vitamin D were shown to be 13.7±7.67, whereas the controls had considerably higher levels (20.7±6.45) ($p<0.01$). Regarding vitamin D insufficiency, it was observed that 22.83% (n=10) patients and 32.29% (n=31) controls had mild deficit, 33.33% (n=16) cases and 7.29% (n=7) controls had moderate deficiency, and 22.91% (n=11) cases and 2.08% (n=2) controls had severe deficiency. About the thyroid profile of the fertile and infertile females, it was observed that the TSH level was significantly higher in the cases (6.42±1.04) with $p<0.01$, T4 levels were significantly higher in the controls (6.41±2.06) than in the cases (5.2±3.54), and T3 levels were significantly higher in the controls (0.93±0.26) than in the cases (0.72±0.55) with $p<0.01$.

Conclusion: The current study comes to the conclusion that vitamin D and TSH levels were shown to be negatively correlated with female infertility. Thyroid profile and vitamin D levels should be routinely checked on all participants who are female infertile.

Keywords: Vitamin D, Infertility, female infertility, Thyroid profile, TSH.

INTRODUCTION

Infertility is the inability to conceive even after a year of regular sex and frequent coitus. A complex condition with economic, psychological, and medical components is infertility. The occurrence and prevalence of infertility vary throughout different regions of the world, as well as within cultures and societies. Infertility affects about 14% of the population as a whole.1. According to the categorization, around 15%, 20%, 35%, and 30% of the population had unexplained infertility, combination infertility, female infertility, and male infertility, respectively.[1]

The causes of female infertility include anovulation, hormonal imbalances, sexually transmitted infections, old age, and disorders of the reproductive system. Idiopathic, radioactive, toxic lead fume, radiation exposure, alcohol use, smoking, diabetes, and/or hypertension are medical problems thought to be linked to infertility.[2]

When exposed to sunshine, the skin produces vitamin D (1,25 dihydroxycholecalciferol), which has several important biological effects such as reducing inflammation, immunosuppression, proliferation, apoptosis, and cell

differentiation. Vitamin D's mode of action is facilitated by receptors produced in the uterus, placenta, and ovary, among other reproductive organs. It is also essential for female reproduction because it increases the synthesis of progesterone, which is produced at a rate of 13% by progesterone, 9% by estradiol, and 20% by estrone in the ovaries.[3]

Vitamin D increases the generation of steroids in the placenta, secretes and expresses human chorionic gonadotropin in syncytiotrophoblast, and modulates HOXA10 expression in the endometrium, which is essential for uterine implantation and receptivity. AMH (antimullerian hormone), which is involved in the long-term preservation of ovarian reserve, was significantly impacted by vitamin D. In individuals with PCOS, vitamin D also influences insulin metabolism through gene transcription and hormone regulation (polycystic ovarian syndrome).[3]

Endocrine variables, which include thyroid hormone and have a significant impact on pregnancy maintenance and reproduction, are essential for maintaining fertility. Thyroid dysfunction is a crucial factor to examine when evaluating infertility since it is linked to menstrual irregularities, anovulatory cycles, lower fecundity, and increased morbidity.[4]

The increased frequency of hypothyroidism in female infertility is linked to aberrant release of luteinizing hormone due to altered oestrogen metabolism, hyperprolactinemia, and disturbances in GnRH production. Therefore, proper thyroid dysfunction therapy improves oocyte physiology, appropriate LH-to-LHRH response, menstrual disturbance reduction, spontaneous fertility, and fertilization rate.[5]

Thyroid dysfunction and vitamin D deficiency both contribute significantly to infertility by altering the anti-inflammatory and immunological regulatory functions of the receptor binding site RXR, also known as the steroid receptor. Serum vitamin D and thyroid hormone levels can be measured to aid in the early detection of infertility linked to these deficiencies, which increases the conception rate in infertile individuals.[6]

Therefore, in order to analyze female infertility, compare the thyroid profile and vitamin D in infertile females, and detect vitamin D insufficiency in infertile females, the current study was carried out to measure the thyroid profile and vitamin D blood levels.

MATERIALS AND METHODS

The goal of the current prospective clinical study is to analyze female infertility by measuring serum levels of vitamin D and thyroid profile, comparing these parameters in infertile females, and determine if these females are deficient in vitamin D. After receiving approval from the relevant ethics committee, the study was carried out at the Department of General Medicine. The patients who visited the Institute's outpatient department of obstetrics and gynecology made up the study population.

Based on the patient's history of not being able to conceive after 12 months of frequent coitus and sexual activity and the absence of any systemic disorders such as diabetes, hypertension, or cardiovascular diseases, infertility was diagnosed. All subjects gave their verbal and written informed permission after being fully told about the study's design. In sterile and aseptic settings, 5 milliliters of fasting intravenous blood were drawn to evaluate the research parameters, which included TSH, T4, T3, and vitamin D levels. An analyzer in the lab was used to evaluate the parameters. There were 96 fertile controls in the research and 48 infertile females. The age range for girls to be included in the study was 18 to 40.

Infertile, free of concomitant conditions such as diabetes, hypertension, or cardiovascular illnesses, and the research participants who volunteered to take part. The criteria for exclusion included females who were infertile and had structural abnormalities in their reproductive organs, such as polyps, septate uterus, fibroids in the uterus or fallopian tube, females older than 18 or older than 40, and participants who refused to take part in the study. The serum was isolated from the blood samples by centrifuging them for 10 minutes at 3000 rpm in order to evaluate the study's parameters. Chemiluminescence Competitive Immunoassay was used to measure vitamin D, TSH, T4, and T3. Chemiluminescence Two-site Sandwich Immunoassay was used to measure TSH, T4 levels, and T3 levels.

RESULTS

The goal of the current prospective clinical study is to analyze female infertility by measuring serum levels of vitamin D and thyroid profile, comparing these parameters in infertile females, and determine if these females are deficient in vitamin D. Table 1 contains a list of the research individuals' demographic details. 48 female infertile controls and 96 fertile controls participated in the research. Females in the 18–40 age groups met the inclusion criteria. The research subjects' mean age for the cases and controls was 30.1±6.5 years and 28.4±6.5 years, respectively. These differences were not statistically significant. Between the ages of 31 and 40, the majority of individuals in both the cases and controls fell into this age range, with 45.83% (n = 22) and 35.4% (n = 34) subjects, respectively.

According to Table 1, patients from cases and controls had serum vitamin D levels of <20 in 72.91% (n=-35) and 41.66% (n=40) respectively, and of >30 in 6.25% (n=3) and 10.41% (n=10). When the vitamin D profile of the research participants was evaluated, the mean levels of vitamin D were found to be 13.7±7.67, but the values of 20.7±6.45 ($p<0.01$) were substantially higher in the controls. Table 2 shows that with regards to vitamin D insufficiency, there were reports of mild deficiency in 20.83% (n=10) patients and 32.29% (n=31) controls, moderate deficiency in 33.33% (n=16) cases and 7.29% (n=7) controls, and severe shortage in 22.91% (n=11) cases and 2.08% (n=2) controls.

About the thyroid profile of the fertile and infertile females, it was observed that the TSH level was significantly higher in the cases (6.42±1.04) with $p<0.01$, T4 levels were significantly higher in the controls (6.41±2.06) than in the cases (5.2±3.54), and T3 levels were significantly higher in the controls (0.93±0.26) than in the cases (0.72±0.55) with $p<0.01$. Table 3 shows that among the study individuals, euthyroidism, hypothyroidism, and hyperthyroidism were seen in 41.66% (n = 20), 8.33% (n = 4), and 50% (n = 24).

DISCUSSION

The goal of the current prospective clinical study is to analyze female infertility by measuring serum levels of vitamin D and thyroid profile, comparing these parameters in infertile females, and determine if these females are deficient in vitamin D.

Table 1 contains a list of the research individuals' demographic details. There were 96 fertile controls in the research and 48 infertile females. Females in the 18–40 age groups met the inclusion criteria. The research subjects' mean age for the cases and controls was 30.1±6.5 years and 28.4±6.5 years, respectively. These differences were not statistically significant. The age group of 31 to 40 years old included the majority of individuals in both the cases and controls, with 45.83% (n = 22) and 35.4% (n = 34) participants, respectively. In the case and control groups, serum vitamin D levels of <20 were seen in 72.91% (n=-35) and 41.66% (n=40) of the individuals, respectively, and of >30 in 6.25% (n=3) and 10.41% (n=10) of the subjects, respectively.

The findings aligned with the research conducted by Gabedian K et al. (2013) and Pagliardani L et al. (2015), which evaluated participants with comparable demographics and Vitamin D levels to those in the current investigation. When the vitamin D profile of the research subjects was evaluated, the mean levels were found to be 13.7±7.67, whereas the values of 20.7±6.45 ($p<0.01$) were substantially higher in the controls. Regarding vitamin D insufficiency, it was observed that 22.83% (n=10) patients and 32.29% (n=31) controls had mild deficit, 33.33% (n=16) cases and 7.29% (n=7) controls had moderate deficiency, and 22.91% (n=11) cases and 2.08% (n=2) controls had severe deficiency.

These findings corroborated those of research by Lata I et al.8 in 2017 and Mansournia N et al. 9 in 2014, in which the authors observed similar vitamin D levels in infertile females. TSH was significantly higher in cases (6.42±4.02) compared to controls (3.66±1.04) with $p<0.01$, while T3 levels were significantly higher in controls (0.93±0.26) compared to the cases (0.72±0.55) with $p<0.01$. T4 levels were also significantly higher in controls (6.41±2.06) than in cases (5.2±3.54) with $p<0.01$, according to an assessment of the thyroid profiles of the infertile and fertile females. These results were comparable to the results of the studies by Trokoudes KM et al[10] in 2006 and Nasir S et al[11] in 2016 where a comparable thyroid profile was seen in infertile females as in the present study. Among the research participants, euthyroidism, hypothyroidism, and hyperthyroidism were seen in 41.66% (n = 20), 8.33% (n = 4), and 50% (n = 24).

CONCLUSION

Within the bounds of its limits, the current study suggests that female infertility is linked to a number of difficult situations, including stress, sexual dysfunction, melancholy, psychological impacts, personal pain, and societal ramifications. In order to effectively manage infertility, hormonal evaluation and appropriate research are thus required. TSH and vitamin D levels are negatively correlated in females who need early therapy for infertility. Nevertheless, the current study included several drawbacks, such as biases related to geographic location, a limited sample size, and a brief monitoring time. Therefore, further long-term research with bigger sample sizes and longer observation periods will aid in coming to a conclusive result.

REFERENCES

1. Strauss JF, Barbieri RL. Yen & Jaffe's reproductive endocrinology chapter 22 female infertility, 8th edition. E-book: physiology, pathophysiology, and clinical management (Expert Consult-Online and Print). Elsevier Health Sciences; 2013;28:556.
2. Poppe K, Velkeniers B. Female infertility and the thyroid. Best practice & research Clinical endocrinology& metabolism. 2004;18:153-65.

3. Lerchbaum E, Obermayer-Pietsch B. Mechanisms in endocrinology: Vitamin D and fertility: a systematic review. European Journal of Endocrinology. 2012;166:765-78.
4. Thomson RL, Spedding S, Buckley JD. Vitamin D in the aetiology and management of polycystic ovary syndrome. Clinical endocrinology. 2012;77:343-50.
5. Mackawy AM, Al-Ayed BM, Al-Rashidi BM. Vitamin D deficiency and its association with thyroiddisease. International journal of health sciences. 2013;7:267.
6. Garbedian K, Boggild M, Moody J, Liu KE. Effect of vitamin D status on clinical pregnancy rates following in vitro fertilization. CMAJ open. 2013;1:77.
7. Pagliardini L, Vigano P, Molgora M, Persico P, Salonia A, Vailati S, Paffoni A, Somigliana E, Papaleo E, Candiani M. High prevalence of vitamin D deficiency in infertile women referring for assisted reproduction. Nutrients. 2015;7:9972-84.
8. Lata I, Tiwari S, Gupta A, Yadav S, Yadav S. To study the vitamin D levels in infertile females and correlation of Vitamin D deficiency with AMH levels in comparison to fertile females. Journal of human reproductive sciences. 2017;10:86.
9. Mansournia N, Mansournia MA, Saeedi S, Dehghan J. The association between serum 25OHD levels and hypothyroid Hashimoto's thyroiditis. Journal of endocrinological investigation. 2014;37:473-6.
10. Trokoudes KM, Skordis N, Picolos MK. Infertility and thyroid disorders. Current Opinion in Obstetrics and Gynecology. 2006;18:446-51.
11. Nasir S, Khan MM, Ahmad S, Alam S, Ziaullah S. Role of Thyroid Dysfunction in Infertile Women with Menstrual Disturbances. Gomal Journal of Medical Sciences. 2016;14:31.

TABLES

S. No	Characteristics	Cases % (n=48)	Controls % (n=96)	Total/p-value
1.	**Mean Age (years)**	30.1±6.5	28.4±6.5	>0.05
2.	**Age range (years)**			
a)	18-24	20.83 (10)	31.25 (30)	
b)	25-31	33.33 (16)	33.33 (32)	
c)	31-40	45.83 (22)	35.41 (34)	
3.	**Serum Vitamin D**			
a)	<20	72.91 (35)	41.66 (40)	
b)	21-39	20.83 (10)	47.91 (46)	
c)	>30	6.25 (3)	10.41 (10)	

Table 1: Demographic characteristics of the study subjects

S. No	Vitamin D status	Cases % (n=48)	Controls % (n=96)
1.	**Mean Vitamin D level**	13.7±7.67	20.7±6.45
	p-value	<0.01	
2.	**Deficiency**		
a)	Mild (10-20)	20.83 (10)	32.29 (31)
b)	Moderate (5-10)	33.33 (16)	7.29 (7)
c)	Severe <5	22.91 (11)	2.08 (2)

Table 2: Vitamin D profile in the study subjects

S. No	Thyroid status	Cases % (n=48)	Controls % (n=96)	p-value
1.	**Laboratory assessment**			
a)	T3	0.72±0.55	0.93±0.26	<0.01
b)	T4	5.2±3.54	6.41±2.06	<0.01
c)	TSH	6.42±4.02	3.66±1.04	<0.01
2.	**Thyroid profile**			
a)	Euthyroidism	41	-	
b)	Hypothyroidism	9	-	
c)	Hyperthyroidism	50	-	

Table 3: Thyroid profile in the study subjects