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ORIGINAL RESEARCH

Comparison of thyroid hormone profile among fertile and infertile females

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ABSTRACT

Objective: To compare the thyroid hormone profile (T3, T4, TSH, Anti-TPOAb, & TBG) in females who are able to conceive and those who are not.

Material & Methods: The sample consisted of 88 individuals who were divided into two groups. group A (infertile) and group b (control) (group B). We used non-probability purposive sampling because each group's subjects were selected in accordance with predetermined criteria. All subjects who matched the qualifying requirements were registered for the current inquiry. Each participant provided written consent before participating. Information was received under tight confidentiality. Utilizing IBM SPSS version 23, data was examined.

Results: Between the two study groups, there were substantial differences in serum T3, T4, TSH, anti-TPOAb, and TBG levels. TSH and anti-TPO antibodies showed a significant mean difference between the fertile and infertile samples, with a p-value less than 0.05.

Conclusion: All of the participants in this study had T3, T4, TSH, and TBG levels that were within the typical pre-pregnancy reference range. When UE infertile females' thyroid hormone profiles were compared to those of fertile females, a tendency towards subclinical hypothyroidism and the occurrence of anti-thyroid antibodies were found.

Keywords: Antibodies, Infertility, Thyroid, Hypothyroidism.

INTRODUCTION

The traditional definition of infertility is the failure to conceive after a year of regular sexual activity without the use of contraception. [1,2] Undiagnosed infertility (UI) is the term used to describe a couple's failure to become pregnant despite trying to conceive for a full year and completing a thorough evaluation. Ovulatory failure, fallopian tube injury, and endometriosis are the components that explain the primary causes of female infertility. [3] Triiodothyronine and thyroxine, two hormones produced by the thyroid gland, are used to control metabolic

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rate, which is subsequently distributed throughout the body (T4). Both of these hormones are important for growth and development, particularly for the development of the brain. [4] Hyperthyroidism and hypothyroidism are terms used to describe thyroid conditions.

Additionally, a subclass of euthyroid patients with thyroid autoantibody-positive results has been identified. [5] It is important to note that in recent years, research on the function of these antibodies in reproductive health has increased. [6] In addition, hypothyroidism in adolescence is related to a delay in sexual maturation. Menstrual issues and ovulation disruption are hence traits of adulthood. [7] Thyroid disorder has also long been associated with an increase in the chance of miscarriage, assuming that thyroid hormone decides to play an active part in embryonic development. [8]

Thyroid disease hyperthyroidism may significantly affect pregnancy. [9] Preterm birth, hypertension, stunted growth, heart failure, and foetal mortality are the most serious effects. [10] The hypothalamic-pituitary-ovarian axis and the hypothalamic-pituitary-thyroid axis are said to be related physiologically, according to emerging evidence from experimental and clinical investigations. [11,12]

According to studies, thyroid dysfunction has been linked to a variety of female infertility issues. [13] Infertile couples should be aware of their thyroid status because it has a large, recurrent, and frequently preventable or reversible impact on infertility. Untreated and undiagnosed thyroid disease can contribute to infertility. [14] Although there are many studies on the topic from other countries, a survey of the literature shows that not nearly enough local study has been done. In order to create effective interventions to lower the incidence of infertility brought on by undiagnosed or untreated thyroid dysfunction, the current study is being proposed with the goal of evaluating the relationship between thyroid dysfunction and thyroid autoimmunity with unexplained infertility.

MATERIALS AND METHODS

This case control study was carried out in department of Physiology, India in collaboration with department of Gynaecology and Obstetrics. Duration of study was 1 year from Jan 2022 till Jan 2023.

The two groups included: Women with Unexplained Infertility (Group A) (Cases) Healthy Parous Women in Group B (Controls). Non-probability purposive sampling was employed because each group's subjects were chosen based on specified standards. Women of reproductive age (20–45 years) and UE infertile women with >12 months of infertility, regular menstrual cycles lasting 25–35 days, endocrinological proof of ovulation, a standard hysterosalphingogram, and normal semen analysis of their spouse met the inclusion criteria for group A (Cases). While it was healthy, parous women for the controls. Women who were diagnosed as infertile with their partner, had irregular menstrual cycles and an-ovulatory cycles, were over 45 years old, took oral contraceptives, had intrauterine devices implanted, and had gynaecological issues like polyps, cancer, cysts, fibroid, and hyperplasia were excluded from the study.

Each subject who took part gave their written consent. A questionnaire created for the current investigation collected all the necessary data. It includes the patient's name, age, length of marriage, height, weight, and BMI as well as their demographic information (name, age), past medical, surgical, and gynaecological histories, as well as their serum T3, T4, TSH, and anti-TPO antibody levels. Additionally, data was input by impartial observers who were not involved in the study, reducing the risk. Data were stored and analysed using IBM SPSS version

23.0. Age, age at marriage, length of marriage, and body mass index were reported as mean and standard deviation; education, family system, and menstrual cycle information were

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reported as count and percentages; and a mean comparison of the thyroid profile and anti-TPO antibodies was made between samples that were fertile and those that were infertile using an independent sample t-test.

RESULTS

Serum T3, T4, TSH, anti-TPOAb, and TBG levels were significantly different between the two study groups. The thyroid profile and antiTPO antibody comparison between study groups in table I reveals that mean T3 values for infertile samples were 131.6 ± 24.04 ng/dl, mean T4 values were 9.37 ± 1.44 g/dl, mean TSH values were 2.47 ± 1.97 mIU/L, mean TBG values were 21.699 ± 4.61 mg/L, and mean antiTPO values were 36.08 ± 10.60 IU/ml, whereas mean values for fertile samples, mean T3 was 135.57±32.55 ng/ dl, mean T4 was 10.10±2.51 µgram/dl, mean TSH was 1.10±2.14 mIU/L, mean TBG was 22.747 ± 7.486 mg/L, and mean antiTPO was 20.13±12.30 IU/ml. Therefore, a significant mean difference between samples that were fertile and those that were infertile was found for TSH and anti-TPO antibodies, with a p-value less than 0.05.

Table 1: Baseline characteristics of study groups

	Infertile	Non-Infertile	P value
Age (years)	31.57 ± 6.12	32.33 ± 5.83	0.556
Age of marriage (years)	23.32 ± 4.84	20.13 ± 6.32	0.025
Duration of Marriage (years)	8.25 ± 4.43	10.35 ± 6.81	0.097
BMI kg/m2	28.53 ± 4.38	23.41 ± 1.67	<0.001

Table 2: Thyroid profile and anti TPO levels of study groups

	Infertile	Non-Infertile	P value
T3 (ng/dl)	131.67 ± 24.04	135.52 ± 32.55	0.525
T4 (µg/dl)	9.36 ± 1.43	10.09 ± 2.51	0.097
TSH (mIU/L)	2.47 ± 1.97	1.12 ± 2.14	0.003
TBG (mg/Litre)	21.69 ± 4.62	22.74 ± 7.48	0.431
antiTPO (IU/ml)	36.08 ± 10.62	20.13 ± 12.31	<0.001

DISCUSSION

Our study's objective was to assess the relationship between undiagnosed and untreated thyroid dysfunction and thyroid autoimmunity and unexplained infertility. This information will be used to design effective interventions that will reduce the incidence of undiagnosed and untreated thyroid dysfunction-related infertility. The age range of the ladies in both groups ranged from 20 to 35 years old. According to this study, women with UI had a higher BMI than those who are fertile. The rise in BMI causes insulin resistance, which also plays a role in infertility. Our work is comparable to Chitme et al work. [15]

TSH values in controls were 1.10 ± 2.14mIU/L, but the mean TSH in women with UI was 2.47 ± 1.97mIU/L, suggesting that certain cases of UI may be caused by minor thyroid function abnormalities. Therefore, it is crucial to get a full thyroid assessment in all patients with UI. It also calls into question whether the first line of treatment for UI in women with TSH levels less than 2.5 mIU/L might be thyroid hormone replacement therapy. Although guidelines for current practises advise against treating women who are trying to conceive naturally and have a TSH below 2.5 mIU/L, some doctors use this lower limit to start therapy. [16, 17]

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The mean T3 levels in the current study were 131.6 ± 24.04 ng/dl in patients and 135.5 ± 32.55 ng/dl in controls, demonstrating no significant difference. Despite the fact that the T3 levels in infertile samples are lower than in controls, it's crucial to note that these levels are still within the typical, pre-pregnancy reference range.

Numerous studies have demonstrated that thyroid T3 and T4 secretion must be roughly normal for normal sexual function (if not fully normal). [18] According to a different study, the women with thyroid antibodies had considerably higher TSH levels and lower levels of free thyroxin T4 than the control group. Sieiro Netto (2004) discovered that women who tested positive for TPO-Ab and those with high TSH levels had a considerably increased risk of miscarriage. [19]

Our study's findings demonstrate that, despite the fact that all of the subjects' T3, T4, TSH, and TBG levels were within the typical pre-pregnancy reference range, there was a tendency towards subclinical hypothyroidism and a higher incidence of anti-thyroid antibodies in females with UE infertility when their thyroid hormone profiles were compared to those of females who were fertile. This underlines the need for thyroid autoimmunity screening in all women with unexplained infertility, even if their thyroid profile is within normal limits. Our research will assist endocrinologists and gynaecologists in establishing thyroid autoimmunity as a baseline examination in female infertility patients. For further investigation and intervention in females with unexplained infertility and an incidence of antithyroid antibodies, more studies with bigger sample sizes are needed.

CONCLUSION

All of the participants in this study had T3, T4, TSH, and TBG levels that were within the typical pre-pregnancy reference range. When UE infertile females' thyroid hormone profiles were compared to those of fertile females, a tendency towards subclinical hypothyroidism and the occurrence of anti-thyroid antibodies were found.

REFERENCES

1. Javaid S, Mastoi SW, Jahan E, Khalid S, Jabeen A, Mahajan N. Prevalence of infertility and its causes in the population of Pakistan: A cross-sectional study. Annals of the Romanian Society for Cell Biology. 2022 Feb 6; 26(01):129-33.
2. Geno KA, Nerenz RD. Evaluating thyroid function in pregnant women. Critical Reviews in Clinical Laboratory Sciences. 2022 Mar 15:1-20.
3. Poppe K, Bisschop P, Fugazzola L, Minziori G, Unuane D, Weghofer A. 2021 European thyroid association guideline on thyroid disorders prior to and during assisted reproduction. European thyroid journal. 2021 Feb 1; 9(6):281-95.
4. Li L, Li L, Li P. Effects of controlled ovarian stimulation on thyroid function during pregnancy. Biology of Reproduction. 2022 Aug 12.
5. Poppe K. Management of endocrine disease: Thyroid and female infertility: More questions than answers?!. European journal of endocrinology. 2021 Apr 1; 184(4):R123-35.
6. Ramees Fathima J. A study on role of thyroid dysfunction and thyroid autoimmunity in infertile women: A Case control study (Doctoral dissertation, Stanley Medical College, Chennai).
7. Anandappa S, Joshi M, Polanski L, Carroll PV. Thyroid disorders in subfertility and early pregnancy. Therapeutic Advances in Endocrinology and Metabolism. 2020 Oct; 11:2042018820945855.
8. Silva JF, Ocarino NM, Serakides R. Thyroid hormones and female reproduction. Biology of reproduction. 2018 Nov 1; 99(5):907-21.

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9. Das D, Banerjee A, Jena AB, Duttaroy AK, Pathak S. Essentiality, relevance, and efficacy of adjuvant/ combinational therapy in the management of thyroid dysfunctions. Biomedicine & Pharmacotherapy. 2022 Feb 1; 146:112613.
10. Colella M, Cuomo D, Giacco A, Mallardo M, De Felice M, Ambrosino C. Thyroid hormones and functional ovarian reserve: Systemic vs. peripheral dysfunctions. Journal of clinical medicine. 2020 Jun; 9(6):1679.
11. Safarian GK, Gzgzyan AM, Dzhemlikhanova Lyailya K, Niauri DA. Does subclinical hypothyroidism and/ or thyroid autoimmunity influence the IVF/ICSI outcome? Review of the literature. Gynecological Endocrinology. 2019 Jul 31; 35(sup1):56-9.
12. Medenica S, Abazovic D, Ljubić A, Vukovic J, Begovic A, Cucinella G, Zaami S, Gullo G. The role of cell and gene therapies in the treatment of infertility in patients with thyroid autoimmunity. International Journal of Endocrinology. 2022 Aug 30; 2022.
13. Dosiou C. Thyroid and fertility: Recent advances. Thyroid. 2020 Apr 1; 30(4):479-86.
14. Oiwa A, Minemura K, Nishio SI, Yamazaki M, Komatsu M. Implications of thyroid autoimmunity in infertile women with subclinical hypothyroidism in the absence of both goiter and anti-thyroid antibodies: Lessons from three cases. Endocrine Journal. 2019; 66(2):193-8.
15. Chitme HR, Al Azawi E, Al Farsi MK, Abdul DM, Jalil MS. Thyroid health and its correlation to female fertility: A pilot study. Indian journal of pharmaceutical education and research. 2019 Jul 1; 53(3):S404-15.
16. Inagaki Y, Takeshima K, Nishi M, Ariyasu H, Doi A, Kurimoto C, Uraki S, Morita S, Furukawa Y, Inaba H, Iwakura H. The influence of thyroid autoimmunity on pregnancy outcome in infertile women: A prospective study. Endocrine Journal. 2020:EJ19-0604.
17. Poppe K, Autin C, Veltri F, Kleynen P, Grabczan L, Rozenberg S, Ameye L. Thyroid autoimmunity and intracytoplasmic sperm injection outcome: A systematic review and meta-analysis. The Journal of Clinical Endocrinology & Metabolism. 2018 May; 103(5):1755-66.
18. Wali AA, Abdelfattah W, Abd-El-Fatah SM. Prevalence of thyroid dysfunction and thyroid autoimmunity in infertile women. Evidence Based Women's Health Journal. 2020 Nov 1; 10(4):308-15.
19. Ramees Fathima J. A study on role of thyroid dysfunction and thyroid autoimmunity in infertile women: A Case control study (Doctoral dissertation, Stanley Medical College, Chennai).