



CLINICAL STUDY OF THYROTROPIN AND PROLACTIN LEVELS IN WOMEN WITH PRIMARY INFERTILITY



IJPRBS-QR CODE

Dr. SUNITHA TIRUMALASETTY*,
Dr. NEELIMA TIRUMALASETTI



PAPER-QR CODE

1. Associate Professor, Department of Biochemistry, Katuri Medical College, Chinakakondrupadu, Guntur, Andhra Pradesh, India.
2. Assistant Professor, Department of Pathology, Katuri Medical College, Chinakakondrupadu, Guntur, Andhra Pradesh, India.

Abstract

Accepted Date:

16/01/2013

Publish Date:

27/06/2013

Keywords

Hypothyroidism,

Infertility,

Prolactin,

Thyrotropin (TSH).

Corresponding Author

Dr. Sunitha Tirumalasetty

INTRODUCTION: Infertility is defined as failure of couple to achieve pregnancy despite one year of regular unprotected sexual intercourse during reproductive age. Female factors contribute more towards infertility when compared to those of men. Hypothyroidism is the most common endocrine disorder affecting females. **AIMS AND OBJECTIVES:** To evaluate the impact of thyrotropin and prolactin levels on menstrual function and fertility of women with primary infertility. **MATERIALS AND METHODS:** The study was conducted on 240 subjects in reproductive age group (20-40 years of age). Among the subjects, 160 were women with primary infertility and 80 were normal fertile women. Fasting venous samples on 3rd day of menstrual cycle were collected and estimation of thyrotropin and prolactin levels were done by using acculite (German) kits on semi chemiluminiscence instrument. **RESULTS:** The results were expressed as mean \pm SD with a thyrotropin value of 2.16 ± 0.94 (in controls) and 28 ± 9.26 (in cases). Prolactin values were 12.58 ± 6.9 (in controls) and 52.9 ± 27.17 9(in cases). Both the thyrotropin and prolactin levels on comparison with cases and controls showed a significant pvalue of <0.001 . **CONCLUSIONS:** Thyrotropin and prolactin levels showed significant difference when compared, between cases and controls which indicate that there is significant influence of hypothyroidism over serum prolactin levels which contributes to decrease in gonadotropins leading to primary infertility.

INTRODUCTION

Infertility is defined as the inability to conceive after one year of regular intercourse without contraception. The estimated prevalence of infertility is 12% and 14% and showed stability in recent years according to the available literature.^[1] This significant prevalence shows that infertility represents a common condition, with important medical, economic and psycho social implications. Among all the causes, female causes of infertility account for 35%, male-factor infertility in 30%, a combination of both male and female infertility in 20% and idiopathic in 15% of couples in the reproductive age group.^[2] Evaluation of these disorders needs a multidagnostic approach where clinical laboratories have a major role.

The dysfunction of hypothalamic pituitary ovarian axis in women often leads to infertility. Thyroid hormones play an important part in normal reproductive function, both through direct effects on the ovaries and also indirectly by multiple interactions with other sex hormones which has an affect on the normal reproductive axis. Prevalence of hypothyroidism in the

reproductive age group is 2-4% which causes infertility and habitual abortions.^[3,4]

Altered prolactin levels i.e, hyperprolactinemia induces suppression of the hypothalamic-pituitary-gonadal axis and induces resistance to the ovary for gonadotropin action, which results in lack of ovulation and amenorrhea.^[5]

Hence, this clinical study was done to evaluate the impact of thyrotropin and prolactin levels on menstrual function and fertility of women with primary infertility.

MATERIALS AND METHODS

The study was conducted on 240 subjects in the reproductive age group of 20- 40 years of age. Among the subjects, 160 were women with primary infertility and 80 were normal fertile women. The exclusion criteria included were male factors of infertility, other female factors like tubal factors, congenital anomalies of urogenital tract, previous history of thyroid disease, thyroid surgeries or on thyroid medications. Women receiving treatment for hyperprolactinemia were also excluded. This study was approved by institutional ethical committee and informed consent

was obtained from all the subjects involved in the present study.

Complete clinical history (including obstetrical and gynecological history) and physical examination (examination of the thyroid gland and semen analysis for the husband to exclude male factor of infertility) was done in all the patients and controls. All patients were explained about the clinical study. Other relevant clinical history was recorded in a pre-designed data collection sheet.

Fasting venous samples on 3rd day of menstrual cycle was collected from all the patients and controls for measuring TSH and prolactin levels. TSH and prolactin levels were estimated by using acculite

(German) kits on semi chemiluminiscence instrument.

RESULTS:

The results were expressed as mean ± SD. Mean ± SD of both cases and controls are tabulated. (Table 1) p value was calculated for comparing the thyrotropin and prolactin levels in both cases and controls. p value was considered statistically significant when it is <0.05. The present study showed a p value <0.01 (for both thyrotropin and prolactin levels) and was statistically considered highly significant. This indicates a significant difference of thyrotropin and prolactin levels was noted on comparison between cases and controls. Statistical analysis was performed using SPSS software.

Table 1

Table showing Mean ± SD values of TSH, Prolactin in cases and controls with p value

Biochemical parameter	Controls (Mean ± S.D)	Cases (Mean ± S.D)	p value
TSH	2.16 ± 0.94	28 ± 9.26	<0.001
Prolactin	12.58 ± 6.9	52.9 ± 27.17	<0.001

DISCUSSION

The dysfunction of hypothalamic pituitary ovarian axis in women often leads to infertility.^[3] Thyroid dysfunction is a condition known to reduce the likelihood of pregnancy and to adversely affect pregnancy outcome. Data on the relationship between thyroid disorders and infertility remain scarce and the association with a particular cause of infertility has not been thoroughly analyzed.^[5, 6]

A slight increase in TSH level with normal T₃ and T₄ is referred to as subclinical hypothyroidism where as high TSH and decrease in T₃ and T₄ is referred to as clinical hypothyroidism.^[7] Sub clinical hypothyroidism is more common. Sub-clinical hypothyroidism (SCTD) is most commonly an early stage of hypothyroidism. Although the condition may resolve or remain unchanged, within a few years in some patients, overt hypothyroidism may develop, with low free T₄ levels as well as a raised thyroid stimulating hormone (TSH) level.^[7]

Hypothyroid women have increased levels of thyrotropin releasing hormone which causes increased production of prolactin

and decreasing levels of sex-hormone-binding globulin. Thus infertile women who are suffering from hypothyroidism have higher serum prolactin levels when compared with hyper and euthyroid subjects.^[8]

Prolactin is a polypeptide hormone secreted by the anterior pituitary gland which plays a main role in the stimulation of lactation in the postpartum period. The increase in prolactin secretion can be either physiological (like pregnancy and lactation) or pathological (like hypothalamic and pituitary diseases etc). Hyperprolactinemia induces suppression of the hypothalamic-pituitary-gonadal axis and resistance of the ovary to gonadotropin action, which results in lack of ovulation, amenorrhea and galactorrhea.^[6,9]

Follicular changes seen in hypothyroidism are mainly due to hyperprolactinemia that impairs secretion and action of gonadotropin.^[10] The prevalence of hyperprolactinemia in infertile group is more when compared to controls in the present study. Infertility associated with hyperprolactinemia is reversible with treatment. Lowering of prolactin levels to

normal or near normal is often necessary to allow ovulation.^[5]

The estimated incidence of hyperprolactinaemia in hypothyroidism has been reported from 0% to 40%.^[6] Its prevalence in female with overt hypothyroidism was reported to be 39% to 57%.^[11,12]

Hypothyroidism itself plays a major role to cause infertility even in absence of prolactinemia which results most probably from arrest in pubertal development as the maturation of oocytes demands normal levels of thyroid hormone.^[13] For infertile women, preparation for medically assisted pregnancy comprises controlled ovarian hyperstimulation that substantially increase circulating estrogen concentrations, which in turn can severely impair thyroid function. In women of reproductive age, hypothyroidism can be reversed by thyroxine therapy to improve fertility and avoid the need for use of assisted reproduction technologies.

Our study showed significant association of infertility with raised serum TSH and prolactin levels. Same findings were found in a study done by Kumkum et al^[14],

Choudhary and Goswami et al^[15] and Singh et al.

So it is necessary to evaluate serum TSH and prolactin levels in infertile women with menstrual abnormalities, which definitely might be advantageous to render the clinician, stabilization of the hormonal abnormality and improve fertility.

CONCLUSIONS

There is a continuous interaction between the thyroid gland and gonadal axes before and during pregnancy. Hypothyroidism influences ovarian function by increasing the secretion of prolactin and decreasing levels of sex-hormone-binding globulin. The present study showed high prevalence of hypothyroidism in infertile women when compared with fertile women of same age group. Thyrotropin and prolactin levels showed significant difference when compared, between cases and controls which indicate that there is significant influence of hypothyroidism over serum prolactin levels which contributes to decrease in gonadotropins leading to primary infertility. Hence estimation of serum TSH and prolactin levels should be

done in early stages in infertile women with menstrual disturbances.

ACKNOWLEDGEMENTS

The authors are grateful to the Management, Superintendent and Department of Biochemistry, Katuri Medical College and hospital, Guntur

REFERENCES:

1. N. Akhter, S.A. Hassan: Sub-clinical hypothyroidism and hyperprolactinemia in infertile women: Bangladesh perspective after universal salt iodination. The Internet Journal of Endocrinology. 2009 Volume 5 Number 1. DOI: 10.5580/8a.
2. Healy DL et al. (1994) Female infertility: causes and treatment. Lancet 343: 1539–1544.
3. Doufas AG, Mastorakos G. The hypothalamic-pituitary- thyroid axis and the female reproductive system. Ann N Y Acad Sci. 2000; 900: 65-76.
4. Poppe K, Velkeniers B, Glinoeer D. Thyroid disease and female reproduction. Clin Endocrinol (Oxf). 2007; 66(3): 309-21.
5. Poppe K, Velkeniers B. Thyroid and infertility. Verh K Acad Geneesk Belg 2002; 64: 389-99.
6. Raber W, Gessl A, Nowotny P, Vierhapper H. Hyperprolactinemia in hypothyroidism: clinical significance and impact of TSH normalization. Clin Endocrinol 2003; 58: 185-91.
7. Elahi S, Tasneem A, Nazir I, Nagra SA, Hyder SW. Thyroid dysfunction in infertile women. J Coll Physicians Surg Pak. 2007; 17(4):191-4.
8. Mishra R, Baveja R, Gupta V. Prolactin level in infertility with menstrual irregularities. J Obstet Gynecol India. 2002; 52: 40-3.
9. Olivar AC, Chaffkin LM, Kates RJ, Allan TR, Beller P, Graham NJ. Is it necessary to obtain serum levels of thyroid stimulating hormone and prolactin in asymptomatic women with infertility? Conn Med 2003; 67: 393-5.
10. Jones RL et al. (2004) Identification of chemokines important for leukocyte recruitment to the human endometrium at the times of embryo implantation and

menstruation. *J Clin Endocrinol Metab* 89: 6155–6167.

11. Honbo KS, Van Herle AJ, Kellett KA. Serum prolactin levels in untreated primary hypothyroidism. *Am J Med* 1978; 64: 782-7.

12. Thomas R, Reid RL. Thyroid disease and reproductive dysfunction: a review. *Obstet Gynecol* 1987; 70: 789-98.

13. Dajan CM, Saravanan P. Whose normal thyroid function is better- yours or mine? *Lancet* 2002; 360: 353-4.

14. Kumkum A, Jasmine K, Shweta G, Pal Ajeshwar N. Hyperprolactinemia and its coorelation with hypothyroidism in infertile women. *J Obstet Gynecol India*. 2006; 56(1): 68-71.

15. Choudhury SD, Goswami A. Hyperprolactinemia and reproductive disorders--a profile from north east. *J Assoc Physicians India*. 1995; 3(9): 617-8.