

## Original Article

# Prevalence of thyroid disorders among infertile women with menstrual irregularities

Nazlima Nargis<sup>1</sup>, Abu Kholdun Al Mahmood<sup>2</sup>, Iqbal Karim<sup>3</sup>

### Abstract

**Background:** The infertility problem is more common phenomenon among the women now a days and has increased over past 30 years. The present study was carried out to see the prevalence of thyroid disorders among infertile women with menstrual irregularities.

**Methods:** It was a cross sectional study conducted at the Department of Obstetrics and Gynecology, Ibn Sina Medical College, Dhaka from January to December 2016. After taking informed consent, total 160 infertile women and 100 normal fertile women volunteers were selected on OPD basis between age group of 18-45 years. Out of 160 infertile women, 100 were of primary infertility and 60 of secondary infertility. Participants were selected on the basis of detailed history, clinical examination and laboratory investigations. Detailed history of participants including age, menstrual history, obstetric history, history of any medications were taken.

**Results:** There was a higher prevalence of hypothyroidism in the infertile women as compared to the fertile one in the study group, particularly in secondary infertility. Oligomenorrhoea was most common in infertile women. Hypothyroidism is commonly associated with ovulatory failure. Hence, assessment of serum TSH is mandatory in the work up of all infertile women, especially those presenting with menstrual irregularities. So the basic approach should be to identify those hypothyroid individuals who have greatest risk for the development of infertility.

**Conclusion:** Long standing hypothyroidism may develop ovulatory dysfunction. So identifying and treating hypothyroidism at an earlier stage before the appearance of ovulatory dysfunction can have potentially great preventive value.

**Key words:** Thyroid disorders, Infertile women, Menstrual irregularities.

### Introduction:

Infertility is the inability of a couple to achieve pregnancy over an average period of one year despite of having regular unprotected sexual intercourse<sup>1</sup>. It can be primary or secondary. Primary infertility is the complete inability to conceive and ranges from 2% to 5% and secondary infertility stands for cessation of further fertility and has a prevalence rate of 20% worldwide.<sup>2</sup> The infertility problem is more common phenomenon among the women now a days and has increased over past 30 years<sup>3</sup>. The prevalence of both primary and secondary infertility is estimated to be between 12-14%. It thus represents a common condition, with important medical, economic and psychological implications<sup>4</sup>.

Infertility may be caused by an underlying medical condition that may damage the fallopian tubes, interferes with ovulation

or causes hormonal complications. Hormonal imbalance is an important cause of anovulation. Women with hormonal imbalance will not produce enough follicles to ensure the development of ovum<sup>5</sup>.

Thyroid hormone is important for growth and metabolism and it regulates cellular functions, therefore along with gonadotropins, e.g. follicular stimulating hormone (FSH), luteinizing hormone (LH) and prolactin also play an important role in female reproductive system and fertility. Thyroid dysfunction is known to affect all aspects of reproductive function in the female. Hypothyroidism or hyperthyroidism can produce infertility, abortions, stillbirths, failure of lactation and menstrual abnormalities; measurement of prolactin and thyroid hormones has been considered an important component tests for infertility<sup>6</sup>.

There are several experimental evidences, both on animals and humans, indicating association of hyperthyroidism or hypothyroidism with menstrual disturbance, anovulatory cycles, decreased fecundity and increased morbidity during pregnancy<sup>7-8</sup>. Most importantly proper management of such thyroid dysfunction results in improvement in health status, normalization of menstrual abnormalities and restoration of normal fertility<sup>9</sup>. Therefore assessment of thyroid dysfunction has been considered as an important component of infertility work up in women<sup>10</sup>. The aim of this study was to see the prevalence of thyroid disorders among infertile women with menstrual irregularities.

1. Associate Professor, Department of Obstetrics and Gynecology, Ibn Sina Medical College & Hospital, Dhaka
2. Professor and Head, Department of Biochemistry, Ibn Sina Medical College, Dhaka
3. Associated Professor of Pathology, Armed Forces Medical College, Dhaka Cantonment.

### Corresponding Author:

Dr. Nazlima Nargis, Associate Professor  
Department of Obstetrics and Gynaecology  
Ibn Sina Medical College & Hospital  
Mobile no. 01718417441  
e-mail: nazlimanargis@gmail.com

## Materials and Methods:

It was a cross sectional study conducted at the Department of Obstetrics and Gynecology, Ibn Sina Medical College, Dhaka from Jan to Dec 2016. After taking informed consent, total 160 infertile women and 100 normal fertile women volunteers were selected on OPD basis between age group of 18-45 years. Out of 160 infertile women, 100 were of primary infertility and 60 of secondary infertility. Participants were selected on the basis of detailed history, clinical examination and laboratory investigations. Detailed history of participants including age, menstrual history, obstetric history, history of any medications were taken. Inclusion criteria was both infertile & normal fertile women aged between 18 to 45 years and. Exclusion criteria were male factor infertility, patient who received medication that could alter thyroid function test like amiodarone, heparin, the female factors like tubal factor, any obvious organic lesion, any history of thyroid disease or previous thyroid surgery.

After taking informed consent, 12 hour fasting venous blood samples were collected from all participants in there early follicular phase of menstrual cycle i. e. between day 3<sup>rd</sup> to 5<sup>th</sup> in plane bulbs. Serum was separated after 1 hour by centrifugation at 3000 rpm for 10 minutes and was tested for

following parameters: Serum FT3, serum FT4, serum TSH.

Quantitative estimation of all hormones done by Chemiluminescence Immunoassay (CLIA) using Acculite CLIA microwells. The reference values for thyroid status were taken as TSH (0.35-5.5  $\mu$ IU/ml), FT4 (0.89-1.76 ng/dl), FT3 (2.30-4.20 pg/ml). Values below or above were considered abnormal. Statistical analysis was performed by ANOVA test, Unpaired student t-test and Chi-square test. P value <0.05 was considered significant level. The study was approved by Institutional Ethical Committee of Ibn Sina Medical College.

## Results

Table-1 shows number of study subjects and their groups (n=260)

Groups	Frequency	Percentage (%)
Normal fertile women (Control)	100	38.5
Infertile women (Cases)	160	61.5
Primary infertile women	100	38.5
Secondary infertile women	60	23.0

Table-2 shows the mean distribution of the study patients (n=260)

Variables	Primary infertile women (n=100) Mean $\pm$ SD	Secondary infertile women (n=60) Mean $\pm$ SD	Normal fertile women (Control) (n=100) Mean $\pm$ SD	p value
Age (years)	26.52 $\pm$ 3.12	27.34 $\pm$ 2.04	27.13 $\pm$ 2.31	0.104

Table-3 shows distribution of the study subjects by menstruation pattern among groups (n=260)

Parameters	Primary infertile women (n=100) No. (%)	Secondary infertile women (n=60) No. (%)	Normal fertile women (Control) (n=100) No. (%)	p value
Regular	35(35.0)	18(30.0)	74(74.0)	
Oligomenorrhoea	42(42.0)	31(51.7)	26(26.0)	
Amenorrhoea	17(17.0)	9(15.0)	0(0.0)	<0.001
Menorrhagia	6(6.0)	2(3.3)	0(0.0)	
Total	100(100.0)	60(100.0)	100(100.0)	

Figure-1: Menstrual abnormality in cases and controls

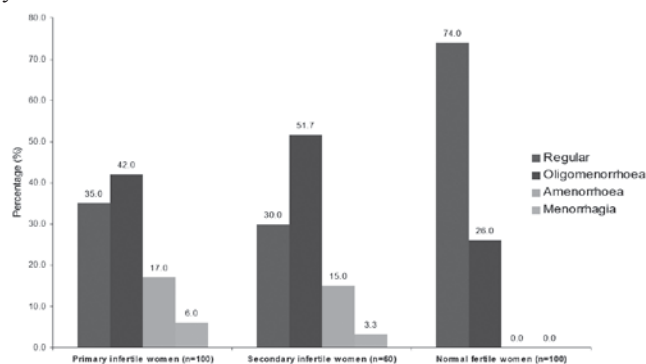


Fig - 1

Table-4 shows comparison of thyroid profile among three groups (n=260)

Table-4

Parameters	Primary infertile women (n=100) Mean±SD	Secondary infertile women (n=60) Mean±SD	Normal fertile women (Control) (n=100) Mean±SD	p value
FT3 (2.30-4.20 pg/ml)	2.36±1.74	2.17±0.98	2.93±1.21	0.001
FT4 (0.89 – 1.76ng/ml)	1.47 ±0.62	1.43 ±0.54	1.58±0.59	0.233
TSH (0.35-5.5µIU/ml)	4.59 ±2.53	4.74± 2.59	3.41± 1.54	<0.001

Table-5 shows hormonal status in the cases and controls (n=260)

Table-5

Hormonal status	Infertile group (n=160) No. (%)	Normal fertile (n=100) No. (%)	P value
Euthyroid	126(78.8)	86(86.0)	0.060
Hyperthyroid	7(4.3)	7(7.0)	
Hypothyroid	27(16.9)	7(7.0)	

Table-6 shows hormonal status in the cases and controls (n=260)

Hormonal status	Infertile group (n=160) No. (%)	Normal fertile (n=100) No. (%)	P value
Euthyroid	(n=126)	(n=86)	
FT3 (2.30-4.20 pg/ml)	2.34±0.8	2.8±0.23	<0.001
FT4 (0.89 – 1.76 ng/ml)	1.5±0.4	1.4±0.89	0.268
TSH (0.35-5.5 µIU/ml)	3.9±1.6	3.36±0.8	0.004
Hyperthyroid	(n=7)	(n=7)	
FT3 (2.30-4.20 pg/ml)	5.2±0.55	5.05±0.31	0.541
FT4 (0.89 – 1.76ng/ml)	3.2±0.64	3.1±0.33	0.967
TSH (0.35-5.5µIU/ml)	0.24±0.05	0.17±0.4	0.654
Hypothyroid	(n=27)	(n=7)	
FT3 (2.30-4.20 pg/ml)	1.1±0.2	1.01±0.14	0.279
FT4 (0.89 – 1.76ng/ml)	0.66±0.07	0.45±0.11	<0.001
TSH (0.35-5.5µIU/ml)	8.72±0.79	6.86±0.45	<0.001

## Discussions:

Thyroid hormones have profound effects on reproduction and pregnancy. Thyroid dysfunction is implicated in a broad spectrum of reproductive disorders, ranging from abnormal sexual development to menstrual irregularities and infertility<sup>11</sup>. The current study was designed to evaluate the prevalence of thyroid status in infertile women with menstrual disorders. The individuals were divided in 2 groups according to fertility i.e. Group 1 infertile women (cases), Group 2 normal healthy fertile women (controls); Cases are further sub-classified as Group 1A (Primary infertile women) and Group 1B (secondary infertile women). Hypothyroidism from infancy, if untreated, leads to sexual immaturity and hypothyroidism beginning before puberty causes a delay in onset of puberty followed by anovulatory cycles. It is stated in different textbooks that in adult women, hypothyroidism results in changes in cycle length and amount of bleeding.

In this study, the majority of infertility (78.8%) as well as fertile (86%) women were euthyroid. But the distribution of thyroid dysfunction in the study group was somehow different- hypothyroidism was more prevalent in the infertile group (16.9%) as compared to control (7%). The prevalence of hyperthyroidism in the cases and the controls were 4% and 7.5%, respectively. Our findings correlates with the study by Goswami et al.<sup>12</sup> In their study they investigated 160 women with primary infertility and 80 fertile women with similar age and socioeconomic status were enrolled as the controls. They found most of the control (86%) and infertile women (87%) were euthyroid. Prevalence of Hypothyroidism was seen in 8% of the infertile subjects whereas in the control group it was found to be 5%. Hyperthyroidism was found in 5% of the infertile patients<sup>12</sup>.

Elahi et al. in their study of infertile (160) and fertile women (100), also found most of the infertile women (89.3%), & control women (93.4%) were euthyroid.<sup>13</sup> The incidence of hypothyroidism (6.4%) was slightly higher as compared to hyperthyroidism (4.3%). Akhter & Hasan, in their study of 113 infertile women, they found that the prevalence of subclinical hypothyroidism was 6.5% and 15%, in primary and secondary infertility respectively.<sup>14</sup> These findings of above studies correlate with findings of our study in which we get high prevalence of hypothyroidism in infertile as compared to control. The prevalence of hypothyroidism in women of reproductive age (20-40 years) varies between 2% to 4%.<sup>15</sup>

In the present study menstrual irregularity was seen in 133 out of 260 cases i.e., 51.2% (Table-3). Goswami et al., revealed that 62.5% of hypothyroid cases had menstrual disturbances<sup>12</sup>. Kumkum et al. had reported the menstrual abnormality to be 57.6% in their study.<sup>16</sup> Oligomenorrhoea was observed in (50%). In the study done by Krasses et al., the prevalence of menstrual irregularities (mainly oligomenorrhoea) reached 23% among 171 hypothyroid patients, while being only 8% in 214 controls ( $p < 0.05$ ).<sup>17</sup> In our study we observed that menstrual irregularities due to both hypo and hyperthyroidism may play a significant role in infertility as compared to euthyroid status.

## Conclusion

There was a higher prevalence of hypothyroidism in the infertile women as compared to the fertile one in the study group. Hypothyroidism is commonly associated with ovulatory failure and menstrual disorders. Therefore serum TSH assessment is mandatory for infertility work up, especially those women presenting with menstrual irregularities.

## References

- Cooper TG, Noonan E, von Eckardstein S, Auger J, Baker HW, Haugen TB et al. World health organization reference values for human semen characteristics. *Hum Reprod update* 2010; 16 (3): 231-45.
- Templeton A, Fraser C, Thompson B. Infertility epidemiology and referral practice. *Hum Reprod* 1991; 6: 1391-4.
- Stephen EH, Chandra A. Use of infertility services in the United States : 1995. *Fam PlannPerspect* (2000) ;32: 132-7.
- Nasima A., Sufi AH. Subclinical hypothyroidism and hyperprolactinemia in infertile women: Bangladesh perspective after universal salt iodination. *The internet Journal of Endocrinology* 2009; 5 (1) : 8-12.
- EniolaOW, Adetola AA, Abayomi BT. A review of female infertility ; important etiological factors and management. *J Microbiol Biotech Res* 2012; 2(3): 379-385.
- Poppe K, Velkeniers B. Thyroid disorders in infertile women. *Ann Endocrinol (Paris)* 2003; 20: 210-5.
- Doufas AG, Mastorakos G. The hypophysalamic - pituitary – thyroid axis and the female reproductive system. *Ann N Y Acad Sci* 2000; 900: 65-76.
- Poppe K, Velkeniers B, Glinoeir D. Thyroid disease and female reproduction. *Clin Endocrinol (Oxf)* 2007; 66: 309-21
- Micinsk P, Wielgus E, Wojcieszyn M, Pawlicki K. Abnormal ovarian reserve test reflects thyroid dysfunction. *Poland J Gyn Invest* 2006; 372 : 1251-62.
- Cramer DW, Sluss PM, Powers RD, McShane P, Ginsburgs ES, Hornstein MD et al. Serum prolactin and TSH in an in vitro fertilization population: is there a link between fertilization and thyroid function? *J Assist Reprod Genet* 2003; 20(6) : 210-5.
- Trokoudes, krinos M, Skordi S Nicos, Picolos, Michalis K, Pedieos IVF centre and Cyprus : infertility and thyroid disorder. *Current opinion in obstetrics and gynecology* 2006; 18(4): 446-451.
- Goswami B, Patel S, Chaterjee M, Koner B. C, Saxena A. Correlation of prolactin and thyroid hormone concentration with menstrual patterns in infertile women. *J Reprod Inferil.* 2009; 10(3): 207-12
- Elahi S., Tasneem A., Nazir I., Nagra S.A., Hyder S.W. Thyroid dysfunction in infertile women. *J Coll Physicians Surg Pak.* 2007;17(4):191-4
- Akhter N, Hassan S. A. Subclinical hypothyroidism and hyperprolactinemia in infertile women: Bangladesh perspective after universal salt iodination. *The Internet Journal of Endocrinology.* 2000;1:1-15.
- Cramer D.W., Sluss P. M., Powers R. D., McShane P., Ginsburgs E. S., Hornstein M.D. et al. Serum prolactin and TSH in an in vitro fertilization population : is there a link between fertilization and thyroid function? *J Assist Reprod Genet.* 2003; 20 : 210-215.
- Kumkum A., Kaur J., Gupta S., Narang P. A. Hyperprolactinemia and its correlation with hypothyroidism in infertile woman. *Obstetrics and Gynecology of India.* 2005;56 : 68-71.
- Krassas G. E., Pontikides N., Kaltsas T., Papadopoulou P., Paunkovic J., Paunkovic N. et al. Disturbances of menstruation in hypothyroidism. *ClinEndocrinol (Oxf)* 1999;50(5): 655- 659.