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Estimation of Thyroid Hormone Levels in Infertility: Study from a Tertiary Care Hospital, Andhra Pradesh.

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Abstract
Background*: Prevalence of hypothyroidism among women in reproductive age group ranges from 6.2 to 11.4%. But there is variation in the prevalence in various parts of country in addition to high prevalence of sub clinical hypothyroidism. And there is growing concern of infertility with an estimated 8-12% of couples suffering from it worldwide.*
Aim & Objectives*: To estimate the thyroid hormone levels in infertility among infertile women.*
Material & Methods*: A hospital based descriptive study was carried out where a total of 115 infertile women who attended infertility clinic at the tertiary care hospital Vijayawadawere selected by consecutive sampling technique. Study duration was 6 months from January to June 2018. Informed consent was taken prior to the start of the study and basic demographic data and other related information was collected by a pre designed questionnaire. Exclusion criteria: Infertile women having tubal blockage, pelvic inflammatory disease, genital tuberculosis, with liver, renal or kidney disease, already on treatment for any thyroid disorders and male component infertility of their husbands were excluded from the study.*
Results & Conclusions*: Out of the 115 women enrolled for the study, 58 (50.4%) were hypothyroid and 57 (49.6%) were euthyroid. Among the 58 cases of hypothyroid, 40 (34.8%) had subclinical hypothyroidism and 18 (15.6%) had overt hypothyroidism. It is extremely important that women are screened for thyroid profile at the initial stage so that early detection can correct the hormonal imbalance and reduce the overall stress and increase the chances of conception.*
Keywords*: infertility, thyroid hormones, estimation, hypothyroidism*

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I. Introduction

World Health Organization (WHO) has defined Infertility as "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse". It can be categorized into primary infertility and secondary infertility [1].

The medical causes of female infertility include ovulation disorders, tubal problems, infections, hormonal problems, endometriosis, polycystic ovarian syndrome and others. Infertility is a growing concern in these days due to a multiplicity of factors. These medical factors clubbed with increased stress, life style changes and improper diet increasing the overall infertility prevalence. The global prevalence of infertility varies but estimated to be around 8 to 12% and in India overall prevalence of primary infertility ranges between 3.9 to 16.8%[2,3].

Thyroid disorder especially hypothyroidism is a major public health problem with its prevalence varying across the globe region to region. And these disorders if undiagnosed and not treated can be cause for infertility. Prevalence of hypothyroidism among women in reproductive age group ranges from 6.2 to 11.4%. But there is variation in the prevalence in various parts of our country in addition to high prevalence of sub clinical hypothyroidism[4,5].

Across the globe there is expansion on knowledge regarding association of infertility with thyroid disorders. Thyroid disorders including both hypothyroidism and hyperthyroidism are associated with menstrual disorders, delayed onset of puberty, anovulatory cycles thereby leading to infertility and pregnancy loss[6,7].

Hence the present study has been taken up with an objective to estimate the thyroid hormone levels in infertility among infertile women.

II. Material & Methods

Study Design: It was a hospital based descriptive study done at Infertility clinic from a tertiary care hospital from Vijayawada. A total of 115 infertile women were selected by consecutive sampling technique in the study duration of 6 months from January to June 2018.

Study participants:
Inclusion criteria- Infertile women who attended infertility clinic and given informed consent.
Exclusion criteria-

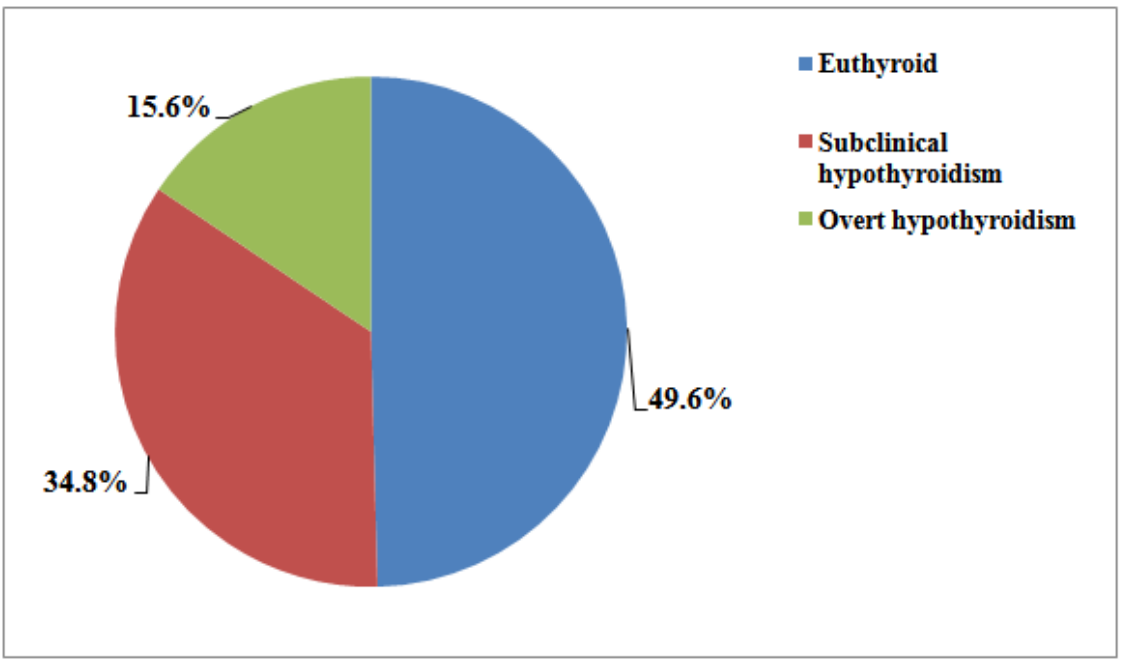
- Infertile women having tubal blockage,
- Pelvic inflammatory disease,
- Genital Tuberculosis,
- With liver, renal or kidney disease,
- Already on treatment for any thyroid disorders and male component infertility of their husband's were excluded from the study.

After taking informed consent, demographic data & brief history was taken from a pre designed proforma followed by general examination and investigations especially thyroid profile (TSH,T3 & T4) and other necessary tests.
Study population was divided into 3 groups[8]:
Group 1: Euthyroid (women with normal TSH level 0.39-4.6mIU/ml)
Group 2: Sub clinical hypothyroidism (Raised TSH 4.6-20 mIU/ml & normal free T4 level)
Group 3: Overt hypothyroidism (TSH >20 mIU/ml & low free T4 level).
Statistical analysis: Data was entered in Microsoft Excel 2010 version and EPI INFO version 7 provided by CDC Atlanta. Numerical data was presented in mean and standard deviation and categorical variables in percentages and proportions. Chi square test and ANOVA test were applied wherever necessary with $p<0.05$ considered as statistically significant.

III. Results

Demographic characteristics-
More than half the proportion of the cases (n=62, 53.9%) belonged to 26-30 years age group followed by 20-25 years age group (n=35, 30.4%). Mean age of the study women was found to be 23.4±3.5 years. With regards to duration of married life, almost three fourth (74.8%) had 1-5 years of marital life followed by 6-10 years in 20% of the study population.
More than two thirds (68.7%) were literates and majority (60.8%) were home makers by occupation.
Thyroid status:
Out of the 115 women enrolled for the study, 58 (50.4%) were hypothyroid and 57 (49.6%) were euthyroid. Among the 58 cases of hypothyroid, 40 (34.8%) had subclinical hypothyroidism and 18 (15.6%) had overt hypothyroidism. It can be inferred from above that, in the present study more than one thirds (34.8%) were having subclinical hypothyroidism indicating the need for investigating for TSH & T4 hormones during initial assessment.

Graph 1: Thyroid status



Comparison between Baseline demographic and clinical characteristics among three groups:

Among the three groups, a baseline comparison of demographic and clinical characteristics was done.

The mean age among three groups had a slight variation which had no statistically significant association. All women of Euthyroid group had regular menstrual cycles but in subclinical and overt hypothyroidism groups, significant cases (22.5% & 38.9%) had irregular menstrual cycles. This association between regularity of menstrual cycles and thyroid status was statistically significant.

Body Mass Index (BMI) was calculated for all study population and present study found that mean BMI values were higher among overt hypothyroidism (31.5 kg/m^2) and subclinical hypothyroidism (26.1 kg/m^2). Euthyroid cases had normal mean BMI values (20.6 kg/m^2). This association was highly significant statistically indicating that hypothyroid women were more overweight and obese compared to euthyroid women.

Thyroid hormones assessment was done among all women and its results showed that TSH values were significantly higher among overt & subclinical hypothyroidism groups and T4 levels were significantly lower especially in overt hypothyroidism group. This difference again was found to be statistically significant by ANOVA test.

Table 1: Comparison between Baseline demographic and clinical characteristics among three groups

Characteristic	Euthyroid (n=57)	Subclinical hypo thyroidism (n=40)	Overt hypo thyroidism (n=18)	p value
Mean age (years)	22.4±1.7	23.6±0.5	23.4±2.5	>0.05**
Menstrual cycles **Regular** **Irregular**	 57 --	 31 09	 11 07	 0.00002*
Mean BMI (kg/m^2)	20.6±3.2	26.1±2.8	31.5±1.4	0.001**
Mean TSH (mIU/L)	3.52±4.7	9.71±5.3	21.8±7.1	0.001**
Mean T4 (mIU/L)	121.5±13.5	103.7±9.4	17.4±5.3	0.0001**

***Chi square test** ****ANOVA test** $p<0.05$ considered statistically significant

IV. Discussion

Present hospital based study which was done in a tertiary care hospital from Vijayawada comprised of 115 infertile women attending infertility clinic.

More than half the proportion of the cases belonged to 26-30 years age group with mean age being 23.4±3.5 years. Almost three fourth had 1-5 years of marital life; more than two thirds were literates and majority were home makers by occupation.

Prevalence of hypothyroidism:

Present study found that half the proportion of the study population (50.4%) were hypothyroid at the time of the study. Out of them, about one thirds of them (34.8%) had subclinical hypothyroidism and 15.6% overt hypothyroidism.

These findings were in concurrence with findings by N.Sridevi&M.Sandhya rani (2015)[9] which found that 50% were hypothyroid , 29% subclinical hypothyrodism and 21% overt hypothyrodism.Similar findings were also observed by Priya DM et al (2015)[10], where prevalence of hypothyroidism, subclinical and overt hypothyroidism was found to be 46.3%, 50.5% and 3.2% respectively.

In contrast to the study findings, study by Verma et al (2012)[11] found a low prevalence of hypothyroidism (23.8%) compared to present study. 14.9% and 8.9% had subclinical and overt hypothyroidism respectively. This difference in the findings might be due to different geographic location of that study which was done in North India compared to present study in South India.

With regards to thyroid hormones present study showed that TSH values were significantly higher among overt & subclinical hypothyroidism groups and T4 levels were significantly lower especially in overt hypothyroidism group. Similar findings were observed in study by N Tasnim and R Begum (2017)[12] where T3 and T4 hormnes were significantly lower in infertile group compared to control group.

V. Conclusions

Present study found that half the proportion of the cases were hypothyroid among whom majority had subclinical hypothyroidism. Hence it is extremely important that women are screened for thyroid profile at the initial stage so that early detection can correct the hormonal imbalance and reduce the overall stress and increase the chances of conception.

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