



## Estimation of Thyroid Stimulating Hormone levels in pregnancy in a South Indian town- Kumbakonam Urban Rural Epidemiological Study – KURES 4

Suchitra M. R.<sup>1</sup>, Shanthi T.S.<sup>2</sup>, Parthasarathy S.\*<sup>3</sup>

<sup>1</sup>Department of Chemistry and Biosciences, SASTRA Deemed to be University (Srinivasa Ramanujan Centre) Kumbakonam – 612001, Tamilnadu, India

<sup>2</sup>KRG Nursing Home, Kumbakonam – 612001, Tamilnadu, India

<sup>3</sup>Department of Anesthesiology, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, Puducherry – 607402, India



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### ABSTRACT

Thyroid dysfunction in pregnancy, especially hidden, may lead on to increased morbidities both in mothers and the foetuses. With this in mind, we conducted a study of estimating Thyroid Stimulating Hormone (TSH) levels in the first trimester of asymptomatic antenatal mothers. In this 680-sample sized study, we measured TSH values after noting down, age, weight, religion, occupation and type of diet. The mean TSH value is 2.36 (0.02 to 31.67) mIU/ml. the incidence of subclinical hypothyroidism was 9.1 % whereas it was 2.9% in hyperthyroidism. All parturients with subclinical thyroid dysfunction were given appropriate treatment. The Hindus and Muslims constituted the majority. There was no difference between TSH values among both religions. Around 95 % were vegetarians, and the value of TSH was similar in parturients with either type of eating habits. A significantly higher level of thyroid dysfunction is noted in working women even though the sample is less. These values correspond to an affording community above the poverty line. We suggest more vigilant screening at the village antenatal care level to decrease thyroid-associated fetal and maternal morbidities. We also suggest that routine TSH screening rather than targeted testing of thyroid disorders should be made mandatory even in Government institutions.

\*Corresponding Author

Name: Parthasarathy S.

Phone: +91 9344304042

Email: [painfreepartha@gmail.com](mailto:painfreepartha@gmail.com)

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### INTRODUCTION

Subclinical hypothyroidism (SCH) is a biochemical rather than a clinical condition which is characterized by elevated serum levels of Thyroid Stimulating Hormone (TSH) above the accepted reference range, but they remain asymptomatic. They have normal concentrations of thyroid hormones (Sahay and Nagesh, 2012). Different studies have noted TSH values of asymptomatic females of different age group (Suchitra et al., 2020; M.R. Suchitra et al., 2020). The incidence of subclinical hypothyroidism in pregnant Indian females is around 14.3%. There are known obstetric complications in such instances (Jacob, 2013). A meta-analysis showed that SCH in early pregnancy, compared with nor-

mal thyroid function was associated with the occurrence of preeclampsia and an increased risk of perinatal mortality. But other studies have reported that SCH during pregnancy was associated with miscarriage (Abalovich *et al.*, 2002; Li *et al.*, 2019). Hence, we aimed to find out the actual incidence of SCH in first-trimester pregnant mothers in a peripheral South Indian town. The secondary aims were to find out the mean TSH values along with any changes with different religions.

## METHODOLOGY

This prospective epidemiological observational study was conducted in a semi-urban town of south India with a population of one and a half lakhs. The institutional ethics and review board (IRBSTH 102/2019) has approved the study. The study was done from April 2019 to February 2020, according to the declaration of Helsinki. A convenient sampling method was done, and continuous eligible pregnant patients were selected for the study. A random sampling of blood for TSH was taken from all parturients in the first trimester. The age, height, weight, religion, type of diet: either a vegetarian or a non-vegetarian were noted. The present occupation was noted. The parturients who worked earlier but quit their jobs were considered homemakers. The type of work, whether heavy labourers or having white-collar jobs like software or banks, were recorded. The procedure of collecting blood was explained in the vernacular language, and consent was obtained from each one of the patients. TSH assay was done in all the collected blood samples as a screening test for thyroid disease. The tests were done in asymptomatic patients. TSH assay was done in our study using electro chemiluminescence immunoassay techniques given in the WHO accuracy guidelines.

Abnormal TSH values were basically grouped into two categories:

1. Elevated TSH: TSH of more than 5 mIU/ml
2. Suppressed TSH: TSH <0.4 mIU/ml.

Even though there are a few guidelines stating the antenatal TSH values to be below 3, we have taken only 5 mIU/ml as the standard to find out the gross incidence (Khadilkar, 2019). All the parturients with abnormal TSH were subjected to full thyroid profile and if the results were normal, only then they were labelled as subclinical hypothyroidism. In all the mothers, the mobile numbers were noted to follow up in cases where they have not followed in person for any untoward events.

## Statistics

With an approximate population of 150000, a crude birth rate of 3.6, application of qualtrix software of statistics, provided a sample size of 384, with a 95 % confidence level, and a margin of error of 5 %. We recruited 680 parturients to add power to the study. The results were subjected to descriptive analyses, ANOVA, student's "t" tests whichever is deemed suitable and necessary and a p-value of < 0.05 was considered statistically significant. Multiple correlation analyses was done for selected intergroup data.

## RESULTS

All 680 patients completed the study. The religion-wise patients are tabled below (Table 1)

The mean weight, height and weight are tabled below (Table 2). The mean TSH value is 2.36 (0.02 to 31.67) mIU/ml. There is no difference between any religion with regard to mean TSH values. (p-value 0.522), Table 3. The mean gestational age was 10.3 weeks. All sampling was done in the first trimester for all the parturients.

The incidence of subclinical hypothyroidism was 62 / 680, i.e. 9.1 %. The incidence of hyperthyroidism is 20/680 - 2.9 %. Combining both hypothyroidism and hyperthyroidism, the incidence is around 12 %. The percentage of vegetarians is only a meagre 5.14 % the rest around 94.86 % were non-vegetarians. More than 633/680 were homemakers and a minimal 43/680 constituted white-collar jobs. The rest four were labourers. Fifty-two parturients out of 633 homemakers were hypothyroid, which was 8.2 % while 10 out of the rest 47 constituted 21%. Yet the mean TSH values were similar. On multiple comparison analyses with Bonferroni correction, even though the sample is less, the incidence of thyroid dysfunction was more in homemakers. Similarly, the weight in homemakers was also significantly altered than white-collar job parturients. (Table 4) There is not much difference in any of the variables between Muslims and Hindus which constituted the majority of the sample size. All hypothyroid patients were subjected to full thyroid profile test and started on thyroid supplements. Propylthiouracil at a dose of 50 mg twice a day was started for hyperthyroid cases.

## DISCUSSION

Any disease or disorder during pregnancy is likely to affect two lives and hence proper and timely intervention to correct any such disease gets top priority. The disorders of the thyroid gland are not known to produce early symptoms.

**Table 1: The number with their respective religion**

S.No	Religion	N (no. of patients)
1.	Hindu	424 (62.3 %)
2.	Muslim	218 (32%)
3.	Christian	18 (2.7%)
4.	Others	20 (2.94 %)

**Table 2: Values of different variables including TSH**

	N	Minimum	Maximum	Mean	Std. Deviation
Age	680	18	40	26.52	3.990
Height	680	135	186	156.98	7.040
Weight	680	34	105	63.29	12.170
TSH	680	.02	31.67	2.3658	2.37982
Valid N (listwise)	680				

**Table 3: Insignificant changes in TSH values with religion as a variable**

		Sum of Squares	df	Mean Square	F	Sig.
TSH	Between Groups	12.779	3	4.260	.751	.522
	Within Groups	3832.776	676	5.670		
	Total	3845.555	679			

**Table 4: Significant weight changes with working women**

		Sum of Squares	df	Mean Square	F	Sig.
Weight	Between Groups	2516.435	2	1258.218	8.688	.000
	Within Groups	98046.646	677	144.825		
	Total	100563.081	679			

Even such milder form of illness like subclinical hypothyroidism is likely to affect both the mother and the baby. Women with hypothyroidism have decreased fertility; even if they become pregnant, risks of abortion, preeclampsia, anaemia, and postpartum haemorrhage are increased. Untreated maternal hypothyroidism can lead to neonatal complications like preterm delivery, low birth weight, and respiratory distress (Wu *et al.*, 2019). The incidence of subclinical hypothyroidism in this study was 9.1 %. We have kept the cut off TSH value at 5 mIU/ml. There are a lot of controversies about cut off values in pregnancy. We kept it at 5 to find out the definite incidence. Another study has (Dhanwal *et al.*, 2013) reported an incidence of 14.5 % of SCH in pregnant mothers if the cut off values are 4.5, but the main difference in their study was the mean TSH was 3.68 Vs 2.3 in this study. We don't want to quote the value of TSH at the different cut off values as we believed that a cut off 5 will definitely reveal a significant incidence to go ahead in principle for universal

screening rather than targeted checking in Indian mothers. Our studies in the same geographical area revealed a 3.4 % incidence among asymptomatic school children while 11 % in college girls (Suchitra *et al.*, 2020; M.R. Suchitra *et al.*, 2020). These studies tell us that the incidence is on the increase among the higher age group with a total incidence of 12 %. The incidence of hyperthyroidism with low TSH levels with normal Free T4 values were noted. The incidence in this study was 2.9 % while many studies have found a grossly less incidence (Mestman, 1997). Propylthiouracil was used in these cases as per the requirements to get the TSH normal. Even these patients were also asymptomatic. We planned to take the blood samples in Muslim women to avoid fasting seasons to get correct values. As lifestyle changes can influence thyroid dysfunction, we wanted to know whether there are any changes in Muslim women. (Raza *et al.*, 2012). We did not find any changes in TSH values with changes in religion. The mean weight and thyroid dysfunction

tion were more in homemakers in our study, but the deficiency is that there are a large number of homemakers than working women (93% Vs 7%). The incidence of vegetarianism is (5.14%) less among all groups except other religion which mainly constituted Jainism. The concept of vegetarian antenatal mothers can have different micronutrient deficiencies is not relevant (Sebastiani *et al.*, 2019). It has been proved that eighty percent of antenatal mothers are not aware of proper nutritious diet during pregnancy (M.R. Suchitra, T. S. Shanthi and S. Parthasarathy, 2020). Even though the religion-wise sample size was not powered, the sample size of 218 in Muslims is quite large enough to interpret the results. We have followed all parturients as homemakers even if they have quit the job for the purpose of pregnancy. This may add some bias in the lifestyle. We did not resort to antibody testing which is becoming increasingly popular. There is no such study which clearly depicts the number of vegetarians among Indian antenatal cases. This is the first study which picturises the thyroid dysfunction among different religions.

## CONCLUSION

The incidence of subclinical thyroid dysfunction in a random antenatal sample of 680 parturients was 12 %, the hypothyroid being 9.1% and hyperthyroid being 2.9%. The incidence was higher in working parturients. The mean TSH value was 2.36 mIU/ml. There was no difference between the values with a different religion. Around 95 % were vegetarians and the value of TSH was similar in parturients with either type of eating habits. These values correspond to an affording community above the poverty line. We suggest more vigilant screening at the village antenatal care level to decrease thyroid-associated fetal and maternal morbidities.

## Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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