

## INCIDENCE OF HYPOTHYROIDISM IN WOMEN OF REPRODUCTIVE AGE GROUP IN RAICHUR, KARNATAKA – A STUDY BASED ON THYROID HORMONE PROFILING

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**ABSTRACT:** In order to study the incidence of hypothyroidism in women of reproductive age in Raichur, the data of women who were referred to Tunge Diagnostic Centre in Raichur was collected and the levels of T<sub>4</sub> and TSH hormones recorded. The incidence in non pregnant women is 9.29% and in the case of pregnant women, the incidence is reported as 7.89%. Overall, an incidence of 11.97% has been found, indicating the high incidence of hypothyroidism in women of this region.

**INTRODUCTION:** Thyroid disorders are one of the most commonly encountered endocrine disorders in India, and the effect it has on the women of reproductive age is noteworthy. One of the most common thyroid disorders in women of that age group is hypothyroidism, which leads to the clinical manifestations such as delay in sexual maturation and onset of puberty, reduced fertility<sup>5</sup>, impaired mental functions, heart disorders, atherosclerosis, pleural effusion, reduced appetite, anaemia, constipation, delayed muscle contraction and relaxation, decreased renal blood flow, etc. In pregnant women, hypothyroidism leads to abortion, premature delivery<sup>1,2</sup>, still birth<sup>1,2,3</sup>, congenital anomalies in the babies<sup>1,4,5</sup>, etc. Thus, keeping in view the adverse effects of hypothyroidism among the general population, in particular among the women of reproductive age group, as well as the demographic and food habits of individuals in a non- coastal region like Raichur and the effects it may have on the prevalence of hypothyroidism, the above mentioned title has been chosen for study. Keeping in mind the socioeconomic status of the general public in mind, the following study model has been implemented, wherein the patients, who were referred by a doctor, for a thyroid study were included in the study group, and whose reports were then considered to evaluate the study and report. Specifically, as it is well known that maternal thyroid status and treatment improves foetal outcomes and neuropsychological development of the newborn, knowledge about the incidence of hypothyroidism and its clinical correlation in a place like Raichur, would be helpful for further necessary health implementations.

**OBJECTIVES:** The objective of the study is to:

1. Assess the prevalence and impact of hypothyroidism in women of age group 15-45 years, in Raichur, by obtaining the percentage of women in the mentioned age group suffering from hypothyroidism.
2. Determine the prevalence of hypothyroidism in pregnant women in Raichur.
3. Determine the prevalence of hypothyroidism in non-pregnant women in Raichur (which includes both married and unmarried women in mentioned age group).

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**METHODOLOGY:** To achieve the mentioned objectives,

- Thyroid database
- Statistical analysis was performed.

Retrospectively, details of all the female patients of reproductive age group in Raichur subjected to thyroid hormone profiling in Tunge Diagnostic Center for the months of March, April and May 2013 was considered and evaluated. The records of such women included in the study group were then reviewed to check if they were pregnant. The data thus obtained was subjected to statistical analysis and results reported as per the mentioned objectives.

**Thyroid database:** The working group of the European Society for Paediatric Endocrinology has recommended measurement of the circulating levels of TSH and the total  $T_4$  as the best parameters for monitoring hypothyroidism and to assess thyroid status.<sup>7</sup> Blood samples of women referred to Tunge Diagnostic Centre were collected using disposable needles and syringes after a day's advice of fasting, profiled for  $T_3$ ,  $T_4$  and TSH levels and the data recorded along with age of patients and the doctor who referred them.

These doctors were then approached, and the patients' corresponding records were reviewed to get their pregnancy status. A thyroid database was then created in a Microsoft excel sheet according to the requirements of the study and the data interpreted.

**Statistical analysis:** The data collected and interpreted was represented statistically, with comparisons made between:

- a. Hypothyroid samples in pregnant and non-pregnant women in reproductive age group 15-45 years.
- b. All women of reproductive age group irrespective of their status.

In this study, only women aged between 15 to 45 years have been included. Only those women, who were referred for a complete thyroid profile analysis by gynecologists and endocrinologists, have been considered in this study to limit the scope of this study to the impact of hypothyroidism in women of reproductive age (15-45 years).

All data collected was dealt with confidentiality, and the data collected was used only for statistical analysis and to arrive at an inference and for no other purpose.

**OBSERVATIONS AND RESULTS:** The data collected is presented in Table 1.

GROUP NO.	STATUS	AGE	SAMPLE	TOTAL
1	NON-PREGNANT	15-25	39	183
2	NON-PREGNANT	26-35	93	
3	NON-PREGNANT	36-45	51	
4	PREGNANT	15-25	56	76
5	PREGNANT	26-35	19	
6	PREGNANT	36-45	1	

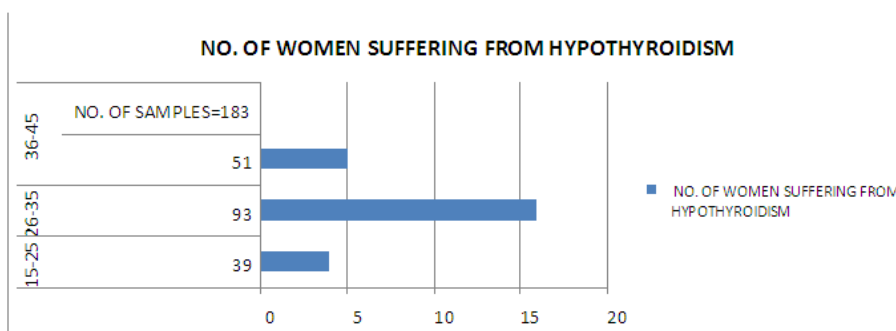
Table 1: Data

Of this data collected, it has been found that in non-pregnant women, the incidence of hypothyroidism as per different age groups is as follows:

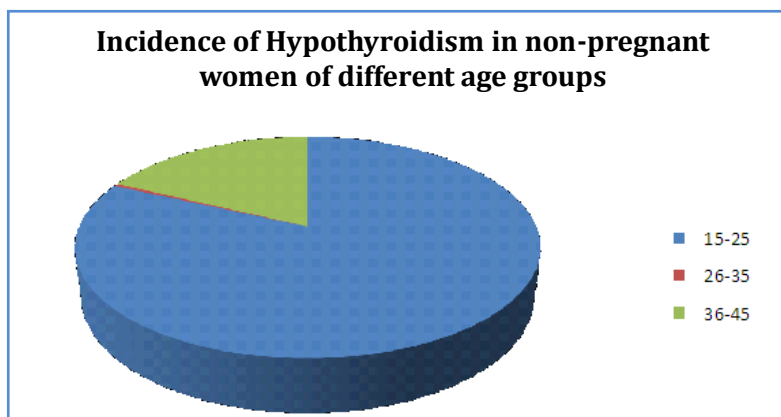
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AGE GROUP	AGE (years)	FREQUENCY	NUMBER OF NON-PREGNANT WOMEN	NON-PREGNANT WITH HYPOTHYROIDISM	
				NUMBER	% OF NON-PREGNANT WOMEN
1	15-25	95	39	7	17.95%
2	26-35	112	93	8	0.08%
3	36-45	52	51	2	3.92%
TOTAL %		259	183		9.29%

**Table 2. Table of Non Pregnant Women And Related Data**



**Figure 1. Graph showing number of non pregnant women suffering from hypothyroidism**



**Figure 2**

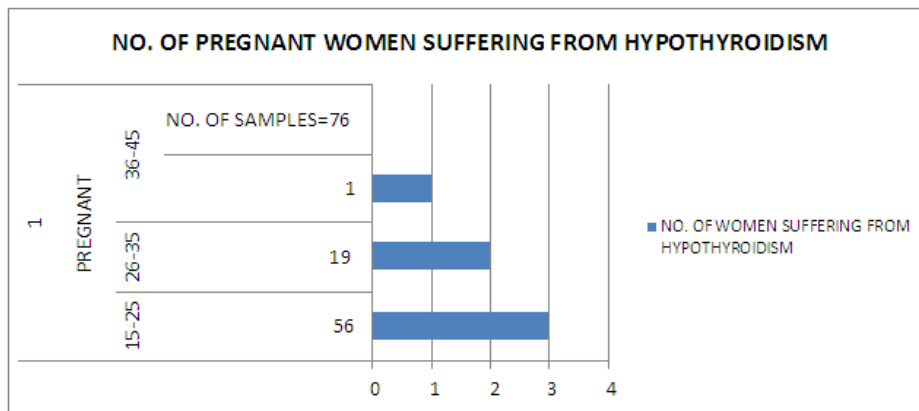
According to Table 2, in the age group of 15 to 25, an incidence of 17.95% was recorded; in the age group of 26 to 35, an incidence of 0.08% was recorded; and in the age group of 36 to 45, an incidence of 3.92% has been recorded. An overall incidence of 9.29% was noted in non-pregnant women.

In case of pregnant women, the data collected is as follows:

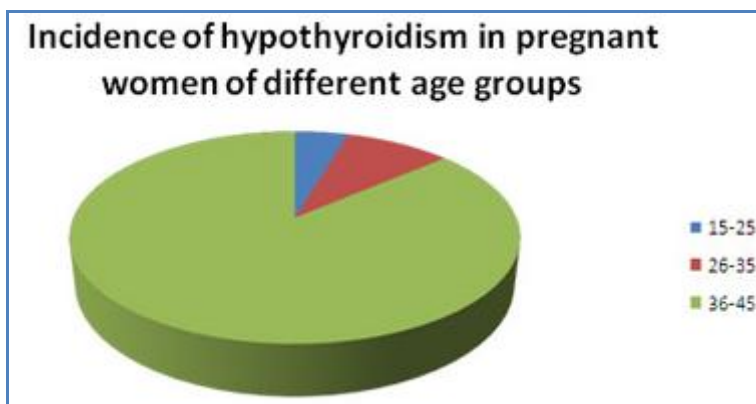
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GROUP	AGE (years)	FREQUENCY	NUMBER OF PREGNANT WOMEN	PREGNANT WOMEN WITH HYPOTHYROIDISM	
				NUMBER	% OF PREGNANT
1	15-25	95	56	3	5.36%
2	26-35	112	19	2	10.53%
3	36-45	52	1	1	100.00%
TOTAL		259	76	6	7.89%

**Table 3. Table of Pregnant Women And Related Data**



**Figure 3: Graph showing number of pregnant women suffering from hypothyroidism**



**Figure 4**

According to Table 3, in pregnant women, in the age group of 15 to 25, the incidence of hypothyroidism is reported at 5.36%. In the age group of 26 to 35, 10.53% of the women were reported hypothyroid. In the age group of 36 to 45, an incidence of 100% has been recorded. Overall, an incidence of 7.89% has been recorded, which is much higher as compared to the incidence in the non-endemic goitre belt of India, which includes Delhi and Kerala.

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AGE GROUP	AGE (years)	FREQUENCY	HYPOTHYROIDISM	% HYPOTHYROIDISM
1	15-25	95	7	7.37%
2	26-35	112	18	16.07%
3	36-45	52	6	11.54%
TOTAL %		259	31	11.97%

Table 4. Data showing incidence of hypothyroidism in total population irrespective of pregnancy status.

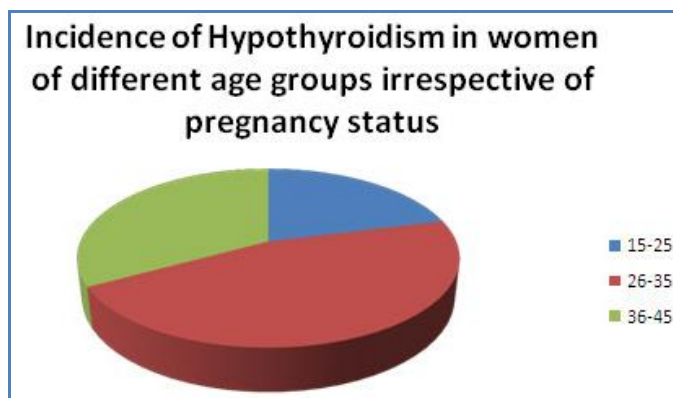


Figure 5

When considering the total number of participants, an incidence of 6.56% has been recorded among non-pregnant women and an incidence of 2.31% incidence of hypothyroidism was recorded among pregnant women. An average incidence of 11.97% has been noted among the women of the reproductive age irrespective of their pregnancy status.

In non-pregnant women, the total T4 ranges from 16.84 nmol/L to 143 nmol/L (normal physiological range being 70 nmol/L to 151nmol/L). There was no significant difference in the average concentration of total T4 between the different age groups. The average concentration of total T4 of all the 183 samples was 89.91nmol/L. There was no significant variation in the levels of TSH in various age groups as well. TSH levels varied from 0.29 mU/L to 68.40 mU/L (normal physiological range being 0.4b mU/L to 5.0 mU/L). The average concentration of TSH of all the 183 samples was 3.98mU/L.

In pregnant women, the total T4 ranged from 43.81 nmol/L to 118.9 nmol/L. There was no significant difference in the average concentration of total T4 of different age groups. The average concentration of total T4 of the 76 samples was 89.87nmol/L. The levels of TSH of the age were considerably higher in the age group of 36 to 40 years as compared to the other two age groups. TSH levels varied between 0.37 mU/L to 37.38 mU/L. The average TSH concentration of all the 76 samples is 3.97mU/L.

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AGE GROUP	THYROXINE (T4) nmol/L		TSH mU/L	
	Mean	Range	Mean	Range
<b>NON-PREGNANT</b>				
15-25	90.28	16.84-130.37	3.53	1.13-63.23
26-35	91.04	7.77-133.15	4.07	0.29-68.40
36-45	85.33	55.6-143	4.54	0.55-34.6
Average(total samples)	89.91		3.98	
<b>PREGNANT</b>				
15-25	90.65	43.81-117.05	3.64	0.37-37.78
26-35	91.92	77.5-118.9	3.75	0.89-11.35
36-45	84.77	84.77	7.95	7.95
Average(total samples)	89.87		3.97	

Table 5. Concentrations of total thyroxine (T<sub>4</sub>) and thyroid stimulating hormone (TSH) in serum of women of different age groups.

All this data shows that the incidence of hypothyroidism is very high in women of Raichur. Both Figures 2 and 3 show the high incidence in the age group 15-25 and 36-45 years. This shows that pregnancy might well be avoided in the early and late years of reproductive age of women.

**DISCUSSION:** The incidence of hypothyroidism in women of reproductive age in Raichur is 11.97%.<sup>13</sup> When the prevalence exceeds 10% in a defined geographical area, the problem is said to be endemic. On comparison of this 11.97% incidence in Raichur with that of non-endemic goitre regions of India (like Delhi and Kerala, where risk of hypothyroidism is negligible (0.071%)<sup>6</sup>, it is about 168 times higher. This calls for an urgent need to screen the general population of Raichur and the surrounding places so that remedial steps can then be taken by the concerned agencies.

From the data observed, a very high incidence of hypothyroidism has been recorded in case pregnant women, making the situation call for an immediate attention. The reason for this high incidence may be the poor socioeconomic conditions of the people of Raichur, multiple pregnancies, adolescent pregnancies, continued demand for pregnancy and childbirth, low nutritional value of food available in Raichur and high physiological demand during the growing age. Environmental factors other than iodine deficiency may also have a possible role for the incidence of hypothyroidism in the region.

Till now, no survey before has been conducted in the region of Raichur. We therefore, practically have no idea of the actual status of hypothyroidism in Raichur. To the best of our knowledge, this might be the first such study to be conducted in this region. Therefore, further investigation becomes necessary to arrive at definite cause of high prevalence of goitre in this population.

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#### REFERENCES:

1. Hetzel B.S., Lancet, 1983, II, 1126-1129

# ORIGINAL ARTICLE

2. Urdahl P., Jorgenson H.S., Silsand T. and Christensen A., Tidsskr. Nor. Laegeforen., 1988, 108, 1477-1479
3. Bauch K., Meng W., Ulrich F.E., Grosse E., Kempe K., Schoenemann G., et al, Endocrinol. Exp., 1986, 20, 67-77
4. Bamforth J.S., Hughes I., Lazarus J. and John R., Arch. Dis. Child, 1986, 61, 608-609.
5. Bohnet H.G., Fielder K. and Leidenberger, F.A., Lancet, 1981, II, 1278
6. I.J. Kharkongor, B.B.P Gupta, Study on prevalence of hypothyroidism in women of reproductive age in Meghalaya, North-eastern India, IISc, 1998.
7. Grutters, A. Delange, F. Giovanelli, G. Klett, M. Rochiccioli, P. Torresani et al, Horm. Res., 1994, 41, 1-2.
8. National Goitre Control Program, in Annual Report 38 (1990-1991), Ministry of Health and Family Welfare, Government of India, 1991.
9. National Iodine deficiency control programme, Annual Report (2001- 2002) Ministry of Health and Family Welfare, Govt of India, New Delhi.
10. A.K. Chandra, L.H. Singh, A. Debnath, S. Tripathy & J. Khanam, Dietary supplies of iodine & thiocyanate in the aetiology of endemic goitre in Imphal East district of Manipur, north east India, Indian J Med Res 128, November 2008, pp 601-605.
11. Glinoe D, Delange F. The potential repercussions of maternal, foetal and neonatal hypothyroxinemia on the progeny. Thyroid 2000; 10:871-87.
12. Annual Report 2001-2002. Salt Department, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion, Government of India.
13. R Kamath, Vinod Bhat, RSP Rao, Acharya Das, Ganesh KS, and Asha Kamath, Prevalence of Goiter in Rural Area of Belgaum District, Karnataka, Indian J Community Med. 2009 January; 34(1): 48-51.
14. Nimmy N.J , Aneesh P.M , Narmadha M.P , Udupi R.H , Binu K.M, A Survey on the Prevalence of Thyroid Disorder Induced by Demography and Food Habits in South Indian Population, Indian Journal of Pharmacy Practice, Volume 5, Issue 2 Apr - Jun, 2012.
15. Sook SS, Deo MG, Karmarkar MG, Kochupillai N, Ramachandran K, Ramalingaswamy V., Prevention of Endemic Goitre with iodised salt. 1973. Natl Med J India 2001; 14; 185-8.
16. Prema. Biochemical Hypothyroidism Secondary to Iodine Deficiency, Journal of Nutrition. 1999; 67(6): 38-49.

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