Research Article

A cross-sectional study to establish the prevalence of subclinical hypothyroidism and its effect on maternal and fetal outcome among pregnant women attending antenatal care outpatient department in tertiary care hospital

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ABSTRACT

Background: Incidence of comorbidities such as anemia, pregnancy-induced hypertension, postpartum hemorrhage, and preterm birth is high among pregnant women with subclinical hypothyroidism. Fetal complications include low-birth-weight babies, first trimester spontaneous abortions, preterm delivery, fetal or neonatal hyperthyroidism, intrauterine growth retardation, high rates of stillbirth and neonatal deaths, neonatal hyperbilirubinemia, higher incidence of neonatal hypothyroidism, and increased perinatal mortality are also seen in pregnant women with subclinical hypothyroidism. Severe iodine deficiency during pregnancy causes fetal hypothyroidism which can result in irreversible brain damage. **Objectives:** The objectives of this study were to establish the prevalence of subclinical hypothyroidism and its effect on maternal outcome among pregnant women attending antenatal care outpatient department in tertiary care hospital. **Materials and Methods:** The study comprised 245 pregnant women attending the antenatal clinic of a tertiary care hospital in Mumbai, India. Thyroid hormone levels and other routine blood investigation were estimated. Patients with thyroid dysfunction were assessed and treated depending on the severity. Subjects were followed until delivery. **Results:** The prevalence of subclinical hypothyroidism was found to be 12.831%. 30% of the hypothyroid patients did not have any high-risk characteristics. Hypothyroidism was associated with recurrent miscarriage ($P = 0.006$). **Conclusions:** The prevalence of subclinical hypothyroidism (12.831%) is high. Hypothyroidism was significantly associated with miscarriage.

KEY WORDS: Sub-clinical Hypothyroidism; Pregnant Women; Maternal Outcome; Fetal Outcome

INTRODUCTION

Problem of goiter is known since ages. References to goiter have been seen in texts dating back to 2700 BC. This is probably because of its extensive prevalence in the times when its exact etiology and possible preventive measures were unknown. It is said that the Chinese were aware of the enlarged thyroids from around 2700 BC. Ayurvedic medicine classifies thyroid diseases into three types; vataja (hyperthyroidism), kaphaja (hypothyroidism), and medaja (thyroidal cyst). The symptoms of these diseases are described in detail in the ayurvedic medicine.[1]

Iodine deficiency disorder (IDD) shows "iceberg phenomenon." Thus, when 1–10% of cretinism are seen, there are underlying 5–30% cases of brain damage which eventually have underlying 30–70% cases of cerebral hypothyroidism. Hence, preventing IDD among the mothers would definitely help to curb the consequences in the fetus.[2]

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The term "subclinical hypothyroidism" is self-explanatory. Here, the signs and symptoms are present to minimal level although serologically the subject is positive. The signs and symptoms at this stage include fatigue, weakness, dry skin, and myalgia which usually overlap with the physiological signs and symptoms of normal pregnancy. Thus, screening becomes the only option at this level.[3]

IDD is a worldwide major public health problem. It affects a large segment of population in all continents of the world. As per the WHO, more than 1.5 billion people worldwide are at risk of IDD. IDD is prevalent in 130 countries affecting 13% of the world population. This can confirm by following stats.[4] Blatt *et al.* found that the North West region of India was mostly affected. He later concluded that iodine deficiency in salt and water among these people living at a high altitude was the reason for the endemicity.[5] As per sample survey conducted by the Indian Council of Medical Research in 28 states and 7 UTs of the country revealed that out of 365 districts surveyed so far, IDD is a major public health problem in 303 districts.[6] Contrary to earlier belief of being confined mainly to the sub-Himalayan belt, iodine deficiency has been found to be widespread. No state is free from IDD 18.[7]

Incidence of comorbidities such as anemia (10–12%), pregnancy-induced hypertension (PIH) (5–10%), postpartum hemorrhage (12.8%), and preterm birth (10–12%) is high among pregnant women in those urban areas.[8] Fetal complications include low-birth-weight (LBW) babies, first trimester spontaneous abortions, preterm delivery, fetal or neonatal hyperthyroidism, intrauterine growth retardation, high rates of stillbirth and neonatal deaths, neonatal hyperbilirubinemia, higher incidence of neonatal hypothyroidism, and increased perinatal mortality. Severe iodine deficiency during pregnancy causes fetal hypothyroidism which can result in irreversible brain damage.[8]

A total number of such studies conducted in India are very few and no such study has been conducted in our setup. Initial inquiry with senior obstetricians of our tertiary care center suggests that the number of cases with hypothyroidism among pregnant women is increasing. Thus, based on feedback of the senior gynecologist of our tertiary care center and as shown by the pilot studies conducted in their department, the need was felt to conduct such study in the present study area. This will give an opportunity to screen such patients in their primary stage and treated, respectively, so that future complication with respect to mother and fetus will be averted and the objective of antenatal care (ANC), i.e., healthy mother and a healthy baby is met. This work will also help in finding the valuable epidemiological determinants resulting in hypothyroidism so that measure may be adopted and condition can be prevented altogether in prepathogenesis phase.

"Jeevan Bindi" a New Initiative

"Jeevan bindi" or "Lifesaving bindi" contains iodine. In March 2015, these bindis were distributed free of cost among tribal women in villages of Nashik and Ahmednagar. This initiative is helpful for pregnant or nursing women are particularly in need because iodine deficiency can lead to children with low intelligence quotient or cretinism, a neurological disorder. Neelvasant Medical Foundation and Research Centre, an non-governmental organization in Maharashtra, is distributing the iodine bindi, targeting women of child-bearing age.

Objectives

1. To find the prevalence of subclinical hypothyroidism among the study subjects.
2. To determine certain epidemiological factors responsible for causation of subclinical hypothyroidism in study subjects.
3. To find the comorbidities related to hypothyroidism among the study subjects.
4. To find the outcome of delivery with respect to mother and child.

MATERIALS AND METHODS

Study Design

A cross-sectional, descriptive study.

Place of Study

Our study is being conducted in Tertiary Care Hospital in the ANC Outpatient Department (OPD) of the Dept. of Obstetrics and Gynaecology.

Study Subject

Pregnant women registered for ANC clinic at tertiary care hospital.

Sample Size Calculation

P = Percentage of the study subjects with subclinical hypothyroidism[4] = 14.3.

- After adding, the 25% extra sample considering that 25% patient will not be able to follow-up so that we have total sample size of 196 + 49 = 245.
- Although 245 study subjects were eligible for the study in the beginning about 19 subjects dropped out from the study due to some or other reasons, final sample size was 226 with 10.3% loss to follow-up.

Sampling Method

Convenient sampling method.

RESULTS

Higher proportion of hypothyroidism was found in women above 32 years of age which was 33.33% with $P < 0.005$ (statistically significant), among those belonging to other than Hindu religion corresponding to 19.07% with $P > 0.005$, among those who had studied between graduate and above that is 50.00% with $P < 0.005$ (statistically significant). For obtaining P value from SPSS educational class has been clubbed. Maximum number of hypothyroid cases were seen among the class IV socioeconomic (SE) class i.e. 26.60% with $P > 0.05$, among the working category women i.e. 30.88 % with $P > 0.05$, among those belonging to joint family i.e. 20.27 % with $P > 0.05$.

The highest proportion of hypothyroid patients was in the first trimester that is 25%, followed by the third ($P = 0.302$), also the prevalence of hypothyroidism was seen significantly higher among the multigravida women corresponding to 32.20% followed by the second gravida ($P < 0.05$).

Preterm birth showed statistical significance among hypothyroid subjects ($P < 0.05$). As majority of hypothyroid study, subjects which constituted to 36.36% were delivered preterm. Abortion showed a preponderance for hypothyroidism with $P = 0.08$, but it was not found to be statistically significant. LBW and still did not show a statistical significance with hypothyroidism. Preterm birth (50% vs. 27.58%) and abortion (25% vs. 3.44%) were higher among overt as compared to subclinical hypothyroid study subjects, other fetal outcomes like LBW and stillbirth failed to show statistical significance with hypothyroidism [Tables 1-6].

Table 1: Distribution of hypothyroid study subjects according to sociodemographic characteristics (n=226)

Sociodemographic characteristic	Total (n=226)	Hypothyroidism n=29 (%)	P
Age group (completed years)			0.029*
18–22	89	07 (7.86)	
23–27	103	13 (18.44)	
28–32	28	7 (30.33)	
≥32	6	2 (33.33)	
Religion			0.256
Hindu	132	14 (13.63)	
Non-Hindu	94	15 (19.07)	
Education			0.018*
Illiterate	22	3 (13.63)	
Class I–VIII	123	7 (8.13)	
Class IX–XII	73	15 (21.91)	
Graduate or postgraduate	8	4 (50.00)	
Occupation			0.08
Homemaker	158	12 (10.12)	
Others	68	17 (30.88)	
Socioeconomic class			0.176
Class I (upper)	19	3 (19.31)	
Class II (upper middle)	70	7 (12.85)	
Class III (middle)	86	11 (15.11)	
Class IV (lower middle)	51	8 (26.60)	
Type of family			0.515
Nuclear	135	15 (14.07)	
Joint	54	9 (20.27)	
Extended	37	5 (18.91)	

#Indicates two-sided significance from Fisher's exact test, *indicates statistically significant P value

Table 2: Obstetric history of hypothyroid study subject

Obstetric characteristics	Total number	Subclinical hypothyroidism (n=29)	P
Trimester			0.302
First	20	4	
Second	76	8	
Third	130	17	
Gravidity			0.0321*
Primigravida	52	4	
Second gravida	115	10	
Multigravida	59	15	

#Indicates two-sided significance from Fisher's exact test, *indicates statistically significant P value

DISCUSSION

The present study showed an overall prevalence of subclinical hypothyroidism to be 12.83%. Higher proportion of hypothyroidism was found in women above 30 years of age but was not found to be statistically significant. The present study observed higher proportion of hypothyroid subject among lower middle SE class which is 19.60% followed by 15% in middle class. In our study, hypothyroidism was found to be significantly associated recurrent pregnancy loss ($P < 0.05$). In the present study, the prevalence of PIH was significantly associated with hypothyroidism with the prevalence of 38%. In our present study, 36.36% of hypothyroid subject delivered preterm as compared 13% of hypothyroid subject delivered without preterm delivery. Thus, statistical significance was seen between hypothyroidism and preterm birth.

Abalovich *et al.* (2007) found the prevalence among pregnant women was 0.3–0.5% overt hypothyroidism and 2–3% subclinical hypothyroidism.[9] As these estimates can be traced back to the study by Klein *et al.*, in 1991, a comparison cannot be made, as over time diagnostic modalities and guidelines and laboratory reference ranges have evolved considerably, as highlighted by the study of

Alkafajei *et al.*[10] Overt hypothyroidism and subclinical hypothyroidism found in our study are also greater than that reported from India, i.e., by Nambiar *et al.* (2011) from Mumbai with 4.8% prevalence of subclinical hypothyroidism and Goel *et al.* from Chandigarh who found the prevalence of overt hypothyroidism as 2.9% and subclinical hypothyroidism as 3.4%, respectively.[11]

As per the study by Jaykumari *et al.* which was carried out among pregnant women in tertiary care hospital of south India. They found majority of hypothyroid subjects belonged to middle class which came out be 57%.The difference was because of use of another system of SE classification which was divided as upper, middle and lower. In contrast, Prasad classification used in our study.[12] The present study showed higher occurrence of hypothyroidism among the working class of women as compared to housewife's. The relation was found to be statistically significant. Ahmad *et al.* carried a retrospective study to find the prevalence of hypothyroidism among the 439 laboratory workers and found comparatively higher prevalence of hypothyroidism.[13]

Table 3: Clinical features of hypothyroidism

Clinical features	Total	Subclinical hypothyroidism (*n*=29)	*P*
Irregular menstrual cycle			0.500#
Present	28	2	
Absent	198	27	
Recurrent pregnancy loss			0.006*#
Present	7	0	
Absent	214	29	
Spontaneous abortions			0.451
At least one	32	3	
None	194	26	
History of stillbirth			0.332#
At least one	7	1	
Absent	219	28	
Irritability, palpitation, and sweating			0.590#
Present	14	0	
Absent	212	29	

#Indicates two-sided significance from Fisher's exact test, *indicates statistically significant *P* value

As per the finding of Rao *et al.,*[14] who conducted study among 163, hypothyroidism was found in 7 (4.16%) of women with recurrent pregnancy loss with $P < 0.05$. Sarkar gave similar result with 6.7% of the hypothyroid women giving a history of recurrent hypothyroidism with $P < 0.05$.[15] This might be because of similar diagnostic facility.

Hypothyroidism was found to be significantly associated with the occurrence of systolic hypertension as well as diastolic hypertension ($P < 0.05$). This finding was higher as compared to that of Wilson *et al.*,[16] where they observed pregnancy outcomes in 24,883 women for PIH. The study by Ajmani *et al.*[17] showed similar findings.

As per the study carried by Ajmani *et al.*[17] who showed statistically significant relation between preterm birth and hypothyroidism, i.e., 33.3% hypothyroid women delivered preterm compared 6% without preterm. George *et al.*[18] in a study from Texas showed high prevalence of preterm birth among subclinical hypothyroid women which was 10% and was found to be statically significant. Low prevalence in this study might because better screening facility and better healthcare service in the western countries.

Recommendation

1. I have given the recommendation at different strata of healthcare administration, i.e., at hospital level, state level, national level, etc.
2. As per the findings of my study, thus I would recommend screening of all the pregnant women attending the ANC OPD of the tertiary care hospital under my study as the prevalence of hypothyroidism has shown a higher level in my study area as compared to other studies.
3. Furthermore, I will recommend creating community health awareness for hypothyroidism during different community health survey in my study area.

Thus, these are my recommendation at the level of my study area. However, as per the different studies, the prevalence of hypothyroidism has shown an increasing trend in different parts of the country it is my vision that screening test for

Table 4: Dietary determinants among hypothyroid study subjects

Determinants	Subclinical hypothyroidism	Euthyroid	Total	*P*
Type of diet				0.102
Vegetarian	8	37	45	
Mixed	21	160	181	
Type of salt				0.510
Iodized	27	193	220	
Common salt	2	4	6	

Table 5: Maternal comorbidity/maternal outcome complication

Type of comorbidity	Subclinical hypothyroidism (*n*=29)	Euthyroid	Total	*P*
PIH				0.02*
Present	5	19	24	
Absent	24	186	210	
Antepartum hemorrhage				0.651
Present	1	2	3	
Absent	28	203	231	
Gestational diabetes				0.126
Present	1	4	5	
Absent	28	201	229	
PPH				0.219
Present	2	8	10	
Absent	27	198	225	
Anemia				0.642
Mild	4	49	53	
Moderate	18	116	134	
Severe	14	22	36	

#Indicates two-sided significance from Fisher's exact test, *indicates statistically significant *P* value. PIH: Pregnancy-induced hypertension, PPH: Postpartum hemorrhage

Table 6: Fetal outcome in current pregnancy

Fetal outcome	Subclinical hypothyroidism	Euthyroid	Total	*P*
Preterm				0.01
Present	8	33	41	
Absent	21	193	214	
LBW				0.234
Present	2	23	25	
Absent	27	203	230	
Abortion				0.08
Present	1	7	8	
Absent	28	219	247	

#Indicates two-sided significance from Fisher's exact test, *indicates statistically significant *P* value. LBW: Low-birth-weight

hypothyroidism (i.e., thyroid function test [TFT]) should decentralize to every state and district which would definitely help detect hypothyroidism in its subclinical stage to decrease the prevalence of hypothyroidism and its complications.

CONCLUSION

The study concludes that there is high prevalence of subclinical hypothyroidism in the present study area (12.3%) among pregnant women. Furthermore, majority of the first trimester subclinical hypothyroid cases were positively screened by TFT. Thus, early screening for hypothyroidism would help in avoiding the adverse outcome among the mother and fetus. Limitation of the study is that anti-thyroid peroxidase antibody test was not done among the study subjects the autoimmune cause of hypothyroidism could not be ruled out. Seeing the high prevalence of subclinical hypothyroidism, it could be recommended that TFT should be part of routine screening among the pregnant women in the present study area.

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