

Prevalence of Thyroid Disorder among the Pregnant Women: A Meta-Analysis

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Abstract: *Thyroid disorder is most common in women's as compare to male population. In females, this is the most common endocrine disorder during pregnancy resulting into abnormal maternal and fetal outcomes. Pregnancy is associated with profound changes in thyroid function. Many studies have reported that thyroid prevalence shows variation with age, sex, dietary habits, stress and geographical location. So, in this article, we have studied the prevalence of Thyroid disorder among Indian female population during the pregnancy on the basis of earlier studies. In the present study, MEDLINE, Pub Med, Google Scholar Data Bases from 2005-2015 were searched for prevalence of thyroid and burden of thyroid in pregnant women. A random effect model was used to obtain the pooled estimate of prevalence of thyroid disorder pregnancy in Indian female population. A total of fourteen studies were identified on prevalence of thyroid disorder among the pregnant women from various parts of India covering a population of 10022. The overall prevalence of diabetes was 18.41% (95% CI: 20.55% to 13.54%).*

Key Words: *Thyroid Disease, Hypothyroidism, Hyperthyroidism, Pregnancy.*

1. INTRODUCTION:

Thyroid gland is an important endocrinal gland in the human body. It is the most studied endocrinal system in the human body. It functions to maintain homeostasis and basic metabolic rate. Thyroid diseases are very common these days and have brought focus on this by a wide range of surgeons and doctors. With the widespread availability of thyroid function testing in recent years, increasing numbers of patients with symptoms, which might be attributable to hypothyroidism and hyperthyroidism, are being tested. In addition to the 20 million Americans who have some form of thyroid disease, more than 12% of the U.S. population will develop a thyroid diseases condition during their lifetime. Perhaps the most stunning statistic is that up to 60% of those with thyroid diseases are unaware of their condition[1]. Thyroid cancer is the most common endocrine cancer approximately 1 to 1.5% of all new cancers diagnosed each year in the USA and its incidence has continuously increased in the last three decades all over the world [1]. The increasing incidence is indicated by the annual percent change (APC) that in the USA was 2.4% from 1980 to 1997 and 6.6% from 1997 to 2009 in the population. Kilforyet al. [2] reported in their study, thyroid cancer is the fifth most common cancer in women in Italy and Jemalet al. [3] stated that thyroid cancer is second most frequent cancer in women below 45 years of age.

The relationship of thyroid disease and pregnancy is important for several reasons. First, pregnancy alters thyroid physiology and increases overall circulating concentrations of thyroid hormones. Secondly, pregnancy is associated with general immunosuppression, which causes an amelioration of symptoms that are associated with autoimmune thyroid diseases [4]. Unfortunately, after the pregnancy is over, people with previously asymptomatic autoimmune-mediated thyroid disease may develop symptoms of hyperthyroidism or hypothyroidism. Finally, it is estimated the 2 to 15% of women become hyperthyroid in post-partum. Therefore evaluation of thyroid disease in pregnancy is important for gestational maternal health, obstetric outcome and subsequent development of the child. The most frequent thyroid disorder in pregnancy is maternal hypothyroidism [5].

The associated with fetal loss, placental abruptions, preeclampsia, preterm delivery and reduced intellectual function in off spring. There is a wide geographic variation in prevalence of hypothyroidism during pregnancy. It varies from 2.5 to 11% in India [6]. Prevalence of hypothyroidism was found to be more in Asian countries compared with the western. Before the onset of fetal thyroid function, that occurs about 12 weeks of gestation, the fetus is dependent on the placental transfer of maternal thyroid hormone for normal development[7].Therefore, maternal hypothyroidism early in the pregnancy cause decreased availability of thyroid hormone during the initial phase of normal brain development and prematurity, low-birth weight, fetal death, fetal distress in labor, prenatal death[8]. Although the presence of hypothyroidism has been associated with successful pregnancies to term, the rates of abortion and stillbirth are doubled in untreated maternal hypothyroidism. Various studies reported up to a 20% incident of perinatal mortality, and congenital malformations associated with maternal hypothyroidism. The aim of the study was to determine the prevalence of thyroid disease in pregnant women and how to manage such conditions and complications.

2. MATERIALS AND METHODS:

A meta-analysis is a statistical analysis that integrates the results of multiple scientific independent studies. Meta-analysis provides a standardized approach for examining the existing literature on a specific, possibly controversial, issue to determine whether a conclusion can be reached regarding the effect of a treatment or exposure. Also Meta-analysis provides a more precise estimate of a treatment effect, and may explain heterogeneity between the results of individual studies [8]. A meta-analysis of the published data is very useful, since a large amount of data is published every year in scientific literature. In 1940, there were roughly 2300 biomedical journals and now this has increased more than 25 400 journals in science, technology and medicine, and their number is increasing by 3.5% a year, in 2009, they published 1.5 million articles [9]

We screened the titles and abstracts of the initially identified studies to determine whether they would satisfy the selection criteria. Any disagreements about selection were resolved through consensus or discussion. Full-text articles were retrieved for the selected titles. Afterward, the quality of studies was assessed according to items related to their objectives, population or sample characteristics, explicitly of inclusion/exclusion criteria, usage of the same mode of data collection for all subjects and its validity, clearly described findings, interval estimations, and appropriate data analysis methods. The nonqualified studies were omitted as well.

We reviewed the age categorizations in the studies, we set cut-offs in a way to maximize the compatibility of our age groups with the age groups reported in the eligible studies. Hence, the age groups were 20-35 taken for pregnant women. In addition, the mean age of subjects, publication date, sample size classified by sex, study location and type of study entered in our meta-analysis to assess the prevalence of thyroid. This form was used by us to extract the relevant information from the selected studies. The data was collected from included studies on year of publication, design, geographic origin and setting, selection criteria, patient samplings and location of research group, participant characteristics. The meta-analysis was performed using Metaxl Software (Version 2.2). It is important to be familiar with the type of data (e.g. dichotomous, continuous) that result from measurement of an outcome in an individual study and to choose suitable effect measures for comparing intervention groups. Most meta-analysis methods are variations on a weighted average of the effect estimates from the different studies. Variation across studies (Heterogeneity) must be considered. Random-effects meta-analyses allow for heterogeneity by assuming that underlying effects follow a normal distribution.

3. ANALYSIS AND RESULTS:

It has been observed from various studies that thyroid is more prevalent among women. Further, among women the prevalence is higher during the pregnancy period. So, in this section we have focused on prevalence of thyroid diseases among the pregnant women. The studies that we have selected were published between the year 2010 and 2015. The characteristics of included studies for the Meta-analysis of pregnant women studies were summarized (Table 1). After excluding non-eligible studies we included sixteen studies from almost all the states. Many studies have reported that thyroid diseases prevalence shows variation with age, sex, dietary habits, stress and geographical location. So, in this article, we have studied the prevalence of Thyroid diseases among Indian female population during the pregnancy on the basis of earlier studies. Among all the studies included in the analysis, the minimum and maximum numbers of the female participants were 76 and 1791 respectively.

The pooled prevalence of thyroid diseases in the pregnant women of India after analyzing 10,023 pregnant women subjects from sixteen studies was 18.41% (95% CI: 20.55 to 13.54%). However, calculation of the heterogeneity statistic ($I^2=96.98\%$ $Q=498.23$ and $p<0.01$,) indicated significant heterogeneity among the prevalence of diabetes among the included studies. Fig. 1 shows all the detailed analysis graphically.

A Meta-analysis of epidemiological studies revealed that the prevalence of our study was significantly lower than the prevalence reported by Fraser and Dunstan [10] and higher than the prevalence reported by Das *et al.* [11]. Among females, this is the most common endocrine disorder during pregnancy resulting into abnormal maternal and fetal outcomes. Pregnancy is associated with profound changes in thyroid function. Table (1) briefs characteristics and the analysis of the included studies like author, year of publication, sample size and proportion with confidence interval this is the output table of the Meta-analysis.

4. DISCUSSION:

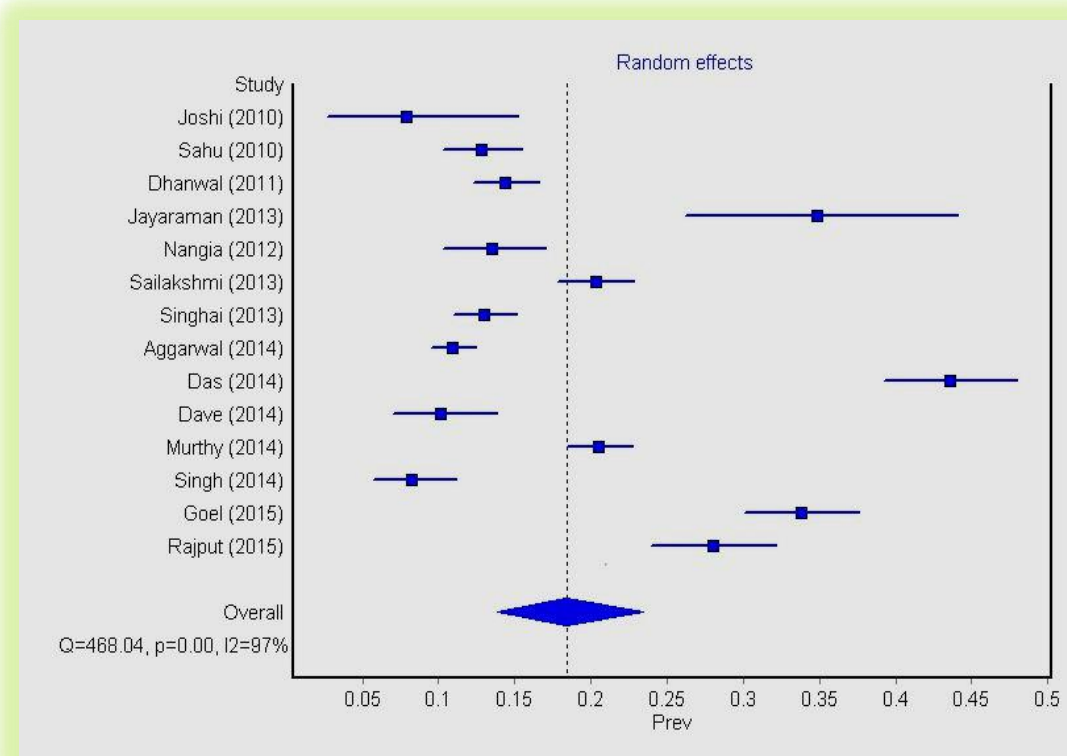
Thyroid diseases in pregnancy adversely affect on both maternal and fetal health if remain undiagnosed and uncorrected. In our meta- analysis, the estimated prevalence of thyroid diseases among the pregnant women was (17.8%) which is lower than the prevalence reported by Fraser and Dunstan [10] in Assam and Joshi *et al.* [12] in Ghaziabad. The lowest prevalence of thyroid disease was (7.9) % reported by Das *et al.* [11] in Maharashtra. Studies under taken revealed population suffers from thyroid had a risk for developing cardiac output, heart rate basal metabolic rate, ventilation rate, muscle weakness, potentiates brain development respectively.

Table 1: Prevalence of Thyroid Diseases among Pregnant Indian Women

Study	Total	Cases	Prev. (%)	LCL 95%	HCL 95%	Weight (%)
Joshi <i>et al.</i> [12]	76	06	7.89	02.72	15.20	6.03
Sahu [6]	633	81	12.80	10.30	15.52	7.31
Dhanwalet <i>al.</i> [13]	1000	144	14.40	12.29	16.65	7.38
Nangia <i>et al.</i> [14]	400	54	13.50	10.32	17.03	7.18
Jayaraman <i>et al.</i> [15]	109	38	34.86	26.17	44.09	6.41
Sailakshmi <i>et al.</i> [16]	1000	203	20.30	17.86	22.85	7.38
Singhai <i>et al.</i> [17]	1000	130	13.00	10.98	15.16	7.38
Aggarwal <i>et al.</i> [18]	1791	196	10.94	09.54	12.43	7.45
Das <i>et al.</i> [11]	500	218	43.60	39.28	47.97	7.25
Dave <i>et al.</i> [19]	305	31	10.16	07.00	13.83	7.08
Murthy <i>et al.</i> [20]	1340	275	20.52	18.40	22.73	7.42
Singh <i>et al.</i> [22]	400	33	08.25	05.74	11.16	7.18
Goel <i>et al.</i> [21]	615	208	33.82	30.13	37.61	7.30
Rajput [23]	461	129	27.98	23.97	32.18	7.23

Table:1.1 Test of Heterogeneity

Test of Heterogeneity	Prev. (%)	LCL95%	HCL95%	Weight
Pooled Statistics	18.41	13.85	23.45	100.00
I-squared	97.22	96.35	97.89	
Cochran's Q	468.04			
Chi2, p	0.01			
tau2	0.05			

**Fig. 1: Forest Plot of Studies on Thyroid Prevalence among Pregnant Women of India**

5. CONCLUSIONS:

Thyroid diseases are growing at a faster rate in human beings in India. The present study revealed that the prevalence of thyroid diseases is higher among the female of India and the same trend has been observed among the pregnant women of India. So, the regular screening of at least thyroid stimulating hormone in serum is recommended for this vulnerable group. Also among the pregnant women, thyroid diseases prevalence is very high which an alarming condition for the growth of fetus. Pregnant women with thyroid dysfunctions are at increased risk of pregnancy related complications such as spontaneous abortion, anemia, preeclampsia, placental abruption, intrauterine growth restriction (IUGR) and postpartum hemorrhage. However, if the mother is tested at an early stage, preferably during her first prenatal visit, and treatment is given to her, outcome can be improved.

There is a lack of awareness, suboptimal level of treatment and control of thyroid hormone in pregnancy. There is a need for good quality studies focusing on thyroid diseases and its treatment in Indians to develop optimal strategies for thyroid diseases management. Special guidelines for desirable levels of risk factors may be necessary for prevention of thyroid diseases. The findings from this review can be useful to implement population-based Indian specific cost-effective thyroid diseases control programs to reduce the burden and optimize patient care in thyroid diseases

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