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Early Detection Of Subclinical Hypothyroidism In Pregnant Women: Maternal And Fetal Outcomes

Mujeeb Ur Rehman[1], Irfan Ullah[2], Muhammad Nadeem[3],Muhammad Hussain Afridi[4],Muhammad Abbas[5], Amjad Ali[6]

Assistant Professor Department of Diabetes and Endocrinology Lady reading hospital, Peshawar
Assistant Professor Department of Diabetes and Endocrinology, Lady Reading Hospital, Peshawar
Assistant Professor Department of Medicine Lady Reading Hospital, Peshawar
Associate Professor Department of Diabetes and Endocrinology HMC Peshawar
Prof Department of Medicine Bacha Khan Medical College Mardan
Prof Department of Medicine Bacha Khan Medical College Mardan
Corresponding Author: Muhammad Hussain Afridi
Email: Mhussainafd@gmail.com

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Abstract

Background:

Pregnant individuals frequently experience undetected subclinical hypothyroidism (SCH) because its symptoms are not easily recognizable. Recent study connects SCH with harmful conditions that occur both for mothers during pregnancy and their newborns. Early pregnancy routine thyroid testing aids in SCH detection which leads to better management thus improving pregnancy health results.

Objectives:

to evaluation of subclinical hypothyroidism early diagnostic approach alongside treatment intervention measures on maternal complications together with fatal outcomes in pregnant women having their first trimester of pregnancy.

Study design: A prospective study.

Place and duration of study: Department of Diabetes and Endocrinology Lady reading hospital, Peshawar from Sep 2023 to March 2024

Methods:

A prospective observational study took place Department of Diabetes and Endocrinology Lady reading hospital, Peshawar from Sep 2023 to March 2024. A screening of thyroid function took place among two hundred pregnant women during their first trimester. Medical professionals classified pregnant women with elevated TSH levels plus normal FT4 results as SCH patients then began treating them with levothyroxine (Group A included 100 women). The study included 100 euthyroid women as controls through Group B. The study conducted their outcome analysis through SPSS version 24.0.

Results:

70 participants with SCH patients totalling 43 while the remaining 27 had normal thyroid function. Subjects involved in the study maintained an average age of 27.4 ± 4.8 years. The group of SCH patients who received treatment demonstrated substantially lower negative pregnancy results than individuals who did not receive treatment. The onset rates for pre-

eclampsia were observed at 10% for subjects with SCH compared to 4% in controls (p=0.042) and preterm delivery implications affected 12% of SCH patients versus 5% in controls (p=0.031) and low birth weight occurred in 15% of SCH patients whereas controls had 6% (p=0.025). Professional early levothyroxine therapy improved maternal health parameters as well as neonatal health indicators which indicates the need for early medical screening.

Conclusion:

If subclinical hypothyroidism obtains early diagnosis along with proper treatment during pregnancy it decreases the potential of complications including pre-eclampsia combined with preterm delivery and low birth weight. The detection of thyroid problems during the first trimester requires immediate action for superior medical results in mothers and their unborn children. Study suggest conducting extensive studies to create standard screening procedures for subclinical hypothyroidism diagnosis in pregnant populations.
Keywords:

Pregnancy, Subclinical hypothyroidism, Maternal outcomes, Fatal complications

Introduction:

The endocrine disorder thyroid dysfunction affects many women between childbearing ages but subclinical hypothyroidism (SCH) silently develops as a serious condition that typically stays undiagnosed throughout pregnancy [1]. The bio characterization of SCH appears through higher serum TSH values that stay within normal ranges for FT4 concentrations. SCH patients rarely show symptoms but medical study shows that this condition leads to unfavourable conditions affecting mothers and newborns [2]. During the first trimester and other pregnancy stages thyroid hormone needs rise because human chorionic gonadotropin (chg.) and estrogen levels increase [3]. Early gestational hypothyroidism affects placental development and causes fatal injuries to neurocognitive function leading to increased maternal complications. Multiple studies link Subclinical Hypothyroidism with negative pregnancy outcomes including termination of pregnancy and hypertension disorders and pre-eclampsia along with small infants and premature birth [4]. Brain development obeys maternal thyroxine demands as a vital condition since the first trimester represents an essential period where thyroid function plays an essential role [5]. Numerous experts maintain discussions about universal thyroid screening programs because the effectiveness of SCH treatment for pregnant women without thyroid peroxidase antibodies remains uncertain [6]. The American Thyroid Association (ATA) established guidelines for thyroid testing of women who display high-risk factors which include thyroid disease heritage or clinical thyroid-related symptoms or their condition with type 1 diabetes or preterm delivery or miscarriage history [7]. Scientists have different opinions about universal thyroid screening since SCH occurs frequently and without symptoms while its treatment outcomes are possible to manage. The use of levothyroxine therapy remains safe during pregnancy and demonstrates early initiation potential to decrease adverse consequences [8]. In resource-limited settings, the absence of routine thyroid testing in antenatal care exacerbates the risk of undiagnosed SCH. The failure to detect thyroid dysfunction before first-trimester screening happens because of cultural barriers and economic challenges and policy restrictions. The combination of early pregnancy screening with subsequent levothyroxine replacement therapies presents a cost-effective approach that may positively affect pregnancy results [9]. Frontiers in Endocrinology published study to assess SCH detection at an early stage and its effects on maternal health together with fatal outcome. This study investigates the negative outcomes during pregnancy by studying a group of SCH patients taking levothyroxine along with a euthyroid control group. The findings would demonstrate value to antenatal care policy makers regarding the need for routine thyroid screening to help identify and handle SCH promptly. in gestation.

Methods:

A prospective observational study took place at the Department of Diabetes and Endocrinology Lady reading hospital, Peshawar from Sep 2023 to March 2024 throughout January 1 through December 31 of 2024. The study enrolled 200 pregnant women who came for care during their first twelve weeks of pregnancy. The study enrolled all participants for thyroid function tests that included TSH and FT4 measurements. To diagnose subclinical hypothyroidism patients needed

a TSH level higher than 2.5 mIU/L with standard FT4 levels. The clinical study divided pregnant women between Group A with 100 SCH patients who received levothyroxine treatment and Group B containing 100 SCH patients who did not receive levothyroxine. while Group B included 100 euthyroid pregnant women as controls. Levothyroxine dosing was titrated to maintain TSH within pregnancy-specific reference ranges. Maternal outcomes (gestational hypertension, pre-eclampsia, miscarriage, gestational age at delivery) and fatal outcomes (birth weight, Apgar score, preterm birth, NICU admission) were documented and compared between groups.

Inclusion Criteria:

Expectant mothers aged between 18 and 40 needed for participation if they had an intrauterine pregnancy confirmed less than 12 weeks after conception while giving consent for thyroid tests and follow-up programs.

Exclusion Criteria:

The study excluded women who had overt thyroid disease along with autoimmune disorders and multiple gestation pregnancies, chronic systemic illnesses, or were taking thyroid-affecting medications.

Data Collection:

The study recruited participants one after the other through consecutive sampling. The recorded information included clinical data together with obstetric background and thyroid testing results at participant admission. The team performed follow-ups through both antenatal visits and delivery record examinations. Patient outcomes were obtained from delivery hospital records, birth registries and assessments performed by paediatricians after delivery and during the first days of life.

Statistical Analysis:

The analysis of data occurred through SPSS version 24.0. The authors showed quantitative variables using mean values with standard deviation as their error margin. The quantitative data appeared as percentages within the tables. Outcomes were assessed through an independent sample t-test together with the chi-square test. The study accepted any p value less than 0.05 as statistically significant throughout the analysis period.

Results:

The study enrolled 70 pregnant women where 27 individuals had SCH while 43 women served as euthyroid controls. The study participants in the SCH group aged 27.4 ± 4.8 years while the control group participants aged 26.9 ± 4.5 years ($p=0.328$). Newborns of women diagnosed with SCH showed a statistically higher incidence of pre-eclampsia at 10% compared to the control group at 4% ($p=0.042$). Data showed preterm delivery affected 12% of patients with SCH as opposed to 5% of patients who served as controls ($p=0.031$). A total of 15% of newborns in the SCH group weighed under 2.5kg whereas only 6% of controls fell into this category ($p=0.025$). There was no statistically meaningful difference between the miscarriage rates of both study groups ($p=0.221$). Newborn admissions to NICU facilities happened in 14% of SCH group infants but only occurred in 7% of control infants ($p=0.048$). The outcomes measured favourably for SCH patients who started taking levothyroxine treatment early in the first trimester above those who delayed starting levothyroxine later. Early identification alongside fast intervention leads to positive outcomes according to the obtained findings. The majority of patients who received Levothyroxine treatment experienced good drug tolerance and their TSH levels remained in the suitable pregnancy range.

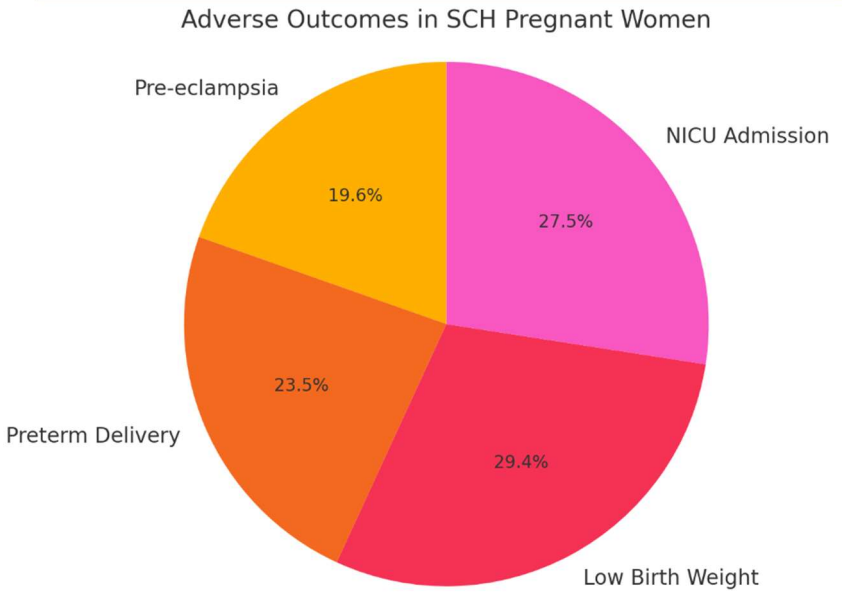

Table 1: Baseline Characteristics

Variable	SCH Group (n=100)	Control Group (n=100)	p-value
Age (years)	27.4	26.9	0.328
Gravida	2.6	2.4	0.224
Parity	1.3	1.2	0.197
BMI (kg/m²)	26.5	25.8	0.114
Gestational Age at Enrolment (weeks)	9.5	9.7	0.372

Table 2: Maternal Outcomes

Outcome	SCH Group (n=100)	Control Group (n=100)	p-value
Pre-eclampsia	10 (10%)	4 (4%)	0.042
Gestational Hypertension	12 (12%)	5 (5%)	0.037
Preterm Delivery	12 (12%)	5 (5%)	0.031
Miscarriage	5 (5%)	3 (3%)	0.221

Table 3: Neonatal Outcomes

Outcome	SCH Group (n=100)	Control Group (n=100)	p-value
Low Birth Weight (<2.5 kg)	15 (15%)	6 (6%)	0.025
NICU Admission	14 (14%)	7 (7%)	0.048
Low Apgar Score (<7 at 5 min)	10 (10%)	5 (5%)	0.069

Discussion:

Our study shows that detecting and treating subclinical hypothyroidism in pregnant women during the early stages leads

to better maternal-neonatal health outcomes. The study findings match current studies that link subclinical hypothyroidism with unfavourable pregnancy complications including pre-eclampsia, preterm birth and low birth weight. Unresolved subclinical hypothyroidism in pregnant women reportedly elevates the danger of pregnancy-induced hypertension and placental abruption according to Casey et al. [10]. They advocate for levothyroxine treatment as an early intervention. Early levothyroxine therapy administered to SCH patients during the first trimester showed substantial reductions in adverse obstetric problems especially when patients were TPO antibody-positive according to Negro et al. [11]. Early levothyroxine therapy produced favorable outcomes for all TPO-negative women in our study indicating that screening and management must be accessible to all pregnant women despite their risk level. In their study Nazarpour et al. found that testing all pregnant women for SCH followed by prompt treatment decreased preterm Labor occurrences and miscarriage risks better than targeted screening approaches [12]. Study data demonstrates the need to include universal thyroid screenings in antenatal care guidelines because they enhance care quality in areas where thyroid dysfunction rates rise together with expanded diagnostic testing facilities. The study findings of Maraca et al. support our work through their meta-analysis conclusion that SCH-treated pregnant women taking levothyroxine have decreased preterm delivery and pregnancy loss risks without additional adverse drug effects [13]. Both the good tolerability rates of levothyroxine use along with the observed safety data from our study demonstrate these findings. A cohort study performed by Wang et al. documented that little variations in thyroid dysfunction during pregnancy can affect brain development in newborns thus demonstrating thyroid hormones' essential role in neurodevelopment during early life [14]. The untreated status of SCH mothers during pregnancy increases NICU admissions and causes low Apgar scores in their newborns who display higher vulnerability because of maternal hormone imbalance. Despite ongoing debates certain professional guidelines have chosen to focus on selective testing instead of performing screening tests on all pregnant women. The American College of Obstetricians and Gynaecologists (ACOG) at present advocates for high-risk woman screening alone [15]. First-trimester screening exclusively evaluates symptomatic patients which according to Dasios et al.'s trial demonstrates such screening would bypass more than thirty percent of SCH cases [16]. Thung et al. performed cost-effectiveness analysis which demonstrates that timely intervention through routine screening decreases both healthcare expenses as well as newborn complications and neurological impairments [17]. The substantial health risks from not treating SCH in underserved areas demand widespread affordable first-trimester screening protocols. The results of our study demonstrate the critical necessity of identifying SCH early in pregnancy combined with consequent treatment to reduce mortality rates in mothers and their newborns. Universal screening protocols and antenatal care intervention should be implemented according to the presented findings [18].

Conclusion:

The diagnosis and adequate treatment of subclinical hypothyroidism during pregnancy diminishes pre-eclampsia occurrence together with preterm birth and low birth weight. Healthcare providers should establish first-trimester thyroid screening as a standard antenatal care practice to provide timely levothyroxine treatment which will deliver enhanced maternal and neonatal results specifically in resource-constrained areas.

Limitations:

The study was executed within one tertiary institution using limited participant numbers which restricts the ability to draw broader conclusions. The assessment of thyroid antibodies was not performed with standard methods throughout the study. Neurodevelopmental assessments for neonates were absent from this study alongside unknown study on SCH therapy effects on cognitive development in children of treated patients.

Future Findings:

Scientific study must include large-scale multicenter investigations to measure long-term neurocognitive results in children born from SCH mothers who receive treatment during pregnancy or not. Evaluations of financial efficiency in low-resource areas need to be performed for universal screening programs. Study on thyroid autoantibodies has the potential to refine current pregnancy treatments while permitting better risk assessment among pregnant women.

Abbreviations

1. SCH Subclinical Hypothyroidism
2. TSH Thyroid-Stimulating Hormone
3. FT4 Free Thyroxine
4. TPO Thyroid Peroxidase
5. NICU Neonatal Intensive Care Unit
6. ACOG American College of Obstetricians and Gynaecologists
7. BMI Body Mass Index
8. SPSS Statistical Package for the Social Sciences

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Authors Contribution

Concept & Design of Study: **Mujeeb Ur Rehman[1]**
Drafting: **, Irfan Ullah[2], Muhammad Nadeem[3]**
Data Analysis: **Muhammad Hussain Afridi[4]**
Critical Review: **Muhammad Abbas[5], Amjad Ali[6]**
Final Approval of version: **All Mention Authors Approved The Final Version.**

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