THYROID FUNCTION, OBESITY, AND PREGNANCY OUTCOMES: CLINICAL FEATURES AND MATERNAL-FETAL RISKS IN WOMEN WITH HYPOTHYROIDISM

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Abstract. Hypothyroidism and obesity are common disorders among women of reproductive age and are associated with adverse pregnancy outcomes. This study evaluated thyroid function and maternal-fetal outcomes in 120 pregnant women, including 60 women with hypothyroidism and obesity and 60 healthy controls. Women with hypothyroidism and obesity had significantly higher TSH levels and a greater incidence of gestational complications, including preeclampsia, gestational diabetes, anemia, placental insufficiency, and preterm birth. Adverse neonatal outcomes, such as lower Apgar scores and increased neonatal hypoxia, were also observed. Early diagnosis, regular endocrine monitoring, and appropriate management may improve maternal and neonatal outcomes.

Keywords: hypothyroidism, obesity, pregnancy, thyroid function, thyroid-stimulating hormone, maternal outcomes, fetal outcomes, neonatal outcomes, gestational complications, preeclampsia.

Introduction. Hypothyroidism is one of the most common endocrine disorders affecting women of reproductive age and remains a significant challenge in modern obstetric practice. According to recent epidemiological studies, overt hypothyroidism occurs in approximately 2–5% of pregnancies, while subclinical hypothyroidism affects up to 10% of pregnant women, depending on the population studied and diagnostic criteria used. Thyroid hormones play a crucial role in maternal metabolism, placental development, fetal growth, and neurocognitive development; therefore, even mild thyroid dysfunction may adversely influence maternal and neonatal outcomes.

In recent decades, the prevalence of obesity among women of reproductive age has increased substantially worldwide. Obesity is recognized as an independent risk factor for infertility, gestational diabetes mellitus, hypertensive disorders of pregnancy, cesarean delivery, and adverse neonatal outcomes. Furthermore, accumulating evidence suggests a complex bidirectional relationship between obesity and thyroid function. Excess adipose tissue may alter thyroid hormone metabolism through leptin-mediated mechanisms, resulting in elevated thyroid-stimulating hormone (TSH) concentrations and

changes in peripheral thyroid hormone activity. Conversely, hypothyroidism contributes to metabolic disturbances, reduced energy expenditure, and weight gain, thereby aggravating obesity.

The coexistence of hypothyroidism and obesity during pregnancy represents a particularly unfavorable clinical condition associated with increased risks of miscarriage, preeclampsia, gestational diabetes, fetal growth abnormalities, preterm birth, and neonatal complications. Recent studies have demonstrated that maternal obesity may modify thyroid hormone dynamics during gestation and influence pregnancy outcomes through complex endocrine and inflammatory pathways. These interactions complicate diagnosis, monitoring, and therapeutic management during pregnancy.

Current international guidelines emphasize the importance of early detection and adequate treatment of thyroid dysfunction during pregnancy. Nevertheless, significant controversies remain regarding screening strategies, trimester-specific TSH reference ranges, optimization of levothyroxine therapy, and risk stratification among obese pregnant women. In addition, data regarding the combined impact of hypothyroidism and obesity on maternal-fetal outcomes remain limited and sometimes inconsistent across different populations.

Given the growing prevalence of both obesity and thyroid disorders worldwide, further investigation of their combined effects during pregnancy is of considerable clinical importance. A better understanding of the relationship between thyroid function, maternal obesity, and pregnancy outcomes may contribute to improved risk assessment, individualized management strategies, and prevention of adverse maternal and neonatal complications.

Therefore, the aim of this study was to evaluate thyroid function, clinical characteristics, and maternal-fetal outcomes in pregnant women with hypothyroidism and obesity and to identify the major risk factors associated with adverse pregnancy outcomes in this population.

The aim of the study was to evaluate the relationship between thyroid function, obesity, and pregnancy outcomes in women with hypothyroidism and to identify the major maternal and fetal risk factors associated with adverse obstetric and neonatal outcomes.

Materials and Methods. A prospective comparative study was conducted at the clinics affiliated with Samarkand State Medical University. The study included 120 pregnant women who were observed throughout gestation and underwent comprehensive clinical, laboratory, and instrumental examinations. Depending on thyroid status and body mass index (BMI), the participants were divided into

two groups. The main group consisted of 60 pregnant women diagnosed with hypothyroidism and obesity, whereas the control group included 60 healthy pregnant women with normal thyroid function and normal BMI. All participants provided informed consent prior to enrollment in the study.

Women were recruited during the first trimester of pregnancy. The inclusion criteria for the main group were singleton pregnancy, confirmed hypothyroidism diagnosed before or during pregnancy, obesity defined as a BMI ≥30 kg/m^2, and gestational age up to 14 weeks at the time of inclusion. The control group included women with uncomplicated singleton pregnancies, normal thyroid function, and BMI within the normal range. Exclusion criteria for both groups comprised multiple pregnancy, pre-existing diabetes mellitus, severe cardiovascular, hepatic, renal, or systemic autoimmune diseases, major fetal congenital anomalies, and refusal to participate in the study.

All participants underwent a detailed clinical evaluation, including assessment of demographic characteristics, obstetric and gynecological history, family history of thyroid disorders, anthropometric parameters, and blood pressure measurements. Particular attention was paid to clinical manifestations associated with thyroid dysfunction, including fatigue, somnolence, constipation, dry skin, hair loss, emotional instability, and other symptoms suggestive of reduced thyroid activity.

Laboratory investigations included complete blood count, biochemical blood analysis, and hormonal assessment. Serum concentrations of thyroid-stimulating hormone (TSH), free thyroxine (fT4), and antibodies to thyroid peroxidase (anti-TPO) were determined using enzyme-linked immunosorbent assay (ELISA) techniques. The obtained hormonal parameters were evaluated according to trimester-specific reference values.

Ultrasonographic examination of the thyroid gland was performed in all participants to assess thyroid volume, echogenicity, and structural abnormalities. Obstetric ultrasound screening was carried out at 11–14, 22–24, and 32–34 weeks of gestation in accordance with standard prenatal care protocols. Special attention was paid to fetal biometric parameters, placental characteristics, amniotic fluid volume, and fetal central nervous system development, given the established role of maternal thyroid hormones in fetal neurodevelopment.

The course of pregnancy was monitored throughout all trimesters. The incidence of early and late gestational complications, including threatened miscarriage, gestational hypertension, preeclampsia, gestational diabetes mellitus, anemia, placental insufficiency, and preterm labor, was recorded and

analyzed. Women with hypothyroidism received standard endocrine management according to current clinical recommendations, with regular monitoring of thyroid hormone levels and adjustment of levothyroxine dosage when indicated.

Delivery outcomes were evaluated with regard to gestational age at birth, mode of delivery, duration of labor, premature rupture of membranes, and intrapartum complications. Neonatal outcomes were assessed using Apgar scores at 1 and 5 minutes, birth weight, body length, signs of fetal distress or neonatal hypoxia, need for neonatal intensive care, and results of neonatal screening for congenital hypothyroidism.

Statistical analysis was performed using SPSS Statistics software (IBM Corp., USA). Quantitative variables were expressed as mean ± standard deviation (SD), while qualitative variables were presented as absolute numbers and percentages. Comparisons between groups were carried out using Student's t-test or the Mann–Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables. Correlation analyses were conducted to evaluate associations between thyroid function indicators and obesity-related parameters. A p-value of less than 0.05 was considered statistically significant.

Results. A total of 120 pregnant women were enrolled in the study and completed follow-up until delivery. The main group included 60 women with hypothyroidism and obesity, whereas the control group consisted of 60 healthy pregnant women with normal thyroid function and body mass index. The mean age of the participants did not differ significantly between the groups ($p>0.05$). Evaluation of thyroid status demonstrated significantly higher serum thyroid-stimulating hormone (TSH) concentrations and lower free thyroxine (fT4) levels in the main group throughout pregnancy compared with the control group ($p<0.001$). Positive anti-thyroid peroxidase antibodies (anti-TPO) were detected in a substantial proportion of women with hypothyroidism, indicating the predominance of autoimmune thyroid dysfunction. Thyroid ultrasonography revealed diffuse structural changes and reduced echogenicity of the thyroid gland more frequently among women in the main group.

Pregnancy in women with hypothyroidism and obesity was characterized by a higher incidence of obstetric complications. Threatened miscarriage during the first and second trimesters was observed significantly more often in the main group than in the control group. Gestational hypertension and preeclampsia were also more prevalent among women with thyroid dysfunction and obesity. In addition, the frequency of gestational diabetes mellitus was markedly increased

in the main group, reflecting the adverse metabolic effects associated with both hypothyroidism and excessive body weight.

Analysis of hematological parameters demonstrated a higher prevalence of anemia among pregnant women with hypothyroidism and obesity. These patients more frequently reported fatigue, weakness, somnolence, constipation, and other clinical manifestations associated with thyroid hormone deficiency. A significant positive correlation was identified between body mass index and serum TSH levels ($r=0.48$, $p<0.01$), suggesting an association between increasing adiposity and deterioration of thyroid function. Fetal monitoring revealed a higher incidence of placental insufficiency, chronic fetal hypoxia, and fetal growth abnormalities in the main group. Ultrasound examinations performed during the second and third trimesters demonstrated signs of impaired uteroplacental circulation more frequently among women with hypothyroidism and obesity. Moreover, abnormalities in amniotic fluid volume were detected more often in this group.

Delivery outcomes differed significantly between the study groups. Women with hypothyroidism and obesity experienced a higher rate of cesarean section, prolonged labor, and premature rupture of membranes compared with healthy pregnant women. The incidence of preterm birth was also increased in the main group. Neonatal outcomes were less favorable among infants born to mothers with hypothyroidism and obesity. Newborns in the main group had significantly lower mean Apgar scores at 1 and 5 minutes, a higher frequency of neonatal hypoxia, and a greater need for specialized neonatal care. Furthermore, low birth weight and signs of intrauterine growth restriction were observed more frequently among these infants. Cases of abnormal neonatal thyroid screening were identified exclusively among newborns from the main group.

Overall, the findings demonstrate that the coexistence of hypothyroidism and obesity during pregnancy is associated with impaired thyroid function, increased maternal morbidity, a higher frequency of obstetric complications, and less favorable neonatal outcomes. The results highlight the importance of early diagnosis, careful endocrine monitoring, and comprehensive management of pregnant women with concomitant hypothyroidism and obesity.

Conclusions. The results of the present study demonstrate that the coexistence of hypothyroidism and obesity during pregnancy is associated with significant disturbances in thyroid function and an increased risk of adverse maternal and fetal outcomes. Women with hypothyroidism and obesity were characterized by persistently elevated serum TSH concentrations and reduced

free thyroxine levels throughout gestation, indicating insufficient thyroid hormone compensation and the need for continuous endocrine monitoring. A significant relationship was observed between increased body mass index and impaired thyroid function, suggesting that obesity may contribute to the progression of endocrine and metabolic disorders during pregnancy. The combination of hypothyroidism and obesity was associated with a higher frequency of obstetric complications, including threatened miscarriage, gestational hypertension, preeclampsia, gestational diabetes mellitus, anemia, placental insufficiency, and preterm birth.

The adverse influence of maternal hypothyroidism and obesity was also reflected in fetal and neonatal outcomes. Pregnancies complicated by these conditions were more frequently associated with chronic fetal hypoxia, impaired fetal growth, abnormalities of uteroplacental circulation, and unfavorable perinatal outcomes. In addition, women in the study group experienced a higher incidence of cesarean delivery, prolonged labor, and premature rupture of membranes. Newborns delivered by mothers with hypothyroidism and obesity demonstrated lower Apgar scores, a greater incidence of neonatal hypoxia, increased requirements for specialized neonatal care, and a higher frequency of abnormal thyroid screening results. These findings indicate that the combination of hypothyroidism and obesity should be considered a significant risk factor for pregnancy complications and adverse neonatal outcomes.

The study confirms the importance of early diagnosis of thyroid dysfunction, timely correction of hormonal imbalance, regular assessment of thyroid status throughout gestation, and comprehensive management of obesity in pregnant women. Implementation of these measures may contribute to reducing maternal and perinatal morbidity and improving pregnancy outcomes in this high-risk population.

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