ASSESSMENT CHANGING OF THYROXINE DOSE FOR THE MANAGEMENT OF PRIMARY HYPOTHYROID DURING FIRST TRIMESTER OF PREGNANCY

Dr. Vu Thi Hien Trinh

INTRODUCTIONS

- Hypothyroidism is a common endocrine disorder
- Affects 3-10% of women, especially those of reproductive age
- 1-2% of pregnant women require Levothyroxine therapy
- 0.4% of pregnancies have TSH >10 mIU/L at 15-18 weeks gestation
- 50-85% require dose adjustment during pregnancy
- Current studies mainly focus on prevalence and clinical characteristics of hypothyroidism in pregnancy

OBJECTIVES

To evaluate treatment outcomes during the first trimester and identify related factors

THYROID CHANGES DURING PREGNANCY

- **Thyroid volume increases** by approximately **10–20%**.
- **TBG (Thyroxine-binding globulin)** levels increase by **75-100% during the first trimester**
- **Increase in T4 levels** and a **decrease in TSH**
- **Renal iodine clearance increases** due to enhanced glomerular filtration rate.
- The **placenta metabolizes iodothyronines** to supply thyroid hormones to the fetus.

THYROID CHANGES DURING PREGNANCY

Thyroxine requirements during pregnancy increase by 20–40% in women with primary hypothyroidism

THYROID HORMONES AND THE FETUS

Effects of thyroid hormones

- **Direct effect** on fetal metabolism and stimulate oxygen uptake.
- **Indirect effect** by regulating the activity of other hormones and growth factors important for fetal development (such as catecholamines, IGFs), essential for the maturation of various tissues.

THYROID HORMONES AND THE FETUS

Consequences of hypothyroidism during pregnancy

- **Delayed brain development**, cognition, and lower IQ in the child.
- **Increased risk of preterm birth**, low birth weight, and miscarriage.
- **Higher risk of gestational diabetes**.
- **Increased risk of stillbirth**.
- **Higher risk of preeclampsia** and gestational hypertension

CAUSES

Primary Hypothyroidism

Acquired	Congenital (from birth)
- Hashimoto's thyroiditis	- Thyroid agenesis or aplasia
- Iodine deficiency	- Ectopic thyroid
- Drugs that inhibit T4 synthesis or release (e.g., lithium, iodide, sulfonamides)	- Defects in iodide transport or utilization (e.g., pendrin mutation)
- Thyroiditis after I-131 therapy, surgery, or radiation for non-thyroid malignancies	- TPO (thyroid peroxidase) deficiency or dysfunction
	- TSH receptor mutation

Diagnosis Classification (ATA 2017)

- **Overt hypothyroidism**

  TSH > 4.0 mIU/L and low FT4 or

  TSH ≥ 10 mIU/L

- **Subclinical hypothyroidism**

  TSH > 4.0 mIU/L and FT4 normal

Dose adjustment (ATA 2017)

- Women with hypothyroidism who are being treated with LT4 and **planning pregnancy** should have TSH evaluated in advance, and **increase LT4 dose** to maintain **TSH < 2.5 mIU/L**.
- **Recommended:** Increase LT4 dose by **20–30% immediately upon confirmation of pregnancy**
- **Monitor TSH every**:
  - **4–6 weeks in the first trimester**
  - **Once in the second trimester**
  - **Once in the third trimester**

Inclusion Criteria

Patients with **primary hypothyroidism** from various causes, achieved TSH levels normal before pregnancy, confirm pregnant

- ✓ Hashimoto’s thyroiditis
- ✓ Graves’ disease treated with Iodine-131
- ✓ Thyroidectomy (total/hemi)
- ✓ Congenital hypothyroidism

RESEARCH METHODS

- **Study period:** From March 2021 to October 2021
- **Study location:** National Hospital of Endocrinology
- **Study design:** Observational – prospective study
- **Sample size:** Convenience sampling

DATA COLLECTION

83 Pregnant womens diagnosed **primary hypothyroidism** and treated with thyroxine supplementation, who achieved TSH levels normal were collected

Patients were examined and followed up at the National Hospital of Endocrinology during the **first trimester**. Informations were collected at 3 visits (6 gw, 10 gw, 14 gw)

RESULTS AND DISCUSSION

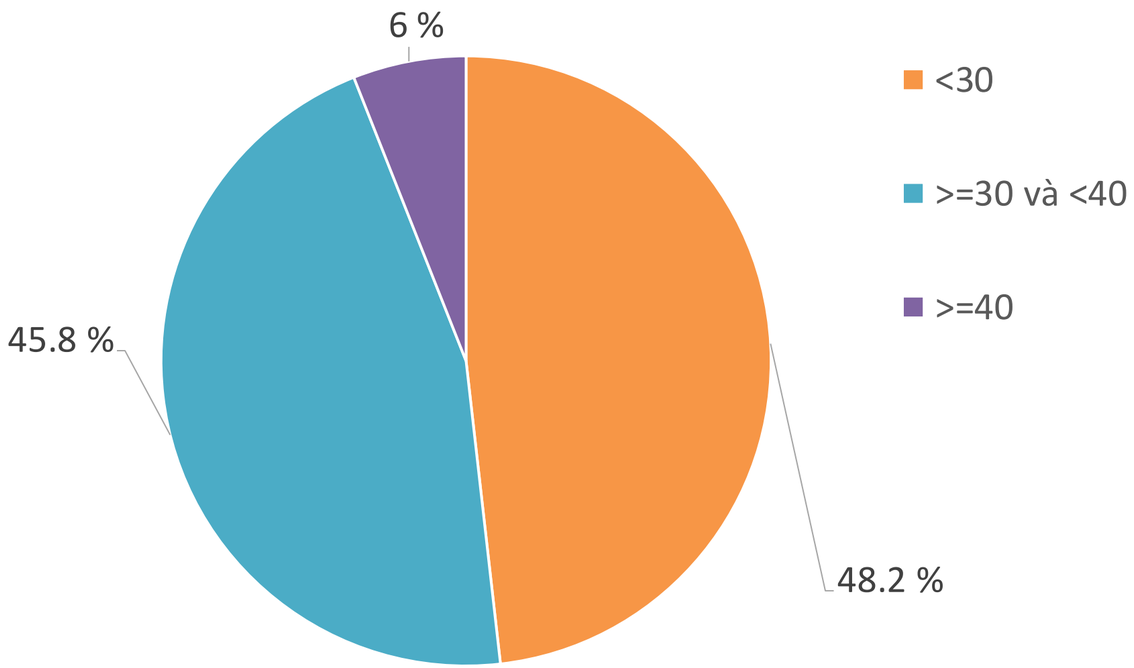
Clinical Characteristics

Summary of clinical characteristics of the participants

Variable	Minimum	Maximum	Mean ± SD
Age (years)	21	47	31.12 ± 5.04
Pre-pregnancy BMI (kg/m^2)	15.63	30.67	20.32 ± 2.11
Duration of hypothyroidism treatment (months)	6	360	62.6 ± 6.6

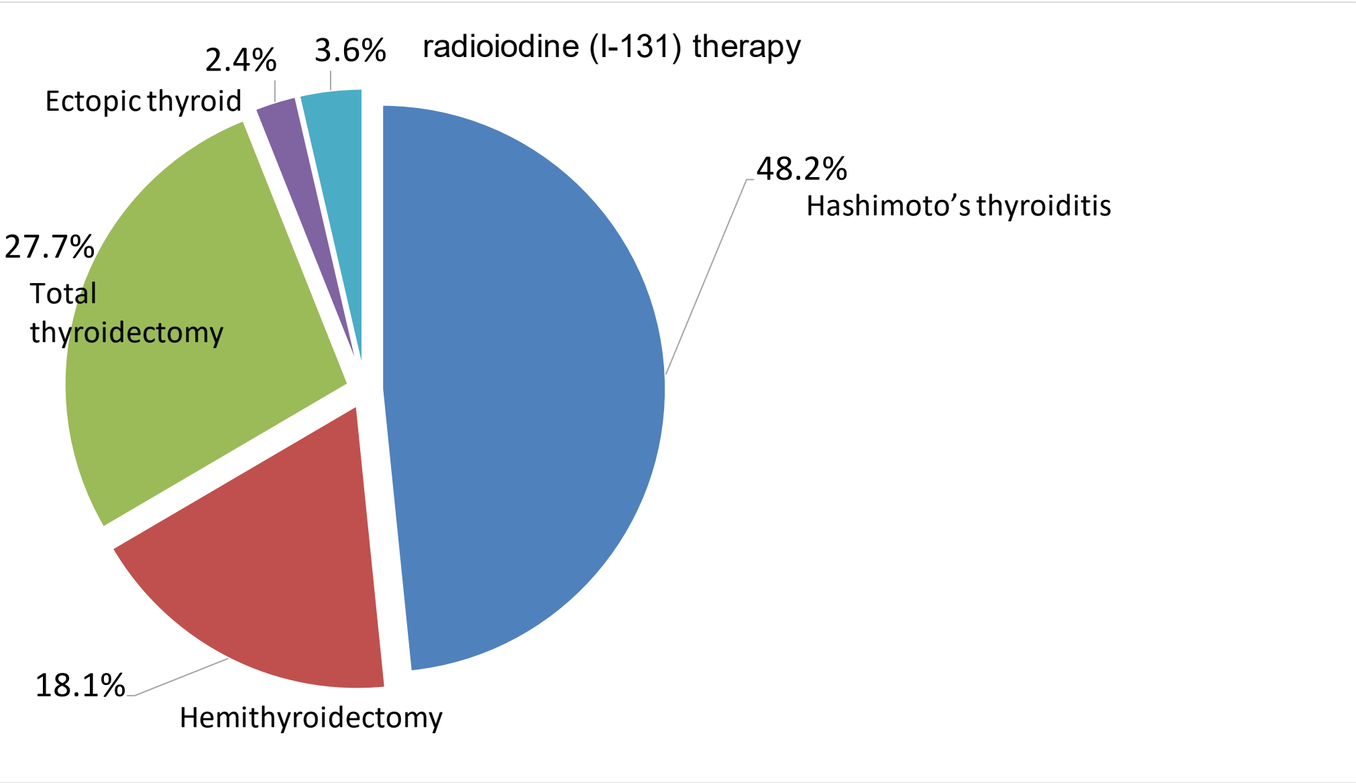
Clinical Characteristics

Ages distribution



Clinical Characteristics

Etiology of hypothyroidism



Subclinical Characteristics

Median levels of FT4 and TSH measured before pregnancy and during each visits (at 6, 10, and 14 weeks gestation)

Variables	Pre-pregnancy (0)	Visit 1 (6 weeks, 1)	Visit 2 (10 weeks, 2)	Visit 3 (14 weeks, 3)	p-value
FT4 *(pmol/L)*	17.07 (12.1–21.7)	15.41 (11.5–22.0)	16.5 (11.4–21.6)	16.43 (11.3–21.9)	**< 0.01**
		p0-1: < 0.05	**p1-2: > 0.05**	**p2-3: > 0.05**	
TSH *(mIU/mL)*	2.06 (0.03–2.42)	2.45 (0.03–16.1)	1.67 (0.04–12.29)	1.98 (0.03–10.2)	**< 0.01**
		p0-1: < 0.01	**p1-2: > 0.05**	**p2-3: > 0.05**	

Subclinical Characteristics

The changing in thyroxine dosage

Dosage	**Pre-pregnancy (LK0)**	**Visit 1 (1)** (6 weeks)	**Visit 2 (2)** (10 weeks)	**Visit 3 (3)** (14 weeks)	**p-value**
Total dose (µg/day)	76.6 ± 30.0	95.3 ± 38.3	100.4 ± 40.5	101.9 ± 42.5	**p0-1 < 0.001** p1-2 > 0.05 p2-3 > 0.05
Dose/kg(µg/kg/day)	1.55 ± 0.6	1.93 ± 0.76	1.97 ± 0.78	1.91 ± 0.77	**p0-1 < 0.001** p1-2 > 0.05 p2-3 > 0.05

Subclinical Characteristics

Thyroxin dosage adjustment across visits

Dose Adjustment	Visit 1	Visit 2	Visit 3	p-value
Increase (%)	61.2	20.5	9.6	**p 1–2: < 0.001** p 2–3: > 0.05
Decrease (%)	0	0	0	
No change (%)	38.8	79.5	90.4	
Median Increase (µg/day)	17.8	0	0	**p 1–2: < 0.001** p 2–3: > 0.05
% Increase from Previous Visit	25	0	0	**p 1–2: < 0.001** p 2–3: > 0.05

Proportion of dose increase among groups of hypothyroidism causes

Cause of Hypothyroidism (83)	% of Patients with Dose Increase	Total Dose Increased (Median/ µg)	% Increase Compared to Pre-pregnancy Dose (Median %)
Thyroiditis (40)	75	25	28.57
Hemithyroidectomy (15)	86.7	28.57	50
Total Thyroidectomy (23)	95.7	50	50
Radioactive Iodine (I131) (3)	100	25	25
Congenital Hypothyroidism (2)	100	60.71	73.81
p	> 0.05	**< 0.001**	> 0.05

Proportion of participants achieving target TSH levels at visits

Target achievement	Visit 1 (%)	Visit 2 (%)	Visit 3 (%)	p-value
Achieved	51.8	71.1	77.8	p 1–2: <0.01 p 2–3: <0.01
Not achieved	48.2	28.9	22.2	

CONCLUSIONS

- In our study, the mean age of pregnant women with primary hypothyroidism was approximately 31 years, and most had a normal pre-pregnancy BMI
- Hashimoto’s thyroiditis was the most common cause, followed by thyroid surgery
- Notably, pre-pregnancy TSH levels and follow-up measurements showed significant changes over time

CONCLUSIONS

- The proportion of patients achieving target TSH increased over time, with most requiring a higher thyroxine dose early in pregnancy.
- Dose requirements varied by etiology
- Early dose adjustments were key to achieving treatment goals

THANK YOU FOR YOUR LISTENINGS!