



## Prevalence of Postpartum Thyroiditis in the Eastern Regions of Iran

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### ABSTRACT

**Background:** Postpartum thyroiditis can have negative impacts on the lives of mothers and infants. The prevalence of this disorder has been shown to be dramatically different in various geographic regions. Despite its importance, there are still no standard recommendations for the screening of this disorder. Thus, determining the prevalence of this disorder is an important factor in decisions regarding universal screening.

**Objectives:** This study was performed in order to evaluate the prevalence of postpartum thyroiditis in the northeast region of Iran.

**Patients and Methods:** Mothers who brought their children to 3 health centers for vaccinations at 2-3 months, 4-5 months, and 6-7 months after delivery were included in this study. Blood sampling was performed in order to determine the random blood sugar, thyroid-stimulating hormone, triiodothyronin radioimmunoassay (RIA), tetraiodothyronin RIA, anti-thyroglobulin, and anti-thyroid peroxidase levels.

**Results:** A total of 842 women with a mean  $\pm$  standard deviation age of  $26.17 \pm 5.7$  years completed the study, with 20.3% seen at 2-3 months after delivery, 32.4% seen at 4-5 months after delivery, and 46.9% seen at 6-7 months after delivery. A total of 63 mothers (7.5%) developed postpartum thyroiditis. Of these, 44 (5.2%) of the participants proved to have hyperthyroidism and 19 (2.3%) had hypothyroidism. Thus, 779 (91.9%) mothers were euthyroid at the time of the study. We did not find any correlations between a family history of thyroid disorder, breast feeding, age, or the gender of the infants with postpartum thyroiditis occurrence.

**Conclusions:** Postpartum thyroiditis is relatively common in the northeast region of Iran. Screening policies may help to detect these patients sooner.

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#### ► Implication for health policy/practice/research/medical education:

Because of importance of screening for postpartum thyroiditis determining the prevalence of this disorder is a significant factor in decisions regarding universal screening.

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## 1. Background

Postpartum thyroiditis (PPT) affects women during the first 12 months after delivery. The incidence of PPT has been reported to be between 1.9% and 16.7% (1). PPT may present as transient hypothyroidism, transient hyper-

thyroidism, or both. However, in some patients, it may result in permanent hypothyroidism. Because the hyperthyroid phase is usually transient and its symptoms are slight, many patients are not diagnosed until they become hypothyroid. In contrast, hypothyroidism can have serious negative impacts not only on the mother, but also on her infant. When hypothyroidism becomes obvious; these mothers are not able to take appropriate care of their babies. Universal screening for PPT is still a matter of controversy, and it has not been recommended by any organization (2).

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## 2. Objectives

One of the important questions regarding the widespread screening of PPT is whether it is sufficiently prevalent to warrant screening (2). A previous study in Iran showed a prevalence of 11.4% in the population of Tehran (3). The aim of this study was to evaluate the prevalence of PPT in the northeast regions of Iran in order to determine the effect of geographical area on the prevalence of PPT.

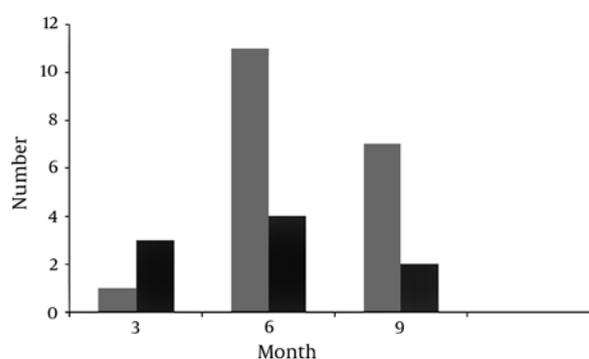
## 3. Patients and Methods

A total of 914 healthy mothers, who were referred to 3 health centers for the vaccination of their babies during the first 7 months after delivery, were included in this study. The participants were divided into the following groups: those seen at 2-3 months, 4-5 months, or 6-7 months after delivery. The sample size was calculated according to previous studies, and  $P = 11\%$  (prevalence). Researchers explained the importance of the study to the mothers. Informed consent was provided by all participants. A history check list, including a history of thyroid disorder in the participant or her family, abortions, gestational diabetes mellitus, rheumatologic disorders, the number of deliveries and gender of infants, drug history, and symptoms of hyper- or hypothyroidism was filled out by the researchers for all subjects. A total of 5 mL of blood was taken from the brachial veins of all participants and centrifuged. All samples were sent to the referral lab under cold chain protection. A random blood sugar assay was performed using the glucose oxidase method (HUMAN GmbH, Wiesbaden, Germany). The normal values for thyroid-stimulating hormone (TSH) were considered to be 0.3-5 mU/L, and values of 4-12.5 mg/dL were considered normal for tetraiodothyronin (T4). Participants with normal T4 values and TSH values between 5 and 10 or less than 0.3 were diagnosed with subclinical hypothyroidism or subclinical hyperthyroidism, respectively. TSH immunoradiometric assays, T4 radioimmunoassays (RIA), and triiodothyronin (T3) RIAs (BECKMAN COULTER Kits Brea, CA, USA, Inter-assay sensitivity = 5.7%, 8.6%, and 7.7%, respectively) were used to evaluate the thyroid function tests. Anti-thyroid peroxidase (TPO) and anti-thyroglobulin (Tg) were measured using the enzymatic immunoassay method (ORGENTEC Diagnostika GmbH, Mainz, Germany, inter-assay sensitivity = 2.2% and 5.2%, respectively). Anti-TPO values greater than 75 and anti-Tg values greater than 150 were considered positive. TSH values greater than 10 mU/L and T4 values less than 4 mg/dL were considered criteria for hypothyroidism, and TSH values less than 0.3 and total T4 values greater than 12.5 were considered criteria for hyperthyroidism. SPSS version 11.5 (IBM Corporation, Armonk, NY, USA) was used to analyze the data. After defining the normal skew, Student's *t*-test was used to compare the variables, and Pearson's test was used to evaluate the correlations. Variables without normal skew (consisting of TSH, age, T4, T3,

anti-TPO, and anti-Tg) were compared with nonparametric tests (Kruskal-Wallis and Mann-Whitney).

## 4. Results

A total of 914 participants entered this study. Seventy-two were omitted from the study because of laboratory data defects. Thus, 842 women with a mean  $\pm$  standard deviation age of  $26.17 \pm 5.7$  years completed the study. The percentages of participants in the 3 postpartum groups were as follows: 20.3% in the 0-3 month group, 32.4% in the 3-6 month group, and 46.9% in the 6-9 month group. A total of 63 mothers (7.5%) had PPT. Hyperthyroidism was confirmed in 9 (1.1%) patients and 19 (2.3%) patients were diagnosed with hypothyroidism. Thus, 774 (91.9%) of the mothers were euthyroid at the time of the study. Both hyperthyroidism and hypothyroidism were more prevalent in the 3-6 month group. A total of 44% of the hyperthyroid patients were in the 3-6 month group (the percentages of hyperthyroid patients in the 0-3 month, 3-6 month, and 6-9 month groups were 33%, 44%, and 22%, respectively). The percentage of hypothyroid patients was also higher in the 3-6 month postpartum group (5.3%, 57.9%, and 36.8% were in the 0-3 month, 3-6 month, and 6-9 month groups, respectively). Subclinical hyperthyroidism was found in 27 (3%) of the patients, and subclinical hypothyroidism was detected in 25 (3%) of the patients. Both subclinical hyperthyroidism and subclinical hypothyroidism were most common in the 6-9 month postpartum group (40.7% and 60%, respectively). The number of participants with a history of abortion was 159 (18.9%). Sixty mothers (7.1%) had a family history of thyroid disorder. Only 14 (1.7%) of the participants had gestational diabetes mellitus. Two patients had a history of rheumatologic disorder. There were no significant differences between the number of abortions in previous pregnancies and the number of deliveries in those with PPT and the normal groups. *Table 1* shows the demographic and laboratory findings for the 3 groups. *Figure 1* presents the results in a different way. High anti-TPO antibody titers (more than 100 U/mL) were detected in 99 participants. Most patients with high anti-TPO ti-



**Figure 1.** Different Types of Presentation of Postpartum Thyroiditis in Months 3, 6, and 9 after Delivery.

Dark columns indicate patients with hyperthyroidism and light columns indicate patients with hypothyroidism.

**Table 1.** Demographic and Laboratory Characteristics of Patients in the Three Groups

	Normal (n = 774) <sup>b</sup>	Hyperthyroid (n = 9) <sup>b</sup>	Hypothyroid (n = 19) <sup>b</sup>	P value
Age, y	26.04 ± 6	26.2 ± 5.7	26.3 ± 5.5	0.98
NO delivery, n	2.05 ± 1.3	2.3 ± 1.5	2.3 ± 0.5	0.5
Anti-TPO <sup>a</sup> , IU/mL	73.5 ± 10.3	70.81 ± 9.8	496 ± 66.8	0.00
Anti-Tg <sup>a</sup> , mg/dL	131.1 ± 13.8	59 ± 4.3	430.7 ± 49.6	0.07
T4 <sup>a</sup> , mg/dL	12.1 ± 1.5	14.9 ± 2.4	4.6 ± 2	0.7
TSH <sup>a</sup> , μU/L	2.4 ± 1.4	0.12 ± 0.04	39.73 ± 1.8	0.00
Blood sugar, mg/dL	78.6 ± 14.04	79.5 ± 12.3	81 ± 22.6	0.6

<sup>a</sup> Abbreviations: SD, Standard deviation; T4, Tetraiodothyronin; Tg, Thyroglobulin; TPO, Thyroid peroxidase; TSH, Thyroid-stimulating hormone.

<sup>b</sup> Values are as Mean ± SD

ters were euthyroid (78.8%), while 10.1% and 11.1% of them were hyperthyroid and hypothyroid, respectively. A total of 200 participants had anti-Tg titers greater than 100 U/mL. Euthyroidism was the most common presentation in this group (86%), while 6.5% and 7.5% of the participants with high anti-Tg titers were hyperthyroid or hypothyroid, respectively. Hyperthyroidism was most prevalent at 6–9 months postpartum. Only 1 patient in this group reported a family history of thyroid disorder. Hypothyroidism was most prevalent 3–6 months from delivery. None of the hypothyroid patients had a family history of thyroid disorders. There were no correlations between PPT and a family history of thyroid disorder, breast feeding, age, or the gender of the infants among the 3 groups. Those with hypo- or hyperthyroidism were referred to an endocrine clinic for follow up.

## 5. Discussion

The prevalence of PPT in this cross-sectional study was 7.5%. A considerable number of longitudinal and cross-sectional studies have evaluated the prevalence of PPT. Two longitudinal studies were conducted in Tehran and Shiraz in Iran, and they demonstrated a prevalence of PPT of 11.5% and 11.4%, respectively (3-4). The prevalence of PPT differs in other Asian countries. For instance, a study that was conducted in 2002 in the Kashmir valley of India reported a prevalence of 7% (5) of PPT. In Japan, among 3,503 antibody-negative women, 4.7% had PPT at the 3<sup>rd</sup> month after delivery (6). The higher prevalence of PPT in our study may be due to the larger sample size. The previously mentioned studies all followed their patients for less than 6 months, except for Shahbazian *et al.* who followed their patients for 1 year. Table 2 shows the prevalence of PPT in a number of Asian countries.

**Table 2.** Prevalence of Postpartum Thyroiditis in a Few Asian Countries

	Author	Year	Prevalence, %
Iran	Shahbazian (3)	2001	11.4
India	Zargar (5)	2002	7
Thailand	Rajatanavin (11)	1990	1
Japan	Sakaihara (6)	2000	4.7
Iran	Present study	2010	7.5

Diaz *et al.* evaluated the prevalence of PPT and its associated risk factors in Spain(7). They measured anti-TPO, TSH, and free T4 levels during the first, second, and third trimesters after delivery. They reported a prevalence of 15.9% for PPT, which is considerably higher than the prevalence in Asian countries. However, Walfish *et al.* found a prevalence of 6% in Canada (8). They examined mothers every 6–8 weeks during their first postpartum year. Stagnaro-Green *et al.* reported a prevalence of 1.1% to 16.7% with a mean of 7.4% (9). The wide range of prevalences of PPT in different countries might be related to differences in ethnicity, geography, iodine intake, the size of the study group, and the length of the follow-up time. However, methodological differences in study design is also a critical factor, and it might also lead to a wide range of PPT prevalences (2).

Only 20%–30% of PPT patients exhibit the characteristic sequence of hyperthyroidism followed by hypothyroidism (10). In this study, we did not follow the participants, and the researchers visited them only once. Therefore, we cannot describe these sequences. Hyperthyroidism was more frequent in the second trimester after delivery (44% of hyperthyroid patients). Hypothyroidism was also more frequent in the second trimester after delivery (57.9% of hypothyroid patients). This can be explained by the higher number of participants who were referred to a health center during the second or third postpartum trimester rather than during the first postpartum trimester. None of the hypothyroid or hyperthyroid patients were symptomatic. Indeed, PPT is a mild disorder and it is not commonly associated with hyper- or hypothyroidism symptoms (2). The relationship between PPT and iodine status has been reviewed in a number of studies. Low urinary iodine has been associated with more severe and long-term hypothyroidism (11). According to the annual province health center report, Mashhad is an iodine-sufficient region. However, measurements of urinary iodine in the postpartum period may be valuable. There were some limitations in the present study. First, we did not determine urinary iodine. Second, thyroid ultrasonography was not performed. Finally, we did not follow the participants, and thyroid function tests were performed only once. However, the number of subjects in the study was higher than the numbers in most previ-

ous studies.

In conclusion, our results imply that PPT seems to be common. Some authors have suggested that PPT be screened only in high-risk women, including those with a family history of thyroid disorders, those who are anti-TPO positive, and those with type 1 diabetes. However, in the present study, only 1 patient with PPT had a family history of thyroid autoimmunity, and there were no patients with a history of type 1 diabetes. These findings reveal that PPT can commonly occur in the absence of risk factors. Anti-TPO titers are the most available screening tool (9). Screening can be conducted during the first trimester of pregnancy, and patients with positive anti-TPO antibody titers have to be retested for thyroid function at least once during the first trimester after delivery.

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