

# Perinatal factors associated with neonatal thyroid stimulating hormone in normal newborns

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## OBJECTIVES

- The aim of this study was to evaluate the effect of neonatal, maternal, and delivery factors on neonatal thyroid stimulating hormone (TSH) levels of normal newborns.

## METHODS

- Subjects were 713 normal infants born through normal vaginal delivery.
- TSH levels obtained by neonatal screening test using dried capillary blood spots were analyzed according to the difference of neonatal, delivery, and maternal factors.
- Association between neonatal TSH levels and free thyroxine (T4) as well as 17  $\alpha$ -hydroxyprogesterone (17 OHP) levels were also evaluated.

Table 1. Comparisons of TSH level according to perinatal factors

	N	TSH	p-value	Ln TSH	p-value
<b>Sex</b>					
Male	375 (52.6%)	3.86 $\pm$ 1.90		1.23 $\pm$ 0.52	
Female	338 (47.4%)	3.69 $\pm$ 1.92	0.225	1.17 $\pm$ 0.53	0.162
<b>Multiple pregnancy</b>					
Singleton	687 (96.4%)	3.75 $\pm$ 1.89		1.19 $\pm$ 0.53	
Twin	26 (3.6%)	4.57 $\pm$ 2.37	0.032	1.42 $\pm$ 0.42	0.026
<b>Birth Order</b>					
1 <sup>st</sup> baby	437 (61.3%)	3.89 $\pm$ 1.92		1.24 $\pm$ 0.49	
2 <sup>nd</sup> baby $\leq$	276 (38.7%)	3.59 $\pm$ 1.88	0.038	1.13 $\pm$ 0.56	0.007
<b>APGAR score at 1min</b>					
<7	18 (2.5%)	3.56 $\pm$ 1.51		1.15 $\pm$ 0.53	
$\geq$ 7	695 (97.5%)	3.78 $\pm$ 1.92	0.629	1.22 $\pm$ 0.52	0.814
<b>APGAR score at 5min</b>					
7,8	67 (9.4%)	4.10 $\pm$ 1.90		1.30 $\pm$ 0.49	
9,10	646 (90.6%)	3.74 $\pm$ 1.91	0.145	1.19 $\pm$ 0.53	0.101
<b>Delivery type</b>					
Spontaneous	579 (81.2%)	3.72 $\pm$ 1.91		1.18 $\pm$ 0.53	
Vacuum	134 (18.8%)	4.01 $\pm$ 1.91	0.112	1.28 $\pm$ 0.49	0.047
<b>Labor type</b>					
Spontaneous	223 (31.3%)	3.59 $\pm$ 1.79		1.15 $\pm$ 0.53	
Induced	490 (68.7%)	3.86 $\pm$ 1.96	0.081	1.22 $\pm$ 0.52	0.080
<b>Maternal DM</b>					
Normal	661 (92.7%)	3.75 $\pm$ 1.89		1.19 $\pm$ 0.52	
GDM/DM	52 (7.3%)	4.14 $\pm$ 2.10	0.149	1.29 $\pm$ 0.53	0.190
<b>Maternal HTN</b>					
Normal	696 (97.6%)	3.77 $\pm$ 1.92		1.20 $\pm$ 0.52	
PIH	17 (2.4%)	4.00 $\pm$ 1.64	0.625	1.30 $\pm$ 0.45	0.439
<b>Maternal thyroid disease</b>					
Normal	653 (91.6%)	3.76 $\pm$ 1.93		1.19 $\pm$ 0.53	
Hypo-	53 (7.4%)	4.01 $\pm$ 1.70	0.356	1.29 $\pm$ 0.47	0.194
Hyper-	7 (1.0%)	3.71 $\pm$ 1.02	0.952	1.28 $\pm$ 0.29	0.672
<b>Maternal medication</b>					
None	591 (82.9%)	3.77 $\pm$ 1.92		1.20 $\pm$ 0.52	
Insulin	30 (4.2%)	4.08 $\pm$ 2.19	0.379	1.23 $\pm$ 0.60	0.555
Synthyroid	49 (6.9%)	4.08 $\pm$ 1.71	0.264	1.32 $\pm$ 0.45	0.128
Steroid	7 (1.0%)	3.91 $\pm$ 2.70	0.839	1.20 $\pm$ 0.61	0.994

Table 2. Correlation between TSH level and perinatal factors

	Ln TSH	
	r	p-value
Gestational age	<0.001	0.998
Maternal age	-0.003	0.927
Sample time	-0.146	<0.001
ROM	0.023	0.541
Birth weight	-0.053	0.154
Birth height	-0.032	0.392
Head circumference	-0.040	0.285
17OHP	0.175	<0.001
ln17OHP	0.220	<0.001
Free T4	-0.020	0.614
lnFT4	-0.009	0.818

Table 3. Multiple linear regression analysis

	Coefficient	SE	p-value
(Constant)	1.308	0.083	<0.001
Ln 17OHP	0.178	0.027	<0.001
Sample time	-0.006	0.002	<0.001
1 <sup>st</sup> baby	-0.104	0.039	0.008
Vacuum Delivery	0.097	0.049	0.048

## RESULTS

- Twin babies and neonates born through vacuum assisted delivery had higher TSH levels than controls.
- There was a significant negative association between TSH level and sampling time after birth.
- First babies had higher TSH levels than babies of higher birth order.
- Sex, birth weight, and gestational age were not associated with neonatal TSH.
- Duration of membrane rupture, Apgar scores and labor induction did not influence TSH level.
- There was no difference in TSH level according to maternal disease such as diabetes, pregnancy induced hypertension, and thyroid disease, nor maternal medication such as insulin, steroid, and thyroid hormone.
- Neonatal TSH levels were not associated with free T4 levels but had a positive relationship with 17OHP levels.
- Multiple linear regression analysis also showed that 17OHP, sampling time, birth order, and mode of delivery influence neonatal TSH level.

## CONCLUSIONS

- Neonatal TSH levels of healthy normal newborns are related with 17OHP levels, sample time, birth order and mode of delivery.
- Acute stress during delivery may influence neonatal TSH level in early neonatal period.

- The author has nothing to disclose.

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