

Correlation of Maternal Serum Thyroid Hormone Levels and Breech Presentation at Term

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Abstract

The objective of this paper is to evaluate the relation between maternal thyroid profiles with breech presentation at term. Seventy nine antenatal mothers with breech presentation and 79 pregnant mothers with cephalic presentation matched by same age and parity as in breech were prospectively evaluated at term. Thyroid profiles (serum TSH and FT4 levels) of all antenatal mothers (n=158) were assessed at 36 weeks of gestation.: Compared with women having fetuses in cephalic presentation to those pregnant mothers, who presented breech presentation at term had significantly higher concentration of TSH at 36 weeks of gestation ($p < 0.001$). Women with serum TSH < 0.817 mIU/l (10th percentile) had breech presentation of 12.5%. The prevalence of breech presentation in the subgroup of women with TSH > 2.6 mIU/l (90th percentile) at 36 weeks of gestation was 85.72% compared with 46.53% in the women with TSH ≤ 2.6 mIU/l. Breech presentation was significantly and independently related to high maternal TSH concentration (> 2.6 mIU/l) at 36 weeks of gestation (OR= 6.8955; 95% CI: 1.4896-31.9203, z stat: 2.4700; $p = 0.0135$). The relation of breech presentation with serum FT4 > 16.4 pmol/l (> 90 th percentile) at 36 weeks of gestation was not significant (OR=0.3680; 95% CI: 0.1103-1.2276; z stat: 1.626; $p = 0.1039$). Serum FT4 assay during late gestation was less reliable. Women with serum TSH level above 2.6 mIU/L) during the end of gestation are at increased risk for fetal breech presentation.

Keywords

Serum FT4, TSH, breech, cephalic presentation

I. Introduction

Breech is defined as when the podalic end of fetus enters the pelvis before the head. The term probably derives from the word britches which mean a cloth covering the loins and thighs. Breech presentation at term is the commonest abnormal fetal presentation and is associated with neonatal and maternal morbidity and mortality. The incidence of breech presentation decreases near term from approximately 16% at 32 weeks to 3-5% at 40 weeks of gestation [1]. Low birth weight, short gestational age, primiparity, and older maternal age were associated with increased risk of breech births, and other causes are established maternal diabetes, congenital malformation of the infant, smoking during pregnancy and late or no prenatal care [2]. Women who themselves were delivered in breech presentation had more than twice the risk of breech delivery in their first own pregnancies [3].

Breech presentation at term is related to maternal thyroid hormone status. Women with elevated maternal serum TSH level during the end of gestation rather than low maternal FT4 level is the key predictor of breech presentation [4]. A recent report however also shows that FT4 assay during gestation are less reliable when compared to nonpregnant situations [5]. Further research is needed to detect the most appropriate tool for screening of maternal thyroid function during gestation. Breech delivery is very much challenging in obstetrics practice, and majority of the clinicians recommend a policy of caesarean delivery for all breech presentation at term.

Others who are experienced with vaginal breech delivery continue to recommend planned vaginal birth for selected women.

The present study is undertaken to evaluate the correlation of maternal serum TSH and FT4 level with fetal breech presentation and also to determine the fetal outcome.

II. Materials and Methods

The cross sectional prospective study was conducted in Burdwan Medical College and Hospital, Burdwan, West Bengal, India over April 2011 to March 2012. Seventy nine antenatal mothers at or after 36 weeks of gestational age with breech and cephalic presentations in each group were taken for data analysis. Antenatal mothers with cephalic presentation were matched by same age and parity of the study population. Certain high risk factors like administration of levothyroxin and antithyroid medication during pregnancy, other malpresentations and positions, multifetal pregnancy, preterm pregnancy, any genital organ anomaly and severe fetal anomalies were excluded from our study. After taking proper written informed consent from the patient the detailed history was elicited followed by general, systemic and obstetrical examinations regarding presentation, position, amount of liquor and routine investigations including thyroid profile. The study was approved by the medical ethics committee of the institution

Sample size

Two hundred and sixty antenatal mothers with breech presentation having singleton pregnancy were recorded at Burdwan Medical

College and Hospital, Burdwan in the 'reference period' of one year. Twelve cases were excluded as they did not give consent for the study. Fourteen cases were excluded as the gestational age can not be calculated properly as they fail to recall LMP, having no previous USG in first trimester and no antenatal record in the present pregnancy. Women on antithyroid drug or thyroid hormone with known hyperthyroidism (n=2) and hypothyroidism (n=6) were not included. Of the remaining pregnant women, 66 delivered prior to 36 weeks and 72 mothers with breech presentation referred from other hospitals in late first or second stage of labor with unknown thyroid profile were also excluded. Another 5 mothers with known congenital malformation of uterus and mothers who gave birth of severely congenital malformed baby (n=4) were excluded from the study. Finally 79 antenatal mothers with breech presentation at or 36 weeks of gestational age were assessed for thyroid profiles and 79 antenatal mothers with cephalic presentation matched with same age and parity as in breech, were also included for estimation of serum FT4 and TSH at the same gestational period. All the antenatal mothers admitted in labor ward either through emergency or antenatal OPD was questioned and examined with predesigned scheduled proforma for data analysis.

Assessments

Obstetric parameters

Term pregnancy was assessed by two ways from the date of last menstrual period and from the ultrasound scan in the first trimester. If there was a discrepancy of more than 7 days between the two measurements, a second ultrasound was performed within 2 weeks to

re-assess the gestational age. Gestational age was expressed in weeks. Amniotic fluid volume was also measured by ultrasound scan at term. Previous obstetrical history (parity, previous presentation during delivery) and mode of delivery in present pregnancy were carefully noted. Birth weight of neonates was measured.

Thyroid parameters

Maternal serum TSH and FT4 level were measured when the pregnant mothers with breech presentation attended in the hospital at or after 36 weeks of gestational age. Same thyroid profile was also measured in the antenatal mothers with cephalic presentation of the same age and parity as in the breech presentation. Serum TSH was measured using a solid-phase, two-site chemiluminescent enzyme immunometric assay. Serum FT4 concentration was also measured by means of a solid-phase immunometric assay. Normal reference ranges of TSH and FT4 were 0.45-4.5 mIU/l and 10.3- 25.7 pmol/l respectively.

Other parameters

Height and weight of antenatal mothers were measured and BMI was calculated. BMI = Weight in kilogram/ height in meter².

Statistical analysis was performed by using statistical package of social science version 20.0 (SPSS). Calculation of mean, median, range, standard deviation and odd ratio (OR) was done. Student's t-test and chi-square analysis were done to assess the significance of variables and p value less than 0.05 is considered as significant. Determinants of breech and cephalic presentations were analyzed by using Pearson's correlation analysis.

III. Results

Table I shows analysis of baseline characteristics of pregnant mothers regarding demographic features of age, parity S-E status and BMI. The mean age of patients was 22.913 ± 2.945 years and the range was from 18-31 years. Maximum number of patients (48.1%) was nullipara. Majority of mothers (50.63%) in breech presentation belongs to upper middle group whereas 48.1% mothers with cephalic presentation are in the same class. Most of the mothers have normal BMI (20-25). Two mothers with breech presentation and a mother with cephalic presentation are obese (>30).

Majority (48.1%) of the babies delivered in breech presentation were within 38-39.9 weeks of gestational age, but most of the babies (58.23%) in cephalic presentation were delivered within 40-41.9 weeks of gestational age. Lower segment caesarean section was performed in 63.29% of breech cases whereas 77.22% of cephalic presentation had normal vaginal birth. Majority of the babies (n=128, 81%) in breech and cephalic presentations had birth weight within 2500-3999 grams (**Table II**).

Table III shows the difference in thyroid parameters between the women who presented in breech and cephalic presentation (n=79 in each group). At 36 weeks of gestation women with fetuses in breech presentation had significantly higher TSH concentration compared with those with fetuses in cephalic presentation ($p < 0.001$). FT4 was not significantly related to breech presentation at term.

Table IV describes the cut-off values of TSH and FT4 hormones of lower than 10th, 10-

90th, and greater than 90th percentile at 36 weeks of gestation in breech and cephalic presentations. These values of TSH in breech presentation were: less than 10th (<0.817 mIU/l), n=2; for the 10-90th (0.817-2.68 mIU/l), n=65; and for >90 th percentile (>2.68 mIU/l), n=12. The number of pregnant mothers in the cephalic presentation for each of the percentile groups having same cut-off points for TSH mentioned above were n=14, 63 and 2 respectively and it is statistically significant (Pearson's correlation = - 0.256; $p = 0.001$). The cut off values of FT4 in breech at 36 weeks of gestational age were made at <10 th (<10.17 pmol/l), n=7; for 10th -90th (10.17-16.4 pmol/l), n=68; and >90 th percentile (>16.4 pmol/l), n=4 and relation between FT4 and breech presentation was found (Pearson co-relation=0.018; $p=0.818$)

Fig 1 represents the percentage of women who presented with breech presentation at term in three percentile categories of maternal serum TSH (mIU/L) levels. With regard to the 10-90th percentile and >90 th percentile TSH groups at term, 50.78% and 85.72% of the women presented in fetal breech while 12.5% of cases of breech presentation in the lower (<10 th percentile) TSH group. Breech presentation in pregnant women with TSH >2.68 mIU/L (>90 th percentile) were 85.72% (12/14) compared with 46.53% (67/144) in women with TSH ≤ 2.68 (mIU/L) [range of maternal TSH: 0.63-3.63].

Cut-off categories for FT4 in breech at 36 weeks of gestational age were 43.75% (7/16), 53.13% (68/128) and 28.57% (4/14) in 10th percentile (<10.17 pmol/L); 10-90th percentile (10.17-16.4 pmol/L); and >90 th percentile (>16.4 pmol/L) respectively [chi square =3.321, df =2, $p=0.190$; Fig2].

IV. Discussion

The current study demonstrates the co-relation of the maternal thyroid hormone status and breech position in late pregnancy and different demographic variables in pregnant mothers like age, parity, socio-economic status with breech and cephalic presentations. Kuppen and associates [4] in their study showed that the mean age of pregnant mothers was 30.6 years and 7% were underweight (BMI <20). The mean age of pregnant mothers in our series was to some extent lower (23 years) due to early marriage and low socio-economic status and less education level of pregnant mothers. The incidence of underweight (BMI <20) in the present study was 32% which signifies that underweight is very much prevalent in developing countries.

The percentile cut-off values of maternal serum TSH in breech presentation in our series were: less than 10th (< 0.817 mIU/l), n=2; for the 10-90th (0.817-2.68 mIU/l), n=65; and for >90th percentile (>2.68 mIU/l), n=12. In cephalic presentation fourteen mothers had serum TSH <0.817mIU/l (<10th percentile) and 2 mothers had serum TSH level more than 2.68mIU/l (>90th percentile). So with increased serum TSH level the number of mothers with breech presentation was also higher in respect to cephalic presentation (**Table IV**). Kuppens et al [4] also noted that the 10th and 90th percentile cut-off points for TSH level were 0.71 mIU/l and 2.50mIU/l respectively and one mother had serum TSH <0.71mIU/l and 12 mothers had serum TSH >2.50mIU/l with breech presentation. So our result corresponds with the finding that

increased serum TSH level (>2.6mIU/l) at 36 weeks of pregnancy was associated with breech presentation at term (OR= 6.8955; 95% CI: 1.4896-31.9203, p =0.0135).

In the current study the cut-off categories for FT4 in breech vs. cephalic presentations at 36 weeks of gestational age were made at <10th (<10.17pmol/l), n=7 vs 9; for 10-90th (10.17-16.4 pmol/l), n=68 vs. 60 and > 90th percentile (>16.4pmol/l), n=4 vs. 10. There was no statistically significant correlation between FT4 level (>16.4pmol/l) and breech presentation at term (OR=0.3680; 95% CI: 0.1103- 1.2276; p =0.1039). Serum FT4 assay during gestation are less reliable when compared to nonpregnant situations [5] and no correlation was noted between serum FT4 and breech presentation [4]

Adequate fetal movement is important for reaching cephalic presentation Moreover it could also be hypothesised that inadequate fetal movement interfere with the development long enough umbilical cord, which, when too short has been associated with increased rate of breech position[6] . Uterine contractions are also important for final cephalic presentation at term. Kuppens et al in their study further noted that none of the women with TSH level within the lowest 5th percentile presented in breech presentation may also be interpreted as indicative of a direct impact of maternal TSH on uterine contraction and, hence, on breech presentation[4]. Other factors controlled for breech presentation in the current study were nulliparity, birth weight (interfering with gestational weight).

Cesarean delivery was noted in our series in 63% of cases in breech presentation and 15% of cases in cephalic presentation respectively. So frequency of caesarean delivery was higher

(>4 times) in breech presentation. Hunnah ME et al reported that 90.4% of the women assigned for planned caesarean section with breech presentation were delivered by caesarean section, where as 43.3% women assigned for planned vaginal delivery was delivered by caesarean section [7]. In contrast to that, our caesarean section rate was 63% as we were neither biased for vaginal delivery nor liberal for caesarean section. The present study showed that lbw (<2500gm) newborns were two times (21.5/11.4) more common in breech presentation in comparison to cephalic presentation. Our result corresponds with the finding of Ray et al, who also noted that lbw was 3 times (13.9/3.8) common in breech presentation [2].

Several limitations of the present study need to be mentioned. First the low number of women underwent breech delivery. Another issue relates to the fact that other possible determinant of breech presentation such as umbilical cord length was not evaluated, and thyroid function including antithyroid antibody should be assessed at different times of gestational period without only single measurement at 36 weeks in a large open pregnant population.

V. Conclusion

In conclusion, the current study shows that in otherwise healthy women high level of maternal TSH during the late gestation is associated with breech presentation at term.

Further strategies should be considered to minimize breech presentation by assessment of the level of TSH at different gestational period, role of maternal thyroid dysfunction and use of thyroxin substitution in women with high TSH level.

VI. References

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Table I Baseline characteristics of 158 pregnant mothers at term

Demographic Features	Total n=158	Breech (n=79) n (%)	Cephalic (n=79) n (%)	p
Mean age, years [SD]	22.913[2.945]			
Median (range) years	23(18 -31)			
Parity				
1-2	80(50.63%)			
Median (range)	1(0-4)			
Socio-economic status				0.948
Upper		7(8.86)	6(7.59)	
Upper middle		40(50.63)	38(48.1)	
Lower middle		20(25.31)	19(24.05)	
Upper lower		9(11.4)	12(15.2)	
Lower		3(3.8)	4(5.06)	
Body mass index (BMI)				0.449
<20		21(26.58)	30(37.97)	
Between 20-25		49(62.03)	43(54.43)	
Between 26-30		7(8.86)	5(6.33)	
>30		2(2.53)	1(1.27)	

p > 0.05(not significant)

Table II Obstetric outcome in both breech and cephalic presentations of pregnant mothers

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Obstetrics features	Breech (n=79)	Cephalic (n=79)	p
Gestational age at delivery(weeks), Mean±SD	39.534±1.4513	40.444±1.4385	0.002*
36-37.9	12(15.19)	6(7.59)	
38-39.9	38(48.1)	26(25.32)	
40-41.9	27(34.18)	46(58.23)	
>42	2(2.53)	7(8.86)	
Liquor pocket (cm)			
<3	5(6.33)	2(2.53)	0.293
3-8	71(89.87)	76(96.20)	
>8	3(3.80)	1(1.27)	
Mode of delivery			
Vaginal delivery	26(32.91)	61(77.22)	0.0001*
LSCS	50(63.29)	12(15.19)	
Forceps	3(3.80)	6(7.59)	
BW in new born (gm), Mean±SD	2668.35±376.91	2882.91±476.89	0.002*
<2500	17(21.52)	9(11.39)	
2500-3999	61(77.22)	67(84.81)	
>4000	1(1.26)	3(3.80)	

n (%), LSCS. Lower segment caesarean section; BW, birth weight; * significant (p<0.05)

Table III Thyroid parameters of FT₄ and TSH in both breech and cephalic presentations at 36 weeks of gestation

Thyroid profiles	Breech (n=79)		Cephalic (n=79)		p
	Mean±SD	Median (range)	Mean±SD	Median (range)	

TSH (miu/l)	1.828±0.688	1.61(0.63-3.63)	1.463±0.701	1.32(0.45-3.9)	<0.001*
FT ₄ (pmol/l)	13.391±2.149	13.7(8.1-17.3)	13.477±2.536	13.5(8.1-17.9)	0.818

* Significant (p < 0.001)

Table IV Distribution of breech and cephalic presentations in different percentile category of maternal serum TSH (mIU/L) and FT₄ (pmol/L) levels at 36 weeks of gestation

Percentile value	Breech n=79 n (%)	Cephalic n=79 n(%)	Total pregnancy
Maternal serum TSH (mIU/L) *			
<10 th percentile (level <0.817)	2(12.5)	14(87.5)	16
10 th – 90 th percentile (0.817-2.18)	65(50.78)	63(49.22)	128
>90 th percentile (>2.68)	12(86.72)	2(14.28)	14
Maternal serum FT4 (pmol/L) **			
<10 th percentile (level (10.17)	7(43.75)	9((56.25)	16
10 th – 90 th percentile (10.17-16.4)	68(53.13)	60(46.87)	128
>90 th percentile (>16.4)	4(28.57)	10(71.43)	14

* Pearson correlation = - 0.256; p=0.001; ** Pearson correlation= 0.018; p=0.818

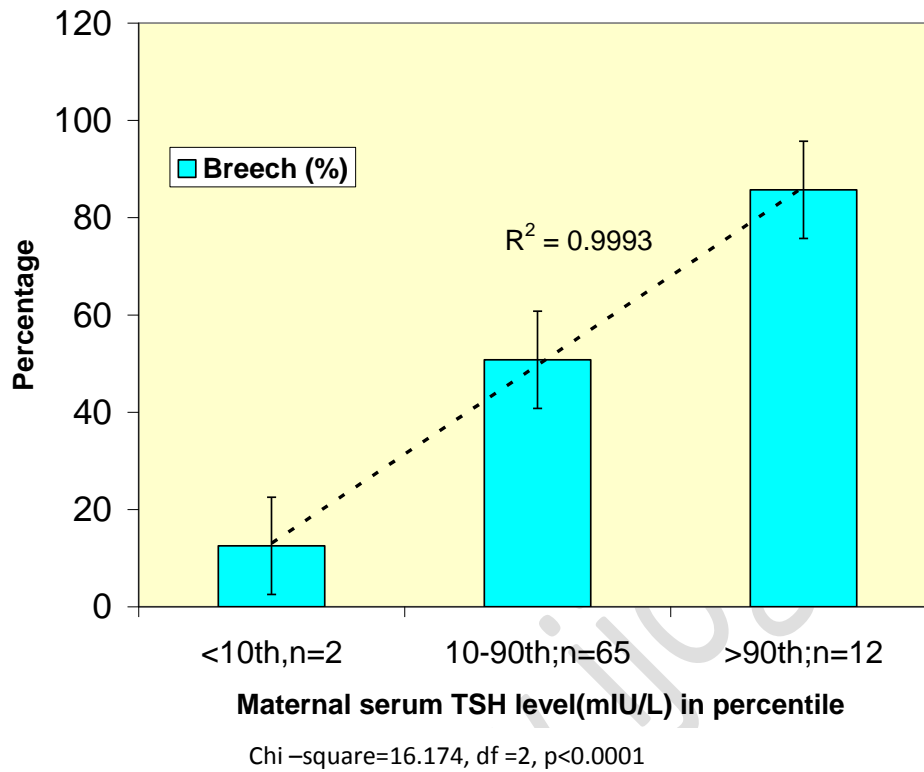
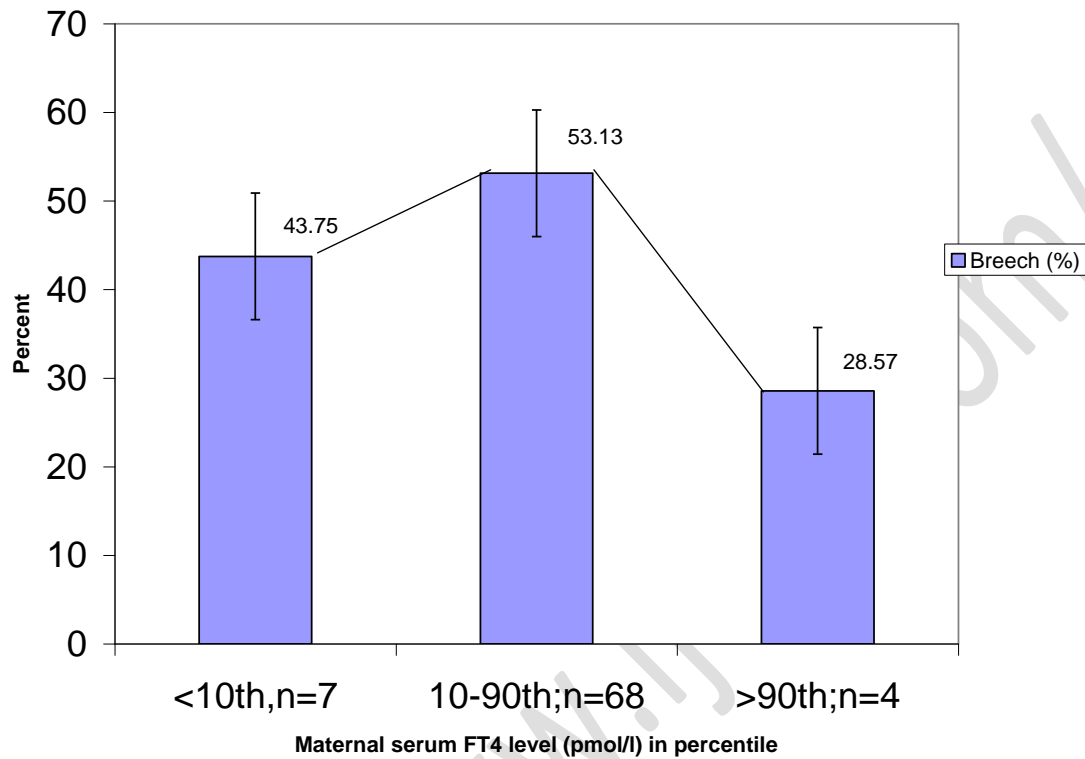


Fig.1 Percentage of breech presentation at term according to different percentile categories of maternal serum TSH (mIU/L) at 36 weeks of gestation



Chi-square=3.321, df =2, p=0.190

Fig.2 Bar diagram representing percentage of breech presentation at term in different percentile category of maternal serum FT₄ (pmol/L) at 36 weeks of gestation