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Original Research Article

Correlation between single pre delivery symphysis-fundal height beyond 36 weeks of gestation and birth weight of newborn after delivery

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ABSTRACT

Background: Accurate assessment of fetal weight is important for optimal obstetric management of labouring mothers. Among the methods of fetal weight estimation, symphysis-fundal height (SFH) measurement is inexpensive and non-invasive readily available simple and acceptable procedure of fetal weight estimation. On the other hand, high rate of low birth weight is one of the causes of high perinatal mortality in our country. Objective was to assess fetal birth weight by measuring symphysis-fundal height.
Methods: This cross-sectional observational study was conducted in the department of obstetrics and gynaecology, Dhaka Medical College Hospital, Dhaka from July 2017 to June 2018. Total 200 consecutive pregnant women of gestational age more than 36 weeks were selected as per inclusion and exclusion criteria. The fetal birth weight was measured before delivery of the foetus by measuring SFH and using the formula and was compared with actual birth weight.
Results: Maximum (35.5%) pregnant mother were in age group 21-25 years followed by 29.5% in 26-30 years, 25.5% in 31-35 years and 9.5% in >35 years age group and mean age was 28.27±4.95 years. Mean weight of new born was 2.81±0.61 kg. Mean symphysis-fundal height 32.76±3.73 cm and maximum (48.5%) pregnant mother had SFH in 35-36 cm group, followed by 30.5% had ≤30 cm and 21.0% had 31-34 cm in this study. New born birth weight had significant positive correlation with symphysis-fundal height.
Conclusions: Symphysis-fundal height has significant positive correlation with birth weight of new born.

Keywords: Birth weight, Correlation, Weeks of gestation, Newborn

INTRODUCTION

The tape measurement of symphysis-fundal height has been suggested as a screening test for the detection of fetal growth retardation, macrosomia and low birth weight (LBW) baby. Fetal death, birth asphyxia, meconium aspiraton, neonatal hypoglycaemia and hypothermia are all increase because of prematurity.[1] To prevent or treat the fetal, neonatal and maternal morbidities and mortalities associated with low birth weight (LBW) and macrosomic neonates, accurate estimation of fetal weight is very important. There are two common methods of estimate fetal weight, clinical methods (Includes palpation method, symphysis-fundal height (SFH) measurement) and sonographic evaluation. One of the clinical methods of calculating foetal weight according to Johnson's formula is [fundal height (cm) – n] × 155 gm where n=12, if vertex is above the ischial spines; n=11, if vertex is below ischial spines.[2] SFH measurements improve the diagnostic value in assessing fetal growth, and are a good alternative to ultrasound biometry.[3] A SFH chart from Cardiff Wales has been recommended for use in developing countries. However, others have developed local SFH charts for populations in developing countries, as these will better

reflect the local population.[4] The accuracy of clinical methods of fetal weight estimation was similar to sonographic estimation at term.[5] Clinical methods of estimation of fetal weight have been shown to be as good as ultrasound at term, giving estimates that are correct to within 10% of the birth weight in 60% to 70% of cases. In our country as a developing country, ultrasonography sometimes unavailable or may not be affordable by patients. Even if available, such measurements may be inaccurate during at term.[6] SFH measurement with a tape-measure seems a simple clinical method because it is cheap readily available, non-invasive and acceptable to patients. Furthermore, it is a reproducible technique that is easily learned.[7]

Birth weight is the first weight of the baby taken just after birth. It is strong predictor of a baby's survival. In general, lower the birth weight, higher the baby's risk of mortality and morbidity. Low birth weight baby can be born too early (premature) too small or both. In Bangladesh infant mortality rate is 27/1000 live birth and neonatal mortality rate is 18/1000. One of the causes of this high perinatal mortality is high rate of low birth weight. Again, over weight fetuses have a relatively increases perinatal mortality rate also (UNICEF, 2017).[8] In large fetus there is high risk for shoulder dystocia, neurological damage, hypoxia, asphyxia, maconium aspirations during delivery. Increase risk of operative delivery may be due to cephalo-pelvic disproportion.[9]

Proper gestational age estimation, from the date of last menstrual period (LMP) is very much popular among the obstetrician. But a wide range of pregnant women, approximately 10-45% cannot provide actual information regarding their last menstrual period which constitutes a major problem to the attending health care provider.[10] Other methods of determining gestational age include date of quickening, symphysis-fundal height estimation and ultrasonic estimation. Each of these methods has varying degree of accuracy and limitations. Symphysis-fundal height measurement is one of the important clinical screening method which has now become popular for estimation of birth weight. This study is to correlate the single pre-delivery SFH and birth weight of newborn after delivery.[11]

Objectives

General objective

To determine the correlation between single pre-delivery Symphysis-fundal height (SFH) after 36 weeks and birth weight of the newborn baby.

Specific objectives

To measure the SFH of study population. To predict the estimated foetal weight by using Johnson's formula. To measure the actual birth weight. To compare the estimated foetal weight and actual birth weight.

METHODS

This was a cross-sectional observational study. This study was conducted in the department of obstetrics and gynaecology, Dhaka Medical College and Hospital, Dhaka from July 2017 to June 2018. The study subjects were the pregnant women more than 36 weeks of gestation admitted to obstetrics ward of Dhaka Medical College Hospital. Two hundred pregnant women more than 36 weeks completed gestation was selected for this study.

Inclusion criteria

Inclusion criteria were Age 18-45 years, pregnancy with a singleton fetus >36 weeks completed gestation, presentation cephalic, BMI within 30 kg/m^2 and patients not in labour.

Exclusion criteria

Exclusion criteria were medical disorder, uterine and/or abdominal mass, multiple pregnancy, diagnosed oligohydramnios or poly hydramonios, death of fetus in uterus, pregnancy with premature rupture membrane and malpresentation.

The fetal birth weight was measured before delivery of the foetus by measuring SFH and using the formula and was compared with actual birth weight.

RESULTS

This cross-sectional observational study was to see the correlation between single pre delivery symphysis-fundal height after 36 weeks and birth weight of the baby. The results are as follows:

Table 1: Characteristic of the pregnant mother (n=200).

Characteristics	Mean±SD	Min-max
Age (years)	28.27±4.95	21.00-37.00
Height (cm)	149.92±6.12	130.00-163.00
Maternal pre delivery weight (kg)	55.82±7.79	41.00-76.00
BMI (kg/m^2)	24.96±4.00	17.97-32.05
Symphysis-fundal height (cm)	32.76±3.73	26.00-36.00
Abdominal girth (cm)	97.01±7.04	85.00-120.00

Table 1 shows characteristics of the pregnant mother. Mean age, height, maternal predelivery weight, BMI, symphysis-fundal height and abdominal girth were 28.27±4.95 years, 149.92±6.12 cm, 55.82±7.79 kg, 24.96±4.00 kg/m^2, 32.76±3.73 cm and 97.01±7.04 cm respectively.

Figure 1 shows distribution of the pregnant mother according to age. Maximum (35.5%) pregnant mother were in age group 21-25 years followed by 29.5% in 26-30 years, 25.5% in 31-35 years and 9.5% in >35 years age group.

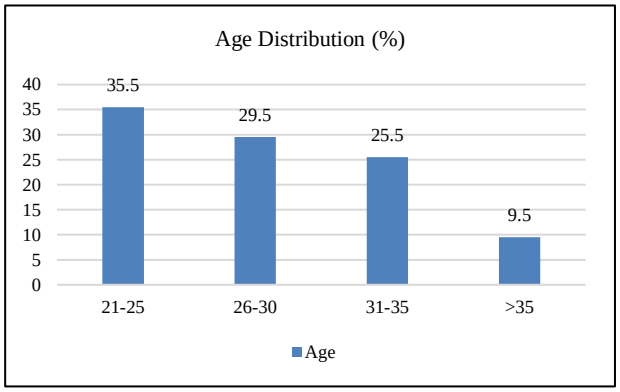

Figure 1: Distribution of study subjects according to age (n=200).

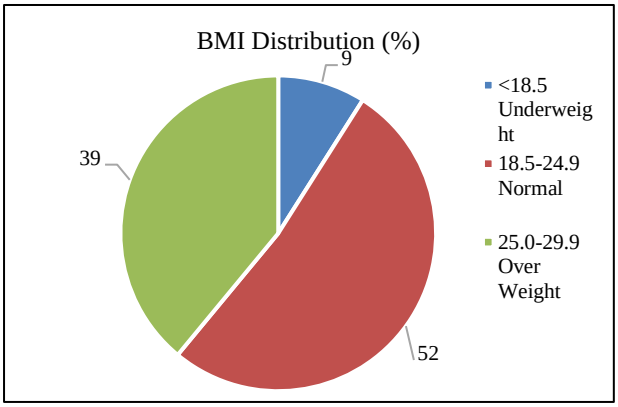

Figure 2: Distribution of study subjects according to BMI (n=200).

Figure 2 shows distribution of the pregnant mother according to BMI. Maximum (52.0%) pregnant mother had normal weight, followed by 39.0% had over weight and only 9.0% had underweight.

Table 2: Estimated foetal weight and actual birth weight at different symphysis-fundal height group (n=200).

Symphysis-fundal height (cm)	N (%)	Estimated fetal weight (kg) mean±SD	Actual birth weight (kg) mean±SD
≤30	61 (30.5)	2.42±0.22	2.08±0.13
31-34	42 (21.0)	3.23±0.18	2.65±0.27
35-36	97 (48.5)	3.70±0.11	3.34±0.32
Total	200 (100.0)	3.21±0.58	2.81±0.61

Table 2 shows estimated foetal weight and actual birth weight at different symphysis-fundal height group. Maximum (48.5%) pregnant mother had SFH between 35-36 cm group, followed by 30.5% had ≤30 cm and 21.0% had 31-34 cm.

Table 3: Estimated foetal weight and actual birth weight at different gestational age (n=200).

Gestational age (completed weeks)	N (%)	Estimated foetal weight (kg) Mean±SD	Actual birth weight (kg) Mean±SD
37	38 (19.0)	2.49±0.36	2.16±0.23
38	68 (34.0)	3.21±0.52	2.77±0.54
39	65 (32.5)	3.41±0.48	3.02±0.57
40	29 (14.5)	3.70±0.04	3.30±0.43
Total	200 (100.0)	3.21±0.58	2.81±0.61

Table 3 shows estimated foetal weight and actual birth weight at different gestational age. Maximum (34.0%) had gestational age 38 weeks, followed by 32.5% had 39 weeks, 19.0% had 37 weeks and 14.5% had 40 weeks.

Table 4: Distribution of percentage error in estimation of fetal weight using Johnson's formula among pregnant mothers (n=200).

Estimation	% error	n (%)	Total
Overestimation	31-35	8 (4.0)	180 (90.0)
	21-30	53 (26.5)	
	11-20	89 (44.5)	
	≤10	30 (15.0)	
Underestimation	≤10	16 (8.0)	20 (10.0)
	10-15	4 (2.0)	

Table 4 shows distribution of percentage error in estimation of fetal weight using Johnson's formula among pregnant mothers. Thirty estimations (15.0%) were within 10% of the birth weight, 89 (44.5%) were within 11-20% of the birth weight, 53 (26.5%) were within 21-30% of the birth weight and only 8 (4.0%) were within 31-35% of the birth weight. Underestimation was 10.0% and overestimation was 90.0%.

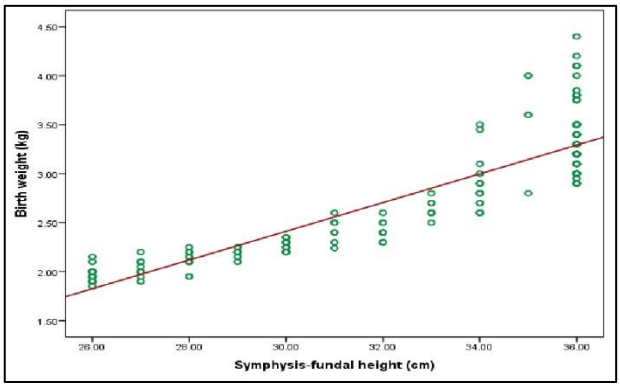

Figure 3: Correlation between birth weight of new-born and symphysis-fundal height of pregnant mother.

The scatter diagram shows positive correlation between actual birth weight and symphysis-fundal height (r=0.894; p<0.001).

Table 5: Correlation between birth weight of newborn and symphysis-fundal height of pregnant mother at different birth weight group (n=100).

New born weight	R value	P value
<2.5	0.876	<0.001
2.50-4.00	0.717	<0.001
≥4.00	0.512	0.195

Table 5 shows correlation between birth weight of newborn and symphysis-fundal height of pregnant mother at different birth weight group. There was positive significant correlation between actual birth weight and symphysis-fundal height of mother among low birth weight (r=0.876; p<0.001) and normal birth weight (r=0.717; p<0.001). Macrosomic baby's birth weight had no significant correlation with mother's symphysis-fundal height

DISCUSSION

Both foetal macrosomia and intrauterine growth restriction (IUGR) increase the risk of perinatal morbidity and mortality and of long term neurologic and developmental disorders.[12] Identification of IUGR after 37 weeks of gestation is an indication for delivery to reduce the risk of foetal mortality.[12] Accurate prediction of foetal weight has been of great interest in obstetrics. As foetal weight cannot be directly measured, it must be estimated from foetal and maternal anatomical characteristics such as the symphysis-fundal height (SFH) measurement. Estimation of birth weight by symphysis-fundal height measurement is a useful alternative where ultrasonography is not available. This cross-sectional observational study was conducted in the department of obstetrics and gynaecology, Dhaka medical college Hospital, Dhaka from July 2017 to June 2018 to see the correlation between single pre delivery symphysis-fundal height after 36 weeks and birth weight of the baby.

Maximum (35.5%) pregnant mother were in age group 21-25 years followed by 29.5% in 26-30 years, 25.5% in 31-35 years and 9.5% in >35 years age group and mean age was 28.27±4.95 years in this study. The mean maternal age was 29.45±4.75 years with a range from 18 to 44 years in Enaohwo et al which consistent to this study finding.[13] Mean weight of new born was 2.81±0.61 kg. Mean birth weight in the study of Enaohwo et al was 3184±502 gm (1600 to 4300 gm).[13] Parvin et al found mean birth weight 3.08±0.38 kg.[14] Mean symphysis-fundal height 32.76±3.73 cm and maximum (48.5%) pregnant mother had SFH in 35-36 cm group, followed by 30.5% had ≤30 cm and 21.0% had 31-34 cm in this study. Parvin et al observed ≤30 cm 22.0%, 31-34 cm 66.0% and >35 cm 12.0%.[14]

In this study, underestimation was 10.0% and overestimation was 90.0%. In the study of Yiheyis et al underestimation was 11.4% and overestimation was 88.3% which was almost similar to this study result.[15] In this study new born birth weight had significant positive correlation with symphysis-fundal height. Parvin et al and Enaohwo et al also found significant positive correlation of new born birth weight with symphysis-fundal height.[13,14] The correlation coefficient revealed a good correlation of SFH with BW as with previous reports from earlier studies.[15]

There are some limitations of the study. The present study was conducted over a relatively short period. This study was conducted with small sample size. Therefore, in future further study may be under taken with large sample size. This study did not measure the remaining factors that could regulate birth weight.

CONCLUSION

Symphysis-fundal height (SFH) has significant positive correlation with birth weight.

Recommendations

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

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