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Original Article

Symphysio Fundal Height (SFH) Measurement as a Predictor of Birth Weight

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Abstract :

Fetal weight is a very important factor to make a decision about labor and delivery. Assuming that in large fetuses, dystocia and other complications like cerebral edema, neurological damage, hypoxia and asphyxia may result during or after the delivery. On the other hand, one of the causes of high perinatal mortality in our country is high rate of low birth weight. Rural people may not have access to ultrasonography which is one of the methods to predict birth weight. For these people alternative easy method is necessary. So we can assess fetal birth weight by measuring symphysio-fundal height. Total 100 consecutive pregnant women of gestational age more than 32 weeks admitted for delivery in the Obstetric and Gynaecology department of Faridpur General Hospital were the subject of this study. After selection of cases, a thorough clinical history was taken and elaborate physical examination was done. Common criteria for collection of data were followed in every case. The fetal weight estimated by Johnson's formula was recorded in the predesigned data sheet and then was compared with birth weight following delivery of the fetus. Collected data were compiled and relevant statistical calculations were done using computer based software. Statistical tests (Correlation) were done between actual birth weight (taken as dependant variable) and fetal weight (found by Johnson's Formula), symphysio fundal height (SFH), pre-delivery weight and height of the patients (taken as independent variables) and the tests revealed that actual birth weight was significantly correlated with fetal weight (found by Johnson's Formula), SFH, pre-delivery weight and height of the patients. Among these fetal weight and SFH had shown highest correlation. Regression analysis showed that SFH, maternal height and maternal weight explained respectively 59%, .011% and .009% of observed variation of birth weight.

Key words: Symphysio Fundal height, Fetal weight.

Introduction :

Fetal weight is indeed a very important factor based on which decision must be made with concern to labor and delivery. Assuming that in large fetuses; dystocia as well as cerebral edema, neurological damage, hypoxia, asphyxia during or after the delivery may result[1]. Moreover caesarean section may be necessary due to feto-pelvic disproportion. On the other hand with small fetuses; fetal demise, birth asphyxia, meconium aspiration and neonatal hypoglycemia and hypothermia are all increased because the fetal organs are not only smaller in size but also immature in function[2].

In our country perinatal mortality is extremely high which is 68.8/1000 live births[3]. One of the causes of this high perinatal mortality is high rate of low birth weight[4]. Again, extremely overweight fetuses have a relatively increased prenatal mortality rate. Perinatal mortality doubled from about 3.5/1000 for those overweight fetuses[1].

Prediction of birth weight is usually done by clinical method, gestational age derived birth weight centiles and ultrasound fetal biometry (cephalometry and fetal abdominal circumference). Each of these methods has varying degree of accuracy and limitations[5]. SFH measurement is one of the methods which has now become popular for estimation of fetal weight using Johnson's formula.

In our country most of our population are rural based (79.9%, according to The Bangladesh Bureau of

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Statistics' population census in March 1991) who have no access to ultrasonography or who cannot afford the cost even when USG is available. In these groups of population, we can assess the birth weight beforehand by measuring SFH by using Johnson's formula.

Materials and methods :

In this cross-sectional study 100 cases of pregnant women admitted for delivery in Obstetric and Gynaecology department of General Hospital, Faridpur, from January 2008 to June 2008 were examined and fetal weight was estimated by using Johnson's formula and after delivery actual birth weight was measured and compared with the estimated fetal weight. The inclusion criteria were gestational age more than 32 weeks, singleton fetus with longitudinal lie with cephalic presentation and maternal weight <91 kg. The exclusion criteria were multiple gestations, malpresentation, poly or oligohydramnios, maternal weight >91 kg, fetal anomalies or death, pregnancy with uterine or adnexal mass.

After formulation of aims of the study a data sheet was made for recording all relevant parameter. A verbal informed consent was taken from each subject. The estimated weight of the fetus was calculated using Johnson's formula. The formula is as follows[6]: Fetal weight (g) = [fundal height (cm) - n] X 155, n = 12, if vertex is at or above the ischial spines. n = 11, if vertex is below the ischial spines.

After admission the SFH measurements were made using a non-elastic measuring tape with the patient in supine position with slight flexion of the knees, the breath pattern is normal, abdomen relaxed and bladder empty. Distance between the fundus of uterus and top of the symphysis pubis was measured with a tape lying in contact with the skin of the abdominal wall. Care was taken to ensure that the fundus was defined by gentle pressure exerted in a plane at right angle to abdominal wall. With all aseptic precautions per-vaginal examinations were carried out to note the position of vertex in relation to ischial spine.

Estimated birth weight was then compared with the actual weight at birth. The birth weight of the baby was measured in grams within half an hour after delivery using a weighing scale named YAMATO- Japan 1985 which was placed in the labour room.

Results :

The age distribution of the patients is shown in Figure 1 and the pre-delivery weight distribution is shown in Figure 2.

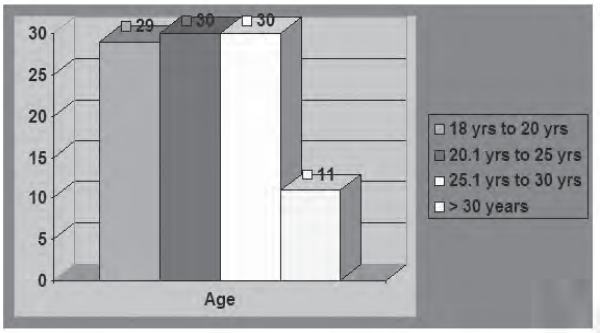

Figure 1: Distribution of the patients by Age

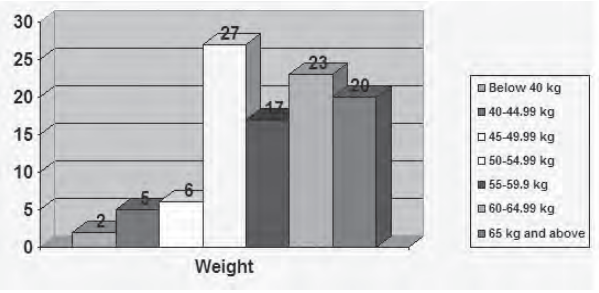

Figure 2: Distribution of the patient by pre delivery weight

Table I: Distribution of the patient by number of ANC

Name of the Characteristic (ANC)	Frequency (%)
None	24 (24)
1 - 2 times	35 (35)
3 times	22 (22)
> 3 times	19 (19)
Total	100
Mean SD	2.07 times ± 1.62 times

Table II: Distribution of the patient by gestational week

Name of the Characteristic (Gestational week)	Frequency (%)
32-36 weeks	10 (10)
36-42 weeks	90
Total	100 (100)
Mean± SD	38.84±1.66 weeks

The distribution of symphysio fundal height is shown in Table III and that of fetal weight calculated from symphysio fundal height using Johnson's formula is shown in Table IV.

Table III: Distribution of the patients by symphysio fundal height.

Name of the Characteristic	Frequency (Percentage)
≤ 30 cm	22 (22)
31 -35 cm	66 (66)
>35 cm	12 (12)
Total	100 (100)
Mean ± SD	31.9 ± 2.35 cm

Table IV: Distribution of the patients by weight of the fetus (by Johnson's Formula)

Name of the Characteristic (Weight of fetus)	Frequency (Percentage)
<2.5 kg	12 (12)
2.5-29.99 kg	37 (37)
3-3.49 kg	38 (38)
³ 3.5 kg	13 (13)
Total	100 (100)
Mean ± SD	3.08 kg ± 0.38 kg

The mean actual weight of the baby (after birth) was observed to have 2.99 kg with std. deviation 0.37 kg. After categorizing the birth weight, maximum neonates were found either in 3-3.49 kg group (48%) or in 2.5-2.99 kg group (31%) which is shown in Figure 3.

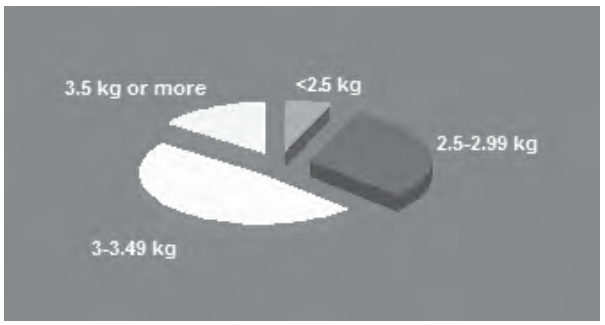

Figure-3: Distribution of the neonates by actual birth weight

Statistical tests (Correlation) were done between actual birth weight (taken as dependant variable) and fetal weight (found by Johnson's Formula), symphysio-fundal height, pre-delivery weight and height of the patients (taken as independent variables) and the tests revealed that actual birth weight was significantly correlated with fetal weight (found by Johnson's Formula) and symphysio-fundal height. These are shown in Figure 4 and Figure 5 respectively.

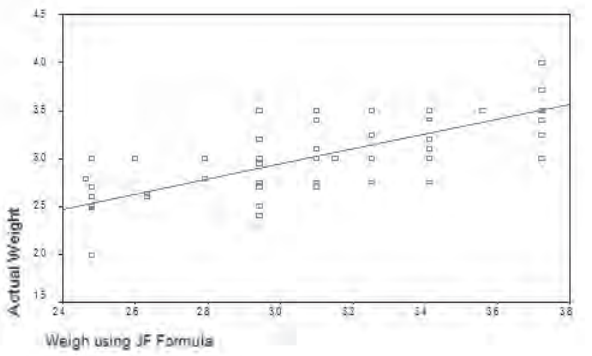

Figure 4: Correlation between actual birth weight and the fetal weight by Johnson's Formula.

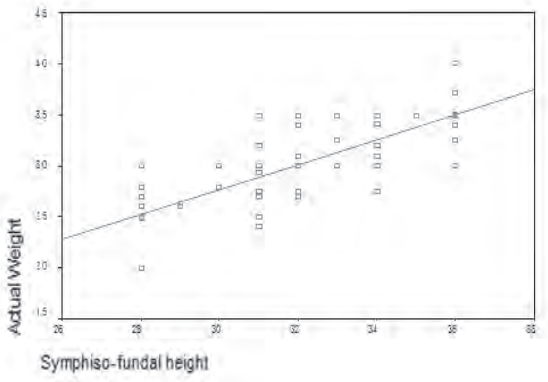

Figure 5: Correlation between actual birth weight and Symphysio fundal height.

It was found that there was a positive relationship present in between the birth weight (taken as dependent variable) and BMI of the patient (taken as independent variable) in the statistical test (Correlation) as shown in Figure 6.

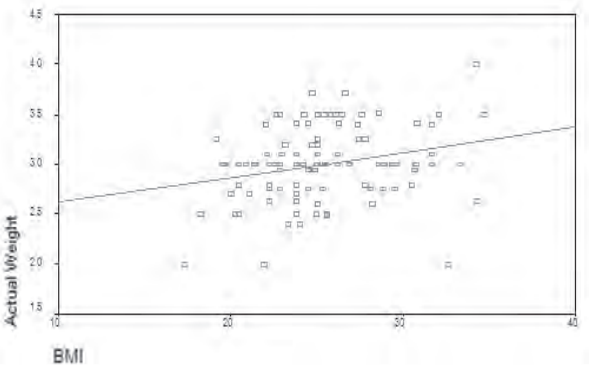

Figure 6: Correlation between birth weight and BMI of the patient.

Discussion:

Estimation of fetal weight in woman who present in early labor at term is important in some patients, a small infant may presage fetal distress during labor if growth retardation or placental abnormalities are present[7], conversely, macrosomia (birth weight 4000g or more) diagnosed in early labor may herald desultory labor, midpelvic arrest, shoulder dystocia or a need for caesarean delivery.

Estimation of birth weight by symphysio-fundal height measurement is a useful alternative where ultrasonography is not available. However sonography is superior to SFH in estimating low birth weight babies, while both methods show wide standard deviations for birth weights above 4000g. The SFH derived birth weight centiles will be found more useful in clinical situations where knowledge of the minimum, maximum and approximate fetal weight are all required for clinical decision-making. In this study the most common characteristics of the mother were, 60% were of 20-30 age group, 27% were 50-55 kg weight group, 89% were >145cm and 6.1% women were non-formal.

Mother weight in pregnancy has a direct relationship with fetal weight. Our observation showed that there was a linear trend i.e. with the increases in mean maternal weight there was an increase in mean birth weight. Birth weight has a tendency to increase with advancing maternal gestational period. Our result also indicates that the relationship between fetal weight and gestational period was linear, Wilcox Allen j et al[8] found the same result. Our study also shows that house wife mother had a tendency to deliver a higher birth weight baby. Moderate to severe physical efforts during pregnancy causes a decrease in fetal weight[9].

The study shows a strong association between socio-economic conditions and fetal weight. Mother's nutritional study is influenced by the socio-economic conditions of the family income. Because solvent family can afford to supply increasing requirement for a pregnant mother, also have regular antenatal care resulting in high fetal weight.

The main problem related to the calculation of estimated fetal weight using Johnson's Formula was, it was not significantly accurate in small gestation age babies (weight less than 2500g). Also, the result indicated that estimated fetal weight using Johnson's Formula had a tendency towards over estimation of baby weight in all groups of babies, particularly in low birth weight cases. Therefore, sonographic estimation is essential to enhance accuracy.

The present study reveals that estimating fetal height intrapartally is crucial to enable the nurse-midwife and/or nursing student to:

* Create a decision regarding the mode of delivery
* Anticipate problem during labor and hence close monitoring of labor could be obtained particularly for small gestation infants
* Anticipate possible shoulder dystocia and hence notify for availability of a senior competent nurse-midwife and/or obstetrician at the time of delivery and
* Predict individual birth weights without special resources requirement except a tailor measuring tape. Its advantages are widespread, economical and generally applicable.

Conclusion :

Fetal weight is significantly correlated with SFH, maternal age, maternal predelivery weight, maternal midupper arm circumference. Sonographic estimation of fetal weight offers advantage over clinical estimation of fetal weight at or before 34 wks of gestation. There was no statistically significant difference between patient and sonographic estimates of fetal weight after 34 wks of gestation.

We conclude that SFH-derived birth weight centiles are useful alternatives to ultrasonography especially in the birth weight range 2500-3999g. The method holds a great promise for use in developing countries. To accept SFH as a screening method for fetal weight estimation in antenatal period, study with large sample size and longer duration is recommended. Future research is needed to replace the ultrasonogram by single pre-delivery symphysiofundal height measurement in estimation of fetal weight, which may be used in developing country like Bangladesh as national level.

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