Original Article

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Product of Symphysio-Fundal Height and Abdominal Circumference: A Predictor of Estimated Fetal Weight at Birth

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Abstract

Introduction: Accurate estimation of fetal weight is vital in the management of labor and delivery. Developing countries like India, where sonography to estimate fetal weight is mostly unavailable and clinical techniques based on fundal height can lead to timely referrals from the periphery. We conducted a prospective longitudinal study to assess fetal birth weight by measuring symphysio-fundal height (SFH) and abdominal circumference (AC).

Materials and Methods: Product of SFH and AC was calculated on 303 antenatal women to get estimated fetal weight in grams at birth; then, this weight was compared with actual weight at birth.

Results: Mean fetal birth weight as measured by SFH × AC (in latent stage) was 2712 ± 436.99 g, and actual mean fetal birth weight was 2621 ± 411.09 g, which is statistically not significant.

Conclusion: SFH × AC is a useful alternative to ultrasonography and is a great promise for use in developing countries. To accept this as a screening method for fetal weight estimation in the antenatal period, large sample sized studies are required. However, it can be used by midwives or peripheral health workers as a predictor of birth weight.

Key words: Abdominal circumference, Fetal weight, Symphysio-fundal height

INTRODUCTION

Accurate estimation of fetal weight is vital in the management of labor and delivery. The knowledge of fetal weight in utero helps in the management of diabetic pregnancy, vaginal birth after a previous cesarean section and intrapartum management of fetuses presenting with the breech.[1,2] Furthermore, when dealing with anticipated preterm delivery salvageability of the baby, the intervention undertaken to postpone preterm delivery, optimal mode of delivery or level of a hospital where delivery should occur is based partly on the estimation of expected birth weight. Categorization of fetus into small or large for gestational age can lead to timed obstetric intervention.[2-4] This is especially true for developing countries like India, where sonography to estimate fetal weight is mostly unavailable and clinical techniques based on fundal height can lead to timely referrals from the periphery.

With this background, we conducted a simple method to predict estimated fetal weight by multiplying symphysio-fundal height (SFH) and abdominal girth in centimeters and evaluated the efficacy of this method by the actual birth weight of the baby.

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MATERIALS AND METHODS

A comparative prospective longitudinal study was conducted on 303 antenatal women, who gave consent to participate in the study until the completion. Prior ethical clearance was obtained from the Institutional Ethical

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Committee. Women were of any parity and age with a period of gestation >28 weeks in any stage of labor admitted in labor ward of our hospital.

Women having obesity, multiple gestations, polyhydramnios or oligohydramnios, malpresentation, and intrauterine device were excluded from the study. In utero, fetal weight and birth weight at delivery was calculated by the same flexible tape calibrated in centimeters and by the same observer. The SFH was taken from mid-point of the upper border of pubic symphysis to the highest point on uterine fundus after correcting the dextrorotation. Abdominal circumference (AC) was measured at the level of the umbilicus. Fetal weight in grams was determined by formula:

$$SFH \times AC$$

After delivery, weighing scale was used to weigh the baby within an hour of birth. The results were tabulated and analyzed.

RESULTS

A total of 303 antenatal women were recruited for the study. 38% were primigravida, and 62% were multigravida. The majority (48.8%) of the patients were between 23 and 27 years of age (Table 1). 72.6% women were beyond 38-week period of gestation (Table 2) 91.5% women had normal vaginal delivery, and 9.5% had a cesarean section.

Figure 1 shows the comparison of predicted fetal weight (determined by SFH × AC) and actual fetal weight. The intraclass correlation was 0.75 with 95% confidence interval of 0.683-0.802 which was statistically significant.

The mean fetal birth weight as measured by SFH × AC (in latent stage) was 2712 ± 436.99 g, and actual mean fetal birth weight was 2621 ± 411.09 g. The mean birth weight as measured in latent stage of labor (<4 cm dilatation of cervix with the head not engaged) was 2712 g and that measured in an active stage of labor (>4 cm dilatation of cervix with head engaged) was 2780.2 g which was not statistically significant.

DISCUSSION

The prediction of fetal assists in the identification of pregnancy at risk of intranatal complications during normal delivery. Equipped with information about the weight of the fetus, the obstetrician is able to make sound decisions thereby decreasing perinatal morbidity and mortality.[5] The present study was conducted in a tertiary care center equipped with all facilities of emergency obstetric care.

Table 1: Age distribution

Age of patient (years)	Percentage of patients
18-22	36.20
23-27	48.60
>28	15.10

Table 2: Gestational age distribution

Gestational age (weeks)	Percentage of patients
28-33	0.10
33-38	23
>38	72.30

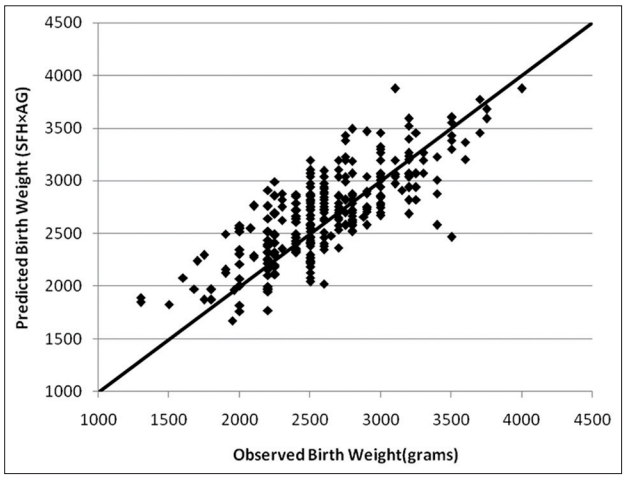

Figure 1: Comparison of predicted fetal weight (determined by symphysio-fundal height × abdominal circumference) and actual fetal weight

Our study found no correlation of age and parity of mother with fetal weight. While Dare *et al.*[6] found estimated fetal weights were higher than actual weight in para 0 and para 5 and also reverse to be true in para 6 and 7.

Like our study, Raghuvanshi *et al.*[7] found Insler and Bernstein formula (SFH × AC) and Hadlock's formula to be closer to actual birth weight. Dare *et al.*[6] also found the product of SFH × AC to correlate with the actual birth weight of the fetus. Amritha *et al.*[5] found an average error in fetal weight estimation was least with SFH × AC method as comforted with Dawn's formula, Johnson's formula and Hadlock's formula using ultrasound. The standard deviation of prediction error was least with Hadlock's ultrasound method closely followed by SFH × AC method. In the present study, the mean of estimated fetal weight was almost close to mean of actual birth weight.

Similarly, Kathiriya *et al.*[8] found Insler and Bernstein formula, to be as accurate as ultrasound estimates for predicting actual fetal weight. Lebdev[9] using similar techniques with correlation factors for maternal weight and duration of gestation achieved similar results. Ojwang and Ouko[10] reported similar

results while applying this formula without correlation factor. They used abdominal girth as the longest circumference of the abdomen while in our study we used circumference along umbilicus as AC making it simpler and more reproducible.

Sowmya *et al.*[11] found error in fetal weight except in >3501 g group were least with SFH × AC method followed by Hadlock's ultrasound method. Johnson's formula showed the least error in group >3501 g. They also found fetal weight was underestimated by SFH × AC method and Dawn's formula, whereas Johnson's and Hadlock's formula overestimated fetal weight. Willocks *et al.*[12] commented that clinical estimation of fetal weight is little more than guess work because the factors such as abdominal wall thickness, uterine tone, amount of liquor, and uterine position in utero alters the calculation. Shittu *et al.*[13] found the accuracy of clinical method deteriorates markedly below 2500 g. similarly, Titapant *et al.*[14] observed that ultrasound was more accurate when there is low birth weight. In our study, even low birth weight (<2500 g) babies and good size babies (>3.5 kg) were found to have correlation with SFH × AC formula.

CONCLUSION

All currently available techniques of *in-utero* estimation of fetal weight have a significant degree of inaccuracy. Clinical estimation, especially by SFH × AC method, is an accurate method for estimation of fetal weight. This formula is of great value for developing countries where ultrasound is not always available at many health centers especially rural areas. The need is to practically apply this method in obstetrics and guide the management decisions.

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