Parturient Abdominal Circumference as a Predictor of Low Birthweight

by C. Mohanty, B. K. Das, and O. P. Mishra

Department of Anatomy and Department of Pediatrics, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India

Summary

The usefulness of parturient abdominal circumference as a predictor of low birthweight (LBW) was studied in 151 singleton pregnancies. The abdominal circumference was measured in early labour and was plotted against the birthweight of the newborns. A significant positive correlation was observed between the two parameters ($r = 0.507$). For the prediction of LBW, the critical limit of the abdominal circumference was 86 cm, which means that an abdominal circumference of more than 86 cm is reasonably safe while lesser values predict a higher chance of a LBW infant. From these observations, the use of a colour-coded tape by peripheral health workers and traditional birth attendants is suggested: red for abdominal circumference <82 cm, yellow for abdominal circumference 82–86 cm, and green for abdominal circumference >86 cm. Mothers who have an abdominal circumference in the ‘red zone’ are at risk of delivering LBW infants.

Introduction

The vast majority of pregnant women in the developing countries, for example India, have little contact with institutional maternal care. They are mostly dependent on traditional birth attendants (TBA) who are often illiterate. So, it is necessary to train the TBAs in recognizing the women at risk of delivering low birthweight babies by means of simple methods. Serial measurements of fundal height and symphysis-fundus graph is being increasingly used for the prediction of birthweight and the diagnosis of intrauterine growth retardation. In an earlier study, we reported the usefulness of a single symphysis-fundus height measurement in early labour as an indicator of low birthweight delivery. However, the measurement of fundal height is not always easily obtained by an illiterate health worker and intra and inter observer variations are likely. Moreover, symphysis-fundus height measurement may not be acceptable to some of the village women. The abdominal circumference measurement is much easier and can be readily done by the peripheral health workers. In underdeveloped countries, where obesity is not a problem, the abdominal circumference may provide a fairly good idea about the size of the foetus. The present study examines the usefulness of a single abdominal circumference measurement in early labour as an indicator of low birthweight and suggests a tape with three colour zones for use by the peripheral health workers.

Patients and Methods

A total of 151 singleton pregnant mothers in early labour together with their newborns were examined. Hydramnios and babies with gross congenital anomalies were excluded. Abdominal circumference was measured at the level of the umbilicus with the patient lying supine with thighs and legs extended. The abdominal circumference was plotted against the respective birthweight.

FIG. 1. Abdominal circumference ($X_1$) vs. birthweight ($X_2$).
Statistical analysis was made using simple linear regression, and a critical value of abdominal circumference for a birthweight of 2.5 kg was ascertained.

Results
Out of the 151 newborns studied, 52 were low birthweight (<2.5 kg). The abdominal circumference plotted against birthweight and the regression line is shown in Fig. 1. A significant positive correlation was observed between the two parameters (r = +0.507, t = 7.179). The regression equation was derived as follows: abdominal circumference (cm) = 67.87 + (7.2 × birthweight/kg). Accordingly, the abdominal circumference corresponding to a birthweight of 2.5 kg was calculated to be 85.87 cm. Table 1 depicts the validity indices of abdominal circumference at their serial cut-off values, as an indicator of low birthweight. The highest sensitivity–specificity product was observed at a cut-off value of 84 cm. At this point, the sensitivity and specificity were 65 per cent and 82 per cent, respectively. However, at the cut-off limit of 86 cm, the sensitivity increased to 71 per cent.

Discussion
From the findings of this study, it is clear that a single, early labour abdominal circumference measurement is a useful tool for the prediction of low birthweight. The best cut-off limit for the identification of babies less than 2.5 kg was 84 cm. If a more sensitive parameter is required in community studies to identify the maximum number of high risk cases, the limit may be increased to 86 cm, and the sensitivity correspondingly increased from 65 to 71 per cent. Accordingly, an abdominal girth of 86 cm is considered reasonably safe while lesser values have a greater chance of delivering a low birthweight baby. However, the real problem of low birthweight babies lies where the birthweight is less than 2 kg, and some workers have recommended that in India, the definition of low birthweight should be limited to babies with a birthweight of less than 2 kg. This will reduce the number of babies requiring special care and hence optimal use of the country’s rather limited resources. According to the regression equation, a weight of 2 kg corresponds to an abdominal girth of 82.27 cm, which may be taken as 82 cm. Babies weighing between 2 and 2.5 kg with a corresponding abdominal girth between 82 and 86 cm may be considered as a borderline group.

From the findings of the present study, a tape with three colour zones is suggested: red (<82 cm), at risk; yellow (82–86 cm), borderline; green (>86 cm), no risk. Illiterate birth attendants and peripheral health workers can be easily trained in the use of the tape so that they can identify ‘at risk’ cases and direct them for institutional delivery.

References