

## Prediction Model for Low Birth Weight and its Validation

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### Background

Despite the enormous role of Low Birthweight in neonatal mortality and morbidity as well as adolescent and adult morbidity, no clinical attempt is made to predict the possibility of a LBW neonate. A study conducted in Cleveland, Ohio proposed a Four-factor scale (low family functioning, stressful events, Quetelet's Index, cigarette smoking) which predicted LBW with 65% sensitivity, 84% specificity and 42% positive predictive value. The need for such a scale in the Indian context was strongly felt and the present study undertaken.

### Aims & Objectives

To assess the factors associated with LBW and formulate a scale to predict the probability of having a LBW infant.

### Material & Methods

Cases were defined as all live neonates weighing <2500g at birth and controls as those  $\geq$ 2500g. Maternal and neonatal data for various risk factors was collected by personal interview (structured questionnaire) and from hospital records. Data for a total of 250 cases and 250 controls were gathered out of which 200 cases and 200 controls were selected using a table of random numbers and were used to study the risk factors and to arrive upon a prediction model. Validation of the prediction model was then done on the rest of 50 cases and 50 controls. Various statistical tests were employed including Goodness-of-fit test and ROC curve obtained for the prediction model.

### Results

Mean weight of cases was  $1.99 \pm .41$ kg vs. controls

$3.03 \pm .39$ kg. 39.6% of the cases were preterm and 63.2% SGA. Factors significantly associated with LBW by multivariate analysis were: weight gained by mother during pregnancy <8.9 kg (OR, 6.1 [95% CI, 1.3 -27.8]; P=0.02), inadequate proteins in diet (<47 g/day) (OR, 6.1 [95% CI, 1.2 -36.1]; P=0.04), female sex of baby (OR, 4.2 [95% CI, 1.1 -16.4]; P=0.04), anaemic mother (Hb <11.0g/dL) (OR, 20.0 [95% CI, 1.6 -246.5]; P=0.02), passive smoking (by father) (more than 5 cig/bidi per week) (OR, 5.6 [95% CI, 1.1 -29.4]; P=0.04), previous preterm baby (OR, 6.9 [95% CI, 1.4 -33.8]; P=0.02) and previous LBW baby (OR, 6.2 [95% CI, 1.7 -23.3]; P=0.01). On univariate analysis: primigravida, nulliparity, pre-pregnancy BMI <20.621, mother's height <1.5324 metre, inadequate calories (<1667.1 kcal/day), Educational Status (less than or equal to intermediate), ANC visits <4, pre-pregnancy weight <45 kg, multiple births (twins), hypertension (chronic/gestational), proteinuria, acute serious infections, recurrent UTI, inadequate spacing (<24 months) and inadequate calories in diet (<1667.1 kcal/day) were also found significant. Having a single live issue appeared protective. Previous abortion did not increase risk for LBW neonate. Using above data, a prediction model was then formulated and scores were given to each of the factors: weight gain by the mother during pregnancy <8.9 kg, proteins in diet <47 g/day, previous preterm baby, previous LBW baby, Hb <11.0g/dl in mother and smoking  $\geq$ 5 cig/bidi by father. A cut-off score was chosen which gave this model a sensitivity of 71.58% & specificity of 66.98%. Validation of the model was done and it revealed a sensitivity of 72.0% & specificity 64%.

### Conclusions

Prevalence of LBW can be reduced by addressing the specific risk factors many of which are preventable. Based on above results, a simplified scale has been developed and validated as a prediction model for LBW.