

Calf Circumference as a Predictor of Low Birth Weight Babies

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The prevalence of low birth weight (LBW) in India ranges from 30-40%. The perinatal mortality among LBW babies (188.8/1000) is about 8 times higher than that in the infants weighing more than 2500 g(l). Birth weight is used as a measure of LBW because of its correlation with gestation and ease of recording in hospital setting. However, in our country 70-90% deliveries are conducted at home by traditional birth attendants and untrained relatives and weight recording is a problem. The present study was conducted with an aim to find an alternate, cheap and reliable predictor of LBW babies that can be used by a trained or untrained person.

Subjects and Methods

The study was conducted on 1600 newborns in the Department of Pediatrics, G.S.V.M. Medical College, Kanpur. The birth weight, crown-heel length and midarm, head, chest, thigh and calf circumferences were measured by standard techniques(2). Weight of the nude baby was recorded in a beam type weighing machine,

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to the nearest 20 g. The baby's supine crown-heel length was recorded by placing him in an infantometer, with knees fully extended and soles of feet held firmly against the foot board. The head circumference was measured by placing a flexible non-stretchable tape anteriorly at the glabella, posteriorly along the most prominent points. The chest circumference was measured at the level of xiphoid cartilage. The midarm circumference was measured in the left arm at the point midway between tip of the acromian process and the olecranon process of ulna. The thigh circumference was measured in supine position, at the level of lowest furrow in the gluteal region; the tape was placed perpendicular to the long axis of lower limb. The calf circumference was measured at the most prominent point in semiflexed position of the leg. All measurements of length were to the nearest 0.1 cm.

Results

Analysis of data indicated that for a birth weight of 2500 g, the critical limit of calf circumference was ≤ 10.8 cm (95% CI = 8.8-12.8 cm). Critical limits for crown-heel length, head circumference, chest circumference, thigh circumference and calf circumference were ≤ 45.2 cm, ≤ 32.2 cm, ≤ 30.1 cm, ≤ 9.0 cm, ≤ 15.04 cm, and ≤ 10.8 cm, respectively. All measurements showed significant correlation with birth weight. The highest correlation was found with calf circumference ($r=0.98$), followed by thigh circumference ($r=0.93$), and chest circumference ($r=0.86$). Using the above critical limit the highest sensitivity of detecting LBW babies was seen with calf circumference (98.4%), followed by thigh circumference (91.6%), and head circumference (76.7%). The specificity for calf circumference was less than thigh circumference; it was 90% and 98.2%,

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respectively. The minimum specificity was seen with chest circumference (68.7%) (Table I).

Discussion

Our results show significant correlation of anthropometric measurements to birth weight, of which calf circumference and thigh circumference had the best correlation with birth weight, which is in accordance with other studies(3,4). The calf circumference in earlier studies(2,5) had a cut-off limit ≤ 10 cm

(sensitivity 96%) which is in accordance with the results of the present study. With calf circumference of ≤ 10.8 cm as the cut-off limit, almost 98% of LBW babies were screened with a fair degree of accuracy.

Calf circumference is a simple, cheap, reliable and quick indicator for predicting LBW in the community. Furthermore, it is easy to train traditional birth attendants to screen out high risk group newborns by simply measuring this circumference.

TABLE I—Utility of Various Measurements for Screening Low Birth Weight Babies

Measurements	Critical limit (cm)	Sensitivity (%)	Specificity (%)
Crown-heel length	45.2	68.7	89.0
Head circumference	32.2	76.7	86.3
Chest circumference	30.1	83.2	68.7
Midarm circumference	9.0	89.5	90.8
Thigh circumference	15.4	91.6	98.2
Calf circumference	10.8	98.4	90.0

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