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Jabeen Fayyaz  
*Aga Khan University*

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# Ponderal Index

Jabeen Fayyaz

Department of Paediatrics, Dow University of Health Sciences and Civil Hospital, Karachi.

The terms Intrauterine growth retardation (IUGR) and small for gestational age (SGA) were used interchangeably in the past. Although, related they are not synonymous. IUGR is the failure of normal foetal growth caused by multiple adverse effects on fetus, while SGA describes an infant whose weight is lower than population norms.

Ponderal index can be used to identify infants whose soft tissue mass is below normal for the stage of skeletal development. The ponderal index (PI) is arrived at by the following formula:

$$\text{PI} = \frac{\text{birth weight} \times 100}{(\text{Crown head length})^3}$$

A ponderal index below the 10th percentile may be used to identify IUGR infants correctly. This can affect the long term outcome. Thus all IUGR infants may not be SGA and all SGA infants may not be small due to growth restrictive process.<sup>1</sup> A low neonatal ponderal index is defined as less than 1 SD below a mean 2.0 and SGA is considered as birth weight below the 10th percentile.

Foetal ponderal index can also be calculated by ultrasound examination and compared with the neonatal PI. Foetal PI had been found to be a predictor of IUGR with the sensitivity and specificity of 76.9% and 82%.<sup>2</sup> Data suggests that foetal PI could be used to rule out IUGR with reasonable accuracy with a negative predictive value of 96.4%.<sup>3</sup> Various studies have shown a good sensitivity and specificity of the application of intrauterine PI in the diagnosis of asymmetrical IUGR. Wider use of intrauterine and the IUGR can be used for the evaluation of fetal retardation because of the high predictable value of the negative test.<sup>4</sup> In utero PI proved to be a valuable index in the prediction of foetal outcome, in those cases of IUGR in whom the in utero PI was smaller than one SD.<sup>5</sup> It has also been found that foetal and neonatal well-being was clearly compromised when IUGR was associated with a low in utero PI.

Birth weight / length ratios, PI, placental weight and BW/placental weight ratios have been correlated with perinatal mortality and morbidity. But studies have also shown that except for PI, other parameters mentioned above are affected by ethnicity, gender and manner of placental preparation.<sup>6</sup>

However, studies have shown that the fetal PI is a poor predictor of discordant growth and should be employed cautiously in twin and triplet gestations.<sup>7</sup>

PI is not a superior predictor than either birth weight or body mass index for selected short term outcomes in new borns.<sup>8</sup> For chronic diseases intrauterine environment seems to be important<sup>9</sup>, it is therefore useful to identify the babies with low ponderal index as it is a reliable predictor of long term complications including microalbuminuria, insulin resistance, high blood pressure and cardiovascular diseases.<sup>10</sup>

PI has been used to assess the asymmetrical IUGR because low birth weight and IUGR tends to reoccur in siblings and clustering of PI in sibling even persists after controlling for factors such as race, gender, maternal age, gravidity, year of birth, gestational age, pregnancy complications and poor maternal illnesses.<sup>11</sup> A hospital based study reported in this issue revealed that 40% of low birth weight babies had asymmetrical body proportion<sup>12</sup>, which can have implications for future long term co-morbidities.

A study undertaken at Nepean Hospital showed that PI appears to be a better measure of infants with IUGR problems than birth weight percentiles.<sup>13</sup> Use of PI curve for gestational age together with other growth curves improves the nutritional assessment of newborns. Further studies should be designed to develop strategies for the short, medium and long-term management of identified risk groups.<sup>14</sup>

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