RESEARCH BRIEF

Comparison of New Ballards Score and Parkins Score for Gestational Age Estimation

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This prospective analytical study was done to compare the accuracy of New Ballards score (NBS) and Parkins score (PS) in assessing the gestational age (GA) in newborns. The GA of 284 babies was assessed by the NBS and PS within 24 hours of birth. The two methods of assessment were compared using the Bland Altmann Plot. The mean difference between the two measurements was 1.530576. 95% of the values lay within the limits of agreement which are -1.82982 and 4.890974. The two methods are found to be in acceptable agreement. Parkins score enables us to easily assess the gestational age of babies within ±12 days, especially in sick and preterm babies.

Key Words: *New Ballards score, Gestational age, Parkins score.*

In the newborn infant, it is essential to know the correct gestational age, so as to evaluate the risk of morbidity and mortality. In all newborn units, the New Ballards Scores (NBS) is primarily used to assess the gestational age. Many of the neurologic criteria are difficult to assess in sick infants or those in incubators. The Parkins Score (PS) uses only four external characteristics i.e. skin texture, skin colour, ear firmness and breast size, thus making it easy for practical use [1]. In this study, we attempt to determine the accuracy of the physical criteria in assessing the gestational age of the babies, so that the errors caused by Ballards Score due to impaired neurological states is avoided.

METHODS

This was a prospective analytical study conducted in the level III NICU and postnatal wards of St. Johns Hospital, Bengaluru, for a study period of 6 months, from March to September 2009. Babies whose GA estimate was available by last menstrual period (LMP) and/or first trimester ultrasonography scan were included. Babies whose obstetric estimate differed from NBS by more than 2 weeks were excluded. 350 babies needed to be assessed assuming that there is a correlation of 0.75 between the NBS and the PS [1]. The assessments were done by two different investigators: one for NBS and the other for the PS, within 24 hours of life. The investigators were blinded to the GA estimate of the mother. One independent assessor did the NBS and confirmed that NBS and Obstetric score match. These subjects were included in the study and were assessed by the PS by the other investigator.

The study protocol was approved by the Institutional ethics committee of the St. Johns Medical College and Hospitals. Data were entered and analyzed in SPSS version 11.5. The two different methods were compared using the Bland Altmann Plot [2]. The mean difference between the two methods was calculated and the standard deviation of the mean was found. The limits of agreement was calculated using the formula: mean ± 1.96SD. The average of the two scores was plotted against the difference between the two readings for each sample.

RESULTS

The number of subjects enrolled in the study was 284, which gives the study a power of 80%. The characteristics of study subjects can be seen in ***Table* I**. All neonates were examined within 1 to 29 hours of life (mean 14.7 hours). The mean gestational age by dates/USG was 36.2 weeks, by NBS was 36.1 (SD-3.31) and by PS was 37.6 (SD-4.06). The mean difference between Obstetric GA and NBS was 0.04 weeks (<1 day), Obstetric GA and PS was 1.5 weeks (12 days) and GA by NBS and Parkins was 1.5 weeks (12 days). The standard deviation of the mean difference was 1.68. The limits of agreement were -1.82982 and 4.890974. When the average of the NBS and PS scores were plotted, 95% of the values were found to lie within the limits of agreement. The mean difference between the NBS and PS in sick babies was 1.5 weeks.

DISCUSSION

There clearly is a need for a method of estimating

WHAT THIS STUDY ADDS?

- The Parkins score correlates well with the gestational age and can be used for assessment, particularly in sick newborns.

gestational age which should not upset ill babies, and in order to distinguish between preterm and small for dates babies it should not be affected by the quality of intrauterine growth [3]. Parkins, *et al*. assessed the accuracy of various physical characteristics in comparison to the neurological criteria used in the Dubowitz score. They recommended a score consisting of four physical characteristics to assess the gestational age of babies. In 1979, Ballards, *et al.* [4] modified the Dubowitz score to develop a simplified score for assessment of fetal maturation of newly born infants. In this study, we compared the accuracy of the PS with the NBS in assessing the gestational age in normal and sick babies.

GA assessment was performed at mean time of 14 hours 7 minutes, thus avoiding factors that decrease the accuracy of physical criteria [5]. In this study, GA assessment by NBS was found to be more accurate than PS. Another study done by Erman, *et al.* [6] also found NBS more accurate compared to Dubowitz score. Moreover, to examine preterms less than 28 weeks, NBS gives a more accurate estimate of gestational age. In our study, there were 16 babies with GA less than 30 weeks when assessed by NBS, but when assessed by the PS there were only 9 babies less than 30 weeks. This limitation was also observed by Parkin, *et al*. [1]. Since two is the lowest score in the PS, which corresponds to a GA of 30 weeks, the confidence with which GA can be assessed in a baby who scores two or less is uncertain. 95% confidence limits for prediction of GA from the sum of the scores for the 4 most reliable characteristics in the study done by Parkin, *et al.* [1] was ±15 days, which is similar to the mean difference obtained in the present study. The results obtained by applying the Bland Altmann plot showed that there is a similarity between the NBS and PS. Most of the values were within the limits of agreement. Hence, the PS can be used to assess gestational age easily in babies, especially in preterm and sick babies, but with an accuracy of ±12 days.

TABLE I CHARACTERISTICS OF SUBJECTS (*N*=284)

Characteristics	*No. (%)*	*Range*
Birth weight (g)*	2262	440-4200
GA by dates/USG (wks)*	36.2	24-41.2
Males	145 (51)	
Females	139 (4)	
Intramural	271 (95)	
Small for gestational age	85 (30)	
Appropriate for gestational age	195 (68.6)	
Large for gestational age	4 (1.4)	
Extremely low birth weight	16 (5.6)	
Very low birth weight	40 (14)	
Low birth weight	102 (35.9)	
Normal birth weight	130 (45.7)	
Macrosomia	1 (0.35)	
Spontaneous vaginal	147 (51.6)	
Forceps extraction	3 (0.6)	
Cesarean section	138 (48.5)	
1 min APGAR score <7	60 (21.1)	
5 min APGAR score <7	5 (1.7)	
Normal newborns	188 (66.1)	
Sick newborns	96 (33.8)	

**Mean (range).*

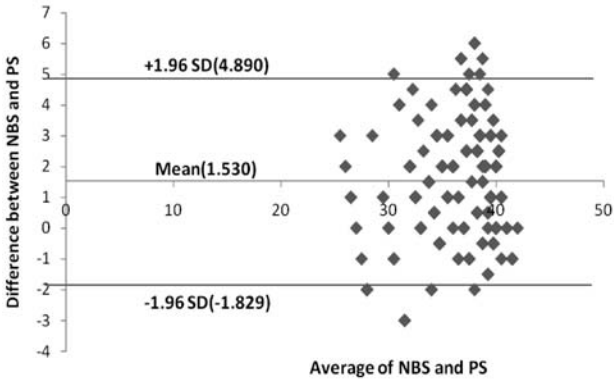

FIG.1 *Bland Altmann plot of the average and difference between the NBS and PS along with the limits.*

Contributions: SRB conceived and designed the study, SR and SN supervised the data collection and reviewed the manuscript, KS and AD collected the data, KS reviewed the literature and prepared the manuscript. The final manuscript was approved by all authors.

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REFERENCES

1. Parkin JM, Hey EN Clowes JS. Rapid assessment of

gestational age at birth,. Arch Dis Child. 1976;51:259-63.
2. Bland JM, Altman DG. Measuring agreement in method comparison studies. Stat Methods Med Res. 1999;8: 135–60.
3. Farr V, Kerridge DF, Mitchell RG. The value of some external characteristics used in the assessment of gestational age at birth. Dev Med Child Neurol. 1966;8:657-60.
4. Ballard JL, Novak KK, Driver M, A simplified score for assessment of fetal maturation of newly born infants. J Pediatr. 1979;95:769-74.
5. Lepley CJ, Gardner SL, Lubchenco LO. Initial nursery care: Assessment of gestational age. *In:* Merenstein GB, Gardner SL, editors. Handbook of Neonatal Intensive Care. 3rd ed. St. Louis: Mosby Year Book; 1993. p.76-99.
6. Erman, Wayan R, Soetjiningsih. Clinical gestational age assessment in newborns using the new Ballard score.Paediatr Indones. 2006;46:97-102.