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Validity of Modified Ballard Score after 7 Days of Life

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ABSTRACT

Context: *Modified Ballard Score is used for assessment of gestational age of a neonate. It is most accurate when done between first 12-20 hours of life, but its validity is known only up to 7th day of life and not beyond it.* ***Aim:*** *To assess the validity of Modified Ballard Score for assessment of gestational age after 7th day of life.* ***Materials and method:*** *The study was conducted in the NICU of Katihar Medical College, Katihar. It is an observational study carried over a period of 3 months, in which 44 neonates were examined in accordance to the physical and neuromuscular criteria of Modified Ballard Score on days 1,3,7 and 10 of life and the result was then compared to the gestational age as calculated from a first trimester ultrasonography report or mother's LMP, whichever was available.* ***Result:*** *Out of 44 subjects, the gestational age from Modified Ballard Score on day 10th of life was accurate in accordance to mother's LMP or first trimester ultrasonography report in 24. Statistical analysis done using IBM SPSS Statistics 24 model revealed a p value of 0.000. Hence, it can be concluded that modified Ballard score is valid after 7 days of life.* ***Conclusion:*** *Since the Modified Ballard Score is observed to be significant on day 10th of life in most of the cases according to the study, therefore, it can be used to assess gestational age of a neonate after 7 days of life.*

Keywords: Ballard score, Validity, After 7 days, Gestational age assessment

INTRODUCTION

Assessment of gestational age of the neonate is an important part of neonatal examination as birth both before or after term is considered a high-risk factor for the neonate. Preterm babies are more prone to hypoglycaemia, hypothermia, apnoea/respiratory difficulty due to RDS, necrotising enterocolitis while Babies born post-term are more likely to develop respiratory difficulty as a result of meconium aspiration, MAS etc. Hence, knowing the accurate age of gestation can help the paediatrician in preparing themselves for the likelihood of development of various clinical conditions and rapidly adapting a plan of action without delay. There are various methods available for assessment of gestational age of baby in utero like calculation from the date of last menstrual period, clinical examination of mother, biochemical evaluation of amniotic fluid, vaginal wall cytology, etc. [1]. But all these methods have their limitations and hence, gestational age assessment of the neonate at birth is considered more reliable than in-utero methods.

In a neonate, gestational age is best assessed by utilising the Modified Ballard Score [2]. The Ballard Score was introduced by Dr. J. L. Ballard in year 1979. This method was later modified to include extremely premature infants in 1991.

The Modified Ballard score utilises physical and neuromuscular criteria for a new born's examination. Both physical as well as neuromuscular criteria have 6 parameters each. Physical criteria consist of examination of the skin, eyes/ears, lanugo, genitalia, plantar surface of feet and breasts, while Neuromuscular criteria consists of baby's posture, square window, scarf sign, popliteal angle, arm recoil and heel to ear manoeuvre. Each criterion is given a separate score ranging from -1 to 5. The total of all these parameters is then compared to a chart mentioning the corresponding gestational age for a given Modified Ballard Score.

Modified Ballard scoring is most accurate when assessment is done between 12 - 20 hours of life. But according to various studies, it can be used accurately up to 7 days of life, but not beyond that [3].

Hence, in situations when a neonate is brought to us beyond the age of one week, gestational age assessment by Modified Ballard score would not be accurate. On the other hand, obstetric assessment by first trimester ultrasonography is most accurate of all other antenatal methods [4]. In cases, when an ultra-sonogram is not available, Calculation of gestational age from Mother's LMP is the most widely used method.

AIMS AND OBJECTIVES

This study is being carried out in order to assess the validity of Modified Ballard score in assessment of gestational age beyond the age of 7 days in a neonate [5].

MATERIALS AND METHODS

The study was conducted in the Department of Paediatrics - Neonatology unit, Katihar Medical College, Katihar, Bihar, India after being approved by the ethics committee of the college.

Informed consent

A written informed consent was taken from the parents of the babies included in the study.

Study design

This is an observational study.

Sample size

A convenient number of 50 neonates were used for the study. Simple Random sampling technique was used.

Duration of study

The duration of the study is three months (from February 2017 to April 2017).

Inclusion criteria

All neonates admitted to the NICU of Katihar medical college, irrespective of their indication of admission or gestational age or diseases were included in the study.

Exclusion criteria

Any neonate with gross congenital anomalies/Erb's paralysis/shoulder dystocia/birth injuries/DDH was excluded from the study.

Grouping

A single group of patients was used.

METHODS

Initially, a convenient number of 50 babies were included in the study. Out of these 50, six could not be followed through until 10th day of life due to LAMA's and referrals. So, the sample size was reduced to a final number of 44.

Each of the 44 subjects were assessed for gestational age using the Modified Ballard score (Figure 1) criteria on days 1,3,7 and 10 of life. This assessment was then compared to the EDD from a first trimester ultrasound or mother's LMP, whichever was available.

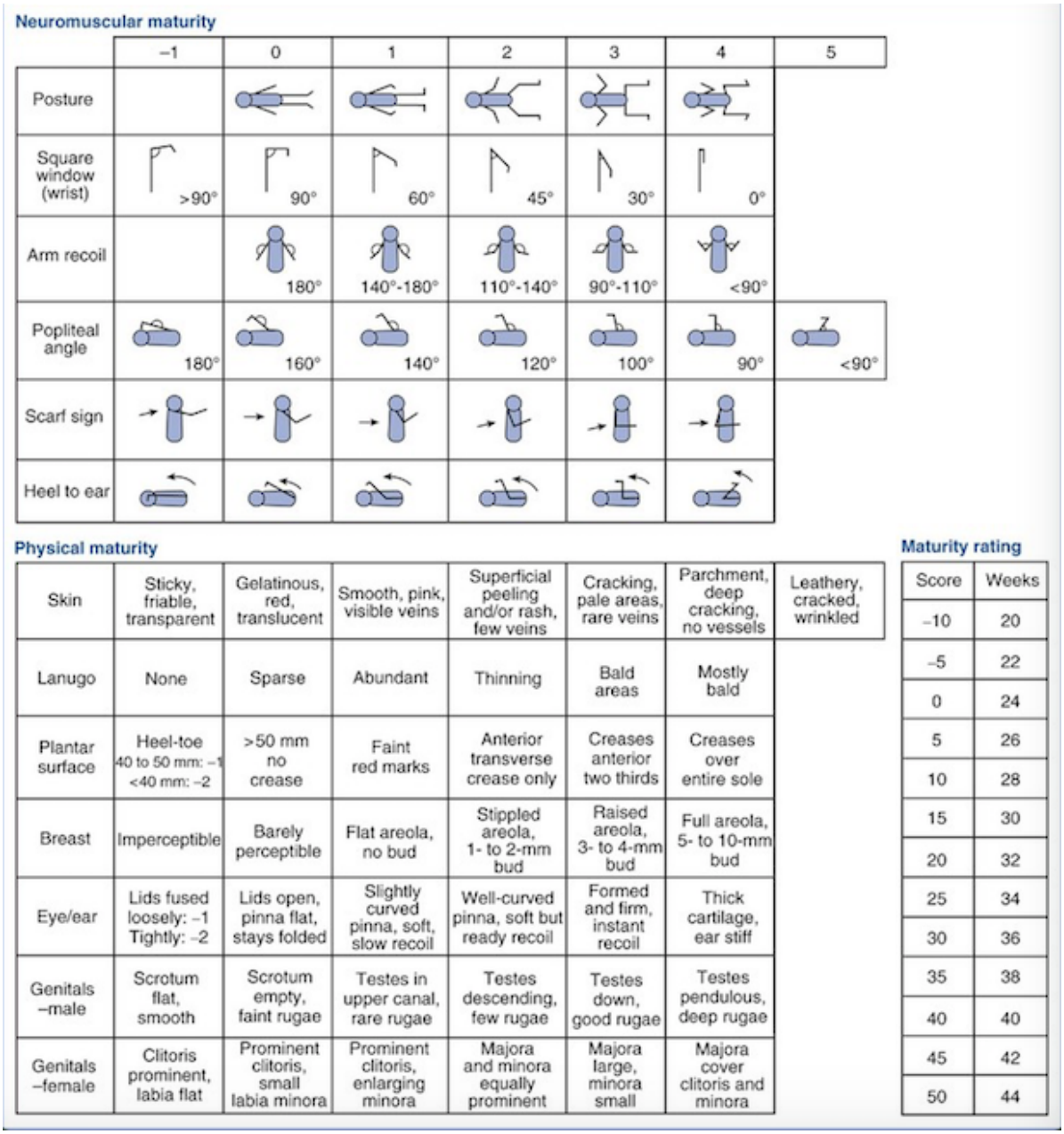

Figure 1 Modified Ballard score

The data was collected on pre-printed case proformas and afterwards was arranged into a master chart using Numbers (version 3.5, 2109) in OS X Yosemite (version 10.10.1).

Statistical analysis

Statistical analysis was done using IBM SPSS Statistics 24 model. Master chart was uploaded onto the SPSS software and ANOVA (Analysis of variance) method was used.

RESULTS

Out of a total number of 50 subjects taken initially, 6 could not be examined up to 10th day of life, due to dropouts because of 5 LAMAs and 1 referral. Hence, the sample size was limited to a final number of 44. Out of these, 28 babies were boys and 16 girls (Figure 2).

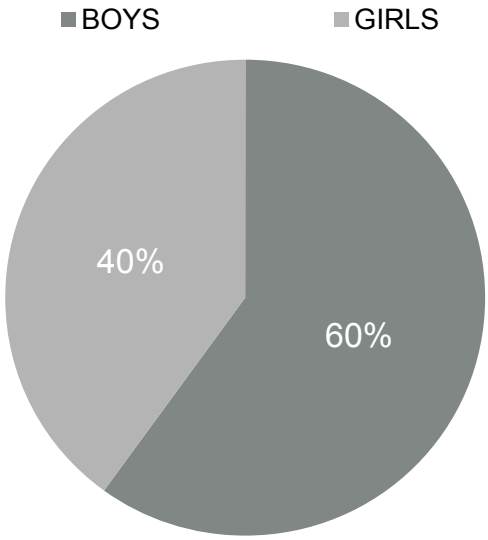

Figure 2 Statistical distribution by gender

Out of total 44 subjects, 23 were delivered by LSCS while 21 by vaginal delivery (Figure 3).

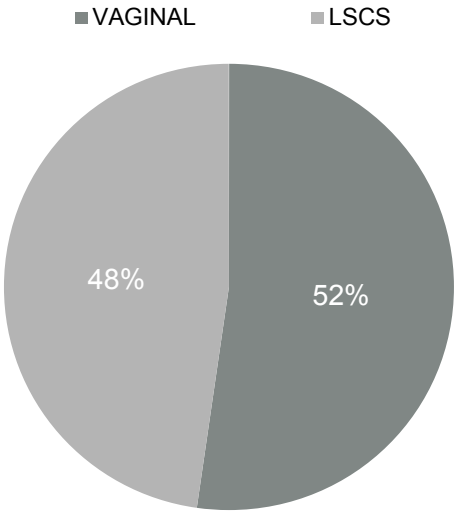

Figure 3 Statistical distribution by type of delivery

Indications of NICU admission

Out of a total 44, 15 babies were admitted in the NICU for birth asphyxia (34%), 8 for prematurity (18%), 6 for RDS (13.6%), 3 with MSL (6.8%), 10 with sepsis (22%) and 1 each for cleft palate and combined cleft lip and palate (2.2% each).

Out of the total 44 subjects, gestational age on 10th day of life, as estimated by Modified Ballard Score was found to be accurate in 24 subjects.

When statistical analysis was done using ANOVA, a p-value of 0.000 was obtained (Table 1).

Table 1 Statistical analysis

Model	Unstandardized Coefficients		Standardized Co-efficients	t	Significance
	B	Std. Error	Beta		
(Constant)	-1.989	3.114	-	-0.639	0.526
Gestational age on day LMP_USG	1.059	0.082	0.894	12.902	0.00

DISCUSSION

Assessment of gestational age in a new born has been accurately done till now by using the Modified Ballard Score up to 7th day of life. In this study, gestational age was assessed in all neonates admitted in the NICU, up to the 10th day of life using the same method and its significance was measured by statistical analysis. Using ANOVA, a P value of 0.000 was obtained which implies that indeed Modified Ballard Score is valid up to 10th day of life.

CONCLUSION

Since, a P value of 0.05 or less implies that null hypothesis is rejected and a p-value of 0.0001 is obtained in this research, it can be concluded that Modified Ballard Score is valid for assessment of gestational age up to 10 days of life.

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