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CORRELATION OF GESTATIONAL AGE ASSESSED BY LMP, THIRD TRIMESTER ULTRASOUND AND BALLARD'S SCORE

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ABSTRACT

Background

An estimation of gestational age (GA) and fetal maturity (FM) is one of the cutting edge of the prenatal care. Since, in resource- poor country like India and South Asian countries, the periodic ultrasound is often not available. The clinical examination of newborn becomes very important and an attempt was made in the present study to correlate whether, third trimester ultrasound or 'LMP' is significantly better to determine the gestational age (GA) when compared with Ballard's score (BS). In many developing countries, ANC's won't remember their 'LMP' and not to perceive regular followup due to lack of literacy, poverty, low human development index (HDI), conception during lactation and hinders the estimation of gestational age etc. So for, inability of the patients to recall the date of last menstrual period.

Objective

The present study aims to compare the gestational age by NBS with LMP, Ultrasonography in third trimester.

Study Design

A prospective observational study (October 2017-March 2018) was conducted at Government tertiary care hospitals, which are attached to Bengaluru Medical College and Research Institute, Bengaluru.

Methods

A total 100 babies who are born to mothers remembering LMP with 3rd trimester USG were enrolled for the study group. During the study period new Ballard scoring was done for babies within 48hrs and Gestational age (GA), according to Ballard's score was compared with LMP age in 3rd trimester USG separately. The collected data was analyzed by using SAS-6.50 version. Univariate and multiple logistic regressions were employed to test the hypothetical results.

Results

The New Ballard score is found to be significantly correlated with GA ($p<0.01$).The USG mean GA was 37 ±2.10 weeks ($p=0.000$) than LMP mean was 36 ±2.0 weeks. Total 64.0 % of the childbirth is lead to normal vaginal delivery. This study shows that New Ballard score correlates more with gestational age (GA) according to USG ($r= 0.955, p<0.01$), LMP was significantly correlated with GA and USG ($r= 0.953, p<0.0001$) when all the age groups are included in the compilation.The analysis shows USG,LMP were found to be strongly correlated with GA ($P<0.01$).

Conclusions

Single third trimester scan or LMP alone can be reliably used in assessing the gestational age, out of which third trimester scan is more reliable. When both parameters are available GA can be assessed more accurately and be confirmed with new Ballard's scoring.

INTRODUCTION

The gestational age is important to assess the maturity of fetus and to decide about termination of pregnancy and to interpret what all complications can happen after delivery [1,2]. Usually to assess the gestational age we are using Naegele's rule with LMP or the first trimester scan for dating of pregnancy [5,6]. So we can understand the expected date of delivery. If 'EDD' is there we can prepare and arrange things during delivery time like preterm care for a preterm delivery. In a developing country like India, many pregnant ladies won't remember their LMP and they won't go for regular checkup. Inability of the patients to recall the date of last menstrual period, as often happens in our country due to low level of literacy, conception during lactation, hinders the estimation of gestational age [1,2]. So they were not having the dating scan or known LMP when they come to the doctor. When they approach the doctor usually it will be second or third trimester. It will be difficult to assess the gestational age and to know about the expected delivery date. Here we are trying to understand how much reliable is the third trimester scan for knowing the gestational age (GA). Those who know the 'LMP' and having third trimester scan, their babies' gestational age we calculated with New Ballard's Scoring. It is accurate within two-weeks of gestation in infants weighing <999gms at birth and is most accurate at 30–42 hrs of age [3]. It is compared with the 'LMP' and third trimester scan since 'NBS' is the definitive tool to assess the gestational age (GA) of babies.

METHODS

A Prospective Observational study was conducted in Neonatal Intensive Care Unit of Bangalore Medical College and Research Institute from October 2017 to March 2018. As per the normative sampled procedure we recruited the babies and all babies were done Ballard's scoring to assess the gestational age (GA) within 36 hrs of life. The inclusion and exclusion criteria has adopted for conducting the research, Inclusion criteria; babies inborn cases and known LMP with third trimester Ultrasonography and exclusion criteria; babies whose mothers who do not know their LMP or not had third trimester Ultrasonography or multiple gestation (GA) or Congenital anomalies (CA) *etc*. All selected babies Ballard's scoring was done and compared with LMP with third trimester Ultrasonography gestational age (GA) and to assess which parameter is better among them and predictors of the study hypothesis. The GA when she delivered, was observed.The neonates was examined for the exact GA on the day of delivery and their maturity was assessed by the pediatrician using Ballard's score.This available data was co-related for further evaluation.

Statistical Analysis

Data was collected in a pretested, semi structured standard proforma, collected data was entered in MS- excel and analysis was done using Special package for Social Sciences (SPSS) version 16. The continuous variables were expressed in mean and categorical variables were expressed in proportions *etc.* Karl Pearson correlation coeffiencient and logistic regression test was used to test the hypothetical results. The results were considered significant at 0.01 level of significance (P 0.000).
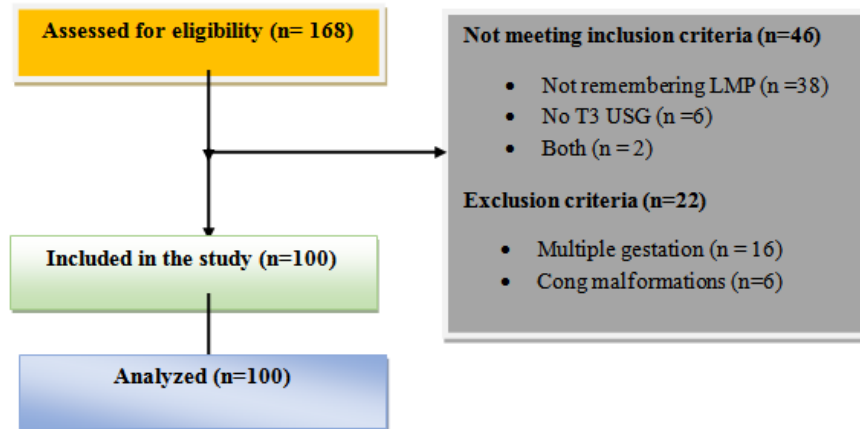

Figure 1: Flow Diagram of the Study

RESULTS

In our study male babies (52%) are more than female babies (48%) sex ratio 1:1. The mean Gestational age (GA) according to LMP was 36$\pm$2 weeks, that of third- trimester USG was 37$\pm$2 weeks. According to New Ballard score was 36$\pm$2 weeks. Total 64.0% of the childbirth is Normal vaginal delivery. This study shows that New Ballard score correlates more with gestational age according to USG (r=0.955) than LMP (r= 0.953) when all the age groups were included in the statistical analysis but shows high significance with both USG and LMP at P value less than 0.01 as in table (2)
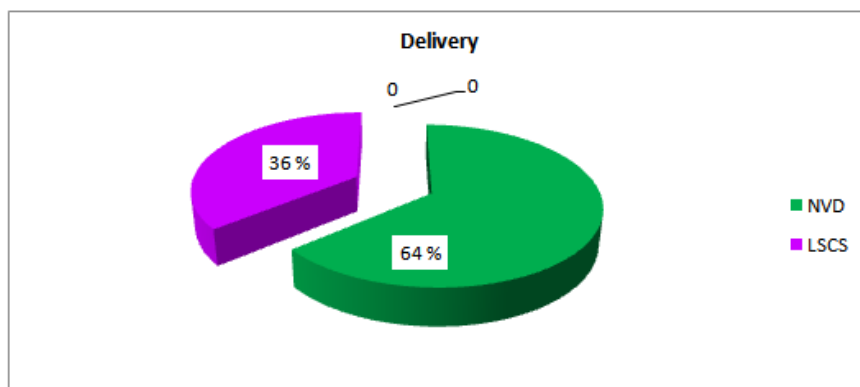

Figure 1: Proportion of Mode of Delivery

Table 1: Descriptive Statistics of Gestational (GA)

Mean		Std. Deviation	N	P-Value
GA_LMP	36.9 weeks	2.5	100	0.00
GA_USG	37.5 weeks	2.6	100	0.00
GA_NBS	36.4 weeks	2.8	100	0.00
Birth Weight	3.25 kg	.35 kg	100	000

The average duration of menstrual cycle was taken and the corresponding GA were determined according to inter-menstrual period multiplied by 10,it turn out to be that, the women with menstrual cycle of 25 days have a term gestation at 3-37 weeks. A total 12-14% had term gestation with SD 0.25.Although 20.05% neonates were expected to be preterm, only 13.0% actually out to be preterm according to Ballard's score.This shows that the baby had attained maturity at a lesser 'GA' which corresponds to their inter-menstrual period of the women. The mean 'GA' of 'LMP' was 36.9 with SD 2.50 weeks,similarly mean GA of USG and NBS was 37.50 weeks and 36.40 weeks with SD was 2.6 and 2.5 respectively.The mean birth weight was 3.25 with SD 0.35 and it was found to be statistically significant (p<0.01) table(1).

Table 2: Statistical Analysis of Correlation of Gestational Age of Neonates between 28-43 Weeks

		LMP	USG	Nbs
LMP	Pearson Correlation	1	.983[**]	.953[**]
	Sig. (2-tailed)		.000	.000
	N	100	100	100
USG	Pearson Correlation	.983[**]	1	.955[**]
	Sig. (2-tailed)	.000		.000
	N	100	100	100
NBS	Pearson Correlation	.953[**]	.955[**]	1
	Sig. (2-tailed)	.000	.000	
	N	100	100	100

**Correlation is significant at the 0.01 level (2-tailed)

DISCUSSIONS

Our entire adult lives pregnancy is 40 weeks. In many literature clearly stated that the duration of pregencny in homesapiens is ten times intermenstural interval (4,5).the GA age of patients was calculated from the routine Naegele's formula.As per Naegeles's formula,nine calendar months and seven days are added to the last menstrual period date.Aleternatively, 10lunar months or 280 days or 40 weeks can be used to calculate the approximate expected dates.The maturity of neonates was assessed by using new Bellard's score. The Ballard maturational assessment, Ballard score or scale is commonly used techniques of GA assessment It assigns a score to various criteria, the sum of all of which is then extrapolated to the GA of the baby. These criteria are divided in to physical and neurological criteria. This coring allows for the estimation of age in the range of 26 weeks -44 weeks.The new Ballard score is an extensive of the above include extremely pre term babies *ie* up to 20 weeks of GA.the scoring relies on the intra uterine changes that the fetus undergoes during its maturation. Whereas the neurological criteria depend mainly upon the muscle tone, the physical ones rely on anatomical changes,the parameters of physical criteria viz skin appearance,presence of laungo,hair,planter creases,breast tissues,ear formation and external genital formation and neuromuscular criteria viz., posture, square winow,arm recpil,politeal angle,scarf sign and heel toear *etc*. The ultrasound examination was done during their ANC visits in third trisemester to assess the GA by recording multiple parameters like BPD,HC, AC and FL with real time ultrasound,all the fetal long bones can be adequately examined and measured.The femur is the largest of the long bones,least movable and easiest to image. The use of BPD and multiple fetal studies we kept NBS as standard and compared with LMP and third semester scan to know alone is good to predict the GA.When we do not have an exact assessment of GA through an established LMP and Ultrasonography of first trimester and we are faced with the situation whreonly a single third trimester USG is available and patient has come in pre-labor or with complaints where decision to postpone labor needs to be taken then a single third trimester USG can be taken as significant to plan management.

CONCLUSIONS

Third trimester scan alone can be used to assess the gestational age of fetus and can help to plan the management. Average duration of menstrual cycle was taken and the corresponding GA were determined by 10 times multiplying the inter-menstrual intervals

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