A cross sectional study to evaluate the effect of maternal age on neonatal birth weight in a tertiary care maternity hospital

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Introduction

There are a large number of studies evaluating obstetric and neonatal outcome over the full range of reproductive maternal ages, especially with a focus on the youngest and the oldest mothers. Young mothers have been shown to be exposed to an increased risk of anaemia, low birth weight, fetal death, eclampsia and preterm birth although, at the same time, they were more likely to have a spontaneous normal vaginal birth and the risk of preeclampsia and postpartum hemorrhage (PPH) were significantly decreased. These studies evaluated outcomes in low-income countries. Many studies performed in low-income countries presented in recent years on the topic of teenage pregnancies have found similar obstetric and neonatal outcomes.

Young (≤19 years) and advanced (≥35 years) maternal age during pregnancy has been linked to adverse fetal and birth outcomes. Young maternal age is associated with an increased risk of fetal growth restriction, preterm delivery, low birth weight (LBW), small for gestational age (SGA), and neonatal mortality. [1-4] Advanced maternal age is associated with higher perinatal mortality and an increased risk of intrauterine growth restriction, LBW, and preterm delivery. [5-6] These associations are consistent and, thought incompletely understood, are thought to arise from biological and social factors. Many younger mothers are still growing, and their nutritional needs compete with those of the fetus. Younger mothers are less likely to seek prenatal care and more likely to be primiparous and to be of lower socioeconomic status. Older mothers are at higher risk of gestational diabetes and preeclampsia, which can impair fetal development. In high-income countries, older mothers tend to be better educated of higher socioeconomic status and lower parity;

whereas in low and middle-income countries, older mothers are likely to have higher parity and live in a more deprived environment.

Complications during pregnancy and birth at an advanced maternal age (either defined as 35 years and older or 40 years or older) have also been evaluated in high-income countries. Advanced maternal age at birth has been found to be associated with gestational diabetes, preeclampsia, placenta previa, caesarean section (CS), placental abruption, preterm delivery, low birth weight, intrauterine fetal death and increased perinatal mortality. The difference in obstetric and neonatal outcomes between teenagers and women at advanced age seemed to be lower risks for several unwanted and threatening outcomes in the teenage group thus, there were no obvious advantages concerning obstetric and neonatal outcomes at advanced maternal ages.

Aim

To assess the effect of maternal age on neonatal birth weight

Objectives

1. To evaluate the frequency of Low neonatal birth weight, normal neonatal birth weight and high neonatal birth weight in parturient women attending study

2. To correlate maternal age and neonatal birth weight using appropriate statistical tests.

Methodology

The study was conducted at department of obstetrics and gynecologist tertiary care maternity hospital located in Mumbai over a course of 3 months.

Targeted population

All the parturient women with live viable singleton pregnancies coming to the study site for termination of pregnancy.

Inclusion criteria

*   all women willing for the study.
*   >18yrs age group
*   Singleton viable pregnancy
*   Willing to participate in the study.

Exclusion criteria

*   women not willing to participate for the study.
*   Less than 18 yrs. Old
*   Multifetal pregnancy

Data collection

Data was collected from hospital confinement data and case record files for all patients visiting study site and meeting the inclusion criteria, after obtaining valid consent.

Data analysis

Data was entered in Microsoft excel 2007 sheet and analyzed using statistical package for social sciences version 20. Parametric statistical tests were used Pearson's correlation test was used to correlate, maternal age and neonatal birth weight.

Results

Our subjects age ranged from 19 years to 39 years, with mean age being 25.4 yrs. +/- 3.97 years. The mean age of women delivering vaginally was 25.34 years +/- 3.5 years and mean age for women undergoing caesarian section was 25.63 years +/-5.07 years. Age was not associated with mode of delivery.

Age and parity were significantly and positively associated, r = +0.250, p=0.025 parity increased by +1 for every 4 years increase in age.

Of the total 104 live births included in our study, 77 were vaginal deliveries and 27 were caesarean deliveries, and of the total 104 live births, 63 were males and 41 were female neonates. The neonatal birth weight ranged from a

minimum 1570g of till a maximum of 4260g. The mean birth weight was 2904g± 480.6g not significantly different (Unpaired t test p=0.100) for male neonates (NBW= 2967g ±462g) or female neonates (NBW= 2806g ±496g).

The neonatal birth weight and parity of respective mother were not found to be significantly associated with each other (Pearsons's correlation coefficient p=0.824), while the age of mother and neonatal birth weight was found to be significantly and positively associated, (Pearsons's correlation coefficient r=+0.262 p=0.025), a positive trend of 262g increase in birth weight observed per year increase in maternal age.

Total 83 of the 104 births (79%) of the births were having normal birth weight (2.5kg-4kg), A total 19 of the 104 total births were Low birth weight neonates (<2.5kg), 89% of whom delivered vaginally while 100% of high birth weight (>4kg) babies delivered by caesarean delivery.
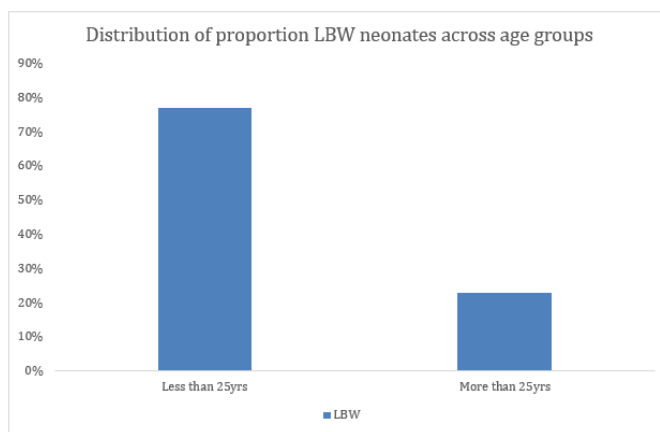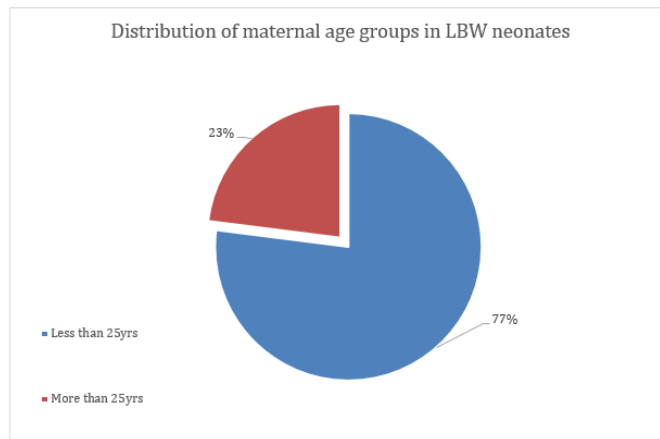
Age Group and Birth Weight Category Cross tabulation

		Birth Weight Category			Total
		LBW	NBW	HBW	
	19-21	2	13	1	16
	22-24	10	22	1	33
	25-27	4	23	0	27
Age Group	28-30	2	13	0	15
	31-33	0	9	0	9
	34-36	0	2	0	2
	37-39	0	1	0	1
Total		18	83	2	103

Under25 * underweight Crosstabulation

		underweight		Total
			Not LBW	
under25	<25yrs	77%	59%	100%
	>25yrs	23%	41%	100%
Total		100%	100%	104

OR = 2.32 Odds of having LBW neonate increased by 132% in those <25yrs age.

RR (14/65) / (4/35) = 0.21/0.1= 2.1 risk of having LBW neonate is 110% increased if age of conception is less than 25yrs.

Distribution of maternal age groups in LBW neonates

Distribution of proportion LBW neonates across age groups

Indication for lower segment C section	Frequency	Percent
Cephalo pelvic disproportion	3	13.6
Meconium-stained liquor	3	13.6
Non-progression of labor	5	22.7
Non-progression of labor with Non-Reactive NST	3	13.6
Non-progression of labor with Non-Reactive NST with post datism	2	9.1
Non-Reactive NST	3	13.6
PPROM	3	13.6
Total	22	100.0

Discussion

The subjects of our study were aged 19 to 39 years, with mean age being 25.4 years +/- 3.97 years. This is lower than the median age of 28yrs of childbearing in India as found by Singh et al in 2023 who computed the same from 2019-21 NFHS data. [7] Lower age of childbearing is associated with significantly lower neonatal birth weight as found by a study in NEMTEK town, Ethopia, as mostly they are unaware and uninformed of the precautions and care that need to be taken during the pregnancy so as to deliver a normal weighed baby. Adolescent girls, especially those in early adolescence, are particularly vulnerable to the health consequences of pregnancy and delivery as their bodies may not be physically ready.

Obstetric fistula, eclampsia, puerperal endometritis and systemic infections are just some of the serious conditions that they may face in the short- and long-term. Adolescent girls generally make less contact with the health system during the antenatal ready and hence the negligence leads to missing out of the underlying problems which culminates into complications including low birth weight. Delaying the first birth is a way of empowering young married women in India, and it could have beneficial effects on young women's educational and economic opportunities. the reproductive health and rights of young women in India still face numerous challenges. Young Indian women's empowerment should be at the center of public health interventions as they would be more likely to take all aspects of their health into their hands. Empowered women are more likely to start and continue to use contraceptives, more likely to deliver safely and more likely to have a skilled birth attendant once they decide to have children [8].

The mean birth weight of our study was 2904g± 480.6g .This is higher than the mean birth weight of 2872.84±478.88 g. as found by Unisa and colleagues in a study on maternal health care services in September 2021.[9] This is because our study is based in a urban setup where more number of women are educated and have higher access to healthcare needed to prevent complications from happening ante-partum, intrapartum and postpartum. Women with a higher level of education and of higher economic status were more likely to have continuum of care. Continuity of maternal health care was found to be associated with an increase in the immunization level of children. Promotion of the continuum of maternal health care approach could help reduce not only the burden of maternal deaths in India,

but also that of child deaths by increasing the immunization level of children.

Our study reveals that per year increase in age leads to increase in weight by 262 grams in an age group of 25-29 yrs. .This is in contrast to US Coronary Artery Risk Development in Young Adults (CARDIA) study wherein per year increase in age leads to increase in weight by 690 grams .(10) .This can be attributed to malnutrition prevalent in urban population as seen in our study often regarded as hidden hunger wherein inspite of maintaining good appetite there is lack of essential micronutrient and vitamins essential for normal growth and development of the baby in utero. During pregnancy, poor diets lacking in key nutrients – like iodine, iron, folate, calcium and zinc – can cause anaemia, pre-eclampsia, hemorrhage and death in mothers. They can also lead to stillbirth, low birthweight, wasting and developmental delays for children. Improving women's diets, access to nutrition services, and nutrition and care practices – before and during pregnancy and while breastfeeding – is critical to preventing malnutrition in all its forms. This is particularly true for the most vulnerable mothers and babies.

Women of higher age group tend to be overweight and higher pre pregnancy BMI tend to cause raised hba1c levels which in turn negatively impacts the child's heath by causing hypoglycemia in a neonate ,prematurely delivered baby having its own implication and preeclampsia(11) ,whereas women of lesser age group tend to be relatively underweight and undernourished again negatively impacting the heath of fetus such as growth retardation, preeclampsia ,small for age gestation babies and premature delivery[12]

In conclusion, in a country with a highly developed social and antenatal maternity healthcare security system giving cost-free maternity and obstetric care to all pregnant women, adolescents had a decreased risk for adverse obstetric and neonatal outcome compared with the reference group. In the same social context childbirth at advanced maternal age was associated with a number of serious complications for the woman as well as the child. For clinicians counselling young mothers it is of great importance to highlight the positive consequences that less obstetric complications and favorable neonatal outcomes are expected. The results imply that there is a need for individualizing the antenatal surveillance programmers and obstetric care based on age grouping in order to attempt to improve the outcomes in the age groups with less favorable obstetric and neonatal outcomes. Such changes in surveillance programmers and obstetric interventions need to be evaluated in further studies.

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