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Original Research Article

The relationship between mother's age and newborn birth weight: a retrospective study

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ABSTRACT

Background: The objective of this study is to assess the impact of maternal age on neonatal birth weight.
Methods: A retrospective study was conducted to evaluate the neonatal birth weight of singleton term infants born to nulliparous, non-diabetic, urban women who delivered at Shahid Sadoughi hospital in Yazd, Iran, between 2020 and 2021. Maternal age groups were defined as adolescents (≤19 years old) and adults (20-40 years old) using data from archived files.
Results: A total of 963 cases were included in this study, with 217 adolescents and 746 adults. The incidence of low birth weight (LBW) (<2500 gr) was 10.6% (102 cases), and macrosomia (>4000 gr) was observed in 7.1% (68 cases) of the neonates. There was a significantly higher rate of neonatal LBW among adolescent mothers.
Conclusions: Our study demonstrates that maternal age has an impact on neonatal birth weight. The incidence of LBW is increased among adolescent mothers.

Keywords: Adolescent pregnancy, Adult pregnancy, Neonatal birth weight

INTRODUCTION

Maternal and fetal well-being are intricately linked, with various factors influencing fetal growth. These factors play a role in regulating fetal metabolic pathways and contribute to "fetal programming."

Birth weight serves as a vital indicator of growth and is a key determinant of child's survival, physical development, and neural growth. It also serves as reliable measure of IU growth, fetal health, and maturity.[1]

Globally, LBW, defined as less than 2500 grams, affects approximately 14.6% of all births, amounting to over 20 million births each year. LBW is a significant contributor to high rates of mortality and morbidity.[2] Factors such as preterm birth, maternal age (both younger than 20 years and older than 35 years), maternal stress during pregnancy, maternal undernutrition before pregnancy, and being a first-time mother have been linked to LBW.[3] The world health assembly set a target in 2012 to reduce the number of infants born with a weight below 2.5 kilograms by 30% by the year 2025. This translates to an annual relative reduction of 3% from 2012 to 2025, aiming to decrease the number of infants with LBW from approximately 20 million to about 14 million.[4]

Adolescent pregnancies are defined as pregnancies occurring in women aged 19 years or younger at the time of conception. In 2021, approximately 13.3 million babies, constituting 10% of global births, were born to young mothers worldwide. Although the rate has shown recent decline, adolescent pregnancies still pose a risk for adverse neonatal outcomes, including fetal growth restriction, preterm delivery, LBW, small for gestational age, and neonatal mortality.[5] Studies have observed significantly lower placental and newborn weights in adolescents compared to adult pregnant women.

Additionally, low placental weight is associated with adverse perinatal outcomes, including higher rates of preterm labor, LBW, and fetal growth restriction.[6] The placental and newborn weights were significantly lower in the adolescent groups and low placental weight is associated with adverse perinatal outcomes than adult pregnant women such as higher preterm labor, LBW and fetal growth restriction rate.[7]

Recent research has demonstrated the impact of maternal age on fetal outcomes. Young maternal age (below 20 years old) has been linked to an increased risk of fetal growth restriction, preterm delivery, LBW, small for gestational age (SGA), and neonatal mortality.[6,8,9] However, a study by Hardy found no significant difference in maternal age, education, or occupation between LBW and normal birth weight infants.[10,11]

LBW remains a significant public health concern worldwide. An infant's birth weight is the most influential factor determining its chances of survival, healthy growth, and development.[12,13]

The purpose of our study was to compare neonatal birth weight between adolescent and adult women.

METHODS

In a retrospective study, evaluated birth weight of all singleton term babies born to nulliparous, non-diabetic, and urban women who delivered at Shahid Sadoughi hospital in Yazd, Iran, between 2020 and 2021. Mothers were divided into 2 age groups: adolescents (≤19 years old) and adults (20-40 years old), based on archived files.

Birth weight was measured using a digital weight scale within 15 minutes of birth and recorded in grams. The recorded weights were categorized into three groups: LBW (<2500 grams), normal birth weight (2500 to 4000 gm), and macrosomia (> 4000 gm). The sex of newborns was also recorded as either male or female. Gestational age was determined either from the first day of the last menstrual period or estimated from dating ultrasound measurements conducted before 20th week of pregnancy.

Exclusion criteria included gestational diabetes, medical disorders (such as diabetes mellitus, chronic hypertension, cardiac or endocrine disorders), substance abuse, smoking, surgical conditions during pregnancy, stillbirths, and multiple pregnancies.

Demographic information such as occupation, economic status, education, and maternal body mass index (BMI) were also considered.

Data analysis was performed using SPSS 20. To adequately address the research question, a sample size of 900 was determined, assuming a confidence interval of 95% and 80% power. The Pearson chi-square test was used to assess differences among the categorized BMI groups, and the McNemar test was employed to determine independence between groups. A p value of the less than 0.05 was considered the statistically significant.

It is important to note that this study is retrospective, and the information was obtained from archived files at the hospital covering the period of 2020 to 2021. Prior to conducting the study, permission to use the files was obtained from the hospital's ethics committee.

The funding for this research was provided by study authors.

RESULTS

In this retrospective study, we evaluated a total of 963 mothers with singleton term pregnancies. Among them, 217 mothers were adolescents (≤19 years old), and 746 mothers were adults (20-35 years old). The adult group included 118 women who were over 35 years old. Table 1 presents the maternal and neonatal demographic information for these age groups.

The mean ± SD of newborn birth weight was found to be 2989 ± 539 grams. Among all the births, there were 504 (52.3%) boys and 459 (47.7%) girls. Based on the collected data, 102 newborns (10.6%) were classified as LBW (<2500 gm), 793 newborns (82.3%) were within the normal weight range (2500-4000 gm), and 68 newborns (7.1%) macrosomic (>4000 gm). Relationship between neonatal weight within 15 minutes of birth and maternal pre-pregnancy BMI is presented in Table 2.

Table 1: The maternal and neonatal characteristics based on maternal age.

Variables	Adolescent, ≤19, n=217	Adult, 20-40, n=746	P value
Maternal (In year, mean ± SD)	17.3±1.7	30.1±6.8	0.2
Gestational age in week (mean ± SD)	37.3±1.4	38.1±1.6	0.6
Pregnancy weight gain in kg (mean ± SD)	7.5±1.9	9.4±2.3	0.9
Body mass index (kg/m^2)			
<18.5	55 (25.3)	178 (23.9)	0.7
18.5-24.9	115 (53)	332(44.5)	
>25	47 (21.7)	236 (31.6)	
Mother employment			
Yes	98 (45.2)	384 (51.5)	0.1
No	119 (54.8)	362 (48.5)	
Neonatal sex			
Girl	212 (46.2)	247 (53.8)	0.1
Boy	260(51.6)	244 (48.4)	
Neonatal apgar score at minute 5 (mean ± SD)	7.6±1.4	7.5±1.7	0.7

Table 2: Comparison of neonatal weight within 15 minutes of birth on various maternal age groups.

Neonatal birth weight (gm)	Adolescent, ≤19, n=217	Adult, 20-40, n=746	P value
LBW (<2500)	69 (67.6)	33 (32.4)	0.00
Normal (2500-4000)	340 (472.9)	453 (57.1)	0.09
Macrosomia (>4000)	29 (42.6)	39 (57.4)	0.1

The group of adolescent pregnant women (<19 years old) exhibited the highest number of infants with a birth weight less than 2500 gm. Of the 102 LBW infants, 69 (67.6%) were born to adolescent mothers, while 33 (32.4%) were born to adult mothers. This difference was statistically significant (p=0.00). Conversely, compared to the adolescent group, there were more macrosomic infants in the adult pregnant women group (57.4% vs. 42.6%), but the difference was not statistically significant (p=0.1). The frequency distribution of newborn weight based on their sex is shown in Table 3.

Table 3: The neonatal weight within 15 minutes of birth on based on neonatal sex.

Neonatal birth weight (gm)	Girl	Boy	P value
LBW (<2500)	45 (44.1)	57 (55.9)	0.1
Normal (2500-4000)	385 (48.5)	408 (51.5)	0.2
Macrosomia (>4000)	29 (42.6)	39 (57.4)	0.09

DISCUSSION

Our study revealed a prevalence of LBW infants of 10.6% in both age groups, which appears to be lower than the global estimate provided by UNICEF (14.6%).[2] Adolescent pregnancy remains a significant concern, especially in developing countries. Our findings demonstrate that maternal age significantly influences newborn birth weight, with a higher incidence of LBW in infants born to mothers under 19 years old. Furthermore, there were no differences in birth weight based on the sex of the neonates; LBW was not more prevalent in boys or girls.

Similar to our study, previous research has also reported a higher risk of LBW and poor prognosis in childhood among infants born to mothers under the age of 19.[12-16]

Contrary to our findings, Muula et al concluded that nutrition during pregnancy and the mother's education level have a greater effect on baby weight than the mother's age.[17] Additionally, several other studies have confirmed that maternal age is not associated with poor infant outcomes, including LBW.[18,19]

In our study, no significant difference was found between the sex of the babies and their birth weight. Conversely, Wubetu et al reported that female fetuses had a lower birth weight compared to males.[8]

Based on our findings, it is crucial for healthcare providers to consider the potential maternal and fetal complications associated with adolescent pregnancies in order to reduce the number of LBW neonates in Iran and achieve the targets set by the world health organization.

CONCLUSION

This study highlights that pregnant women aged <19 years are at a higher risk of LBW. These findings provide further evidence supporting the benefits of delaying the first birth until the age of >20 years.

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