

Research Article

Comparison of Maternal and Neonatal Outcomes and Risk factors in Younger and Older Mothers

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Submitted: 01 June 2018

Accepted: 26 June 2018

Published: 28 June 2018

ISSN: 2475-9465

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Keywords

• Age; Maternal outcomes; Neonatal outcomes; Risk factors; Morbidity; Preterm; Low birth weight

Abstract

Pregnancies during young age have significant adverse maternal and neonatal outcomes. Certain risk factors can also affect these outcomes depending on the maternal age.

Objective: To determine the incidence of different maternal and neonatal outcomes and risk factors of adverse outcomes in younger and older mothers.

Study design: Cross-Sectional.

Study duration and place: The study was conducted for 3 month duration in Department of Community Medicine, King Edward Medical University, Pakistan from May 2017 to July 2017.

Subjects and methodology: A cross-sectional study was carried out at Lady Wellington and Lady Aitchison Hospital Lahore Pakistan. 120 mothers were selected based on laid down inclusion criteria. Data was collected through a pretested questionnaire and analyzed using SPSS 23.

Results: The frequency of life threatening complications was recorded to be 26.7% in older mothers and 15% in younger mothers. Both LBW and Preterm births were significantly more common in younger mothers with a frequency of 13% and 45% respectively as compared to older mothers. There is also a significant correlation of low birth weight (LBW) and preterm birth with maternal age ($p=0.034$, $p=0.019$). There was a significant correlation of maternal hypertension ($p=0.035$) and history of previous C-section with maternal age ($p=0.017$); both had greater frequency in older mothers.

Conclusion: Our study concluded that younger pregnancies are associated with higher risk of neonatal outcomes such as low birth weight (LBW) and preterm birth, although there is no significant correlation with neonatal morbidity. Young mothers are also at high risk of developing maternal complications. In contrast older pregnancies have generally safer neonatal outcomes. Preventive measures should be used to limit neonatal and maternal outcomes, and health education should be promoted regarding nutritional balance and birth control.

ABBREVIATIONS

GDM: Gestational Diabetes Mellitus; SGA: Small for Gestational Age; LBW: Low Birth Weight; PPH: Post Partum Hemorrhage; C-section: Cesarean Section; Hb: Hemoglobin

INTRODUCTION

Around 280,000 maternal deaths occur globally every year, with the majority in low and middle income countries [1]. The leading causes of maternal mortality are hemorrhage, infection and preeclampsia. According to Sarah et al., an observational study of more than 5,000 low risk pregnancies in Pakistani tertiary care hospitals showed substantially worse perinatal and maternal outcomes, which were 5-fold or greater than those seen in high income countries. This study highlights the over and unnecessary use of practices such as injudicious use of oxytocin,

routine episiotomy incisions, overuse of C-section, and artificial rupture of membranes, as contributory and preventable factors leading to poor maternal outcomes [2].

Women fewer than 20 years and over 35 years were at high risk of perinatal morbidity [3]. Although the incidence of young age pregnancies has decreased all over the world, the number of adolescent pregnancies is still significant in low income and developing countries. Every year around 2.5 million births occur to girls under the age of 16. There is a strong risk of under reporting of these statistics because majority of young age pregnancies are aborted. In Pakistan, around 35% of women are married by the age of 18 and 5% give birth to their first child before the age of 15, despite the legal age of marriage for females being 16 [4]. Kumar reported an incidence of 4.1% adolescent pregnancies presenting in a hospital setting in India over a period of 5 years [5]. A study

conducted by F. Althebo et al., in 2015 reported 11.9% adolescent pregnancies in six low income countries [6].

There are discrepancies in the literature found regarding the risk of maternal and neonatal complications associated with the age of mother. The study done by Althebo in 2015 reports that younger age of mother is associated with a lesser risk of maternal complications whereas it had a higher incidence of neonatal adverse outcomes. The adverse outcomes reported by the study to be increased were LBW and premature birth of the infants [6]. Whereas, the study of Kumar in 2007 reported that maternal complications like pregnancy induced hypertension, pre-eclampsia toxemia, eclampsia and premature onset of labor was found more commonly in younger mothers (aged 13-19) than in older mothers (aged 20-30). The study also reported an increased incidence of neonatal complications including perinatal asphyxia, jaundice and respiratory distress syndrome in children born to teenage mothers. Kumar also reported an increased risk of fetal and neonatal deaths in off-springs of younger mothers [5]. Both of the studies reported an association with decreased birth weight and young age of the mother [5,6].

The risk factors associated with adverse maternal and neonatal outcomes include obesity, decreased physical activity, gestational diabetes mellitus (GDM), eclampsia, anemias, eclampsia and preeclampsia toxemia [7-11].

A Prospective cohort study conducted to determine the prevalence of GDM and associated maternal and neonatal complications revealed that GDM was higher in women in Qatar (16.3%) and in the age group of 35-45 years. GDM women are at increased risk of developing pregnancy induced hypertension, pre-eclampsia, antepartum hemorrhage, pre-mature rupture of membranes and cesarean delivery. Neonates are at an increased risk of preterm birth, macrosomia, congenital anomalies and birth trauma [9].

Results from a retrospective cohort study indicate that moving from mild to severe anemia risk of preterm increases significantly, while SGA risk increases with high hemoglobin (Hb) level during first two trimesters. There was little association between maternal Hb level during third trimester and SGA risk. Similar pattern and magnitude of association between maternal anemia and preterm birth and SGA were found among black and white women [11].

Most of the studies are regarding the increased risk of maternal and neonatal complications in children born to adult women. Gestational diabetes, obesity, reduced physical activity is among the established risk factors for adult women but the data regarding the outcome in young females with these risk factors is considerably very low.

MATERIALS AND METHODS

Our study was a cross-sectional study set in a tertiary care hospital, Mayo Hospital Lahore and associated Lady Wellington and Lady Aitchison Hospitals Lahore, Pakistan. The study was conducted over duration of 3 months with a sample size of 120 patients divided into 2 groups: 60 women under the age of 24 and 60 women above the age of 24. The sample size was estimated by using 95% confidence level, 10% absolute precision with

expected percentage of adolescent pregnancies as 11.9% [6], and first child before age 15 as 5%. The sampling technique used was Non Probability Convenient Sampling. Women aged greater than 15 and less than 40 were included in the study. The Data Collection Procedure used by all members of the batch was the data collection tool (pre-tested questionnaire).

Data was extracted with the help of a questionnaire (Obtained and modified from WHO publication "Evaluating the quality of care for severe pregnancy complications: The WHO near-miss approach for maternal health, 2011"). Birth outcomes of interest for this study included: pre-term delivery (live birth delivered at < 37 weeks gestation), LBW (live infant weighing < 2500g at birth), and neonatal death (death of a live birth within 28 days of infancy).

Final mode of delivery or end of pregnancy was categorized under vaginal delivery; C-section; complete abortion; vacuum aspiration; medical methods for uterine evacuation; laparotomy for ectopic pregnancy; laparotomy for ruptured uterus; women discharged/died while pregnant; and others.

Maternal mortality was characterized as either before birth, after birth or 42 days after birth. Maternal complications were grouped as falling into one of: postpartum hemorrhage; preeclampsia; eclampsia; sepsis or severe systemic infection; ruptured uterus; and organ failure.

Adverse neonatal outcomes were characterized as still birth; perinatal mortality; neonatal morbidity; LBW; and preterm birth.

Maternal risk factors including maternal diabetes; maternal hypertension; maternal anemia; diagnosed nutritional deficiency; previous c-section; socioeconomic status; health care center; and distance to local health care center were also assessed.

Data obtained was analyzed by Statistical Package for Social Scientist (SPSS) version 23. Quantitative variables like age were presented as mean \pm SD. Qualitative variables like gender were presented in frequency and percentages. Comparison of the two groups of mothers: younger than 24 and older than 24 years of age was evaluated by applying chi-square test, with statistical significance set at p value \leq 0.05.

The synopsis was approved by the Institutional Review Board of King Edward Medical University. Proper consent in accordance with WHO and institutional guidelines was taken.

RESULTS

The study sample was divided into two groups: mothers aged below 24, representing the cases; and mothers aged more than 24, representing the control group. These are later on referred to as younger mothers and older mothers. The mean age of the mothers in the younger mothers' group was 21.70 with a minimum of 17 and a standard deviation of \pm 1.759. The mean age in the older mothers' group was 28.75 with a maximum of 37 and a standard deviation of \pm 3.150 (Figure 1).

The mean hospital stay was greater in older mothers (4.70 ± 3.984) compared to younger mothers (3.15 ± 1.205), giving us a positive t value of 1.550. For estimated gestational age in weeks, mean value for older mothers is 36.08 ± 5.803 weeks compared to

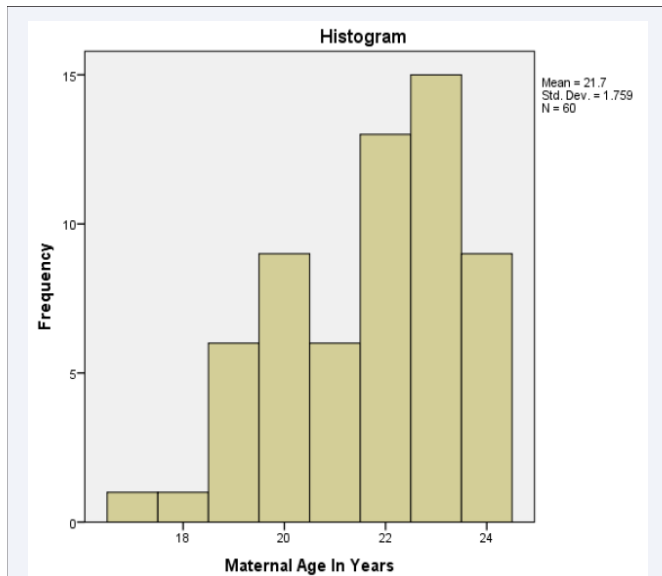


Figure 1 Histogram representing relative frequencies for maternal age in group < 24 years.

36.18 ± 4.674 weeks for younger mothers. This gave us a negative t value and a p value of 0.917, which is not statistically significant.

The percentage of C-section as final mode of delivery was higher among older mothers (80%) compared to younger mothers (75%) (Figure 2).

We applied the Chi Square Test to compare the two groups of mothers for complications as well as risk factors. According to the analysis, there was little or weak correlation of life threatening complications with maternal age ($\phi = 0.116$) which was statistically insignificant ($p > 0.05$). The frequency of life threatening complications was recorded to be 26.7% in older mothers and 15% in younger mothers. PPH and preeclampsia were most frequent in the younger mothers (both with a frequency of 33% among those with complications); in older mothers, ruptured uterus was the most common complication (31% among those with life threatening complication). There was no significant association between maternal mortality and maternal age ($p > 0.05$) (Figure 3).

Regarding neonatal complications, we found little or no association between perinatal mortality and maternal age ($\phi = 0.012$). LBW and Preterm births both were significantly more common in younger mothers with a frequency of 13% and 45% compared to older mother (frequency of 10% for both variables). There was also a significant correlation of LBW and preterm birth with maternal age ($p = 0.034$, $p = 0.019$). However, no significant relationship was demonstrated regarding neonatal morbidity ($p = 0.319$) (Figure 4).

We did not record a significant correlation between maternal diabetes as a risk factor for complications and maternal age. The frequency of maternal anemia was higher in younger mothers (53%) compared to older mothers (48%) whereas the frequency of Diagnosed nutritional deficiency followed the opposite pattern (45% in older compared to 32% in younger mothers). There was a significant correlation of maternal hypertension ($p = 0.035$)

and history of previous c sections with maternal age ($p = 0.017$); both had greater frequency in older mothers. No significant associations were recorded between the two groups regarding maternal diabetes; anemia; diagnosed nutritional deficiency; distance to the nearest healthcare facility; number of visits to the health care professional per month; as well as socioeconomic status and source of maternal guidance ($p > 0.05$).

DISCUSSION

Majority of maternal deaths occur in low and middle-income countries, mostly due to complications of pregnancy such as hemorrhage, infection and eclampsia [1]. Maternal and neonatal outcomes in low risk pregnancies in Pakistan have been shown to be 5-fold worse as compared to high income countries [2]. Women under 20 and over 35 years of age are at higher risk of perinatal complications [3]. According to a study conducted in 2016, 35% of females in Pakistan are married by age 18 and 8%

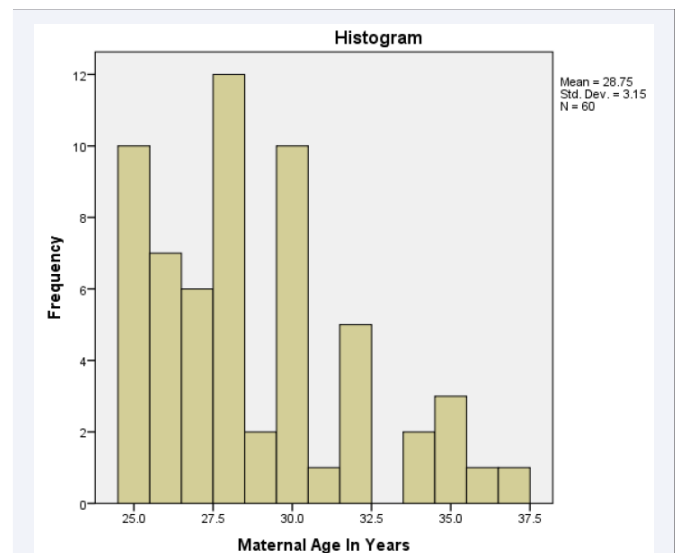


Figure 2 Histogram representing relative frequencies of maternal ages > 24 years.

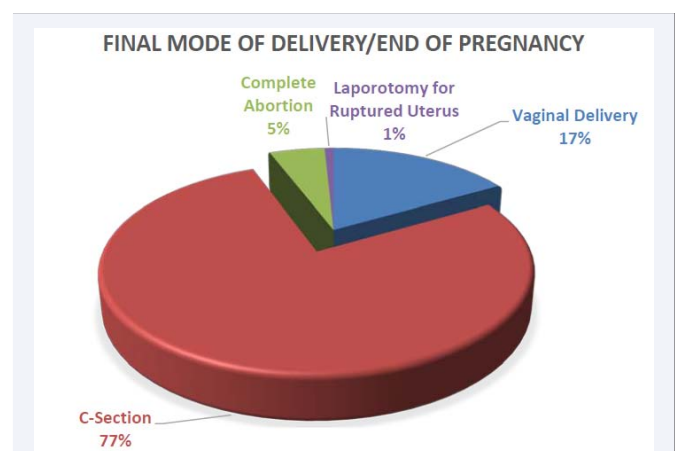


Figure 3 Pie chart comparing the frequencies for various modes of delivery. In our study majority of children were delivered via C-section followed by vaginal delivery.

give birth to their first child before age 15 [4]. According to a case control study, 50% of adolescent mothers in Pakistan were primi gravidas, > 3 2% were having their second baby and 17% were delivering their third or more baby [3]. In our study, we explore maternal and neonatal outcomes as well as maternal risk factors in relation to the age of the mother in 2 groups of 60 cases each (Figure 5).

Our study reports the frequency of C-sections as final mode of delivery among young mothers to be 75% compared to 80% in older mothers. This is in accordance with a recent study from Romania, which reports that C-section delivery occurs less frequently in teenagers than in adults [13]. However according to another study, there is no statistical difference regarding frequency of C-section among the 2 groups [20].

Our study reports that maternal complications have a greater frequency in older mothers as compared to younger mothers, whereas neonatal outcomes such as LBW and preterm birth are more common among younger mothers. This is in accordance with almost all studies that record higher risk of preterm birth and low birth weight in teenage and adolescent pregnancies

[14-17]. According to a study, the risk of preterm birth before 34 weeks is 3-fold and risk before 28 weeks is 4-fold greater in women under the age of 20 [18].

Among younger mothers, PPH and pre-eclampsia were more frequent compared to older mothers, in whom ruptured uterus was the most common complication. This is supported by a population-based study in Finland, which reports elevated risk for pre-eclampsia and preterm delivery among teenage mothers [19]. Other studies [13], have also reported a higher incidence of PPH among the group of young pregnancies.

The risk factors associated with adverse maternal and neonatal outcomes include obesity, decreased physical activity, and gestational diabetes, eclampsia, anemias, eclampsia and preeclampsia toxemia [8-11]. In agreement with already published literature, our study reports a higher incidence of maternal anemia among younger mothers [19-21]. Studies indicate that moving from mild to severe anemia, the risk of preterm birth increases significantly [11]. This can indicate a correlation between higher percentages of preterm births in younger mothers who also have higher incidence of maternal anemia.

Women in the age category 35-45 years are at higher risk for developing GDM. GDM women are at increased risk of developing pregnancy induced hypertension, pre-eclampsia, antepartum hemorrhage, pre-mature rupture of membrane and cesarean delivery [9]. Our study shows a lower incidence of maternal diabetes among the young mothers' group compared to the older mothers' group, which has been reported by other studies as well [19].

Our study reports a significant correlation of maternal hypertension with maternal age ($p=0.034$). This finding has also been reported by a study from China, which concludes that increased maternal age over 35 years leads to increased risk for hypertensive disorders in pregnancy [22].

We also report a correlation between previous C-section and advanced maternal age. This holds significance in light of a retrospective cohort study from British Columbia, which suggests that after 1 or 2 prior C-sections, risks for adverse outcomes are reduced among women who have had a prior vaginal birth as well. Thus a planned vaginal delivery or C-section can be arranged accordingly [23]. However another study found no statistically significant difference in advanced maternal age and normal pregnancies in terms of preterm labor, C-section and morbidity and mortality [24].

Summarizing our discussion, we note that maternal age can influence maternal and neonatal outcomes as well as impact of various risk factors. Among the neonatal outcomes, LBW and preterm birth are reportedly higher in younger mothers. Maternal outcomes including life threatening complications are higher in older mothers, with some complications like eclampsia and PPH having higher incidence among younger mothers as well. Risk factors such as anemia, hypertension and history of previous C-section have a significant correlation with adverse outcomes, and prevention against these can improve outcomes for both the neonate and the mother.

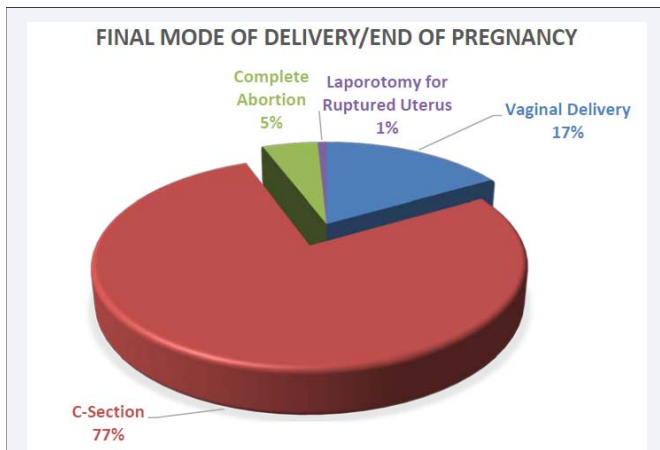


Figure 4 Pie chart demonstrating frequencies of various adverse neonatal outcomes. LBW was the commonest adverse outcome encountered in the study.

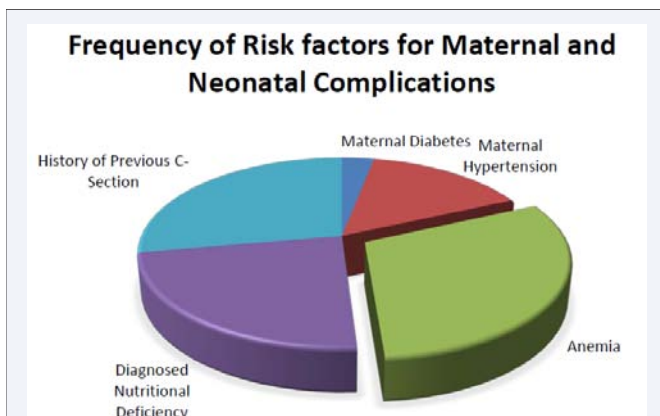


Figure 5 Pie chart for risk factors influencing adverse maternal and neonatal outcomes. Maternal anemia and nutritional deficiencies are the commonest risk factors in both groups.

This research has some limitations. The sample size selected for the young mothers group is small (n=60) and hence stratification of young pregnancies and delivery outcomes based on age cannot be performed. The study also does not take into account genital infections associated with pregnancy, which may contribute as a mechanism for preterm birth [13]. Our study is restricted to sample collection from a tertiary care hospital, and therefore cannot predict maternal and neonatal outcomes and complications in rural areas.

CONCLUSION

Our study concluded that teenage and adolescent pregnancies are associated with higher risk of neonatal outcomes such as LBW and preterm birth, although there is no significant correlation with neonatal morbidity. Young mothers are also at high risk of developing complications like pre-eclampsia, eclampsia and PPH, and have a higher incidence of maternal anemia as well. In contrast older pregnancies have safer neonatal outcomes, but can be associated with adverse maternal outcomes such as hypertension induced disease. Preventive measures should be used to limit neonatal and maternal outcomes, and health education should be promoted regarding nutritional balance and birth control.

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Cite this article

Ali MM, Rehman MB, Ahmad MQ, Omaira G, Ahsan I, et al. (2018) Comparison of Maternal and Neonatal Outcomes and Risk factors in Younger and Older Mothers. *Ann Community Med Pract* 4(2): 1035.