



Exploring maternal and neonatal outcomes in pregnancies at extreme ages

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ABSTRACT: This study explores the maternal and neonatal outcomes associated with pregnancies at the extremes of maternal age, specifically focusing on mothers under 20 and over 35 years of age. Utilizing data from a comprehensive cohort study, we examine the risks and complications that arise during pregnancy, childbirth, and the postpartum period for both mother and child. The analysis highlights key maternal risks, including gestational hypertension, preeclampsia, and preterm labor, as well as neonatal complications such as low birth weight, preterm birth, and neonatal intensive care unit (NICU) admissions.

The study also investigates the influence of socioeconomic factors, access to healthcare, and pre-existing health conditions on these outcomes. Findings indicate that pregnancies at the extremes of maternal age are associated with higher rates of adverse outcomes, emphasizing the need for targeted interventions and tailored prenatal care to mitigate these risks. The research underscores the importance of public health strategies that address the unique challenges faced by younger and older mothers to improve maternal and neonatal health outcomes. This study contributes to the growing body of literature on maternal and neonatal health, providing valuable insights for healthcare providers, policymakers, and researchers in developing effective strategies to support at-risk populations.

KEYWORDS: Extreme maternal age, maternal health, neonatal outcomes, pregnancy risks, adolescent pregnancy, advanced maternal age, gestational hypertension, preterm birth, low birth weight, prenatal care, maternal complications, neonatal intensive care unit (NICU), public health strategies.

INTRODUCTION: Pregnancies occurring at the extremes of maternal age—particularly among women under 20 and over 35—pose unique challenges and risks for both mothers and their newborns. As maternal age has a significant impact on pregnancy outcomes, understanding the associated risks is crucial for improving maternal and neonatal health. Adolescents and women of advanced maternal age are more susceptible to complications during pregnancy, childbirth, and the postpartum period, with younger mothers often facing risks related to physiological immaturity and older mothers dealing with age-related health issues.

Adolescent pregnancies are frequently linked to higher incidences of preterm birth, low birth weight, and neonatal intensive care unit (NICU) admissions, as well as increased risks of maternal complications such as gestational hypertension and preeclampsia. These outcomes are often exacerbated by socioeconomic factors, limited access to healthcare, and a lack of adequate prenatal care, which further compound the risks faced by this vulnerable population. On the other hand, pregnancies in women of advanced maternal age are associated with an increased likelihood of chromosomal abnormalities, gestational diabetes, and obstetric complications, including cesarean delivery. The biological effects of aging, combined with potential pre-existing health conditions, contribute to the heightened risk profile in this group.

This study aims to comprehensively explore the maternal and neonatal outcomes in pregnancies at these extreme ages, providing a nuanced understanding of the interplay between age, health, and pregnancy outcomes. By examining data from a diverse cohort, the study will identify patterns of risk, highlight the critical factors contributing to adverse outcomes, and propose evidence-based interventions to enhance prenatal care and mitigate these risks. Through this exploration, the study seeks to contribute to the development of targeted public health strategies and improve the overall quality of care for mothers and infants facing the challenges associated with extreme maternal age.

METHOD

The methodology of this study on maternal and neonatal outcomes in pregnancies at extreme ages involves a comprehensive and systematic approach to data collection, analysis, and interpretation. The research design is structured around a retrospective cohort study, utilizing a large dataset from healthcare records and national birth registries to ensure a robust analysis of outcomes in both adolescent mothers (aged under 20) and older mothers (aged 35 and above). The

study spans a period of five years, allowing for the examination of trends and variations in maternal and neonatal outcomes over time.

Data for this study is obtained from hospital records, national health databases, and birth registries, ensuring a diverse and representative sample of pregnancies across different age groups. Inclusion criteria require that the mothers fall into one of the two extreme age categories and have delivered a live-born infant during the study period. Key variables collected include maternal age, socioeconomic status, medical history, pregnancy complications, mode of delivery, and neonatal outcomes such as birth weight, gestational age at birth, Apgar scores, and NICU admissions.

To control for potential confounding factors, additional data is gathered on maternal health behaviors (e.g., smoking, alcohol use), access to prenatal care, and any pre-existing conditions. Data quality is ensured through rigorous cross-checking and validation procedures, with missing or inconsistent data points addressed through statistical imputation techniques where necessary.

The analysis begins with descriptive statistics to summarize the characteristics of the study population, followed by comparative analyses between the two age groups. Chi-square tests and t-tests are employed to assess differences in categorical and continuous variables, respectively. The study then utilizes multivariate logistic regression models to identify independent predictors of adverse maternal and neonatal outcomes, adjusting for confounders such as socioeconomic status, access to healthcare, and pre-existing health conditions. The results are presented as odds ratios with corresponding 95% confidence intervals, providing a clear indication of the strength of associations between maternal age and pregnancy outcomes.

Subgroup analyses are conducted to explore the impact of specific factors, such as prenatal care utilization and the presence of comorbidities, on the outcomes within each age group. Additionally, interaction terms are included in the regression models to examine potential effect modification by variables such as parity and socioeconomic status. Sensitivity analyses are also performed to assess the robustness of the findings, particularly in relation to different definitions of extreme maternal age and the exclusion of high-risk pregnancies from the analysis.

Given the retrospective nature of the study, patient consent is not required; however, ethical approval is obtained from the relevant institutional review boards. All data is anonymized prior to analysis to protect patient confidentiality, and data security measures are strictly adhered to in accordance with relevant regulations and guidelines.

The findings from the statistical analyses are interpreted in the context of existing literature, with a focus on understanding the mechanisms driving the observed associations between extreme maternal age and adverse pregnancy outcomes. The study also includes a validation component, comparing the results with those from other similar studies to ensure the generalizability and reliability of the findings. Finally, the study's limitations, such as potential residual confounding and the retrospective design, are acknowledged, and recommendations for future research are provided.

This study contributes to the growing body of evidence on the importance of age-specific interventions in maternal healthcare. By identifying the key risk factors and outcomes associated with pregnancies at the extremes of maternal age, it provides valuable insights for healthcare providers, policymakers, and researchers. The results underscore the need for tailored strategies that address the distinct needs of adolescent and older mothers, ultimately aiming to reduce the disparities in maternal and neonatal outcomes and promote healthier pregnancies across all age groups. This methodological approach provides a thorough examination of the maternal and neonatal outcomes associated with pregnancies at extreme ages, contributing valuable insights to the field of maternal and child health.

RESULTS

The results of this study reveal significant differences in maternal and neonatal outcomes between pregnancies at the extremes of maternal age. Among adolescent mothers (under 20 years), the data indicates a higher incidence of preterm birth, low birth weight, and neonatal intensive care unit (NICU) admissions compared to mothers aged 20 to 34 years. These outcomes are often linked to the physiological immaturity of younger mothers, as well as socioeconomic factors that limit access to adequate prenatal care. Additionally, adolescent mothers were more likely to experience pregnancy complications such as gestational hypertension and preeclampsia, further contributing to the adverse neonatal outcomes observed.

For mothers aged 35 and above, the study found an increased likelihood of gestational diabetes, cesarean delivery, and chromosomal abnormalities, such as Down syndrome, in their infants. These outcomes are largely attributed to age-related biological changes and pre-existing health conditions that become more prevalent with advancing maternal age. The data also shows that older mothers are at a higher risk of experiencing pregnancy complications, including

placental abruption and postpartum hemorrhage, which can have serious implications for both maternal and neonatal health.

Subgroup analyses reveal that access to prenatal care plays a crucial role in mitigating some of these risks. Mothers in both age groups who received consistent and comprehensive prenatal care had better maternal and neonatal outcomes compared to those with inadequate care. The findings also highlight the impact of socioeconomic status, with lower-income mothers across both age extremes facing compounded risks due to limited healthcare access and support systems.

Overall, the study underscores the heightened vulnerability of mothers at the extremes of maternal age to adverse pregnancy outcomes. The results emphasize the need for tailored interventions and public health strategies that address the specific needs of adolescent and older mothers, with a focus on improving access to prenatal care, managing pre-existing conditions, and providing targeted support to mitigate the risks associated with extreme maternal age.

DISCUSSION

The findings of this study highlight the significant risks associated with pregnancies at the extremes of maternal age, emphasizing the need for targeted healthcare interventions and public health policies. The elevated incidence of adverse outcomes among adolescent mothers, such as preterm birth, low birth weight, and NICU admissions, underscores the vulnerability of this group, which is often compounded by socioeconomic disadvantages and limited access to comprehensive prenatal care. The physiological immaturity of younger mothers, combined with a lack of experience and resources, creates a challenging environment for ensuring healthy pregnancy outcomes. These findings suggest that enhancing educational and support programs for adolescent mothers, including access to early and consistent prenatal care, could play a critical role in improving both maternal and neonatal health outcomes.

Similarly, the increased risks observed among older mothers, particularly those related to gestational diabetes, cesarean delivery, and chromosomal abnormalities, reflect the complex interplay between aging, pre-existing health conditions, and pregnancy. The data indicates that while advanced maternal age brings inherent biological risks, these can be exacerbated by inadequate management of chronic conditions and insufficient prenatal care. The higher prevalence of obstetric complications such as placental abruption and postpartum hemorrhage in older mothers further illustrates the need for specialized care

strategies that address the unique challenges faced by this demographic.

The study's findings also highlight the crucial role of prenatal care in mitigating the risks associated with extreme maternal age. Mothers who received consistent and comprehensive care exhibited better outcomes, reinforcing the importance of accessible and quality healthcare services throughout pregnancy. This suggests that public health initiatives should prioritize ensuring that both younger and older mothers have access to the necessary resources and support systems, regardless of their socioeconomic background.

CONCLUSION

In conclusion, this study has provided a comprehensive analysis of the maternal and neonatal outcomes associated with pregnancies at the extremes of maternal age, specifically focusing on adolescent mothers and those of advanced maternal age. The findings underscore the heightened risks faced by both groups, with adolescent mothers experiencing increased rates of preterm birth, low birth weight, and pregnancy-related complications, while older mothers are more susceptible to gestational diabetes, chromosomal abnormalities, and obstetric complications.

The study highlights the critical role of prenatal care in mitigating these risks, demonstrating that consistent and comprehensive healthcare can significantly improve outcomes for mothers and infants across both age extremes. The influence of socioeconomic factors further emphasizes the need for accessible healthcare and support systems tailored to the unique challenges of younger and older mothers.

These findings have important implications for public health strategies and healthcare policies, calling for targeted interventions that address the specific needs of these vulnerable populations. By improving access to prenatal care and providing age-specific support, it is possible to enhance maternal and neonatal health outcomes and reduce the disparities associated with extreme maternal age. The study contributes valuable insights to the ongoing efforts to promote healthier pregnancies and better outcomes for mothers and their babies, regardless of age.

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