

“More Visits, Better Outcomes?” – A Cross-sectional study Of Antenatal Care Utilization and Pregnancy Outcome in a Tertiary Care Hospital In South India

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Abstract:

AIM ; To evaluate the association between antenatal care (ANC) utilization and pregnancy outcomes and to assess demographic and clinical factors influencing ANC attendance.

MATERIALS AND METHODS: This prospective cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology at Yenepoya Medical College Hospital over 18 months. A total of 450 pregnant women admitted for delivery were enrolled. Sociodemographic data, ANC visit details, quality indicators, and maternal and neonatal outcomes were recorded. Statistical analysis was performed using Chi-square test, and p-values <0.05 were considered significant.

RESULTS: Out of 450 participants, 20.44% experienced at least one adverse outcome during pregnancy or childbirth, while 79.55% had no recorded complications. Maternal near- miss events were reported in 3.11% of cases. Similarly, perinatal mortality occurred in 2.88% of cases. Women with fewer ANC visits (<7) were more likely to experience adverse outcomes, while those with >7 visits had better outcomes (91.6% without adverse events).

CONCLUSION: Quality antenatal checkups, at least eight visits and early booking improve maternal and perinatal outcomes.

Keywords: Antenatal care, Pregnancy outcomes, Maternal health, Perinatal mortality, Prenatal care

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Introduction

Maternal and perinatal mortality rates and ratios are considered as indicators of a nation's growth and to improve on these indicators the World Health Organization and individual nations of the world have formulated protocols for focused and goal oriented antenatal care. Appropriate antenatal care (ANC) facilitates early detection and management of pregnancy-related complications and promotes healthy behaviours among expectant mothers.

Maternal mortality remains a major public health concern worldwide. According to the World Health Organization, the global maternal mortality ratio (MMR) in 2023 was 197 per 100000 live births(1). Least developed countries (LDC) account for nearly 43.9% of these deaths, India accounting for 7.2% of the MMR(1). Despite improvements in healthcare services, India continues to face challenges in achieving optimal maternal and perinatal health indicators.

The National Family Health Survey-5 reports that although a large proportion of women receive at least one ANC visit, fewer complete the recommended number of visits(2). Insufficient ANC utilization has been associated with increased risk of anemia, preterm birth, low birth weight, and perinatal mortality.

Recognizing these concerns, the present study was conducted to evaluate the association between the number and quality of ANC visits and pregnancy outcomes in women delivering at a tertiary care hospital.

Aim

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To evaluate the association between antenatal care utilization and pregnancy outcomes and to assess demographic and clinical factors influencing ANC attendance.

Materials And Methods

This was a cross-Sectional, prospective and observational study conducted at the department of Obstetrics and Gynecology, Yenepoya Medical College Hospital, Deralakatte, Mangalore.

Women who were admitted for delivery at Yenepoya Medical College Hospital during the 18 months study period from December 2023 to May 2025 were included in this study. Details from their antenatal, intrapartum and postnatal records was collected.

Participants were 450 antenatal women who were admitted at Yenepoya medical college hospital and who met the inclusion criteria were selected for the study using purposive sampling technique. Inclusion criteria was women admitted for delivery with available antenatal records. Exclusion criteria included women with major medical disorders diagnosed before pregnancy, multifetal gestation, women without antenatal documentation, maternal deaths or near-miss cases before 12 weeks of gestation. After receiving ethical approval and the participants' signed informed consent, the study was carried out. According to the proforma, the patient's sociodemographic information was recorded, including age, education, socioeconomic level, religion, urban or rural location, parity, and the interval between pregnancies in multigravidas.

Information on the PHC, CHC, or tertiary center where prenatal exams were performed was gathered.

Reports of prenatal checkups were used to evaluate the quality and frequency of prenatal care visits (the WHO recommended frequency includes the first visit within 12- weeks of pregnancy, trailed by visits at 20, 26, 30, 34, 36, 38, and 40 weeks). We verified whether the following were given weight, Blood pressure, fundal height measurement, oral iron, calcium and folic acid supplementation (the WHO advises taking 60 milligrams of elemental iron & 0.4 mg of FA and 1.5 to 2 g elemental calcium daily), Td injection dosages, and the least amount of routine biochemical and hematological testing (blood sugar, hemoglobin, blood grouping, Rh typing, serology, urine for protein and sugar), as well as ultrasound imaging(3). Pregnancy outcomes were gathered, including maternal near misses, maternal deaths (those that happened after the first trimester but before discharge), perinatal deaths, NICU admissions, preterm births, anemia (<9g%) after 28 weeks of pregnancy, postpartum hemorrhage, and fetal growth restriction. An association between pregnancy outcomes and prenatal care visits throughout the first, second and third trimesters was evaluated.

Data was analysed using SPSS version 25. Qualitative variables was summarised using numbers and proportions whereas quantitative variables was summarised using Mean and SD or median and IQR. The association of antenatal visits and pregnancy outcomes were analysed using Chi square test, statistical significance was considered at $p < 0.05$. using the above data number and quality of antenatal visits and the pregnancy outcomes was compared for each of the demographic data.

Results And Analysis

The study comprised a total of 450 participants with a mean age of 27.6 ± 4.9 years. Educational status revealed that the majority had completed secondary education (51.56%), followed by those with higher secondary education (34.89%). Participants with graduation level education constituted 8.89%, while only 4.67% had attained primary education, indicating a moderate educational background across the population. In terms of residence, urban dwellers accounted for a significant majority (78.66%), while only 21.33% resided in rural areas. Socioeconomic classification indicated that 59.56% of the participants belonged to the upper-lower class and only 0.22% were from the low socioeconomic group.

Among the 450 study participants, the majority were multiparous women (51.11%), while 38.66% were primiparas, and 10.22% were grand multiparas. This distribution indicates that a large proportion of participants had at least one previous childbirth. In terms of antenatal care (ANC), the majority of women (67.77%) received ANC at tertiary care centers and Primary Health Centers (PHCs) accounted only 2.44%, respectively. The mean interpregnancy interval was 3.39 ± 2.4 years, indicating a moderately spaced gap between

pregnancies among the participants. A very high proportion of participants (98.66%) reported receiving oral iron supplementation during pregnancy, reflecting good adherence to standard antenatal care protocols for anemia prevention. Similarly, 98.44% underwent minimum routine hematological investigations, the widespread compliance with baseline diagnostic evaluations during pregnancy. Ultrasonography (USG) was performed in 97.55% of cases, the strong utilization of imaging diagnostics for pregnancy monitoring as shown in Table.1.

Among the 450 women included in the study, 90.88% delivered at term and the majority underwent vaginal delivery (57.77%). 20.44% experienced at least one adverse outcome during pregnancy or childbirth. Maternal near-miss events were reported in 3.11% of cases, and perinatal mortality occurred in 2.88% of cases. Percentage of NICU admissions, fetal growth restriction (FGR), preterm labor, maternal ICU admission, anemia (<9 g/dL) and Postpartum hemorrhage (PPH) were 13.55%, 1.55%, 4.88%, 1.11%, 1.11% and 2.67% respectively.

Table 2 summarizes the association between selected demographic factors and the number of antenatal care (ANC) visits among the study participants. Age and education showed a statistically significant association with ANC visits. Parity had a significant association with ANC visit frequency where multiparas had the highest proportion of >7 ANC visits. Most women who visited tertiary care centers had >7 visits.

Incomplete or substandard antenatal care may contribute to increased risk of complications during pregnancy.

Women with fewer ANC visits (<7) were more likely to experience adverse outcomes. Most women who started ANC in the 1st trimester had no adverse outcomes. Maternal near-miss events were substantial among women with <4 ANC visits (33.3%), Intrauterine fetal deaths (IUD) and NICU admissions also showed significant reductions with increased ANC attendance ($p = 0.044$ and $p = 0.010$, respectively). Adverse outcomes such as maternal near-miss, fetal demise, NICU admissions, fetal growth restriction (FGR), maternal ICU admissions, and postpartum hemorrhage (PPH), preterm labor and anemia showed higher rates in women with <4 visits. Maternal mortality was absent across all groups. Overall, the findings affirm that higher frequency of ANC visits is linked to improved maternal and neonatal health outcomes as depicted in Table.3.

Early ANC registration in the first trimester appears essential for ensuring adequate antenatal care. Most women who had more than seven ANC visits started in the first trimester (97.5%) emphasising the early engagement with prenatal care. The timing of the first ANC visit across trimesters was evaluated for its impact on maternal and perinatal outcomes. While maternal near-miss and mortality there is no statistically significant differences across trimesters ($p = 0.667$), NICU admissions were significantly higher when ANC began in the third trimester (100%) compared to earlier trimesters ($p = 0.009$). Fetal growth restriction (FGR)

and preterm labor were also significantly more when ANC began later in pregnancy ($p = 0.001$). Other adverse events, such as intrauterine fetal death (IUD), ICU admissions, anemia, and postpartum hemorrhage (PPH), there is no significant association with the trimester of ANC initiation ($p > 0.05$). These findings suggest earlier ANC initiation, ideally in the first trimester, may reduce risks of poor neonatal outcomes such as FGR and NICU admission.

Discussion

Antenatal checkups is one of the most effective health interventions for preventing maternal and perinatal mortality and morbidity. ANC provides a unique opportunity for screening and diagnosis, health promotion and disease prevention among the pregnant women. Also, utilization of ANC services and institutional delivery are dependent on many factors like social, cultural and administrative factors.

According to the World Health Organization's 2016 recommendation a pregnant woman should undergo at least 8 antenatal encounters whereas national health mission recommends at least four visits(3, 4).

The burden of maternal deaths varies significantly by income groups of various countries. The least developed countries (LDC) accounted for an MMR of 313 per 100000 live births almost 60% higher than the world statistics. Inequities in access to health care and the wealth divide between rich and the poor are reflected in the high rate of maternal mortality in several parts of the world.

Just three states in India —Kerala, Maharashtra, & Tamil Nadu—have been able to reach the Sustainable Development Goal (SDG) 3 milestone of 70 deaths per one million live births, despite the fact that India's maternal mortality ratio has dropped from 130 per lakh live births in 2014–16 to 97 in 2019–215.

The National Family Health Survey (NFHS 5) revealed that in India 70.0 % (75.5 % in urban areas, 67.9 % rural areas) mothers had an antenatal check-up in the first trimester, but only 58.1% (68.1% in urban areas, 54.2% rural areas) mothers had at least 4 antenatal care visits. In Dakshina Kanada 86.1 % mothers had an antenatal check-up in the first trimester, and 82.0 % mothers had at least 4 antenatal care visits. Low birth weight babies are more likely to be born to pregnant women who do not receive high-quality antenatal care (ANC), and there is a direct correlation between the infant and perinatal mortality rates and inadequate or non-existent ANC(4). In a study conducted in Bangladesh they found that mothers who received inadequate ANCs the proportion of adverse perinatal outcome was higher among women who received inadequate ANCs 69.0% vs those who received adequate ANCs i.e. 32.0%6. Abanga E A et al, in their study also found that women who received high quality ANCs had significantly lower odds of delivering LBW and preterm babies (AOR = 0.13 and AOR = 0.15 respectively)(7).

The average age of the 450 participants in our study was 27.6 ± 4.9 years. According to educational status, the

majority (51.56%) had finished secondary school, and the main religion was Islam. According to socioeconomic classification, 59.56% of the participants were in the upper-lower class, and the vast majority of participants (78.66%) lived in urban area. In a related study conducted in Gujarat in 2017, Jogia et al. found that 81.54% of the expectant mothers were between the ages of 20 and 30; 82.31% were housewives; 87.7% identified as Hindu; and 72.46% lived in a rural area(8). Roy et al. from their study in Lucknow, Dorji et al. from Bhutan, and Shruthi et al. from Kerala also reported similar demographic characteristics(9-12).

In our study women who had fewer than seven ANC visits were more likely to have negative outcomes, whereas those who had more than seven visits fared better (91.6% without adverse events). Women with fewer visits had greater rates of adverse outcomes, including postpartum hemorrhage (PPH), ICU hospitalizations, and fetal growth restriction (FGR) ($p = 0.001$). In a study by Mst Taslima Abid et al published in 2024 they found higher rates of preeclampsia, PPH, preterm, low birth weight and NICU admissions with < 4 ANCs as compared to > 4 ANCs(13). Lim S W C et al found that risk of maternal death was 6 per 1,00,000 live births in general population and 64.3 per one lakh live births in unbooked pregnancies including increased risk of emergency caesarean delivery, ICU admissions and blood transfusions(14). Twenty five ANC attendant and seventy one non-attendant pregnant women had maternal near miss events in a retrospective study by Kebede TT et al(15).

According to Vogel JP et al who conducted secondary analysis of the WHO Antenatal Care Trial, in LMIC perinatal death was statistically higher in the reduced visits group (RR 1.15; 95% CI 1.01 to 1.32) but no clear difference between groups for other primary outcomes such as maternal death, hypertensive disorders of pregnancy, preterm birth, etc(16). In our study we found there is significant increase in adverse perinatal outcomes with reduced visits. Moreover our study suggested increased risk of perinatal morbidity with delayed onset of antenatal visits which was also observed in a study by Beauclair R et al where they found increased risk of stillbirth with late initiation of ANCs(17).

One of this study's intrinsic limitations, common to all cross-sectional investigations, was that no follow-up was done on these cases after discharge from the hospital. Furthermore, because it was an institution-based study, the results cannot be seen as accurately reflecting the community.

Conclusion

Adequate frequency and quality of antenatal care significantly improve maternal and neonatal outcomes. Women with fewer than 4 ANC visits are at higher risk of complications such as PPH, FGR, and NICU admission and those with 8 or more visits have fewer perinatal complications compared to < 8 visits. Hence

Government of India’s ministry of health and family welfare should align its guidelines for antenatal visits with that of WHO 2016 recommendations of at least 8 antenatal contacts to reduce both maternal and perinatal adverse events.

Promoting early registration, ensuring completion of at least eight ANC visits, and strengthening community-based awareness programs are essential to improve maternal and perinatal health indicators.

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