Association between antenatal care utilization with severe maternal and perinatal morbidity

Sonali Deshpande, Mohini Khedekar, Shrinivas Gadappa, Swati Badgire

Government Medical College and Hospital, Aurangabad, Maharashtra, India

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ABSTRACT

Aim: To analyse association between adequate antenatal care utilization with severe maternal morbidity and severe perinatal morbidity.

Methods: The prospective observational study was conducted in a Government medical college and hospital, Aurangabad from 1st October 2017 to 30th September 2019 after Institution Ethics Committee approval. Pregnancy after 28 weeks without pre-existing medical disorder and fetal anomaly were studied. The data were analyzed to find out the association between adequate antenatal care utilization and severe maternal and severe perinatal morbidity by using chi-squared test.

Results: Among 500 participants, 243 (48.6%) had adequate visits. Women with inadequate antenatal care utilization were at higher risk of preterm delivery, severe maternal and perinatal morbidity.

Conclusions: Inadequate antenatal care is can predict increased severity of maternal and perinatal morbidity.

Keywords: Antenatal care utilization, focused antenatal care, severe maternal morbidity, severe perinatal morbidity

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INTRODUCTION

Antenatal care (ANC) is a preventive obstetric health program that aims at optimizing maternal-foetal outcome through regular monitoring of pregnancy for the successful pregnancy outcome and healthy babies.[1,2] Good quality ANC improves maternal health; decreases the chances of suffering from anaemia, pregnancy induced hypertension, preterm labour and promote positive pregnancy outcomes, including a reduced risk of low birth weight and preterm babies.[3] The antenatal period clearly presents opportunities for reaching pregnant woman with number of interventions that may be vital to their health and well- being. In 2002, World Health Organization (WHO) has recommended a package of at least four visits in antenatal period with evidence-based interventions through goal-oriented clinic visits as known as focused antenatal care (FANC).[4,5] Since 2002, many low- and middle-income countries have adopted FANC into national policies, guidelines and institutional protocols. However, global estimates indicate that only about half of all pregnant women receive this recommended amount of care.[6] Our women are just beginning to appreciate the value of antenatal care, so it is only prudent to evaluate the current trend and its effectiveness before implementing a new recommendation WHO in 2016.[7] Thus, this study was conducted to analyse the effect of antenatal care on maternal and perinatal outcome where there is 19000 delivery annually.

METHODS

A prospective observational study was conducted in Government Medical College and Hospital, Aurangabad from 1st October 2017 to 30th September 2019, after Institution Ethics Committee approval. Sample size of 500 was taken by the prevalence data. All pregnant women with singleton pregnancy who registered for antenatal care at any facility and delivered after 28 weeks in this hospital were

CORRESPONDENCE

Mohini Khedekar
Department of Obstetrics and Gynecology,
Government Medical College and Hospital,
Aurangabad, Maharashtra, India, Pincode-431001
Mobile # +91-8424879708;
Email: mrkhedekar123@gmail.com

included. Women without antenatal visit at study site, known pre-existing medical disorder and fetal congenital anomaly were excluded.

Severe maternal morbidity (SMM) was defined by at least one of the following complications: haemorrhagic shock, severe postpartum haemorrhage (second-line uterotonic treatment associated with transfusion of at least two units of packed red blood cells, and/or uterine artery ligation, and/or uterine compressive sutures and/or hysterectomy), eclampsia, abruptio placenta, severe preeclampsia, severe sepsis (sepsis with organ failure), convulsions, diabetic ketoacidosis, deep venous thrombosis or pulmonary embolism, grade 3 or 4 perineal trauma, uterine rupture, intensive care unit (ICU) admission.

Severe perinatal morbidity (SPM) included at least one of the following complications: very preterm birth (before 32 weeks), birth weight below the third percentile, foetal death, early neonatal death (<7 days and before discharge), neonatal trauma (except collarbone fracture), brachial plexus strain, meconium aspiration syndrome, neonatal convulsions,5-minute Apgar score <7.

Antenatal care was considered as adequate when care was given by skilled health care provider (ANC care provided by nurse/physician), timely (initial ANC visit during first trimester of pregnancy), sufficient (at least 4 ANC visits during the pregnancy such as between 8-12 weeks, 24-26 weeks, 32 week and 36-38weeks) and appropriate in content (an indicator summarizing the procedure and process of care provided during ANC care). For the indicator of appropriate content, we selected following items; weight, height, blood pressure, urine analysis, blood analysis for haemoglobin, blood grouping and Rh typing, VDRL, HIV, and GCT, Obstetrics Ultrasound (at least once between 16-18 weeks), tetanus vaccination, prescription of iron & folic acid (at least for 90 days), vitamins, calcium supplementation and deworming. If the antenatal care service did not fully comply with this criterion, then the antenatal care was considered under inadequate care.

MS Excel and SPSS version 25 was used. Chi-square test was applied to find association between ANC visits and perinatal and maternal outcome. The significance level of this test was checked at 0.05.

RESULTS

Out of 500 pregnant women, maximum women (55.2%) who attend antenatal clinic belonged to age group of 20-25 years and 77.8 % belonged to upper lower class of socio-economic strata. Mean age was 23 years. Around 64.6% were multiparas and 53.4% were from urban background. History of IPV was revealed by 32.6% pregnant women.[Table-1]

Table-1: Distribution according to Baseline Characteristics (n=500)

Characteristics		Frequency	Percentage
Age in Years	≤20	99	19.8
	>20-25	276	55.2
	>25-30	97	19.4
	>30	28	5.6
Gravidity	Primigravida	177	35.4
	Multigravida	323	64.6
Socio-economic status*	Lower class	50	10
	Upper lower class	389	77.8
	Lower middle class	35	7
	Upper middle class	19	3.8
	Upper class	7	1.4
Residence	Rural	233	46.6
	Urban	267	53.4
H/o Intimate Partner Violence (IPV)	Revealed	163	32.6
	Not revealed	337	67.4

*Socioeconomic status is according to Modified Kuppuswamy Scale.

The minimum number of scheduled antenatal visits was 4; and 52% of the woman had recommended number of visits (for their duration of pregnancy). Nevertheless 48% women had irregular visits and 40% women began antenatal care after 12 weeks of gestational age. Moreover 15% of the woman missed injection tetanus toxoid and 35.6% of the woman missed the ultrasound between 16-18 weeks. Only 68.4% women had their complete blood and urine profile including CBC, blood group, HIV, HbsAg, VDRL, GCT, thyroid profile, urine routine and

microscopy and 48.6% received hematinic for at least 3 months. Thus, 48.6% pregnant women had adequate antenatal care utilization. [Table-2]

Table-2: Distribution according to utilization of antenatal care services (n=500)

Parameter			Frequency	Percent
Initiation of care	≤12 weeks		300	60
	>12 weeks		200	40
Antenatal Visits	As recommended		260	52
	Irregular		240	48
Investigation	Blood & Urine	Done	342	68.4
		Not Done	158	31.6
	Obstetric USG	Done	322	64.4
		Not Done	178	35.6
Treatment	Tetanus toxoid	Received	425	85
		Not received	75	15
	Hematinic	Received	243	48.6
		Not received	257	51.4
	Deworming	Received	270	54
		Not received	230	46
Antenatal care	Adequate		243	48.6
	Not Adequate		257	51.4

Among 257 women having inadequate antenatal care utilization, 41 women had preterm delivery of which 12 participants had very preterm delivery, while among 243 women who had adequate antenatal care utilization, 233 delivered at term which was statistically significant which signifies that inadequate antenatal care was associated with preterm delivery. But there was no statistically significant association between antenatal care utilization and mode of delivery. Severe maternal morbidity (SMM) occurred among 83 women. The main maternal complication was severe pre-eclampsia in 54 women, severe PPH, hemorrhagic shock, ICU admission, eclampsia in 14 women each, placental abruption in 10 women, puerperal sepsis and perineal tear in 2 women each. Among 14 women with severe PPH, 4 women with severe PPH required surgical interventions in the form of bilateral uterine artery ligation and uterine compression sutures while other responded to medical management. Among 14 ICU admissions, 3 women had placental abruption with multiorgan dysfunction, 2 women had eclampsia with pulmonary edema and 1 woman had PRES syndrome, while 8 women were in hemorrhagic shock requiring ICU. Inadequate antenatal care was associated with severe maternal morbidity except puerperal sepsis and grade 3 and 4 perineal tear. Thus, women with inadequate antenatal care utilization were at higher risk of severe maternal morbidity than with adequate antenatal care. No maternal death was observed in women enrolled in the study. [Table-3]

Table-3: Distribution according to antenatal care utilization and maternal outcome (n=500)

Maternal outcome		Inadequate ANC (n=257)		Adequate ANC (n=243)		χ2 test	p-value*
		Frequency	(%)	Frequency	(%)		
Gestation at delivery (in weeks)	28-32	12	4.66	0	0	21.5	<0.0001
	32-37	29	11.28	10	4.11	21.5	<0.0001
	37-41	216	84.04	233	95.88	21.5	<0.0001

Maternal outcome		Inadequate ANC (n=257)		Adequate ANC (n=243)		χ2 test	p-value*
		Frequency	(%)	Frequency	(%)		
Mode of delivery	Vaginal	201	78.21	193	79.42	0.117	0.947
	LSCS	55	21.4	49	20.16	0.117	0.947
	Instrumental	1	0.38	1	0.41	0.117	0.947
Severe maternal morbidity*	Severe PE	41	15.95	13	5.34	11.6	0.003
	Severe PPH	11	4.3	3	1.2	4.28	0.038
	Hemorrh shock	11	4.3	3	1.2	4.28	0.038
	ICU admit	11	4.3	3	1.2	4.28	0.038
	Eclampsia	11	4.3	3	1.2	4.28	0.038
	Abruptio	10	3.89	0	0	17.8	<0.0001
	Puerperal sepsis	2	8	0	0	0.75	0.8
	3°& 4° tears	2	8	0	0	0.75	0.8

**p<0.05 indicates statistically significant. *one woman may have more than one severe maternal morbidity indicators.*

The severe perinatal morbidity occurred in 37 women. Inadequate antenatal care utilization was significantly associated with severe perinatal morbidity indicators like very preterm birth <32 weeks, birth weight <3 rd centile, 5 minutes Apgar score <3, IUFD, early neonatal death. Among nine IUFDs, four were fresh still birth because of placental abruption and five were macerated still birth among which two each were attributed to undiagnosed diabetes mellitus and fetoplacental insufficiency, and one was postdated. Three babies who had meconium aspiration syndrome despite adequate antenatal care utilization had cord around neck, prolonged PROM and oligohydramnios each.

Table-4: Distribution according to antenatal care utilization and severe perinatal morbidity

Parameters*	Inadequate ANC (n=257)		Adequate ANC (n=243)		χ2 test	p-value
	Frequency	(%)	Frequency	(%)		
Meconium aspiration syndrome	11	4.3	3	1.2	4.28	0.352
Preterm <32 weeks	12	4.66	0	0	21.5	<0.0001
Convulsion	7	2.7	4	1.6	1.19	0.492
Weight <3rd centile	10	3.89	0	0	17.8	<0.001
5-minute Apgar <3	10	3.89	0	0	17.8	<0.001
IUFD	9	3.5	0	0	2.82	<0.0001
Early NND	4	1.55	0	0	0.75	0.043
Brachial plexus strain	1	0.38	0	0	0.117	0.947

*p<0.05 indicates statistically significant *one participant may have more than one severe perinatal morbidity indicator.

DISCUSSION

To estimate the association between antenatal care utilization and severe morbidity, we used chi-square test of significance. This method enabled us to access impact of antenatal care utilization on SMM and SPM. This approach seems appropriate as we hypothesize that ACU may have an impact on each of these morbidities.

In our study, the mean age of participants was found to be 23 years, which was similar to the findings noted by Abbas et al[8] but 64.6% participants were found to be multiparous, 53.4% were from urban area and 46.6% was from rural area which was not consistent in which maximum participants (87.7%) were from

rural area. The possible reason for this discrepancy could be that our institute is located in an urban area with large number of referrals from nearby rural area. Compared with participation in the study conducted by Manisha et al [9] where 62% lower middle class of socioeconomic strata, it was found that 77.1% participants in this study belong to upper lower class. The same reason cited above can be applied here.

The prevalence of late initiation of care was 6.1 % in Belgium [10] and 17% in the study conducted in the area of Northern -Paris [11], however in our study 40% of the participants had late initiation of care. This discordance in the result might be explained by high prevalence of underprivileged rural population in our study. Around 32.6% women in this study revealed the history of IPV. This might be one of the important but less uttered factors for inadequate ANC utilization. In our study, 52% women had recommended number of antenatal care visits. Moreover 15 % of the woman missed injection tetanus toxoid and 35.6% of the woman missed the ultrasound between 16-18 weeks. In our study, only 68.4 % women had their complete blood and urine profile. However, 51.4% population had inadequate antenatal care utilization compared to 34.6% population in study conducted by Linard et al.[12] This could be due to difference in demographic variation in population.

In our study, there was statistically significant association found between antenatal care utilization and severe maternal and perinatal morbidity indicating that women with inadequate antenatal care utilization are at a higher risk SMM and SPM. Failure to follow-up in third trimester leads to missing out on cases of severe preeclampsia which ultimately results in low birth weight and IUGR babies. Two studies have previously reported an association between a small number of visits and perinatal morbidity. Petrou[13] described an association between low birth weight, admission to neonatal ICU and perinatal mortality; and Raatikainen[14] described an association between low birth weight, foetal and neonatal death. Bouvier-Colle[15] reported a higher risk of maternal ICU admission among women with no antenatal care. Similarly, a study conducted by M Linard et al[12] also shows association between inadequate antenatal care and severe pre-eclampsia, severe PPH, birth weight below third centile, very preterm birth, and foetal death. This association may reflect the importance of regular antenatal care to screen for and treat some pathology like severe pre-eclampsia. Other studies [16,17] reported an association between inadequate antenatal care utilization and perinatal morbidity.

CONCLUSIONS

There was significant association of inadequate antenatal care with severe maternal morbidity like preterm delivery, very preterm delivery; and severe perinatal morbidity indicators like very preterm birth <32 weeks, birth weight <3 rd centile, 5 minutes Apgar score <3, IUFD, early neonatal death.

REFERENCES

1. World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva, Switzerland. 2016. Available at: http://apps.who.int/iris/bitstream/10665/250796/1/9789241549912- eng.pdf?ua=1]. Accessed 16 December 2016.
2. Main D. The epidemiology of preterm birth. Clin Obset Gynecol.1988;31:521-32.
3. Ahmed Z, Khoja S, Tirmizi SS. Antenatal care and the occurrence of low birth weight delivery among women in remote mountainous region of Chitral, Pakistan. Pak J Med Sci. 2012;28(5):800-5.
4. Joshi C, Torvaldsen S, Hodgson R, Hayen A. Factors associated with the use and quality of antenatal care in Nepal: a population-based study using the demographic and health survey data. BMC Pregnancy Childbirth. 2014;14:94.
5. Carroli G, Villar J, Piaggio G, Khan-Neelofur D, Gulmezoglu M, Mugford M, et al. WHO systematic review of randomised controlled trials of routine antenatal care. Lancet. 2001;357:1565-70.
6. WHO. Antenatal care randomised trial: Manual for the implementation of the new model. 2020 [cited 6 November 2020]. Available from: https://apps.who.int/iris/bitstream/handle/10665/42513/WHO_RHR_01.30.pdf
7. WHO and UNICEF Antenatal care in developing countries: Promises achievements and missed opportunities: An analysis of trends, levels and differential's:1990-2001. 2003;WHO and UNICEF, Geneva, New York
8. Abbas AM, Rabeea M, Abdel Hafiz HA, Ahmed NH. Effects of irregular antenatal care attendance in primiparas on the perinatal outcomes: a cross sectional study. Proc Obstet Gynecol. 2017;7(2):2.
9. Kasat M, Vijay NR, Kawthalkar A. Effect of quality of antenatal care on the perinatal outcome: A cross sectional study. Panacea J Med Sci. 2019;9(2):48-52.
10. Fobelets M., Beeckman K., Hoogewys A, Embo M, Buyl R, Putman K. Predictors of late initiation for prenatal care in a metropolitan region in Belgium. A cohort study. Public health. 2015;129(6):648–54.

11. Azria E, Guittet L, Delahaye M, Koskas M, Naoura I, Luton D, et al. Improvement of first-trimester ultrasound screening in socially deprived settings through a community-based perinatal network. Eur J Obstet Gynecol Reprod Biol. 2011;159:351-4.

12. Linard M, Blondel B, Estellat C, Deneux-Tharaux C, Luton D, Oury JF, et al. Association between inadequate antenatal care utilisation and severe perinatal and maternal morbidity: an analysis in the PreCARE cohort. BJOG. 2018;125:587-95.

13. Petrou S, Kupek E, Vause S, Maresh M. Antenatal visits and adverse perinatal outcomes: results from a British population-based study. Eur J Obstet Gynecol Reprod Biol. 2003;106(1):40-9.

14. Raatikainen K, Heiskanen N, Heinonen, S. Under-attending free antenatal care is associated with adverse pregnancy outcomes. BMC Public Health. 207; 7(268). https://doi.org/10.1186/1471-2458-7-268

15. Bouvier-Colle MH, Varnoux N, Salanave B, Ancel PY, Bréart G. Case-control study of risk factors for obstetric patients' admission to intensive care units. Eur J Obstet Gynecol Reprod Biol. 1997;74(2):173-7.

16. Baroos H , Tavares M, Rodrigues T. Role of prenatal care in preterm birth and low birthweight in Portugal. Journal of Public Health. 1996;18(3):321-8.

17. Heaman MI, Newburn-Cook CV, Green CG, Elliott LJ, Helewa ME: Inadequate prenatal care and its association with adverse pregnancy outcomes: a comparison of indices. BMC Pregnancy Childbirth. 2008;8:15-10.1186/1471-2393-8-15.