Original Article

Comparison of Delays and Its Impact among Women who Delivered Normally *versus* Those Women who Needed Admission to the Obstetrics ICU of a Tertiary Care Hospital in Gujarat, India : A Case Control Study

Vandana Majhi[1], Sangita V Patel[2], Maitri Shah[3], Latika Tarun Chugh[4], Reshma R[5], Saurav J Chaudhari[5], Jesal H Patel[6]

Abstract

Background : Outcome of pregnancy may not always favorable for both mother and baby. Early recognition and effective response related to these complications is a boon to contend the unpredictable results of pregnancy. So, the present study was conducted to assess the delays in birth preparedness and its impact on delivery outcomes.

Materials and Methods : A hospital-based case control study was conducted in a Tertiary Care Hospital. Participants were selected from postpartum delivery ward and obstetric ICU of the hospital. For cases 179 women were selected who required to get admitted in obstetric ICU during pregnancy and delivered whereas 179 women who had normal childbirth in hospital were selected for control group. Then both the group were interviewed and compared the delay present among them and its impact on delivery outcome.

Result : Around 131(73%) cases and 120(67%) controls were found to have delays present at any level. Delivery outcomes shows 15(11%) intrauterine fetal deaths among cases and only 2(1%) in control group.

Conclusion : Adverse maternal outcomes were seen in delays during pregnancy suggesting that timely and proper management are more helpful to mitigate them. More attention is required on the aspect of birth preparedness and complication readiness to reduce maternal mortality and morbidity.

Key words : Birth preparedness, Delays, Pregnancy, Maternal mortality.

Majority of maternal complications arises during pregnancy and many of them either prevented or effectively treated. Other complications may exist before pregnancy but are worsened during pregnancy, especially if not managed as part of the woman's care.

According to UN inter-agency estimates, the global maternal mortality ratio declined by 38% – from 342 deaths to 211 deaths per 1,00,000 live births from year 2000 to 2017. This translates into an average annual rate of reduction of 2.9%. While substantive, this is less than half the 6.4% annual rate needed to achieve the Sustainable Development global goal of 70 maternal deaths per 1,00,000 live births. There has been significant progress since 2000[1]. As per latest MMR Bulletin the maternal mortality ratio of India has declined to 113 in 2016-18 from 122 in 2015-17 and 130 in 2014-2016[2].

Editor's Comment :

- Timely recognition and management of delays during pregnancy can significantly reduce adverse maternal and fetal outcomes.
- Strengthening birth preparedness and complication readiness is essential to improving delivery outcomes and lowering maternal mortality and morbidity.

While much has been accomplished, more need to be done in future.

For achieving the SDG target of a global MMR of fewer than 70 maternal deaths per 1,00,000 live births by 2030 will require continued investment in maternal health research, programs and policy at the global level and very focused action in countries[3].

[1]MD (PSM), Assistant Professor, Department of Community Medicine, ESI-PGIMSR, ESIC Medical College & Hospital, Joka, Kolkata, West Bengal 700104
[2]MD (PSM), Associate Professor, Department of Community Medicine, Government Medical College Baroda, Vadodara, Gujarat 390001 and Corresponding Author
[3]MD (Obstat & Gynaecol), Associate Professor, Department of Obstetrics and Gynaecology, Government Medical College Baroda, Vadodara, Gujarat 390001
[4]MD (PSM), Assistant Processor, Department of Community Medicine, Narayana Medical College, Nellore, Andhra Pradesh 524003
[5]MBBS, Junior Resident, Department of Community Medicine, Government Medical College Baroda, Vadodara, Gujarat 390001
[6]MBBS, Intern, Department of Community Medicine, GCS Medical College, Hospital & Research Centre, Ahmedabad, Gujarat 380025
Received on : 20/02/2024
Accepted on : 23/02/2024

How to cite this article : Comparison of Delays and Its Impact among Women who Delivered Normally *versus* Those Women who Needed Admission to the Obstetrics ICU of a Tertiary Care Hospital in Gujarat, India : A Case Control Study. Majhi V, Patel SV, Shah M, Chugh LT, Reshma R, Chaudhari SJ, Patel JH. *J Indian Med Assoc* 2025; **123(5):** 17-21.

Thaddeus and Maine (1994) have provided an explanatory model of maternal mortality that identifies delays in seeking, reaching and obtaining care as the important factors leading to maternal death. This explanatory model, known as the Three Delays Model, categories delays into three types which are: delays in reaching care, delays in seeking care and delays in receiving adequate care once at the point of service[4].

Maternal mortality and morbidity is the tip of an iceberg. Many women survive serious complications during pregnancy, delivery and the puerperium so investigation between the women who delivered normally and women who were admitted in Obstetric ICU of a Tertiary Care Hospital followed by delivery will identify the reasons of failures within the healthcare systems as well as other prospects of obstetrical care in the community.

Aims and Objectives

(1) To assess if there were any delays at various stages (such as decision-making, reaching healthcare facilities and receiving care) between women who experienced normal deliveries and those admitted to the Obstetric Intensive Care Unit (ICU) and delivered at a Tertiary Care Hospital.

(2) To assess how delays affect pregnancy outcomes upon reaching the hospital.

Materials and Methods

A case control study was conducted at Obstetrics and Gynecology department of a Tertiary Care Hospital. Based on pilot study, the proportion of first delay among controls was 59% and among cases was 42%. The ratio of cases and control was 1:1. By keeping 95% of confidence interval and 90% power a sample size of 358 patients with 179 in each group was calculated using MedcalC software. The study was approved by the Scientific and Ethical Committee of the institute. All patients who met with criteria of normal labour were considered as control excluding those who required LSCS[5]. And all postpartum women who had deviation from normal labour criteria and required to get admitted in Obstetric ICU were considered as cases[6]. The study was conducted from January, 2019 to December, 2020. Purposive sampling method was used for the allocation of subjects in cases and control group.

A predesigned and pretested questionnaire based on Thaddeus and Maine three delay model was administered to all the subjects of both the groups[4]. The questionnaire was validated for the study population by a pilot study. The operational definition of delay is when it takes more than an hour to make a decision, get to a hospital and get medical attention.

Participants were interviewed after taking written consent in a language which they understand before filling questionnaire forms. Participants in the case group were interviewed after the stabilization of the illness that resulted in their ICU admission. The interview was carried out in the language the study participants understood.

Data entry was done in Microsoft excel 2007 and analyzed by using MedcalC 14 software. Descriptive analysis was used to describe the distribution of all variables in cases and control group. Odds ratio was calculated for all delays with 95% confidence interval.

Results

In present study 129 (72%) cases were in the age group of 20-29 years with a mean of 25 (SD-5.1) and 148(82.6%) controls were in the same age group of 20-29 years with mean 25 (SD-4.1). There were 153(85%) cases and controls who were Hindus followed by 23(13%) cases and 24(14%) controls who were Muslim by religion. Only 1-2% controls and cases were Jain by religion respectively. There were 33(18%) cases and 7(4%) controls were from tribal area. Whereas 71(40%) cases and 58(32%) controls were from rural area and 75(45%) cases and 114(64%) controls were from urban area in the present study.

The level of education of study participants revealed that 56(31%) cases and 32(19%) controls were illiterate. 80(45%) cases and 73(40%) controls had completed primary level of education while 24(13%) cases and 42(23%) controls were educated upto secondary level. 16(9%) cases and 23(13%) control groups were educated upto higher secondary and only 3(2%) cases and 9(5%) controls were graduated. The study participants were divided into two subclasses depending upon the type of family. 100(56%) cases and 93(52%) control groups had joint family system and 79(44%) cases and 86(48%) control group had nuclear family system. The study subjects were assessed according to the Modified BG Prasad's Socio-economic Classification-2019 (Modified

according to current CPI January, 2019=330)[7]. Cases belonged to the upper middle class were 10(5.58%), lower middle class were 14(7.82%), upper lower class were 104(58.1%), and lower class were 51(28.4%) while 10(8.93%) controls belonged to upper middle class, 36(20.1%) to lower middle class, 97(54.1%) to upper lower class, and 30(16.7%) to lower class (Table 1).

Among 179 cases most commonly 21% of women experienced eclampsia, 20% severe abdominal pain, 16% antepartum hemorrhage, 20% severe anemia, 8% pre-eclampsia, 6% water breakout without labour and 3% fever whereas 6% had other reasons like hepatitis, loss of consciousness, ectopic pregnancy for cases admission. The control group experienced no complications and all deliveries were normal.

Between the cases and controls, it took an average of 1576 minutes (26 hours) and 390 minutes (7 hours) respectively to decide to seek medical attention. Failing to view the symptoms as serious were the main causes of the first delay among cases whereas lack of transportation and funds was primary cause among controls in making decision. In considering the second delay, the average amount of time taken to reach health facility was 64 and 43.3 minutes, respectively for the cases and controls. The average time taken for receiving care for cases and controls was 18 and 40 minutes, respectively.

In this study 1st delay was found among 110(61%) cases and 107(60%) controls. The odds ratio was 1.07(95% CI 0.70-1.63, P=0.7456), which shows statistically not significant. 2nd delay was found among 16(9%) cases and 6(3%) controls. And the odds ratio was 2.84(95%CI 1.08-7.4, P=0.003), which indicate that women who took more than 60min to reach health care facility had 2.8 times higher risk to get admitted in ICU with some maternal illness. Whereas 3rd delay was found among 5(3%) cases and 7(4%) controls and the odd ratio was 0.7(95%CI 0.21-2.26, P=0.55), which shows statistically not significant (Table 2).

Regarding unfavorable delivery outcomes in delayed participants, among 131 cases 49(37%) participants had delivered low birth weight baby, and 18(14%) cases delivered still birth, 15(11%) cases had IUFD, 36(27%) cases had premature birth 1 case had abortion. And among 120 controls 38(31%) participants had delivered low birth weight baby and 3(2%) cases delivered still birth, 2(1%) cases had IUFD, 2(1%) cases had premature birth.

Table 1 — *Socio-demographic characteristics of study participants*

Variables	Cases (n=179)	Controls (n=179)	Total (n=358)
Age	Mean 25 years SD (±5.1)	Mean 25 years SD (±4.1)	
<20 years	10(5%)	7(4%)	17(5%)
20-29 years	129(72%)	148(83%)	277(77%)
30-39 years	37(21%)	24(13%)	61(17%)
40-49 years	3(2%)	0	3(1%)
Religion :			
Hindu	153(85%)	153(85%)	306(86%)
Muslim	23(13%)	24(14%)	47(13%)
Jain	3(2%)	2(1%)	5(1%)
Residence :			
Tribal	33(18%)	7(4%)	40(11%)
Rural	71(40%)	58(32%)	129(36%)
Urban	75(42%)	114(64%)	189(53%)
Participant's education :			
Illiterate	56(31%)	32(19%)	88(25%)
Primary	80(45%)	73(40%)	153(43%)
Secondary	24(13%)	42(23%)	66(18%)
Higher secondary	16(9%)	23(13%)	39(11%)
Graduate	3(2%)	9(5%)	12(3%)
Participant's husband's education :			
Illiterate	39(21%)	20(11%)	59(16%)
Primary	66(37%)	53(30%)	119(33%)
Secondary	49(27%)	64(36%)	113(32%)
Higher secondary	20(11%)	27(15%)	47(13%)
Graduate	5(3%)	15(8%)	20(6%)
Type of family :			
Joint	100(56%)	93(52%)	193(54%)
Nuclear	79(44%)	86(48%)	165(46%)
Socio-economic class :			
Upper middle	10(6%)	16(9%)	26(7%)
Lower middle	14(8%)	36(20%)	50(14%)
Upper lower	104(58%)	97(54%)	211(56%)
Lower	51(28%)	30(17%)	50(14%)

Table2 — *Distribution of study participants with respect to different level of delays during pregnancy*

Delay	Cases (n=179)	Control (n=179)	Odd ratio	P-Value
1st Delay in decision to seek care				
Present (≥60min)	110(61%)	107(60%)	1.07	0.7456
Absent (≤60min)	69(39%)	72(40%)	CI 95%-0.7024-1.6394	
2nd Delay in reaching care				
Present (≥60min)	16(9%)	6(3%)	2.8303	0.0034
Absent (≤60min)	163(91%)	173(97%)	CI 95%-1.0811-7.4093	
3rd Delay in receiving adequate health care				
Present (≥60min)	5(3%)	7(4%)	0.7	0.55
Absent (≤60min)	174(97%)	172(96%)	CI 95%-0.2198-2.2678	

Discussion

The current study has revealed 1st delay was present in both the group participants. Most of the cases were already having illness like raised Blood Pressure and Anemia which transformed into more serious condition with time due to further delays like decision making, transport and seeking medical care. Early recognition and prompt action is the key to reduce such adverse pregnancy outcomes.

Several factors such as participants knowledge of danger signs of pregnancy, identification of mode of transport, savings for delivery expenses can contribute to birth preparedness which can prevent maternal morbidity and mortality. Hence more focus is needed in the field of birth preparedness as primary prevention to reduce the adverse maternal outcomes.

In our state, referral audit system is present that is done by nodal officers available in both Gynecology and Pediatric Department in Tertiary level health care so they get informed by the peripheral health facility about the cases who require immediate attention. Which provide them help to start the treatment immediately in the tertiary health care facility. That's the reason there was absence of 3rd delay in maximum participants.

A study conducted by Leonardo Antonio Chavane, *et al* (2016) in Mozambique, Sub-Saharan Africa region found that the second delay was more frequent when compared to third delay in more than 60% of women who died. The current study aligns with Chavane et al's findings regarding the prevalence of delays in maternal healthcare. Both studies emphasize the significance of the second delay, highlighting the detrimental impact on maternal outcomes[8].

In a study in Brazil conducted by Rodolfo C Pacagnella, *et al* (2010) found that the occurrence of any delay increased the severity of maternal outcome, particularly leading to maternal death. The current study echoes this concern, emphasizing the transformation of pre-existing illnesses into more serious conditions due to delays. Together, they advocate for comprehensive strategies to minimize delays and improve maternal health globally[9].

Similarly other authors Filippi V, *et al* identified an association between delays and severe pregnancy outcomes through maternal near miss aduits study in developing countries[10].

Another study conducted by Atsumi Hirose, *et al* in Afghanisthan have included some information on delays, the current study adds depth by specifically addressing the first delay and its impact on pre-existing illnesses. Both studies highlight the need for early recognition and prompt action to prevent adverse maternal outcomes. Integrating insights from both studies could inform targeted interventions that address delays comprehensively in diverse settings[11].

In an audit study conducted by Pius Okong, *et al* in Uganda, it was found that more than half of the cases of severe maternal morbidity was attributed to substandard care and a delay in Phase I as contributors to severe maternal morbidity. While the current study highlights the compounding impact of the second delay on pre-existing illnesses. Together, they emphasize the importance of addressing delays comprehensively, encompassing both healthcare quality improvements and timely interventions[12].

Another recent study carried out by Tiruneh G, *et al* (2020) in South Gondar found that severe maternal outcomes are significantly associated with delay in deciding to seek Emergency Obstetric Care. The present study complements this connection by highlighting the exacerbating influence of the second delay on adverse pregnancy outcomes[13].

A study conducted out by Shamsun Nahar, *et al* in Bangladesh found that first delay was significantly attributed to adverse maternal outcome and can be prevented by raising awareness through couple/ family-based education about maternal complications While the current study aligns with this perspective, it further emphasizes the compounding impact of the second delay on pre-existing illnesses[14].

Additionally, J Killewo, *et al* study in rural Bangladesh further reinforces the association between delays in decision-making, reaching and receiving care with pregnancy-related morbidities, aligning with the current study's emphasis on the first delay's impact on pre-existing illnesses[15].

Conclusion and Recommendation

Adequate birth preparedness and complication readiness can intervene adverse maternal and infant outcomes during pregnancy. To reduce the maternal and infant mortality and morbidity more emphasis should be given on raising awareness about danger signs of pregnancy for which a prompt action is

required to save life. This approach should be used in combination with initiatives to train community-based skilled birth attendants, upgrade public health facilities to provide emergency obstetric care, implement programs to increase access for the most vulnerable populations and enhance the standard of care at all levels. In summary, the current study contributes unique insights by focusing on the second delay and its association with pre-existing illnesses emphasizing the importance of comprehensive strategies to address delays and improve outcomes globally.

Funding : None

Conflict of Interest : None

References

1 Maternal mortality - Unicef Data [Internet]. [cited 2020 Jul 19]. Available from: https://data.unicef.org/topic/maternal-health/maternal-mortality/

2 Special Bulletin On Maternal Mortality In India 2015-17 Sample Registration System Office Of Registrar General, India [Internet]. 2019 [cited 2020 Sep 20]. Available from: http://www.censusindia.gov.in

3 The Sustainable Development Goals and Maternal Mortality – Maternal Health Task Force [Internet]. [cited 2020 Jul 13]. Available from: https://www.mhtf.org/topics/the-sustainable-development-goals-and-maternal-mortality/

4 Monitoring birth preparedness and complication readiness tools and indicators for maternal and newborn health Center for Communication Programs Family Care International [Internet]. [cited 2019 Jun 22]. Available from: http://reprolineplus.org/system/files/resources/bpcr_monitoringtools.pdf

5 DC Dutta's Textbook of Obstetrics/ : Internet Archive [Internet]. [cited 2019 Jun 30]. Available from: https://archive.org/details/DC30DTO8/page/n1

6 Guidelines for Obstetric HDU and ICU [Internet]. 2016 [cited 2019 Jul 25]. Available from: https://nrhm.gujarat.gov.in/images/pdf/Obstetric-ICU-National-Guidelines.pdf

7 Debnath Dhrubajyoti J KR — Modified BG Prasad Socio-economic Classification, Updated – 2020. 2018; **4(1):** 30-2. Available from: https://iapsmupuk.org/journal/index.php/IJCH/article/download/1480/1026

8 Chavane LA, Bailey P, Loquiha O, Dgedge M, Aerts M, Temmerman M — Maternal death and delays in accessing emergency obstetric care in Mozambique. Available from: https://doi.org/10.1186/s12884-018-1699-z

9 Pacagnella RC, Cecatti JG, Parpinelli MA, Sousa MH, Haddad SM, Costa ML, *et al* — Delays in receiving obstetric care and poor maternal outcomes: results from a national multicentre cross-sectional study [Internet]. 2014. Available from: https://community.openclinica.com/

10 Filippi V, Richard F, Lange I, Ouattara F — Identifying barriers from home to the appropriate hospital through near-miss audits in developing countries. *Best Pract Res Clin Obstet Gynaecol* 2009; **23(3):** 389-400.

11 Hirose A, Borchert M, Niksear H, Alkozai AS, Cox J, Gardiner J, *et al* — Difficulties leaving home: A cross-sectional study of delays in seeking emergency obstetric care in Herat, Afghanistan. *Soc Sci Med* 2011; **73(7):** 1003-13.

12 Okong P, Byamugisha J, Mirembe F, Byaruhanga R, Bergstrom S — Audit of severe maternal morbidity in Uganda Á implications for quality of obstetric care.

13 Tiruneh GA, Arega DT, Kassa BG, Bishaw KA — Delay in making decision to seek care on institutional delivery and associated factors among postpartum mothers in South Gondar zone hospitals, 2020: A cross-sectional study. Heliyon [Internet]. 2022 Mar 1 [cited 2022 Jul 16];8(3):e09056. Available from: http://www.ncbi.nlm.nih.gov/pubmed/35284676

14 Nahar S, Banu M, Nasreen HE — Women-focused development intervention reduces delays in accessing emergency obstetric care in urban slums in Bangladesh: a cross-sectional study [Internet]. 2011. Available from: http://www.biomedcentral.com/1471-2393/11/11

15 Killewo J, Anwar I, Bashir I, Yunus M CJ — Perceived delay in healthcare-seeking for episodes of serious illness and its implications for safe motherhood interventions in rural Bangladesh - PubMed [Internet]. [cited 2022 Jul 16]. Available from: https://pubmed.ncbi.nlm.nih.gov/17591337/