

Maternal and Fetal Outcome among Referred Patients to a Tertiary Health Care Center in Solapur, Western India

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Abstract: ***Background:** Referral care in obstetric is important due to the unpredictable emergency that arise during pregnancy with the potential to progress and become life threatening to both mother and child. Maternal and neonatal death can be easily prevented if referral systems are in place that allows pregnant women to reach the appropriate health care service when needed. The present study was conducted with the objective to identify the primary cause of referral and analyze the maternal and fetal outcomes of referred cases. **Material and methods:** Prospective cross-sectional study was done among antenatal/postnatal mothers referred and admitted as in-patient between 2020 and 2022 in a tertiary care hospital. Universal sampling of patients during the study was period was done and included in the analysis. **Results:** A total of 9240 delivered was conducted, of which 3973 (42.9%) patients were referred cases. Mean age of referred patients was 23.72 ± 4.7 years with 64.1% of referrals from rural area and 88% belonging to lower socio-economic class. The common causes of referral in the present study were pre-eclampsia (17.3%), previous LSCS (11.6%), meconium stained liquor (10.5%), COVID-19 related (8.4%), malpresentation (6.7%), PROM (6.7%), oligohydramnios (5.6%), eclampsia (5.3%). Majority (58%) patients underwent LSCS. Maternal death documented in the present study was 1.9% due multiple organ dysfunction syndrome with DIC with MODS (55.6%), COVID-19 (17.7%), and septicemia (11.3%). NICU admission and still birth was 22.3% and 0.1% respectively. Low birth weight babies were 54.8%. **Conclusion:** The proportion of referred cases in our study was very high suggesting the need to provide training to all staff handling referred cases for adequate management.*

Keywords: Referral, maternal outcome, fetal outcome, maternal morbidity, fetal morbidity

1. Introduction

The World Health Organization has documented that 800 women die due to pregnancy and birth related complications worldwide every day. [1] Most of all pregnancy and delivery-related maternal deaths occurs in India, which is the single country with the highest burden of maternal mortality. India has made tremendous effort in improving maternal health which is evident from the drastic decline in maternal mortality ratio (MMR) from 130 during 2015 to 113 in 2017. [2] This has only been possible after the implementation of various maternity related health programs such as Janani Suraksha Yojana, Janani Shishu Suraksha Karayakram and ambulance services. Despite these efforts our MMR still remains high when compared with developed countries. One of the possible reasons is poor referral mechanism. WHO has estimated that 88 to 89% of maternal death can be prevented with timely access to emergency obstetric service through an efficient referral mechanism. [3]

Referral care in obstetric is important due to the unpredictable emergency that arise during pregnancy with the potential to progress and become life threatening to both mother and child. Maternal and neonatal death can be easily prevented if referral system is in place that allow pregnant women to reach the appropriate health care service when needed. A recent research of maternal services found the most of the successful programme have a well-established referral system as one the component. [4]

Our institution is a tertiary care referral center and we receive a lot of high risk women with obstetric emergency. There are certain obstetric procedures that need to be

performed to save the life of mothers during emergency. This can be done only by trained staffs with the necessary equipment's to prevent maternal death. Understanding the pattern of referral and causes will help us in being more prepared to attend any obstetric emergency.

2. Material and methods

A prospective cross-sectional study was conducted in the Department of Obstetric and Gynecology of Government Medical College in Solapur among antenatal/postnatal mothers referred to the hospital and admitted as in-patient over 2 years between 2020 and 2022. Universal sampling of all obstetric cases referred, during the study period were included in the analysis based of the following selection criteria:

Inclusion criteria:

- All referred ANC cases to our tertiary care institute with >20 weeks of gestation.

Exclusion criteria:

- Early pregnancy complications which occurred <20 weeks.
- Booked patients at tertiary care center.
- Self-referrals.

Based on review of literature a structured questionnaire with details of demographic information and obstetric data was collected. The questionnaire has been divided into three parts the first part has patients details such as age, gestation

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age, cause of referral, person accompanying the patients, period of pregnancy, distance of travel etc. The second of the questionnaire had details of maternal outcomes such as mode of delivery, any complication and in case of maternal death the cause was documented. The third part was neonatal outcomes such as birth weight, still birth, need for NICU admission and its causes etc.

Ethics consideration: The study was conducted only after obtaining ethical clearance from the Institutional Research Board (IRB) of the Dr. V M Medical College Hospital & Research Centre.

Statistical analysis: Data entry was done in Microsoft excel and analysis by SPSS software version 21. All the variables were expressed in frequency and percentage.

3. Results

During the study period a total of 9240 patients delivered at our hospital, of which 3973 (42.9%) were referral cases. Most of the referral were from rural area (64.1%) than urban (35.9%) and belonged to the age group of 20 to 30 years. (Table 1) Majority (88%) of the referred cases belonged to the lower socioeconomic class; this was followed by middle class (8%) and upper class (4%). Referred cases were mostly accompanied their family and relatives (56.3%) followed by nurses (25.9%) and doctors (17.8%).

Table 1: Age distribution of referred patients (N=3973)

Age group	Frequency	Percentage
<20	1232	31.1
20-30	2225	56.0
>30	516	12.9
Total	3973	100

Registered cases in the present study were 71% while unregistered were 29%. Among the referred pregnant mothers, 48.9% were primipara, 42.9% were multipara and only 8.1% were grand para based on their parity (Table 2).

Table 2: Parity status of referred patients (N=3973)

Parity status	Frequency	Percentage
Primipara	1943	48.9
Multipara	1707	42.9
Grandpara	323	8.1
Total	3973	100

Based on distance travelled by pregnant women, 67.7% had to travel between 25-100 km and 23.8% less than 25km.8.5% i. e.341 patients had to travel more than 100km to reach our hospital. (Table 3) Most of the patient arrived at our hospital in a private vehicle (48.9%) followed by public vehicle (36.2%). Ambulance facility was used by only 14.9% of patients.2109 (53.2%) patient reached our hospital in less than 8 hours. It took somewhere between 8-12 hour for 36.9% of referral to reach us and 9.9% more than 12 hours.

Table 3: Distance travelled by referred patients to reach higher center (N=3973)

Distance (km)	Frequency	Percentage
<25	948	23.8
25-100	2684	67.7
>100	341	8.5
Total	3973	100

Most of the patients were referred from primary health center (38.3%). From the regional and sub-district hospital we had 26.9% and 23.9% referral. Only 10.9% of the referral was from private hospitals. (Table 4)

Table 4: Place of referral of the referred patients (N=3973)

Place of referral	Frequency	Percentage
PHC	1361	34.2
RH	1072	26.9
SDH	853	21.4
Private	235	5.9
Other district	452	11.37
Total	3973	100

We received 67.9% mother with referral during the intrapartum period which was followed by 30.9% during antenatal and 1.2% during postpartum period. (Table 5)

Table 5: Period of pregnancy of referred patients during referral (N=3973)

Period of pregnancy	Frequency	Percentage
Antenatal	1229	30.9
Intrapartum	2697	67.9
Postpartum	47	1.2
Total	3973	100

Among the several causes of referral patients to our hospital, the most common causes were anemia (20.7%), pre-eclampsia (17.3%), previous LSCS (11.6%) and MSL (10.5%).8.4% of referral were due shutdown of maternity ward in peripheral centre due to COVID-19. Other causes like eclampsia, malpresentation, oligohydrannios, PROM constituted <10%. (Table 6)

Table 6: Cause of referral (N=3973)

Cause of referral	Frequency	Percentage
Anemia	824	20.7
Eclampsia	212	5.3
Pre-eclampsia	688	17.3
Previous LSCS	462	11.6
Malpresentation	268	6.7
APH	58	1.4
PPH	42	1.0
Oligohydrannios	224	5.6
PROM	268	6.7
Pre-term	198	4.9
Meconium stained liquor	420	10.5
Postdatism	148	3.7
IUD	18	0.4
Twins	24	0.6
Ruptured uterus/cervical tear	6	0.1
Rh negative	51	1.2
COVID-19 protocol	337	8.4
Unavailability of service	32	0.8

Of the 3973 deliveries of referred cases, 98.1% got discharged successfully, while 79 i. e.1.9% had expired. The

common causes of maternal mortality were multiple organ dysfunction syndrome with DIC with MODS (55.6%), COVID-19 (17.7%), and septicemia (11.3%). Other causes of death were irreversible haemorrhage with shock (7.5%), DIC + shock + APH (5%) and CVA + HIS (2.5%). (Table 7)

Table 7: Cause of maternal death (n=79)

Cause of maternal death	Frequency	Percentage
CVA + HIS	2	2.5
DIC + shock + APH	4	5.0
Irreversible haemorrhage + shock	6	7.5
DIC + MODS	44	55.6
Septicemia	9	11.3
COVID-19	14	17.7
Total	79	100

Around 40% of referred case expired in 24 hours of admission and 20% in one to three days. (Table 8)

Table 8: Distribution of patients based on admission to death interval (N=79)

Time interval from admission to death	Frequency	Percentage
<24 hour	32	40.5
1-3 days	16	20.2
4-7 days	14	17.7
1-2 weeks	17	21.5
Total	79	100

Most of the newborn (66.5%) were health with no major issues. 54.8% were low birth weight. 22.3% needed NICU admission while 0.1% were still birth. (Table 9)

Table 9: Neonatal outcome of referred mothers* (N=3979)

Neonatal outcome	Frequency	Percentage
Still birth	7	0.1
NICU	889	22.3
Healthy	2648	66.5
LBW	2183	54.8

Excluding 18 IUD and addition 24 twins, *multiple outcomes in single newborn

4. Discussion

The present study was conducted in Tertiary care teaching hospital to evaluate the various characteristic of obstetric referred cases and the maternal and fetal outcomes. In our study 3973 patients were referred from a total of 9240 that constituted 42.9% of referral. Other studies by Jakhar et. al., [5] Gupta et. al., [6] Khade et. al., [7] and Kumari et. al. [8] reported 9.96%, 15.37%, 28.8% and 31.15% respectively. Studies done in Ghana, [9] Phillipine, [10] and Nepal, [11] have reported 17.6%, 5.9% and 2.6% respectively. Among the reviewed studies, the proportion of referred cases was maximum in our study. The present study was done during COVID pandemic during which many peripheral hospitals were converted into COVID hospitals, which affected antenatal care. Due of the lack of antenatal OPD facility and delivery services, many antenatal patients were directly referred to our tertiary hospitals. Similar situation was also reported by Khade et. al., [7] in their study which was done during the pandemic period.

High referrals can put a huge burden on tertiary care government hospital that already has their own routine

deliveries. Health care professional catering to obstetric patients need to be trained to handle extra the referred cases especially those presenting in emergency. Moreover to decrease the burden on tertiary care level, specialist at primary level need to know the conditions that need referral and avoid unnecessary referral.

Majority of the referred cases belong to the age group of 20-30 years in the present study. Several studies such as Bharathi et. al. (63.6%), [12] Mahendra et. al. (62.96%), [13] Jakhar et. al. (70.7%) [5] and Kiranmai et. al. (73%) [14] also reported similar proportion. This is expected since most of the pregnancy occurs in this age group.

Primi and multi constituted 48.9% and 42.9% respectively while grand multipara was only 8.1%. The proportion of primi para ranged between 46% to 65% and that of multi between 30% to 50% is various studies. [15, 16, 17] Less than 10% of referred cases were grandmultipara in all the studies. Thus primipara and multi para constituted most of the cases with primipara being slightly more than multi.

Majority of the referred cases i. e. 67.7% travelled between 25 and 100km to reach our tertiary care centre. 23.8% travelled less than 25 km with 8.5% having to travel more than 100 km. Gupta et. al. [6] had a similar percentage as ours, while Jyotsana et. al., [17] Kumari et. al. [8] and Prakriti et. al. [16] had around 65% referred patients having to travel less than 50 km and around 10% travelling more than 150 km. Distance travelled by patients is an important factor in contributing to delay in receiving health care. Under the NHM, The Ministry of Health and Family Welfare have initiated the Birth Waiting Homes for women residing in remote and tribal areas to have easy access to institutional delivery.

In our study 48.9% had used private vehicle to reach our center, 36.2% used public transport and only 14.9% had come in an ambulance. Studies by Shenoy et. al., [18] Ankita et. al. [8] and Hareesh et. al. [15] had greater percentage using ambulance of 60 to 70% with less than 40% using private or public vehicle. Gupta et. al. [6] and Sabale et. al. [19] had around 30% using ambulance over other mode of transport. Our study had the least percentage of referred cases using the ambulance. The reason for this was COVID-19 pandemic, during which we received referral cases that were not emergency and hence patients did not need an ambulance to arrive at our centre.

We received maximum referrals from PHC (34.2%) and RH (26.9%) followed by SDH (21.4%) and private hospitals (5.9%). We also had 11.37% of referral from other districts. Studies by Ankita et. al. [8] and Sabale et. al. [19] had less than 15% of referrals from PHC and greater percentage from Rural and District hospital. Referral from private hospitals was less than 10% in most of the studies except by Shenoy et. al. [18] were 83% of the referral cases were from private hospital. This study was conducted in a tertiary care private hospital hence it received a greater proportion of referrals from other private hospital. A study from Pakistan by Ayesha et. al. [20] had 35% of their referrals from Dias. Hence source of referral varies across studies and it depends

on the type of tertiary care centre, its location and the existing referral mechanism is that locality.

In our study 67.9% were referred during the intrapartum period and 30.9% during antepartum and 1.2% in postpartum period. Ayesha et. al., [20] Kiren et. al. [12] and Mahendra et. al. [13] had a similar proportion of intrapartum referrals but a greater proportion of post-partum referral between 8 to 10%. None of the studies had analyzed the causes of intrapartum, antepartum and postpartum referrals separately. Hareesh et. al. [15] in their study mentioned that 24% of intrapartum referral had no high risk factors and emphasized that unnecessary referral were overburdening their hospital.

The cause for referral varies widely across the studies. Gupta et. al. [6] documented pre-eclampsia (22.2%), anaemia (18%), malpresentation (15%), previous LSCS (7.6%), CPD (3.7%), postdatism (1.4%). Other causes such as Rh negative, polyhydramnios, heart disease etc were less than 1%. Dutta et. al. [21] reported PIH (15%) to be most common followed by previous LSCS (12.5%), PROM (11%), preterm (10%), fetal distress (10%), CPD (%), postdatism (4%) and others cause such as anaemia, APH etc to be around 3%. Aggarawal et. al. [22] reported septicemia (26.7%) to be most common followed by PPH (18.4%). Ankita et. al. [8] had hypertensive disease (16.7%), previous LSCS (12.7%), anemia (7.7%), PPH (6%), APH (5.5%), fetal distress (4.3%) and CPD (4%) as the causes of referral. Patel et. al. [23] in their study classified the cause of referral based on the period of pregnancy. Among the antenatal causes of referral the common cause were severe anaemia (32.4%), missed abortion (16.2%), MTP with tubal ligation (21.6%), severe vomiting (5.4%) and gestational diabetes (2.7%). Among the intrapartum cause of referral, non-progression of labour (23%), pre-eclampsia (16%), malpresentation (15%), previous LSCS (6%), fetal distress (5%) and severe anaemia (4%). Finally among the postpartum causes of referral, PPH (83.3%) was the most common reason followed by pain abdomen (11.1%) and post-partum psychosis (5.5%). This study gives a clearer understanding of causes based on the period of referral.

Though there is a wide variation on the obstetric condition due to which referral is made to the higher among the various study, we can conclude the most common causes were pre-term, hypertension disorder, anaemia, hemorrhage, previous LSCS and fetal distress. Understanding the common causes can help identify measures and improve the functioning for primary and secondary care level to reduce such referral or provide training to initiate treatment till patients reach tertiary care level.

In our study 98.1% of mothers got discharged and only 1.9% maternal death was documented among the referred cases in our study. A study by Rehka et. al. [5] had documented 98.3% discharges, 0.78% shifted to other specialty and 0.88% of death. Kumari et. al. [8] also reported similar finding but had a greater number of death i. e. 4.94%. Other studies by Sabale et. al., [19] and Khatoon et. al. [20] documented 0.79% and 2.5% of maternal mortality respectively in their study. Bharathi et. al. [12] reported zero death in their study while Agarwal et. al. [22] reported the

maximum number of maternal mortality of 24.6%. Agarwal et. al. [22] had included only post-cesarean referred cases in their study excluding antenatal and intrapartum referral which could explain such high numbers of death.

Our study document a total of 79 maternal deaths. The common causes of maternal mortality were multiple organ dysfunction syndrome with DIC with MODS (55.6%), COVID-19 (17.7%), and septicemia (11.3%). Other causes of death were irreversible haemorrhage with shock (7.5%), DIC + shock + APH (5%) and CVA + HIS (2.5%). Deepika et. al. [24] also reported similar cause. Prakriti et. al. [25] found hypertensive disorder (25.4%) to be the most common reason. Jyotsana et. al. [17] found PPH and DIC common among patient with eclampsia causing death. Qureshi et. al. [26] reported one death in the study due to septicemia. The maternal rate was very minimal in most of study with a small sample size. Hence the results cannot be compared. But a study by Ankita et. al. [8] documented 73 maternal death due to hypertensive disorder (44.2%), anaemia (18.5%), PPG (14.2%), pulmonary embolism (2%) and other causes like APH, rupture of uterus and cardiac disease to be less than 2%. We can conclude that there is no single causes for maternal death but, having multiple medical condition increases the risk of maternal. Of these medical condition such as hypertension, diabetes, anemia needs special attention, since they can be diagnosed early and provided the necessary treatment.

We had 0.1% still birth and 66.5% live birth. The percentage of still birth varied across different studies. Maskey et. al. [11] and Khade et. al. [7] reported 3.4% and 4.9% still birth respectively, while Gupta et. al. [6] and Khatoon et. al. [20] documented 10% and 13% of still birth among the referred cases. Most of the other studies [6, 10, 12, 19] had documented neonatal death rate ranging between 0.42% and 5.3%. But a study by Qureshi [26] had documented a higher proportion of neonatal death rate (7%). Since we did not follow-up the new born beyond NICU admission we were unable to estimate the neonatal death which occurs with 1 week of life.

The proportion of newborns needing NICU admission in our study was 22.3%. Bharathi et. al. [12] and Verma et. al. [24] also reported a similar percentage of 23% like our study, while Rehka et. al. [5] and Mahendra et. al. [13] reported 18% each. Cristina et. al. [10] had documented only 4.5% of newborns needing NICU admission, on the other hand Devineni et. al. [14] in their study had 30% newborn shifted to NICU. Having a well-equipped NICU set at tertiary care level is essential as it is seen that many a time the referral of mothers to tertiary level is due to fetal cause then maternal. Hence obstetric department can function most effective when supported by the anesthetics and paediatric department along the necessary equipment and other facilities.

5. Conclusion

The present study has highlighted the details of referred obstetric cases to our hospital. We received a great proportion of referred cases during the study due to COVID-19 pandemic. Most of the patients belonged to lower socioeconomic class and were referred from the PHC,

travelling a distance of 25 to 100 km in private vehicle. Most of the referral were during intrapartum period due to anaemia and eclampsia. Majority of the mothers had a favorable outcome. Common cause of maternal death in the present study was MODS and septicemia. LBW was very prevalent in the present with almost ¼ of newborns needing NICU admission due jaundice, respiratory distress, pre-term and others. The data obtained from the study shows that most of the referral were not emergency but were referred due to non-functioning of PHC during COVID-19.

Author Contributions

“All authors contributed equally to the writing of this paper. All authors read and approved the final manuscript.”

Conflicts of Interest: “The authors declare that they do not have any conflict of interests.”

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