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Assessment of severe acute maternal morbidity and associated maternal deaths in females admitted to hospital based setting

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ABSTRACT

Background: Severe acute maternal morbidity has long-term ill effects on socioeconomic condition and health of the females including excessive financial burden post-treatment which may last lifelong to the desertion of females after hysterectomy considering the inability to reproduce.

Aims: The present clinical trial was carried out to assess the incidence and various causes leading to SAMM. Also, the trial was aimed at factors associated with the instance of near-miss cases or SAMM.

Materials and Methods: 82 SAMM cases and 4 maternal deaths were evaluated based on the WHO criteria. The data were maternal deaths, demographic data, complications encountered, gestational age at the time of SAMM, SAMM event time from admission time, ICU admission, and associated organ failure/dysfunction. The collected data were subjected to statistical evaluation and the results were formulated.

Results: Maternal death resulted from abdominal pain in 75% (n=3) and breathlessness in 25% (n=1) female. The disorders associated with SAMM were surgical cause, haemorrhage, hypertension, indirect causes, and medical conditions respectively in 1.21% (n=1), 32.92% (n=27), 63.41% 9n=52), 2.43% (n=2), and 18.29% (n=15) females. The etiology of 4 deaths was due to 50% (n=2) deaths each from cardiac and respiratory etiology in females with the gestational age of 30.10±2.14 weeks and 25.7±1.3 years of age. Near-miss cases were 34.14% (n=28) due to compromised transport facility.

Conclusion: The present study concludes that severe acute maternal morbidity affects significant females and is the leading cause of maternal death. The most common factor associated with SAMM is in the present study was hypertension leading to morbidity followed by hemorrhage, whereas, leading causes for morbidity were respiratory and cardiac causes.

Keywords:

Severe acute maternal morbidity, near-miss cases, Postpartum, pregnancy.

INTRODUCTION

SAMM (Severe acute maternal morbidity) also termed as near-miss morbidity signifies females experiencing life-threatening or potentially life-threatening events or episodes either during pregnancy or postpartum period of 42 days after pregnancy. However, SAMM is a morbid condition where subjects experiencing it survive owing to the care given. The reproductive, mental, and physical health of the females after SAMM are adversely affected

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owing to the complications associated with it.[1] Various data in literature had suggested growing evidence of long-term ill effects on socioeconomic condition and health of the females after obstetrics and gynecological complications. These complications include excessive financial burden post-treatment which may last lifelong to the desertion of females after hysterectomy considering the inability to reproduce.[2]

SAMM being a life-threatening state requires urgent and prompt medical intervention to save the life of the affected female. The recognition of females with severe acute maternal morbidity has emerged recently as an alternative and promising tool to assess and evaluate maternal deaths as maternal death constitutes one of the major causes of death in the females of the reproductive age group. Apart from maternal deaths, severe acute maternal morbidity lad to various morbid conditions in affected females. Hence, identification and assessment of severe maternal morbidity timely can help avoid various associated complications.[3]

The common conditions leading to SAMM include sepsis, hypertension (Eclampsia and pre-eclampsia), uterine rupture, hemorrhage including early pregnancy loss, and Dystocia. WHO criteria are the most common method to identify severe acute maternal morbidity. With the advancement in the medical field, maternal deaths are declining to evaluate the confirmed SAMM cases, a more sensitive measure in gynecology. To standardize and make the quality of care better, maternal death mortalities should be included in SAMM cases.[4]

In previous literature, only a few longitudinal studies are reported to assess SMM. Evaluation and assessment of the SAMM will strengthen the understanding of its progression, improvements needed in intervention, thereby, preventing mortality in affected females.[5] Hence, the present clinical trial was carried out to assess the incidence and various causes leading to SAMM. Also, the trial was aimed at factors associated with the instance of near-miss cases or SAMM.

MATERIALS AND METHODS

The study was conducted at Department of Obstetrics and Gynaecology, Dr Vasantrao Pawar Medical college hospital and research centre Nashik, Maharashtra after obtaining clearance from the concerned Ethical committee. The study subjects were recruited from the Department of Obstetrics and Gynaecology of the institution. A total of 1432 deliveries were performed during the study period and reported SAMM cases were 82 and 4 maternal deaths.

The study identified the SAMM cases based on the WHO criteria. The subjects were continuously followed or assessed from the time interval of their admission to death or discharge, whichever is applicable.

The inclusion criteria for the present study were females either surviving or presenting with the life-threatening condition during childbirth, pregnancy, and or 42 days postpartum/pregnancy termination, females with no other associated comorbidity, females of age 18 years or more, and WHO criteria SAMM cases: with organ failure/dysfunction assessed from Laboratory criteria, clinical criteria, and management-based criteria. The exclusion criteria were subjects suffering pregnancy-related mortality or morbidity from trauma or poisoning like non-obstetric causes, maternal death/ morbidity encountered after more than 42 days of pregnancy termination/delivery, subjects not willing to give consent for the study.

The data for the study were collected from the medical records of the department concerning deliveries and maternal deaths reported in the study period. Concerning reported maternal deaths, the data retrieved from the medical records included demographic characteristics, gestational age, death cause, and death time. For SAMM or near-miss cases, the data collected included demographic data, complication encountered, gestational age at the time of SAMM, SAMM event time from admission time, ICU admission, and associated organ failure/dysfunction.

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The collected data were subjected to statistical evaluation and the results were formulated.

RESULTS

A total of 1432 deliveries were performed during the study period, and reported SAMM cases were 82 and 4 maternal deaths. The demographic characteristics of the study subjects are listed in Table 1.

Table 1: Demographic characteristics of the study females

Characteristic	Variables	Maternal death		SAMM	
		%	n	%	n
Age Group	18-28 years	50	2	78.04	64
	29-34 years	25	1	12.19	10
	>35 years	25	1	9.75	8
Parity	Nulliparous	75	3	40.24	33
	1	25	1	40.24	33
	2			14.63	12
	>2			4.87	4
Education	Illiterate	25	1	2.43	2
	Graduation or less	25	1	35.36	29
	Post-graduation	50	2	62.19	51
Socioeconomic status	Upper			1.21	1
	Middle	100	4	86.58	71
	Lower			12.19	10
Gestational Age	≤22			13.41	11
	≥22 & <28			2.43	2
	≥ 28 & < 34			29.26	24
	≥ 34 & < 37	50	2	26.82	22
	≥ 37 & ≤ 42	25	1	23.17	19
	Post delivery	25	1	4.87	4

Majority of study subjects with SAMM were within the age of 18-28 years with 78.04% (n=64) subjects followed by 12.19% (n=10) subjects from 29-34 years, and least 9.75% (n=8) older than 35 years. Mortality was also highest in age group of 18-28 years with 50% (n=2) reported death. 75% (n=3) deaths were in nulliparous females, whereas, SAMM was seen in 40.24% (n=3) in nulliparous and females with single parity. Concerning gestational age, it was seen that 50% (n=2) deaths were in females in gestational age of ≥ 34 & < 37 and 25% (n=1) death each in ≥ 37 & ≤ 42 weeks and post-delivery females. Near-miss cases were seen in gestational age of ≤22, ≥22 & <28, ≥ 28 & < 34, ≥ 34 & < 37, ≥ 37 & ≤ 42 weeks, and post-delivery females respectively in 13.41% (n=11). 2.43% (n=2), 29.26% (n=24), 26.82% (n=22), 23.17% (n=19), and 4.87% (n=4) cases.

The presenting complaints for admission to hospital concerning SAMM were vaginal discharge, Abdominal pain, Convulsion, Blurred vision, Headache, Syncope, Vaginal bleeding, fever, limb swelling, unconsciousness, chest pain, breathlessness, and epigastric pain/burn reported respectively by 7.31% (n=6), 28.04% (n=23), 6.09% (n=5), 4.87% (n=4), 17.07% (n=14), 3.65% (n=3), 18.29% (n=15), 7.31% (n=6), 15.85% (n=13), 1.21% (n=1), 1.21% (n=1), 2.43% (n=2), and 1.21% (n=1) subjects. Maternal death in these subjects were owed to chief complaint of abdominal pain in 75% (n=3) and breathlessness in 25% (n=1) female. The death reported in the 4 study females were all attributed to underlying medical causes. The disorders associated with SAMM in 82 cases were surgical cause, haemorrhage,

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hypertension, indirect causes, and medical conditions respectively in 1.21% (n=1), 32.92% (n=27), 63.41% 9n=52), 2.43% (n=2), and 18.29% (n=15) females (Table 2).

Table 2: Presenting complaints and underlying disorders in study females

Characteristic	Variables	Maternal death		SAMM	
		%	n	%	n
Presenting Cause	Vaginal discharge			7.31	6
	Abdominal pain	75	3	28.04	23
	Convulsion			6.09	5
	Blurred vision			4.87	4
	Headache			17.07	14
	Syncope			3.65	3
	Vaginal bleeding			18.29	15
	Fever			7.31	6
	Limb swelling			15.85	13
	Unconsciousness			1.21	1
	Chest Pain			1.21	1
	Breathlessness	25	1	2.43	2
	Epigastric Pain and burn			1.21	1
Associated Disorder	Surgical cause			1.21	1
	Hemorrhage			32.92	27
	Hypertension			63.41	52
	Indirect cause			2.43	2
	Medical conditions	100%	4	18.29%	15
	Others			2.43%	2

The present study also assessed the ICU characteristics and reason for ICU admissions in the study subjects. A total of 26 subjects required intensive care where 4 subjects died and 22 survived near-miss cases. The etiology of 4 deaths was due to 50% (n=2) deaths each from cardiac and respiratory etiology in females with the gestational age of 30.10±2.14 weeks and 25.7±1.3 years of age. In near-miss cases, the reason for admission to ICU were surgical, haemorrhage, hypertension, cardiac, respiratory, and others in 4.54% (n=1), 40.90% (n=9), 31.81% (n=7), 9.09% (n=2), 9.09% (n=2), and 13.63% (n=3) study subjects respectively. These females had a mean age of 25.76±1.71 years and gestational age of 30.10±2.14 weeks. The mean ICU duration stays in females was 4.1±1.2 days and 3.56±0.84 days respectively in maternal death and SAMM cases as summarized in Table 3.

Table 3: Characteristics of the study females admitted to ICU

ICU characteristics (Mean±S.D)	Maternal Death (n=4)	SAMM (n=22)
Stay duration (days)	4.1±1.2	3.56±0.84
Age (years)	25.7±1.3	25.76±1.71
Gestational Age (weeks)	30.10±2.14	33.66±2.21
Parity	0.7	0.69
Reason for ICU admission		
Surgical		4.54% (n=1)
Hemorrhage		40.90% (n=9)
Hypertension		31.81% (n=7)
Cardiac	50% (n=2)	9.09% (n=2)
Respiratory	50% (n=2)	9.09% (n=2)
Others		13.63% (n=3)

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On assessing the factors responsible for near-miss cases and maternal death were also assessed in the study. The three main factors found responsible were healthcare factors, transport factors, and personal/family factors. Concerning deaths, one death each (25%) was contributed to health care factor (human resources lack) and transport lack (to health centers), and two deaths (50%) were due to personal family factors (1 each from resource and awareness lack). Near-miss cases were 34.14% (n=28) due to compromised transport facility. For health care factors 1.21% (n=1), 20.73% (n=17), 1.21% (n=1), and 6.09% (n=5) were respectively due to Obstetric care lack, human resources lack, anesthesia lack, and expertise lack. Personal/family factors responsible were Admission refusal, Awareness lack, Previous ill experience, and Resource Lack, and treatment refusal in respectively 4.87% (n=4), 31.70% (n=26), 3.65% (n=3), 23.17% (n=19), and 12.19% (n=10) subjects as shown in Table 4.

Table 4: Factors responsible for SAMM and mortality in study females

Factors	Variables	Maternal death		SAMM	
		%	n=4	%	n=82
Health care factors	Lack of Obstetric care			**1.21**	**1**
	Lack of human resources	**25**	**1**	**20.73**	**17**
	Lack of anesthesia			**1.21**	**1**
	Lack of expertise			**6.09**	**5**
Lack of Transport facility to health care centers		**25**	**1**	**34.14**	**28**
Personal Factors/ Family factors	Admission refusal			**4.87**	**4**
	Awareness lack	**25**	**1**	**31.70**	**26**
	Previous ill experience			**3.65**	**3**
	Resource Lack	**25**	**1**	**23.17**	**19**
	Treatment refusal			**12.19**	**10**

DISCUSSION

The results showed that the majority of study subjects with SAMM were within the age of 18-28 years with 78.04% (n=64) subjects followed by 12.19% (n=10) subjects from 29-34 years, and at least 9.75% (n=8) older than 35 years. Mortality was also highest in the age group of 18-28 years with 50% (n=2) reported deaths. 75% (n=3) deaths were in nulliparous females, whereas, SAMM was seen in 40.24% (n=3) in nulliparous and females with single parity. Concerning gestational age, it was seen that 50% (n=2) deaths were in females in gestational age of ≥ 34 & < 37 and 25% (n=1) death each in ≥ 37 & ≤ 42 weeks and post-delivery females. These characteristics were following the samples of Roopa S et al[6] in 2013 and Roost M et al[7] in 2009 where similar demographics and gestational age were similar to the present study.

The presenting complaints for admission to hospital concerning SAMM were vaginal discharge, Abdominal pain, Convulsion, Blurred vision, Headache, Syncope, Vaginal bleeding, fever, limb swelling, unconsciousness, chest pain, breathlessness, and epigastric pain/burn reported respectively by 7.31% (n=6), 28.04% (n=23), 6.09% (n=5), 4.87% (n=4), 17.07% (n=14), 3.65% (n=3), 18.29% (n=15), 7.31% (n=6), 15.85% (n=13), 1.21% (n=1), 1.21% (n=1), 2.43% (n=2), and 1.21% (n=1) subjects. Maternal death in these subjects were owed to chief complaint of abdominal pain in 75% (n=3) and breathlessness in 25% (n=1) female. The death reported in the 4 study females were all attributed to underlying medical causes. These findings were similar to Oladapo OT et al[8] in 2005 and Ali et al[9] in 2011 where underlying disorders reported were hypertension, sepsis and haemorrhage.

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In the present study, a total of 26 subjects required intensive care where 4 subjects died and 22 survived near-miss cases. The etiology of 4 deaths was due to 50% (n=2) deaths each from cardiac and respiratory etiology in females with the gestational age of 30.10±2.14 weeks and 25.7±1.3 years of age. In near-miss cases, the reason for admission to ICU were surgical, haemorrhage, hypertension, cardiac, respiratory, and others in 4.54% (n=1), 40.90% (n=9), 31.81% (n=7), 9.09% (n=2), 9.09% (n=2), and 13.63% (n=3) study subjects respectively. These females had a mean age of 25.76±1.71 years and gestational age of 30.10±2.14 weeks. The mean ICU duration stays in females was 4.1±1.2 days and 3.56±0.84 days respectively in maternal death and SAMM cases. These results were in agreement with the studies of Strand K et al[10] in 2008 and Lapinsky S et al[11] in 2011 where comparable data concerning ICU, to the similar study was demonstrated by authors.

Three main factors found responsible were healthcare factors, transport factors, and personal/family factors. Concerning deaths, one death each (25%) was contributed to health care factor (human resources lack) and transport lack (to health centers), and two deaths (50%) were due to personal family factors (1 each from resource and awareness lack). Near-miss cases were 34.14% (n=28) due to compromised transport facility. For health care factors 1.21% (n=1), 20.73% (n=17), 1.21% (n=1), and 6.09% (n=5) were respectively due to Obstetric care lack, human resources lack, anesthesia lack, and expertise lack. findings correlated well with the findings of Lawton B et al[12] in 2014 and Shreshtha N et al[13] in 2010 where similar factors were found responsible for death and SAMM cases by the authors.

CONCLUSION

Within its limitations, the present study concludes that severe acute maternal morbidity affects significant females and is the leading cause of maternal death. The most common factor associated with SAMM is in the present study was hypertension leading to morbidity followed by hemorrhage, whereas, leading causes for morbidity were respiratory and cardiac causes. Continuous monitoring of pregnant females and identification of the contributory factors is necessary to prevent mortality and morbidity in high SAMM risk females. The study had few limitations including geographical area bias, smaller sample size, and a short monitoring period. Hence, more longitudinal studies with a longer monitoring period and larger sample size are required to reach a definitive conclusion.

REFERENCES

1. Bibi S, Ghaffar S, Memon S, Memon S. Severe acute maternal morbidity (SAMM) in postpartum period requiring tertiary Hospital care. Iran J Reprod Med . 2012;10:87–92.
2. Kim, MK, Lee, SM, Bae, SH, Kim, HJ, Lim, NG, Yoon, SJ, et al. Socioeconomic status can affect pregnancy outcomes and complications, even with a universal healthcare system. Int J Equity Health. 2018;17:2.
3. Chhabra P. Maternal near miss: an indicator for maternal health and maternal care. Indian J Community Med. 2014;39:132–7.
4. Kalhan M, Singh S, Punia A, Prakash J. Maternal near-miss audit: lessons to be learnt. Int J Appl Basic Med Res. 2017;7:85–7.
5. Filippi V, Chou D, Ronsmans C, et al. Levels and causes of maternal mortality and morbidity. In: Black RE, Laxminarayan R, Temmerman M, et al. (eds) Reproductive, Maternal, Newborn, and Child Health. Disease Control Priorities, 3 edition, volume 2. Washington, DC, 2016, pp. 51–70.
6. Roopa PS et al ‘‘Near Miss’’ Obstetric Events and Maternal Deaths in a Tertiary Care Hospital: An Audit. Journal of Pregnancy, 2013;393758.

ISSN 2515-8260 Volume 08, Issue 04, 2021

7. Rööst M, Altamirano VC, Liljestrand J, Essén B: Priorities in emergency obstetric care in Bolivia–maternal mortality and near-miss morbidity in metropolitan La Paz. BJOG. 2009;116: 1210-17.
8. Oladapo OT, Sule-Odu AO, Olatunji AO, Daniel OJ: "Near miss" obstetric events and maternal deaths in Sagamu, Nigeria: a retrospective study. Reprod Health. 2005;2:9.
9. Ali AA, Khojali A, Okud A, Adam GK, Adam I: Maternal near-miss in a rural hospital in Sudan. BMC Pregnancy Childbirth. 2011,29:11-48.
10. Strand K, Flaatten H. Severity scoring in the ICU: a review. Acta Anaesthesiol Scand 2008;52:467–78.
11. Lapinsky SE, Hallett D, Collop N, Drover J, Lavercombe P, et al. Evaluation of standard and modified severity of illness scores in the obstetric patient. J Crit Care. 2011;26:1–7.
12. Lawton B, MacDonald EJ, Brown SA, et al. Preventability of severe acute maternal morbidity. Am J Obstet Gynecol 2014;210:1-6.
13. Shrestha NS et al. Near miss maternal morbidity and maternal mortality at Kathmandu Medical College Teaching Hospital. Kathmandu University Medical Journal 2010;8:222-6.