

Prospective assessment of mental and physical health of maternal near-miss women: A low-middle-income country's experience

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ABSTRACT

Background: Traumatic birth experience is an unaddressed arena, especially in Asian women, with several societal stigmas lingering around. **Aim:** A study was undertaken to simultaneously assess the post-partum mental and physical health follow-up of maternal near-miss (MNM) women and compare it with women of uneventful deliveries. **Materials and Methods:** The prospective cohort study enrolled 88 MNM women (case cohort) and 80 women with an uneventful peri-partum period (control cohort) at the same time. The participants were followed up with Edinburgh Postnatal Depression Scale (EDPS), PTSD Checklist - Civilian Version (PLC-C), and a 36-item short-form-survey form over 6 months after the delivery. **Results:** The case group had higher mean EPDS and PLC-C scores, with poor quality of life (QOL) performance, compared to the control group at 6 weeks and 3 months, and 6 months follow-up ($P < 0.05$). At the sixth-week follow-up visit, the study observed that 28 (31.8%) women from the case group required a psychiatry consultation compared to the control group with only two (2.5%) participants ($P < 0.001$). At 3 months, an evident difference was noted on various QOL parameters, such as limitations due to physical health and emotional problems, energy fatigue, general health, and health change parameters between the two groups ($P < 0.05$). The difference persisted at 6-month follow-up as well for limitations due to physical health, energy fatigue, and general health parameters only ($P < 0.05$). **Conclusion:** There is an urgent need for a multi-departmental collaborative approach at the hospital level and policy-making decisions at higher levels for the mental health of Asian women facing MNM events.

Keywords: Low-middle-income country, maternal near miss, mental health, prospective study, quality of life, tertiary care hospital

Introduction

World Health Organization (WHO) defines a maternal near miss (MNM) as any female patient who survived a deadly situation that occurred during the peri-partum period. The causes of MNMs have evolved over the years, ranging from

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hemorrhage, sepsis, hypertensive disorders, peri-partum infections, and complications such as multi-organ dysfunction syndrome (MODS), liver disease, renal disease, or uterine dysfunction.^[1] Besides the medical conditions leading to an MNM, there could be non-medical causes. These include inadequate human resources, delay in seeking help, delay in referring patients (particularly with high-risk pregnancy), deficiency of necessary instrumentation/medicines/blood products, scarcity of transfer services, economic burden, and missing awareness of the MNM danger signs by caregivers.^[2] Life-threatening events

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related to pregnancy and delivery can have long-lasting effects on the mothers even after their primary condition has been managed.^[3] Physical health, being more evident, typically receives more attention, while mental health usually remains ignored.^[4] Mental ill health propels into deterioration of the quality of life (QOL) and well-being of the affected woman and her family. Mental health aspects that are especially relevant in the setting of a severe obstetric illness include post-partum depression (PPD) and post-traumatic stress disorder (PTSD).^[5]

Several studies are available touting PPD as a leading cause of mental health morbidity among women who have had an apparently normal pregnancy and puerperium.^[6] However, not many of these consider patients who had a critical event in the peri-partum period (Oates, 2003). This MNM population is especially vulnerable to PPD, which may lead to these women being handicapped when caring for themselves and their newborns. Similarly, a severe obstetric outcome is a stressor, which can lead to PTSD in MNM cases.^[7]

While significant progress has been made worldwide to reduce maternal mortality, there is still a long way to go before a difference in maternal morbidity (both physical and mental) is made among women who have faced MNM events. Studies must assess the prevalence of adverse mental health issues among MNM women and ensure early and adequate preventive psychiatry, family medicine, and primary care type support.^[2] Hence, the present work was planned to assess long-term impacts on the affected women's mental and physical health.

Materials and Methods

The study was carried out in the Obstetrics and Gynecology department of a tertiary-level postgraduate teaching hospital in northern India. The hospital is a referral center with >7000 deliveries per year. Most patients are complicated referrals from the various states of northern India. This ensured a diverse study population, enrolling women with severe obstetric complications. Eighty-eight women, fulfilling the MNM diagnosis as per WHO criteria in the emergency obstetric ward were recruited at the time of hospital discharge. During the same period, 80 women who had a normal peri-partum period at the same institute were recruited as the control group. The inclusion criteria for recruitment for the study were the WHO MNM criteria and willingness to follow up at the institute for 6 months in addition to uneventful delivery patients available at the same time. Written informed consent was taken from both the case and control groups; only women who consented were followed up in the present report. Excluded women were those who did not consent or those who died within 42 days of the post-partum period.

The women in each cohort (case and control) were asked to attend an MNM clinic in the hospital. Mental health was assessed at 6 weeks, 3 months, and 6 months post-discharge, in terms of PPD and post-traumatic stress disorder (PTSD) assessments, using the EPDS questionnaire and PTSD Checklist – Civilian

Version (PCL-C) scoring. The participants' QOL was evaluated at 3 months and then at 6 months, with the help of standardized score systems, in collaboration with the Department of Psychiatry in the same institute. We used the 36-Item Short Form Survey (SF-36) questionnaire. The SF-36 is a validated instrument that measures the participants' health condition and their health-related QOL. Women whose scores were higher than the cut-off were offered psychiatry support.

Ethical consideration

The study abided by the Declaration of Helsinki. The PGIMER Chandigarh intramural institutional ethics committee (IEC) approved the study.

Sample size calculation

We assumed a bad outcome of 20% and 5% in the case and control groups, respectively, with the error margin set at 5% and a power of 80%. As the estimated sample size was 75 per group, we planned to enrol at least 5% more patients in each group.

Statistical analysis

The SPSS version 22 software used for statistical analysis. Chi-square and student t-tests were conducted to compare the qualitative and continuous data. $P < 0.05$ was considered as statistically significant.

Results

The participants' demographic and obstetric profiles are mentioned in Table 1. The average age of the participants was 26 years, comparable in both groups. A lesser education level was observed in the case cohort compared to the control,

Table 1: Demographic and obstetric profile of the study participants

	Cases, n=88(%)	Controls, n=80(%)
Demographic variables		
Age groups		
<20	8 (9)	20 (25)
20-25	19 (21.5)	37 (46.2)
26-30	29 (32.9)	18 (22.5)
31-35	22 (25)	5 (6.3)
>35	10 (12.5)	0
Education		
Graduate	13 (14.8)	23 (28.8)
High	28 (34)	44 (55)
Middle	11 (11.2)	7 (8.8)
Primary	14 (15.9)	2 (2.5)
Illiterate	22 (25)	4 (5)
Obstetrics profile (Parity)		
No term birth	1 (1.1)	0
Primipara	26 (29.5)	28 (35)
Multipara; 2 living kids	29 (32.9)	32 (40)
Multipara; 3 living kids	19 (21.6)	20 (25)
Multipara; >3 living kids	13 (14.8)	0

with 25% of illiterate participants from cases and 5% from the control arm.

Out of the 88 MNM participants recruited in the case group, 68 (77%) participants were diagnosed in the antenatal period, while 20 (23%) faced life-threatening complications in the post-partum period. Out of the 68 antenatal MNM patients, 58 (85%) had MNM events in the third trimester, and 10 (15%) patients were diagnosed as MNMs in the first and second trimesters. In the case group, 65 (74%) participants received antenatal care, 14 women had less than three antenatal visits, and nine patients had no antenatal visits. In contrast, in the control group, 79 (99%) women had at least three antenatal visits. The average hospitalization duration was longer for case group participants (16.4 days), as against the control (4.05 days) ($P < 0.05$). Twenty-six case group women required admission in the ICU facility. The mean ICU stay duration was 4.1 days in the case group, but none from the control group required ICU admission.

Obstetric diagnosis

In the case group, the underlying obstetric conditions included pregnancy-induced hypertension in 15 (17%), placenta accreta syndrome in 23 (26%), and post-partum hemorrhage in 22 (25%). The complications, such as acute fatty liver of pregnancy, peri-partum cardiomyopathy, H1N1 infection, and hepatitis E infection, were seen in 12 (13.6%) case group participants. Three participants had post-abortion/puerperal sepsis, requiring surgical intervention to treat uterine perforation; two patients had gut injuries due to septic abortions, and one had pyoperitoneum, requiring a laparotomy. Two patients presented with non-pregnancy-related surgical complications in the form of obstructed hydrocephalus due to a glioma in one patient and an amoebic liver abscess in another. Pre-existing medical conditions were observed in 11 (12.5%) case group participants. These included chronic hypertension [3 (3.4%)], chronic kidney disease [3 (3.4%)], heart disease [2 (2.2%)], diabetes [1 (1.1%)], systemic lupus erythematosus [1 (1.1%)], and Budd Chiari syndrome [1 (1.1%)].

In the control group, 27 (34%) women suffered from hypertensive disorders of pregnancy, 15 (19%) from intrahepatic cholestasis of pregnancy, and 8 (10%) from gestational diabetes. Pre-existing medical conditions were noted in six (6.8%) patients, including diabetes mellitus [1 (1.2%)], heart disease [1 (1.2%)], chronic hepatitis C [1 (1.2%)], systemic lupus erythematosus [1 (1.2%)], carcinoma thyroid [1 (1.2%)], and hypothyroidism [1 (1.2%)]. One (1.2%) control group participant had placenta previa, and another (1.2%) had placenta accreta syndrome. Eleven (13.7%) patients had a fetal growth restriction with no maternal complication, and nine (11.2%) had an uncomplicated pregnancy.

Mode of delivery

In the case group, vaginal birth occurred in 34 (39%) women, accounting for approximately one-third of the participants. A peri-partum hysterectomy was performed for seven patients

who presented with an uncontrollable post-partum hemorrhage. Twenty-four (27.2%) patients delivered via lower-segment cesarean section, out of which two (2.2%) underwent a peri-partum hysterectomy, due to an uncontrollable post-partum hemorrhage. Twenty-three (26%) patients underwent a classical cesarean section, followed by peri-partum hysterectomy for placenta accreta syndrome. There were 7 (8%) abortions in this group, one needing a peri-partum hysterectomy due to an irreparable uterine perforation.

Forty-seven (58.7%) control group participants underwent a vaginal delivery, and 31 (38.7%) had a lower-segment cesarean section. One control group participant underwent a classical cesarean section, followed by a hysterectomy for placenta accreta syndrome, and one had a first-trimester abortion.

Two patients died in the case group before completing the 6-month follow-up visit. One could not afford dialysis for acute renal failure after being discharged from the hospital, while another patient was diagnosed with a glioma during pregnancy and was scheduled for neurosurgery. There were no deaths in the control group.

PPD findings

At six weeks, a higher mean EPDS score was noted among the case group participants as against the control ($P < 0.001$). The trend continued at the 3-month and 6-month visits ($P < 0.001$). At the sixth-week follow-up visit, the study observed 28 (31.8%) women from the case group bearing a score of more than 10, requiring psychiatry consultation. However, in the control group, only two (2.5%) women required psychiatry consultation ($P < 0.001$). The trend continued at the 3-month follow-up visit, showing seven women in the cases versus one in the controls ($P = 0.06$). None of the women in either group has a score of >10 at the sixth-month follow-up assessment [Table 2].

PTSD findings

The mean PCL-C score was higher for the case group at all three assessments, with a significant difference at 6 weeks and 3 months ($P < 0.001$). However, at 6 months post-partum, the difference between two cohorts remained statistically insignificant ($P = 0.6$).

Quality of life findings

At 3 months, a statistically significant difference was noted on various parameters such as limitations due to physical health and emotional problems, energy fatigue, general health, and health change parameters between the two groups ($P < 0.05$). At 6 months, the difference was noted for limitation due to physical health, energy fatigue, and general health parameters only ($P < 0.05$) [Table 3].

Neonatal feeding

At 6 weeks, 78% of the case group patients exclusively breastfed their neonates, compared to 98% of the control group ($P < 0.05$).

At 3 months, 84% of the case group patients were exclusively breastfeeding, compared to 93% of the control group. At 6 months, there was a further fall in the exclusive breastfeeding rates in both the case and control groups. Only 43% of babies in the case group were exclusively breastfed at 6 months, while more than 50% had mixed feeds. About 60% of the babies in the control group were still exclusively breastfed at 6 months.

Neonatal intervention for failure to thrive was needed for six infants in the case group at 6 weeks. Two of those six infants at 3 months also continued to require intervention for poor weight gain. However, none of the infants in the case group needed such an intervention at 6 months. In the control group, none of the babies needed intervention for failure to thrive at 6 weeks, 3 months, and 6 months. Two babies in the control group needed surgery for a cleft lip, and two needed treatment for scabies. Immunization rates were similar in both the case and control groups.

Sub-group analysis of maternal near-miss patients

MNM patients with cardiovascular co-morbidity showed the highest EPDS score and psychiatric consultation need among

all co-morbid patient (patients with renal, hepatic, uterine, neurological, respiratory, cardiovascular, and hematological dysfunction) pools ($P < 0.05$). There was no significant difference with duration of hospitalization and ICU care among the co-morbid sub-groups [Table 4].

Discussion

The present study showed a stark difference in the mental health status of women who faced life-threatening complications during childbirth and the post-partum period in terms of PPD, PTSD, and changes in the QOL. The study concluded that severe obstetric complications caused extensive damage to the mother's mental health, which continues long after discharge from the hospital. This health aspect often gets neglected, which can lead to long-term complications.^[6]

In the present study, a higher number of the case group participants needed psychiatric intervention for PPD compared to the control group. Alluvala *et al.* used the same screening tool in their study and found a higher prevalence of PPD among MNM patients.^[8] Similar findings were also reported in studies conducted in the Burkina Faso and Benin regions. The MNM women in these regions reported more negative feelings and a lack of self-esteem up to a year post-partum. They had higher healthcare service utilization than the uncomplicated labor and delivery groups.^[9] Abdollahpour *et al.* summarized that the risk of depression in the MNM group was twice compared to the non-MNM group. Due to an increased risk of PPD in women with a severe obstetric outcome, they recommended implementing a routine screening program for these women.^[10] It is the need of the hour for Asian women against the background of disadvantaged societal positions, the prevalence of domestic violence, multiple role expectations, relatively reduced access to education, and other circumstances such as these.^[11,12]

The present study found a significant difference in the mean values for PTSD between cases and control groups at 6 weeks and 3 months. However, no woman in either of the groups needed pharmacological intervention for PTSD. A study by Angeline *et al.* on 1157 MNM patients and control group participants evaluated the prevalence of PTSD among these women using PCL-C scores. The same study did not find an association between severe maternal

Table 2: Mental health evaluation in two study groups

PPD Parameters	Cases, n=88	Control, n=80	
At 6 weeks follow-up visit			
Average EPDS score	7.545±3.99	4.3±1.39	$P < 0.001$
Psychiatric evaluation needed for postpartum depression (cut-off score >10)	28	2	$P < 0.001$
Average PLC-C score	3.62±3.51	1.07±1.22	$P < 0.001$
At 3 months follow-up visit			
Average EPDS score	5.89±2.57	3.82±1.25	$P < 0.001$
Psychiatric evaluation needed for postpartum depression (cut-off score >10)	7	1	$P < 0.001$
Average PLC-C score	2.75±0.20	2.46±0.43	$P < 0.001$
At 6 months follow-up visit			
Average EPDS score	4.39±1.03	1.33±1.08	$P < 0.001$
Psychiatric evaluation needed for postpartum depression (cut-off score >10)	0	0	$P < 0.001$
Average PLC-C score	1.122±1.34	1.02±0.90	$P < 0.001$

The $P < 0.05$ was assumed significant; Data represented as mean±standard deviation

Table 3: Three and 6 months follow-up assessment on SF-36 scale

SF-36 sub-section specific mean scores	At 3 months follow-up visit			At 6 months follow-up visit		
Physical health	72.23±16.6	86.52±16.7	0.000	80.2±8.7	84.2±14.8	0.033
Role limitations due to physical health	53.99±11.8	73.45±11.8	0.000	66.5±16.5	69.8±20.9	0.325
Role limitations due to emotional problems	76.53±21.6	84.93±21.6	0.005	79.7±20.8	82.8±17.9	0.319
Energy fatigue	42.03±9.3	51.98±9.3	0.000	44.1±8.8	48.2±11.5	0.029
Emotional well being	65.44±13.9	68.21±13.9	0.161	65.9±11.2	67.3±14.1	0.508
Social functioning	78.62±10.8	79.93±10.8	0.475	78.6±10.9	79.4±14.5	0.705
Pain	70.41±6.3	71.35±6.4	0.435	70.3±6.3	70.9±11.5	0.661
General health	38.17±5.6	78.85±5.7	0.000	39.6±6.2	76.3±13.2	0.000
Health change	32.43±20.6	43.12±20.6	0.001	38.8±19.9	43.3±17.6	0.207

$P < 0.05$ assumed significant. Data represented as mean±standard deviation

Table 4: Subgroup analysis of maternal near-miss patients in the “cases” group

Organ-specific comorbidity	Uterine dysfunction	Renal	Hepatic	Neurological	Respiratory	Cardiovascular	Hematological	P
Number of patients (%)	33 (37.5)	15 (17)	6 (6.8)	13 (14.7%)	4 (4.5)	9 (10.2%)	8 (9)	NA
Duration of Hospitalization	17.36±13.6	24.1±22.0	15.7±5.9	12.8±6.5	13.8±7.1	13.8±8.7	7.88±2.5	0.13
Duration of intensive care unit stay	0.64±1.6	2.5±7.9	0.67±1.6	1.23±1.7	2.5±4.4	1.44±2.0	0.25±0.7	0.69
Post-postpartum depression assessment using EPDS score at 6 weeks								
EPDS score	8.1±4.5	8.2±3.4	7.17±5.0	6.62±4.1	8.5±4.0	13.8±8.7	6.25±3.2	0.02*
Psychiatric evaluation needed in-EPDS score	13 (15%)	4 (4.5%)	2 (2.2%)	2 (2.2%)	2 (2.2%)	4 (4.5%)	1 (1.1.%)	NA
EPDS score	6.1±2.9	7.1±2.6	4.8±1.1	5.61±2.9	5.25±0.9	6.67±3.1	5.25±2.2	0.51
Psychiatric evaluation needed in-EPDS score	2 (2.2%)	2 (2.2%)	0	0	0	2 (2.2%)	1 (1.1.%)	NA
EPDS score	4.39±1.2	4.6±0.9	4±1.4	4.1±0.7	4.5±0.7	4.7±1.0	3.1±2.0	0.09
Psychiatric evaluation needed in-	None							

*P<0.05 was assumed significant; Data represented as mean±standard deviation, and patient number with percentage in brackets. # One patient each died in renal and neurological organ dysfunction co-morbidity category

morbidity (SMM) and PTSD. However, the authors said women who faced SMM suffered a traumatic experience and needed counseling and support.^[13] According to Slomian *et al.*, a traumatic birth experience hinders physical recovery. It leads to depression, PTSD, and anxiety in the mothers, which can lead to durable implications that affect the well-being of the infant, mother, and family.^[14] Abdollahpour *et al.* observed that a critical peri-partum event, leading to severe maternal morbidity, can trail to mental issues.

The third component in the current study evaluates the psychological health of the participants. SF-36 evaluates the QOL using nine sub-categories. In present study, the cases scored poorly compared to the control group across all nine categories. The scores were especially low in the general health and health change categories at 3 months and 6 months, suggesting that an MNM event has long-lasting effects on the general health of the patients. Significant score differences between cases and controls were also observed for physical health and limitations, role limitations due to emotional health, and energy fatigue. Patients described limitations in physical activities as the inability to climb a flight of stairs, emotional problems with social activities, mild body pain, and interference of pain with their daily activities. The effect on physical health was most likely due to the residual after-effects of the MNM condition on the woman's body. Assarag *et al.* listed complicated delivery, a low socio-economic status, psychological disorders during pregnancy, and a history of psychological disorders as the causative factors for increased psychological stress and poor QOL among MNM women.^[15] Alluvala *et al.* used the WHO-QOL BREF questionnaire to assess the QOL of MNM women; it revealed a miserable QOL in the case cohort, strengthening the necessity for mental aid among these women.^[8] A recent study by Alemu *et al.* saw a positive effect of social support on the QOL of an MNM survivor. It may be attributed to the stress-buffering effect of social support, which allows these women to cope with stressful events more effectively; social support includes resources and support from people within their social environment.^[16]

The loss of an organ, as in a hysterectomy (done for managing an MNM condition or an adverse pregnancy outcome such as stillbirth, abortion, or neonatal death), may appear to affect the mental health of the MNM women significantly. Within the

present study, a sub-group analysis was done to evaluate three aspects of mental health (depression, PTSD, and QOL) among MNM women who underwent a peri-partum hysterectomy or had an adverse pregnancy event. However, no significant difference could be established between the groups within the MNM case cohort, although mean scores for EPDS and PCL-C were higher in the cases group with perinatal and organ loss. It may be because these women realized that they had faced a life-threatening MNM event and that losing an organ was more acceptable than losing their life. As this realization may be due to the immediate shock of the MNM situation, profound mental ill-health issues may become apparent after that effect wears off over time. The finding was supported by observations of Pilli *et al.*^[16] In contrast, Alluvalla *et al.* noted a higher frequency of depression, with suicidal thoughts, in roughly 30% patients with perinatal loss.^[8] Dela Cruz *et al.* stated that women who have had a peri-partum hysterectomy needed follow-up visits and psychological support for up to 3 years after the event. None of the women in their study who had a peri-partum hysterectomy were satisfied with the single post-partum visit in the sixth or eighth week.^[17] This re-addresses the fact that mental health issues stem from MNMs and their sequelae (peri-partum hysterectomy and adverse pregnancy event) may surface in the initial few months following the event, making cases for a more extended follow-up period for these women. In agreement with Alluvala *et al.* and Abdollahpour *et al.*, the present study suggests an action need in the present-day hospital management algorithms,^[18,19] which center to a great extent on early pregnancy care with a short length of post-partum attention.^[8,10]

The study's novelty lies in conducting a prospective analysis of MNM women to assess their long-term physical and mental health status with follow-ups up to 6 months post-partum. It is also the first study carried out in a tertiary-care center in a developing country, allowing us to identify the mental health needs of MNM women. The study found that women affected by MNM events continued to suffer significantly more mental morbidity even after being discharged from the hospital.

Limitations

Present findings may require validation in tertiary-care hospitals in different parts of Southeast Asian countries and India.

However, studying this critical issue, with several lingering stigmas, is a brave attempt.

Conclusion

There is an urgent need for a multi-departmental collaborative approach at the hospital and primary care level with policy-making decisions at higher levels for the mental health of Asian women facing MNM events. The mental health support may be in the form of bereavement clinics for women with an adverse pregnancy outcome or a psychiatric evaluation carried out at a pre-determined time after the MNM event.

Disclosure statement

The authors declare that they have no conflicts of interest.

Ethical approval

This study was approved by the PGIMER Chandigarh review board (Intramural institutional ethics committee).

Human and animal rights statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Conflicts of interest

There are no conflicts of interest.

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