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Original Article

Prevalence of Maternal Near-Miss in Damietta Governorate

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Abstract

Background: Maternal near misses [MNMs] were classified according to different criteria and were used for a number of years as a reliable instrument for assessing maternal health problems. However, this resulted in inconsistent estimates of the incidence of MNMs.

Aim of the study: This study aimed to assess the prevalence of maternal near-miss and maternal mortality causes in Damietta Governorate.

Patients and Methods: This cross-sectional study included 295 pregnant females who were recruited from the Obstetrics and Gynecology emergency room and outpatient clinic at Al-Azhar University Hospital and general hospitals in Damietta governorate. All pregnant women underwent complete medical, gynecological, and obstetric history taking, general and local pelvi-abdominal examinations, routine laboratory investigations, and pelvi-abdominal ultrasound. The total number of MNMs and maternal deaths [MDs] were recorded during the study period.

Results: In all, 295 pregnant women were enrolled in the study. Their mean age was 27.186 ± 6.1 years, ranging from 18 to 44 years. Their mean gestational age was 35.4 ± 4.2 weeks, ranging from 15 to 42 weeks. Of these pregnant women, 35 [11.86%] had complications; 30 of the 35 sick women [85.71%] were MNMs, and 5 [14.29%] were MDs. Hepatic problems accounted for 42.90% of complications in pregnant women with morbidities, followed by neurologic problems [40%], respiratory problems [34.30%], cardiovascular problems [22.9%], coagulation problems [20%], uterine problems [17.1%], and renal problems [11.4%].

Conclusion: The WHO MNM criteria are important for the evaluation of care. Hemorrhage, preeclampsia and multi-organ failure are the main causes of death and MNM.

Keywords: Maternal Near-Miss; Maternal Deaths; Pregnancy; Preeclampsia.

INTRODUCTION

Worldwide maternal death rates are on the decline, and women are facing an increasing number of potentially fatal obstetric complications, especially in low- and middle-income countries [LMICs] [1]. In low- and middle-income countries [LMICs], there are approximately thirty women who survive a potentially fatal obstetric complication known as a maternal near miss [MNM]. Despite the fact that care for women following MNM typically ends when they are discharged from the hospital, the effects of maternal near miss might last a lifetime [2]. The effects are typically multifaceted, including socioeconomic, mental, and physical elements of functioning [3].

Maternal morbidity has been compared to the base of the iceberg, and maternal deaths to its tip. For example, for every pregnancy-related death, 20 to 30 other women suffer acute or chronic morbidity [including maternal near-miss], frequently with long-term consequences that impair their ability to function normally [4]. Because it happens more frequently than maternal mortality, maternal morbidity is a more significant indicator for the examination of obstetric care [5].

Maternal Near Miss [MNM] is defined as "a woman who nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy," by the World Health Organization [WHO] [6]. It was calculated by deducting the number of women who passed away from life-threatening illnesses from the total number of women having those conditions. Different parts of the world have different rates of MNM. It is most common in Asian and African nations, with a significant concentration in middle-class and lower-class countries [7]. A condition known as an obstetric near-miss [NM] occurs when a mother might have perished if she had not received high-quality medical attention. We can gain a better understanding of the conditions and preventable factors that lead to maternal deaths by speaking with women who experience severe morbidities throughout pregnancy, childbirth, and the postpartum period. The three primary categories of criteria used by the WHO to identify NM cases are clinical criteria, intervention-based criteria, and process-based criteria [8].

For numerous years, maternal near misses were employed as a reliable technique for evaluating maternal health issues that were characterized using different criteria, resulting in varying estimates of their incidence. WHO recommended a new categorization with 25 criteria based on the existence of organ and system dysfunction [cardiovascular, respiratory, renal, hepatic, neurologic, coagulation, and uterine] [9]. So, this study aims to assess the prevalence of maternal near-miss and maternal mortality causes in Damietta Governorate.

PATIENTS AND METHODS

This cross-sectional study included 295 pregnant females who were recruited from the Obstetrics and Gynecology emergency room, outpatient clinic at Al-Azhar University Hospital and general hospitals in Damietta governorate during the period from January 2022 to December 2023. Our study followed the Helsinki declaration principals. Ethical approval was obtained from the institutional review board of Damietta faculty of medicine, Al-Azhar University. Written informed consent was obtained from every patient at the time of recruitment. Patients were diagnosed as MNM based on the WHO criteria [10]. The exclusion criteria were: 1] Non pregnant females. 2] Women less than 15 years old and more than 45 years old. 3] Women with severe chronic illness.

Data collection

All pregnant women underwent complete medical, gynecological, and obstetric history taking, general and local pelvi-abdominal examinations. Routine laboratory investigations were also done including CBC, ABO/RH, renal function test, liver function test, and the coagulation profile. Pelvi-abdominal Ultrasound was done for every woman. Data of current pregnancy were collected including Type of labor [spontaneous, induction or instrumental], Duration of labor, Type of delivery [NVD or CS], and Complications at any stage.

Outcome measures

The total number of MNM and MDs at the hospital during the study period. The incidence of MNM and MMR. Any intervention procedures not usually used prenatal, intrapartum and postnatal care.

Statistical analysis

Data were imported into Statistical Package for the Social Sciences [SPSS version 20.0] [Statistical Package for the Social Sciences] software for analysis. The normality of the data was tested by the Kolmogorov-Smirnov test. Qualitative data were presented as numbers and percentages and were compared by the Chi square test, while quantitative data were presented as mean and standard deviations and were compared by the independent t test. As a result, the p-value will be considered significant at the level of <0.05.

RESULTS

A total number of 295 pregnant females were included in our study. Their age ranged between 18-44 years with a mean value of 27.186 ± 6.1 years. Their gestational age ranged between 15 - 42 weeks with a mean value of 35.4 ± 4.2 weeks. From those pregnant females, 35 [11.86%] develop morbidity, 30 out of 35 morbid females [85.71%] were MNM and 5 [14.29%] were MDs [Table 1].

The mean age of females with morbidity was 30.11 ± 8.76 years and the mean GA was 32.77 ± 6.25 weeks. Pregnant females who developed morbidity have statistically significant lower age and lower GA than pregnant females who did not developed morbidity. In terms of vital and laboratory data, Pregnant females who developed morbidity have statistically significant higher systolic and diastolic blood pressure than pregnant females who did not developed morbidity [P = 0.001]. Also, pregnant females who developed morbidity have statistically significant elevated liver function than pregnant females who did not developed morbidity [P =0.001] [Table 2]. Among females with morbidity 31.4% have history of previous CS, 48.65 have history of previous complicated pregnancy, 54.3% have anemia while DM and HTN were detected in 34.3% for each. Pregnant females who developed morbidity have statistically significant higher previous CS rate, previous complicated pregnancy, DM, HTN and anemia than pregnant females who did not developed morbidity [P >0.05 for all]. Among the 35 females with morbidities, 45.7% were referred from other places, 17.1% were referred from the Ministry of Health [MOH] hospitals, 17.1% were referred from private hospitals, 11.43% were referred from private clinics, and 8.6% were referred from home. Out of the 260 non-morbid females, 50% were referred from other places, 24.23% were referred from the

Ministry of Health [MOH], 9.62% were referred from private hospitals, 10.38% were referred from private clinics, and 5.77% were referred from home. The chi-square test results do not indicate a statistically significant difference in referral rates between non-morbid and morbid females [P<0.05]. As regards the pregnancy termination, among females with morbidity 22.9% were delivered via NVD, 71.40 were delivered CS while 5.7% were abortion. Pregnant females who developed morbidity have statistically significant higher CS rate than pregnant females who did not developed morbidity [P=0.001] [Table 3]. According to the life-threatening conditions, the most frequent life-threatening conditions in pregnant females with morbidities was preeclampsia in 34.30% followed by post-partum hemorrhage and multi organ failure in 17.10% for each, then 72 eclampsia & sepsis in 8.6% for each then ectopic pregnancy in 5.7% and lastly rupture uterus in 2.9% [Table 4]. The most frequent intervention procedures in pregnant females with morbidities was blood transfusion in 42.90%followed by ICU admission in 22.90% then D & C after incomplete abortion in 14.30% then laparotomy in 8.6%, and lastly hysterectomy was done in 2.8% of patients [Table 5]. As regards the complications, the most frequent complications in pregnant females with morbidities was hepatic in 42.90%followed by neurologic in 40% then respiratory in 34.30%, CVS in 22.9%, coagulation in 20%, uterine in 17.1% and lastly renal in 11.4% [Table 6].

Table [1]: Demographic and clinical data of the included participants.

Variables		Values
Age [years]	Mean ± SD	27.2 ± 6.1
	Range	18 - 44
GA [weeks]	Mean ± SD	35.4 ± 4.2
	Range	15 - 42
Clinical outcomes. N [%]	Morbid women	35 [11.8%]
	MNM	30 [85.7%]
	MDs	5 [14.2%]

Table [2]: Comparison between the morbid and none morbid pregnant females as regards clinical outcomes.

Variables	Morbid females [N=35]		Non-Morbid females [N= 260]		P value
	Mean	SD	Mean	SD	
Age [years]	30.1	8.7	26.7	5.5	0.03*
Gestational age [weeks]	32.7	6.25	35.7	3.75	0.009*
HR beat/min	97.8	4.67	78.62	6.41	0.176
RR cycle/min	17.4	0.98	17.35	0.86	0.453
Temperature	37	0.24	36.98	0.21	0.091
Systolic BP	126.86	23.55	108.58	8.08	0.001*
Diastolic BP	80.86	12.63	70.87	4.66	0.001*
Hb gm/dl	10.49	0.92	10.25	1.00	0.174
HCT	33.29	3.50	33.48	3.26	0.756
WBCs $x10^3/mm^3$	8.16	0.44	8.11	0.49	0.479
Platelets $x10^3/mm3$	301.46	21.01	300.17	24.03	0.740
ALT IU	32.11	20.18	20.25	4.95	0.001*
AST IU	40.63	23.01	27.37	5.34	0.002*
Urea mg/dl	28.93	17.42	25.37	2.82	0.235
Creatinin mg/dl	0.75	0.36	0.71	0.11	0.445

Table [3]: Risk factors in pregnant females with and without morbidities

Variables		Morbid females [N=35]		Non-Morbid females [N= 260]		P value
		N	%	N	%	
Previous Pregnancy	**Previous CS**	11	31.4%	38	14.6%	0.012*
	Previous complicated pregnancy	17	48.6%	30	11.5%	0.001*
Comorbidities	**DM**	12	34.3%	23	8.8%	0.001*
	HTN	12	34.3%	13	5.0%	0.001*
	Anemia	19	54.3%	64	24.6%	0.001*
Referral data	**From other place**	16	45.70%	130	50	0.6
	From MOH hospitals	6	17.10%	63	24.23	0.3
	From private hospital	6	17.10%	25	9.62	0.1
	From private Clinic	4	11.43%	27	10.38	0.8
	From home	3	8.60%	15	5.77	0.5
Pregnancy termination	**NVD**	8	22.90%	163	62.70%	0.001*
	CS	25	71.40%	92	35.40%	
	Abortion	2	5.70%	5	1.90%	

Table [4]: Life threatening conditions in pregnant females with morbidities.

Variables	N	%
Pre-eclampsia	12	34.30%
Eclampsia	3	8.60%
Anti-partum hemorrhage	2	5.70%
Post-partum hemorrhage	6	17.10%
Multi organ failure	6	17.10%
Sepsis	3	8.60%
Ectopic pregnancy	2	5.70%
Rupture uterus	1	2.90%

Table [5]: Intervention procedures in pregnant females with morbidities

Variables	N	%
Blood transfusion	15	42.90%
Laparotomy	3	8.6%
ICU admission	8	22.90%
D & C after incomplete abortion	5	14.30%
Hysterectomy	1	2.8%

Table [6]: Complications in pregnant females with morbidities

Variables	N	%
Hepatic	15	42.90%
Neurologic	14	40.00%
Respiratory	12	34.30%
CVS	8	22.90%
Coagulation	7	20.00%
Uterine	6	17.10%
Renal	1	11.40%

DISCUSSION

The study's objective is to determine the prevalence of maternal near-misses and maternal mortality causes in Damietta Governorate. The women's ages varied from 18 to 44, with a mean of 27.186 ± 6.062 years. The gestational age ranged from 15 to 42 weeks, with a mean of 35.410 ± 4.214 weeks. Close to our study, **Rulisa *et al.*** [11] found that the majority of women with maternal morbidity were between the ages of 20 and 35. Women over the age of 35 formed 15% of the cohort. Along with our investigation, **Silva *et al.*** [12] found that maternal age equal to or greater than 35 years is one of the risk variables for maternal morbidity. In line with our findings, Mekango et al. [13] reported that about two-thirds of controls and 45.6% of cases had gestational ages between 37–41 weeks.

In our investigation of clinical outcomes in 295 pregnant women, 35 [11.86%] had morbidity. 30 of 35 sick females [85.71%] were MNMs, while 5 [14.29%] were MDs. Along with our investigation, **Akrawi *et al.*** [14] reported that a total of 180 women with potentially life-threatening illnesses [PLTCs] were diagnosed, with 155 women requiring critical interventions and 153 developing SMOs, resulting in 142 MNMs and 11 MDs. Females experiencing morbidity had a mean age of 30.11 ± 8.76 years and an average gestational age of 32.77 ± 6.25 weeks. Pregnant females that acquired morbidity had a significantly lower age and GA than pregnant females who did not develop morbidity. Close to our investigation, Naderi et al. [15] showed that the average age of near miss cases was 28.3 ± 6.1 years versus the control groups 26.0 ± 5.8 years [$P < 0.001$] and Gestational age mean ± standard error [SE] is 27.7 [0.6].

In our study, 31.4% of females with morbidity had a history of CS, 48.65% had a history of problematic pregnancy, 54.3% had anemia, and 34.3% had DM or HTN. Pregnant females who acquired morbidity had significantly greater rates of previous CS, complex pregnancy, DM, HTN, and anemia than pregnant females who did not develop morbidity.

Along with our study, **Rulisa *et al.*** [11] reported that 55 patients had problems from hypertension disease, indicating a frequency of 32 per 1000 live births. The majority of patients suffered from severe pre-eclampsia [36%], followed by eclampsia [60%]. Eight patients were diagnosed with HELLP syndrome. Hypertension was responsible for 16% of deaths. Eight maternal deaths came from eclampsia, including 2% from severe preeclampsia giving a case fatality rate of 16 %.

Similar to our analysis, **Joseph *et al.*** [16] presented all cause-of-death categories in 2018, emphasizing the importance of hypertensive disorders of pregnancy, circulatory system diseases, and obstetric embolism. The large decrease in mortality from preeclampsia-eclampsia medical and nonspecific abortion, complications of anesthesia, intrapartum hemorrhage, and amniotic fluid embolism. Maternal mortality have increased due to chronic hypertension, genitourinary tract infection, diabetes mellitus, malnutrition, liver problems, mental and central nervous system disorders, and respiratory diseases.

In our study, among females with morbidity 45.7% were referred from other place; 17.1% were referred from MOH, 17.1% were referred from private hospital, 11.4% were referred from private clinic, and 8.6% were referred from home. Pregnant females who developed morbidity have statistically significant higher referral rate than pregnant females who did not developed morbidity.

Against our study **Naderi *et al.*** [15] reported that the highest near miss ratio [104.8 in 1000] was observed in the referral [educational] hospital compared with public [9.9 in 1000] and private [7.5 in 1000] hospitals and may be that because females have more risk factors that affected referral rate.

Close to our study, **Nakimuli *et al.*** [17] reported that referral to a more specialized unit is 5%. In our study among females with morbidity 22.9% delivered via NVD, 71.40% delivered by CS while 5.7% had abortion.

Pregnant females who developed morbidity have statistically significant higher CS rate than pregnant females who did not developed morbidity and pretension of CS related infection [antibiotic use] with prophylactic antibiotic during CS and treatment of sepsis with parenteral therapeutic antibiotics and Preterm birth with target population women with preterm labor and corticosteroid for fetal lung maturation were 100%.

Along with our study **Oliveira & Costa** [18] reported that with respect to obstetric history, 44.7% of patients were primiparous, 18.8% had a history of abortion, and 20.5% had a history of previous CS.

In agreement with our study **Ghazivakili *et al.*** [19] reported that 48.2% of women admitted with preterm labor were prescribed with corticosteroids for fetal lung maturation after 3 hours of hospital stay from admission.

In our study the most frequent life-threatening conditions in pregnant females with morbidities was pre-eclampsia in 34.30% followed by post-partum hemorrhage & multi organ failure in 17.10% for each, then eclampsia & sepsis in 8.6% for each then ectopic pregnancy in 5.7% and lastly rupture uterus in 2.9% and Pretension of postpartum hemorrhage with target population women giving birth in health care facilities were 100% and treatment of severe postpartum hemorrhage with target population women with severe PPH was 100% and removal of retained material was 50% and internal iliac ligation and Hysterectomy were 16.7% and anticonvulsant for eclampsia with target population women with eclampsia and use of any uterotonics include oxytocin was 100% while using ergometrine was 83.3% and Misoprostol use was 66.7%.

Along with our study, **Oliveira & Costa** [18] reported that the main disorders presented by the study participants were hypertension [62.7%], hemorrhage [53.7%], infections [49%], heart disease [4.7%], and thromboembolism [2.4%]. Among the 160 cases of hypertensive disorders, 108 [42.3%] were severe pre- eclampsia, 35 [13.7%] were eclampsia, and 17 [6.7%] were chronic hypertension exacerbated by pregnancy. One hundred five [41.2%] participants had HELLP syndrome.

Along with our study, **Abha *et al.*** [20] reported that among the direct causes of maternal near miss, hypertensive disorders of pregnancy were the most common cause [38.8 %] followed by hemorrhage [22.2 %]. Severe anemia was the most common indirect cause [57 %]. Hematological system was the most system to be involved [36.49 %].

In agreement with our study **Kalisa *et al.*** [21] reported that among women with SMO, oxytocin was given in [93.5 %] women for prevention of postpartum hemorrhage, and only [72.4 %] women with severe PPH received oxytocin as treatment.

Close to our study **Ghazivakili *et al.*** [19] reported that from the total number of women with severe PPH, 83.5% received Oxytocin, and 23.6% received Misoprostol and Hysterectomy was 7.1%.

Against our study, **Rulisa et al.** [11] reported that the most common causes of severe maternal morbidity resulted from peritonitis [30.2 %], hypertensive disease [28.6 %], hemorrhage [19.3 %] and cardiomyopathy [5.2 %] so Hypertensive disorders [primarily severe preeclampsia/eclampsia] were the second leading cause of severe maternal morbidity; one maternal death resulted from eclampsia and this may because the number of patients wasn't enough.

Naderi et al. [15] found that the most common causes of near misses were severe preeclampsia [27.3%], ectopic pregnancy [18.4%], and abruptio placentae [16.2%]. Overall, 15.2% had at least one systemic illness. In our analysis, the most common intervention technique in pregnant females with morbidities was blood transfusion [42.90%], followed by ICU hospitalization [22.90%], D&C after incomplete abortion [14.30%], laparotomy [8.6%], and hysterectomy [2.8%].

Along with our study, **Norhayati *et al.*** [2] revealed that the overall ICU admission rate was 0.3% [67/21,579], whereas the admission rate for women with maternal near miss was 72.3%. Hemorrhagic diseases accounted for 78.9%. In our study, the most common problems in pregnant females with morbidities were hepatic [42.90%], followed by neurologic [40%], pulmonary [34.30%], CVS [22.9%], coagulation [20%], uterine [17.1%], and renal [11.4%].

In contrast to our study, **Liyew *et al.*** [22] reported that 23% had coagulation complications, 20% had neurological complications, 20% had cardiovascular complications, 19% had multiple organ failure, 8% had respiratory complications, 7% had uterine complications, 2% had renal complications, and finally 1% had hepatic complications, which could be due to a small number of patients.

Compared to our analysis, **Kalisa *et al.*** [21] found that the most common organ dysfunctions among women with MNM disorders were cardiovascular dysfunction [n = 56; 65.1%], followed by multiple organ dysfunction [n = 35; 40.7%].

The mortality rate for hepatic dysfunction was highest [33.3%]. The MNM/mortality ratio was highest for cardiovascular dysfunction [8:1], followed by renal and neurologic dysfunction [5:1], possibly due to insufficient patient numbers. In our investigation on the vital statistics of females with and without morbidities. Pregnant females with morbidity had significantly higher systolic and diastolic blood pressure than pregnant females without morbidity.

In addition to our study, **Ghazivakili *et al.*** [19] revealed that severe preeclampsia [63.5%] [persistent systolic blood pressure of 160 mmHg or diastolic blood pressure of 110 mmHg]. In our study, pregnant females who acquired morbidity had significantly higher liver function than pregnant females who did not develop morbidity.

In conjunction with our findings, **Mecheril Balachandran *et al.*** [23] reported that laboratory examinations with morbidity revealed increased liver enzymes and a low platelet count.

Along with our work, **El-Agwany *et al.*** [24] found that laboratory examinations with morbidity revealed fits and hemolytic anemia, increased liver enzymes, and low platelet count syndrome.

Along with our investigation, **Abha *et al*.** [20] found that the most common clinical criteria were jaundice in the context of pre-eclampsia, and the laboratory-based criteria were acute thrombocytopenia. A blood transfusion of more than five units was necessary in 35% of the women.

Conclusion: The WHO MNM criteria are important for the evaluation of care. Hemorrhage, preeclampsia and multi organ failure are the main causes of death and MNM.

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