Article

Maternal Near Miss in Al-Najaf Province; Causes and Prevalence; A cross-sectional Study

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Abstract: A maternal near miss, as defined by the World Health Organization (WHO), is a woman who has experienced a life-threatening situation and survived during pregnancy, labour, or the puerperium period.Maternal near miss is a more appropriate indicator of the quality of maternal health services than maternal death, as the former occurs more frequently than the latter. This allows for the identification of the factors that contribute to a fatal outcome, thereby facilitating the improvement of maternal health services.The objective of this study is to ascertain the prevalence and aetiology of maternal near-miss cases in AL-Najaf province, employing the criteria set forth by the World Health Organization (WHO). The study was conducted at a statistical unit within the maternal and paediatric department of AL-Zahraa Hospital in AL-Najaf. The study was conducted in the province from 2 January to 30 June 2018. The target population comprised all women admitted to the hospital during the antenatal, perinatal, and puerperium periods in September 2017.A total of 1,560 patient records were reviewed in this study according to the WHO criteria for maternal near miss, which were divided into two main groups: those with and without maternal near miss. During the study period, a total of 1,560 patients' A review of the records according to the WHO criteria for MNM revealed that 358 (22.9%) women met at least one criterion, resulting in an MNMR of 14.7 per 1000 live births. The maternal near-miss ratio is 14.7 per 1,000 live births.The likelihood of a maternal near miss increased significantly with advancing age, multiparity, non-employment status, and lack of adequate antenatal care.Preeclampsia was the most common cause, accounting for 122/358 (34.1%) of cases, followed by postpartum haemorrhage in 92 (25.7%) women, sepsis or systemic infection in 55 (15.4%), and severe anaemia in 42 (11.7%). Severe complications of abortion were identified in 36 cases (10.1%).The proportion of near-miss cases was 76.2% in hypertensive women and 16% in non-hypertensive women. Furthermore, 52.9% of women with a surgical history and 9.7% of those without a surgical history were classified as near-miss cases, respectively

Keywords: Maternal, Prevalence, Near, MNM, MMR, Implementation.

1. Introduction

Maternal health can be defined as the health of pregnant women during the antenatal, perinatal, and postpartum periods. Maternal health is an active component of a country's healthcare system and a fifth-millennium development goal. It represents the state of obstetric health and facilitates the monitoring of the implementation of facilities within that country (1).

There are numerous indicators that can be used to assess the quality of a healthcare system, including maternal death (MD) and maternal near miss (MNM).

Maternal mortality is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (2). Maternal death is a sentinel event used to monitor the quality of a healthcare system. The standard indicator is the maternal mortality ratio (MMR), defined as the ratio of the number of maternal deaths per 100,000 live births (LB). (2)

As a result of enhanced healthcare provision, the MMR has been declining consistently in developed countries. Maternal mortality represents merely the most severe end of a spectrum of maternal morbidity, the full extent of which remains largely uncharted and under-evaluated. (1) Annually, approximately 536,000 females perish from pregnancy-related causes, equating to one death every minute. (2)

It is estimated that over 99% of maternal deaths occur in developing countries, with approximately half of these occurring in sub-Saharan Africa. (3, 4) This is particularly evident among women aged 15 to 19 in Africa, for whom childbirth is the leading cause of mortality.

Furthermore, it has been determined that approximately 20 million pregnant women annually experience maternal morbidities, which are defined as chronic illnesses that persist after childbirth. (5)

Maternal near miss or severe acute maternal morbidity is currently defined according to the World Health Organization (WHO) as "a woman who experiences a life-threatening situation and survives during pregnancy or childbirth or within 42 days of the end of pregnancy" (9, 10, 11). The incidence of MNM cases is higher than that of maternal death, and these cases are considered a public health problem in Latin America (12). It is estimated that for every maternal death, there are approximately 15 cases of maternal near miss (MNM) (11, 13, and 14). The rarity of MDs in Western countries, due to the success of modern medicine, has led to an increased interest in analysing so-called "near miss" events. MNM is a superior indicator of maternal health service quality in comparison to MD. This is due to the fact that it provides data that elucidates the contributing factors involved in a fatal outcome. Consequently, it serves as a foundation for the implementation of measures aimed at enhancing maternal healthcare (11, 15, 16).

2. Materials and Methods

This paper presents the findings of a descriptive, cross-sectional study conducted at a single centre. The study included all women admitted to the hospital in September 2017 during the antenatal, perinatal, and puerperium periods.

The study was conducted by a review and assessment of all file record sheets of the intended patients at the statistical unit of the maternal and paediatric department in AL-Zahraa Hospital in Al-Najaf province from 2 January to 30 November 2018.

The study was approved by the Ethical Committee at the Faculty of Medicine, University of Kufa.

The director and administration office of AL-Zahraa Hospital provided official consent.

All data were kept confidential and used solely for the purposes of the study. All files were coded with a specific number, and any identifiable information about the patients, such as names and phone numbers, was removed to ensure the privacy of the patients. The target population consisted of women who were admitted to the hospital with or without a life-threatening situation and survived during the pregnancy, labour,

and postpartum period. The inclusion criteria for MNM cases were considered according to the following MNM features based on the WHO identification criteria.

File record sheet was done to include all information that is present in the file of the patient, as shown in Figure 1.

ID: Name   Case sheet

No. Tel No.

Maternal Age (year):

Residence: Urban   ☐   Rural

Occupation:

Level of education:

Marital status:

Weight (kg): ☐   Height (m): ☐   BMI (kg\m²):

Smoking history   Smoker   ☐

                          Non-smoker   ☐

Family history   Yes   ☐   NO

Consanguinity   Yes   ☐   NO

Hospitalization   Public   ☐   Private

Gravidity ☐   Parity ☐   Abortion

Antenatal care booking   Yes   ☐   No

Mode of delivery   CS   ☐   Emergency ☐   Elective ☐

                   NVD   ☐

Medical history   Hypertension ☐   DM ☐   Renal disease ☐

                  PCOS ☐   Heart disease ☐   others

| Surgical history | Curettage | | Previous C\S | | No. of CS | |

Gestational Age At admission (weeks)

Presentation on admission	

Hospital stays (days)

The following section presents the statistical analysis of the data.

The statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 25. Prior to analysis, continuous variables were assessed for statistical normal distribution using frequency and histogram analysis. All variables appeared to follow a normal distribution.

Descriptive statistics are presented as mean, standard deviation (SD), frequencies, and percentages. A chi-square test was employed to ascertain the statistical significance of the association between near misses and other categorical variables. A Student's t-test (independent two samples) was utilised to compare the mean gestational age on admission and hospital stay of near-miss and non-near-miss groups. A level of significance of ≤ 0.05 was considered indicative of a significant difference or association. The results and findings were subsequently presented in tables and figures, accompanied by an explanatory paragraph for each, using the Microsoft Office Word software version 2010.

A total of 1560 patients' records were reviewed in this study; according to the WHO criteria of MNM, 358 (22.9%) women had at least one criterion, giving an MNMR of 14.7 per 1000 live births, as shown in the figure.
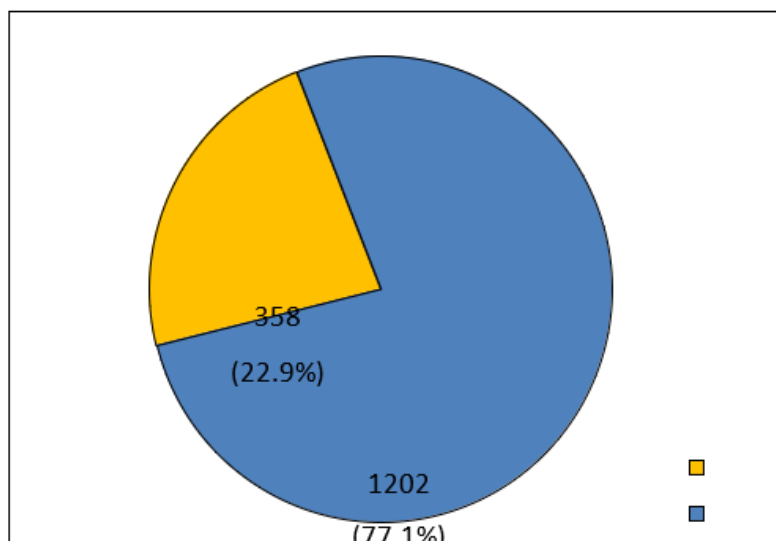
Figure 2 Maternal Near Miss Ratio (MNMR) (n =1560)

3. Results

Demographic Characteristics of Patients:

Demographic features of MNM and non-MNM, with parity and antenatal care (ANC) booking, were demonstrating in Table 3.1.

The cross-tabulation for MNM against demographic characteristics of the studied group revealed that the frequency of MNM significantly increased with Advancing age; the least frequent MNM was reported in women aged ≤ 20 years (12.2%) compared to 25.9% in those aged 21 – 30 years, 26.5% at the age of 21 – 30 years, and 31% at age > 40 years, (Chi-square = 31.5, P< 0.001). The other significant association was found between housewife occupation and higher frequency of MNM; among the housewives, the proportion of MNM was 25.2% compared to 11% among employed women (Chi-square = 23.38, P< 0.001). Additionally, a significant lower proportion of MNM was reported among women with regular ANC visits compared to those with irregular or no ANC visits (chi-square = 34.45, P<0.001).

No statistically significant association had been reported with other variables, including residence, family history, or type of hospitalization (private or public); in all comparisons, the chi-square was insignificant (P>0.05).

Further comparison of the mean age across the MNM status revealed that near-miss women had a higher mean age than the non-near-miss group; the mean age was 27.30 ± 11.21 and 26.08 ± 9.34, respectively.

In a comparison of parity, multiparous is represented 287/358 (80.17%), while the primiparous is 71/358 (19.83%); there is a statistically significant between the multiparous and primiparous (P-value < 0.001), as shown in Figure.

Table 1. Relationship between Maternal Near Miss and Demographic Characteristics of the Studied Groups.

Variable		Maternal Near Miss				Total	Chi-square	P-value
		Yes		No				
		No.	%	No.	%			
Age (year)	≤ 20	044	12.20	318	87.80	0362	31.50	**< 0.001**
	21 - 30	219	25.90	626	74.10	0845		
	31 - 40	086	26.50	238	73.50	0324		
	> 40	009	31.00	020	69.00	0029		
Residence	Urban	254	22.70	864	77.30	1118	0.118	0.73
	Rural	104	23.50	338	76.50	0442		
Occupation	Housewife	331	25.20	984	74.80	1315	23.38	**< 0.001**
	Employed	027	11.00	218	89.00	0245		
Family history	Yes	013	15.30	072	84.70	0085	2.97	0.084
	No	345	23.40	1130	76.60	1475		
Parity	primiparous	071	15.13	398	84.87	0469	21.19	**< 0.001**
	multiparous	287	24.30	894	75.70	1181		
Hospitalization	Public	333	23.10	1108	76.90	1441		

	Private	025	21.00	094	79.00	0119	0.27	0.60
Antenatal care visit	Regular	086	15.40	471	84.60	0557		
	Irregular	177	24.90	534	75.10	0711	**34.45**	**< 0.001**
	None	095	32.50	197	67.50	0292		
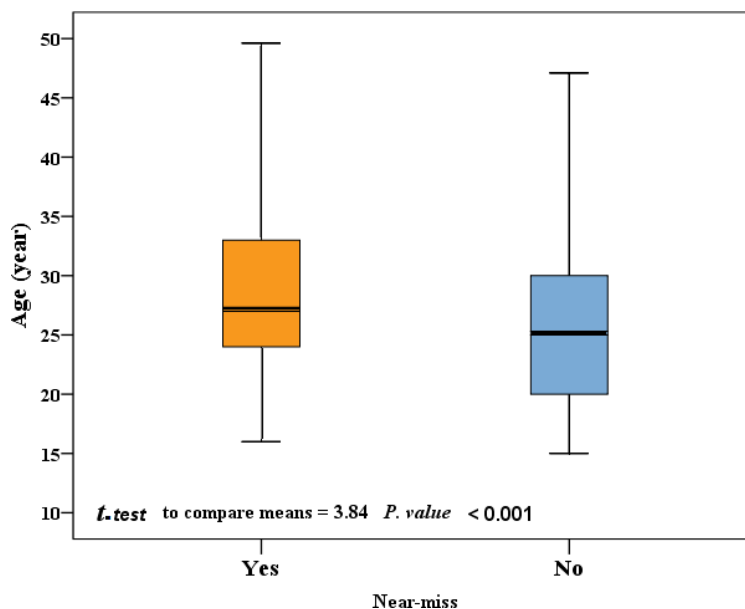
Figure 3 Box Plot for Comparison of Mean Maternal Age According to Near Miss Status

Regarding the relationship between MNM and medical and surgical history, hypertensive women were more likely to have near misses than non-hypertensive; the proportion of near misses was 76.2% in hypertensive vs. 16% in non-hypertensive (chi-square = 328.9, P<0.001).

Also, women who had previous surgeries had more frequent near misses than those with no surgical history, 52.9% vs. 9.7%, respectively (chi-square = 350.3, P<0.001).

Other diseases showed insignificant association with the frequency of MNM; the chi-square was insignificant (P>0.05), as shown in Table 3.2.

Table 2 Relationship between Maternal Near Miss and Medical and Surgical History of the Studied Groups.

		Maternal Near Miss					Chi-square	P-value
Variables		Yes (n = 358)		No (n = 1202)		Total		
		No.	%	No.	%			
Hypertension	Yes	138	76.2	43	23.8	181	328.90	**< 0.001**
	No	220	16.0	1159	84.0	1379		
Diabetes Mellitus	Yes	22	16.9	108	83.1	130	2.91	0.088
	No	336	23.5	1094	76.5	1430		
Renal disease	Yes	5	14.3	30	85.7	35		

	No	353	23.1	1172	76.9	1525	1.52	0.22
Heart disease	Yes	5	26.3	14	73.7	19	0.123	0.73
	No	353	22.9	1188	77.1	1541		
Others*	Yes	9	28.1	23	71.9	32	0.495	0.48
	No	349	22.8	1179	77.2	1528		
Surgical history	Yes	253	52.9	225	47.1	478	350.3	**< 0.001**
Recurrent scare	No	105	9.7	977	90.3	1082		

Respiratory diseases, blood abnormalities, hepatic diseases, thyroid disease.

Table 3. Relationship between Maternal Near Miss and Presentation on Admission of the Studied Groups

	Maternal Near Miss				
	Yes (n = 358)		No (n = 1202)		Total
Presentation on Admission	No.	%	No.	%	
Labor pain	178	49.7	681	56.7	859
Lower abdominal pain	69	19.3	207	17.2	276
Vaginal bleeding	43	12.0	214	17.8	257
Leaking liquor	29	8.1	60	5.0	89
Other	39	10.9	40	3.3	79
Total	358	100.0	1202	100.0	1560
Chi-square = 44.53, P -value < 0.001					

Table 4. Relationship between Maternal Near Miss and Mode of Delivery of the Studied Groups

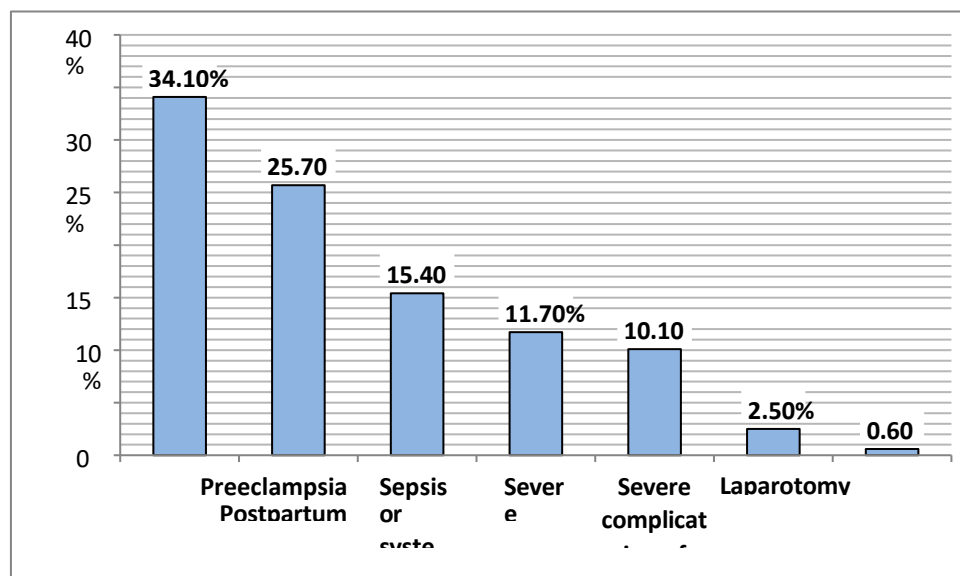|	Maternal Near Miss				
	Yes		No		Total
Mode of Delivery	No.	%	No.	%	
Normal vaginal	119	33.2	1048	87.2	1167
Cesarean section	239	66.8	154	12.8	393
Total	358	100.0	1202	100.0	1560
Chi-square = 426, P -value < 0.001					

Table 5. Comparison of Mean Gestational Age at Admission and Duration of Hospitalization in Near Miss and non-Near Miss Women.

Variables	Yes (n = 358)		No (n = 1202)		T-test	P-value
	Mean	SD	Mean	SD		
Gestational age at admission	33.4	6.16	29.49	11.13	6.36	**< 0.001**
Hospital stays (days)	2.04	0.74	1.57	0.6	12.30	**< 0.001**

Table 6: Distribution of Causes of Maternal Near Miss Events.

Disease Specific Criteria	No.	Percent out of near miss (n = 358)	Percent out of total (n=1560)
Preeclampsia	122	34.1%	7.8%
Postpartum hemorrhage	92	25.7%	5.9%
Sepsis or systemic infection	55	15.4%	3.5%
Severe anemia	42	11.7%	2.7%
Severe complications of abortion	36	10.1%	2.3%
Laparotomy: Ectopic pregnancy Ruptured uterus	6 3	2.5%	0.6%
Eclampsia	2	0.6%	0.1%
Total	358	100.0	22.9

* None of the patients had ruptured uterus or w e r e admitted to the intensive care unit; no (cardiovascular dysfunction, respiration dysfunction, renal dysfunction, hepatic dysfunction, neurologic dysfunction, uterine dysfunction/hysterectomy)

Figure 4. Proportional Distribution of Causative Criteria of Near Miss in Descending Sorting

4. Discussion

The objective is to prevent maternal mortality by addressing the acute complications that may arise during pregnancy, childbirth, and the postpartum period. These complications, if left untreated, can jeopardize the woman's life and require prompt intervention to avert fatal outcomes (25). MNM can be employed as a complement or alternative to the investigation of MDs, particularly in cases where there is a high risk of morbidity.

With increasing frequency, the analysis of this phenomenon facilitates the recognition of the hazards present in women during pregnancy, labour, and the postpartum period. (17, 18)

The WHO reports that approximately five million women globally suffer from critical illnesses associated with motherhood, with an estimated 10% mortality rate.

It is possible to avoid maternal deaths in 80% of cases. MNM is a highly correlated indicator of MD, as it represents an intermediate stage across all cases and can be employed as an indicator for the evaluation of maternal programmes at the population level or for the analysis of individual cases (19

The primary objective of the present study was to estimate the maternal mortality ratio (MMR) among Iraqi women residing in Al-Najaf Alashraf province who were admitted to AL-Zahraa Hospital. To this end, a total of 1,560 medical files of these women were reviewed and analysed.

The present study revealed that the incidence of maternal near-miss (MNM) was 22.9%, resulting in a maternal near-miss ratio (MNMMR) of 14.7 per 1000 live births (LB). This figure is relatively elevated when compared to that of neighbouring countries. In Alborz Province in Iran, for instance, Ghazivakili et al. In the 13 facilities under study, a total of 38,715 deliveries were recorded over the course of one year. Of these, 38,663 were live births, resulting in an MNMR of 4.97 cases per 1,000 LB (20).

In Iraq, a cross-sectional study conducted in six public hospitals in Baghdad between 1 March 2010 and 30 June 2010 revealed a low MNM rate of 5.06 per 1,000 LB (21).

A further cross-sectional study was conducted in the northern Iraqi region of Erbil province at the Maternity Teaching Hospital between 1 June and 31 December 2013. During the seven-month data collection period, 17,353 live births were registered, along with 142 cases of maternal near miss (MNM) and 11 cases of maternal death (MD). (8) A retrospective facility-based review of cases of MNM that occurred in 2006-2007 at

Damascus Maternity University Hospital in Syria revealed an MNMR of 32.9 per 1,000 live births (35).

Another cross-sectional study of MNM cases in four major public referral hospitals, the capital cities' hospitals, and one in each country (Egypt, Lebanon, Palestine, and Syria) were the focus of the study. Beginning in 2011, the MNMR per 1000 LB in each country was as follows: Egypt, 12.1; Lebanon, 4.3; Palestine, 12.9; and Syria, 4.5. (22)

In Egypt, a prospective case-control study was conducted over a period of one year, from 1 May 2014 to 30 April 2015, at the Women's Health Hospital, Assiut University. The study included 342 women with MNM and 684 age-matched control women. Over the course of the study period, there were 17,503 deliveries, with a mean birth weight of 342 MNM cases. The prevalence of MNM was approximately 19% of all deliveries. A lower ratio was reported in Turkey; a retrospective study including all women who fulfilled the WHO criteria for MNM or MD between June 2009 and June 2014 at a tertiary referral education hospital. During a period of five years, Uygur et al. found that 2.4 MNM per 1,000 LB.

The incidence of MNM described in the literature differs widely, from 0.7 to 101.7 cases per 1,000 LB (11, 31, and 39). Consequently, there is a wide range in the prevalence depending on location, setting of the study, and sample size of the intended population.

In consideration of the impact of age, the percentage of patients in this study who were aged ≤ 20 years (12.2%) was found to be significantly lower than the percentages observed in patients aged 21–30 years (25.9%), 31–40 years (26.5%), and > 40 years (31%).

Some studies have characterised MNM as a problem affecting women at more advanced ages, regardless of their marital status or parity (11). One of the clinical and etiological studies of MNM in a tertiary hospital in central India reported a mean age of 28 ± 3.11 for MNM patients (23), which is nearly the same range as our results.

The current study revealed a significant correlation between housewife occupation and a higher prevalence of MNM. Among housewives, the incidence of MNM was 25.2%, compared to 11% among employed women.

In Egypt, a prospective case-control study (2015) was conducted to investigate the delays associated with MNM cases admitted to the Women's Health Hospital, Assiut University. The study found that 74.3% of MNM women with a housewife occupation were delayed, while 25.7% of women in other occupations experienced delays.

5. Conclusion

hypertensive disorders accounted for the most common event of MNM (50.6%); the second common cause was severe hemorrhage (in abortions, ectopic pregnancies, antepartum and postpartum hemorrhage) groups. Finally, our study findings was also in line with studies conducted in other countries around the world.

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