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Characteristics of extreme maternal morbidity at the Regional Hospital of Ayacucho, Peru, 2021-2023

Características de la morbilidad materna extrema en el Hospital Regional de Ayacucho, Perú, 2021-2023

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ABSTRACT

Extreme maternal morbidity (EMM), according to WHO, is a condition in which a woman nearly almost loses her life due to complications during pregnancy, childbirth, or the postpartum period. This rate is higher in low- and middle-income countries. Although maternal mortality has declined in Peru, the EMM is not fully described, underlining the importance of its analysis to improve maternal health services. Objective: To describe EMM in the Regional Hospital of Ayacucho, Peru, between June 2021 and June 2023, and to analyze key indicators to improve maternal care. Materials and methods: An observational, retrospective, cross-sectional study was conducted with 100 cases of EMM. Socio-demographic data, obstetric characteristics, pathological history and interventions were assessed using epidemiological surveillance forms and formulas to calculate the EMM, maternal mortality ratio and other metrics. Results: The mean age of the patients was 28 years, mostly cohabiting women with secondary education. The most frequent criteria for EMM were severe hypoxia (50%) and cardiovascular compromise (39%). HELLP syndrome (30%) and postpartum hemorrhage (22%) were the most common complications. The EMM was 19.4 per 1,000 live births and the maternal mortality ratio was 5.75 per 100 cases of EMM. Conclusions: The EMM in Ayacucho (2021-2023) reveals severe complications mainly in young women with low educational level. It is crucial to implement effective prevention and management strategies to reduce its incidence and improve obstetric outcomes.

Key words: Pregnancy complications, Near miss, healthcare, Postpartum hemorrhage, HELLP syndrome

RESUMEN

La morbilidad materna extrema (MME), según la OMS, es una condición en la que una mujer casi pierde la vida debido a complicaciones durante el embarazo, parto o puerperio. Esta tasa es mayor en países de ingresos medianos y bajos. Aunque la mortalidad materna ha disminuido en Perú, la MME no está completamente descrita, lo que subraya la importancia de su análisis para mejorar los servicios de salud materna. Objetivo. Describir la MME en el Hospital Regional de Ayacucho, Perú, entre junio de 2021 y junio de 2023, y analizar indicadores clave para mejorar la atención materna. Materiales y métodos. Se realizó un estudio observacional, retrospectivo y transversal con 100 casos de MME. Se evaluaron datos sociodemográficos, características obstétricas, antecedentes patológicos e intervenciones utilizando fichas de vigilancia epidemiológica y fórmulas para calcular la razón de MME, el índice de mortalidad materna y otras métricas. Resultados. La edad media de las pacientes fue de 28 años, en su mayoría convivientes con educación secundaria. Los criterios más frecuentes de MME fueron hipoxia severa (50%) y compromiso cardiovascular (39%). El síndrome HELLP (30%) y la hemorragia posparto (22%) fueron las complicaciones más comunes. La razón de MME fue de 19,4 por 1,000 nacidos vivos y el índice de mortalidad materna de 5,75 por cada 100 casos de MME. Conclusiones. La MME en Ayacucho (2021-2023) revela complicaciones graves principalmente en mujeres jóvenes y con bajo nivel educativo. Es crucial implementar estrategias efectivas de prevención y manejo para reducir su incidencia y mejorar los resultados obstétricos.

Palabras clave: Complicaciones del embarazo, Potencial evento adverso, Hemorragia posparto, Síndrome HELLP

Introduction

Extreme maternal morbidity (EMM) is an event of public health interest that has a significant impact on the evaluation of health services, since timely and quality care can prevent fatal outcomes in women with se-

vere obstetric complications[1]. The World Health Organization (WHO) defines EMM as a condition in which a woman almost dies, but survives a complication during pregnancy, childbirth or within 42 days after termination of pregnancy[2].

The Latin American Federation of Obstetrics and Gynecology Societies (FLASOG) describes EMM as 'a serious complication that occurs during pregnancy, childbirth and puerperium, which puts the woman's life at risk or requires immediate attention to avoid death'[3]. FLASOG, in meetings in Lima and Santa Cruz de la Sierra defined guidelines to address EMM based on specific disease criteria (septic shock, hypovolemic shock, eclampsia), organ dysfunction and case management, optimized with the Technical Health Standard for Epidemiological Surveillance of Extreme Maternal Morbidity of the Peruvian Ministry of Health, in 2021[4].

EMM is higher in middle- and low-income countries, ranging from 4.9% in Latin America to 5.7% in Asia to 14.9% in Africa, while in high-income countries the rates range from 0.8% in Europe to 1.4% in North America[5]. It is estimated that about 50 000 cases of EMM occur annually in the United States, accounting for 2.0% of all births[6]. In Mexico, a 2010 study found a prevalence of EMM of 2.1%[7]. Another 2019 multicenter, cross-sectional study in Ethiopia reported that EMM ranged from 0.6%-30% relative to live births[8].

Although maternal mortality has declined in Peru at a rate of 68 per 100 000 live births, there is an EMM case base that has not been fully utilized to evaluate and improve maternal health services[1]. Cases of EMM are more numerous than those of maternal death, allowing more valid conclusions about risk factors and quality of care. Lessons learned in the management of surviving cases can be used to prevent new maternal deaths, being less threatening to health care providers than maternal death analyses[3]. The identification of EMM cases allows the construction of new indicators that facilitate quality audit by results. Epidemiological surveillance of EMM is a key point of the regional strategic framework to reduce maternal mortality.

The main objective of the present study is to describe extreme maternal morbidity (EMM) in the Regional Hospital of Ayacucho, Peru, during the period June 2021-June 2023, analyzing various EMM indicators and contributing to the improvement of maternal health services in the region.

Materials and methods

An observational, retrospective and cross-sectional study was carried out. The population consisted of 104 cases of women attended at the Regional Hospital of Ayacucho (Ayacucho, Peru), between June 2021 and June 2023. This institution is a Level II-2 facility in the southern highlands of Peru and the reference center with the highest resolution capacity in the Ayacucho, Huancavelica and Cuzco regions. Only 100 women who met the EMM criteria were included. A census study of the cases was carried out according to the institutional epidemiological surveillance records of each patient.

The variables studied consisted of sociodemographic data (age, marital status, educational level, department, province and district), criteria for extreme maternal morbidity (cardiovascular, respiratory, renal, hematologic/coagulation, hepatic neurological, uterine dysfunction and ICU admission), obstetric characteristics (prenatal care, gestational age at the beginning of prenatal care, number of prenatal care, gestational age, term of pregnancy, number of fetuses, place of delivery or abortion, obstetric history, condition of admission and discharge of the patients), pathological history (maternal complications such as postpartum hemorrhage, hypertension disorders in their different forms, infections and other conditions) and interventions received (use of oxytocin, misoprostol, ergometry, etc.), misoprostol, ergometrine, other uterotonics, magnesium sulfate, anticonvulsants, antibiotics, corticosteroids for lung maturation, prevention of bleeding, antibiotic prophylaxis, anesthesia, analgesia, blood requirements, blood products and specialized care).

The detection of patients with EMM was by reviewing the medical records of pregnant women with EMM criteria, determining the sociodemographic variables, obstetric characteristics, pathological history and interventions received. In addition, the results were evaluated with morbidity and mortality indicators.

The institutional epidemiological surveillance records of each patient were used, which are validated by FLASOG and the Technical Health

Standard for the epidemiological surveillance of EMM[4]. These detailed the clinical and laboratory criteria and interventions and management according to the affected system or apparatus. Once the patients were identified, the medical records were reviewed to verify the inclusion and exclusion criteria.

Categorical variables were presented with absolute and relative frequencies. For numerical variables, the mean and standard deviation were used in the case of normal distribution, while the median and interquartile range were used for those with non-normal distribution. Normality was assessed visually using histograms or the Shapiro-Wilk test. Analysis was limited to participants with complete data. All statistical procedures were carried out using STATA version 16 software.

Outcome indicators were calculated using the following formulas:

Extreme maternal morbidity ratio = Number of EMM cases in a given period/Number of live births in the same period x 1 000.

Maternal mortality (case fatality) ratio = Number of maternal deaths in a given period/Number of maternal deaths + Number of EMM cases in the same period x 100.

Maternal mortality ratio, EMM/Maternal death ratio = Number of EMM cases in a given period/Number of maternal deaths in the same period for each maternal death that occurred[4].

Percent of cases with three or more inclusion criteria = Number of EMM cases with three or more inclusion criteria/Number of EMM cases x 100[9].

The study was approved by the Ethics Committee of the Regional Hospital of Ayacucho. Anonymity/confidentiality of the participants' data was maintained at all times through coding.

Results

During the study period, a total of 100 cases of EMM were identified in our hospital. The mean age was 28.3 years, indicating a mostly young population. Most of the patients were cohabitants (68%). In terms of education, 51% of the patients had secondary school education, which could have influenced access to health information. Most of the patients came from Ayacucho (80%), in the southern highlands of Peru, while the remaining 20% came from the surrounding regions of Cuzco and Huancavelica. Sixty-two percent lived in urban areas (Table 1).

The EMM criteria showed a high rate of cardiovascular compromise; 39% presented shock and 39% required the use of vasoactive agents to optimize blood pressure, especially noradrenaline. In addition, 9% of patients had severe metabolic acidosis, with pH <7.1 and 8% lactate levels >5 mmol/L. There was one cardiac arrest, with cardiopulmonary resuscitation. Fifty percent of the patients experienced severe hypoxia and 20% required intubation and mechanical ventilation, with a mean of 3.2 days of intubation, showing the severity of their respiratory conditions. In addition, they suffered cyanosis 2%, gasping respiration 3%, tachypnea 5% and bradypnea 1%.

Regarding renal involvement, 8% showed oliguria, 5% acute azoemia and 4% required dialysis. Hematologic involvement was shown as acute thrombocytopenia in 41%, with a mean platelet count of 28 418/mL [19 000-47 000], and 52% required massive transfusions with a mean of 3.7 [3-4]. For liver involvement, there was acute hyperbilirubinemia in 4% and jaundice in one preeclamptic woman. Neurological involvement included coma in two cases and epileptic seizure

Table 1. Sociodemographic characteristics of patients with extreme maternal morbidity (n=100).

Characteristics	n (%)
Age (years)	28.3 [23 - 34]
Marital status	
Single	17 (17.0)
Cohabiting	68 (68.0)
Married	13 (13.0)
Educational level	
Primary	16 (16.0)
Secondary	51 (51.0)
Technical higher	15 (15.0)
University higher	14 (14.0)
Department	
Ayacucho	80 (80.0)
Cuzco	15 (15.0)
Huancavelica	5 (5.0)
Origin	
Urban	62 (62.0)
Rural	38 (38.0)

Values express n (%) or median [interquartile range].

and stroke with one case, respectively. Hysterectomy was necessary in 18% of the cases and 82% required admission to the intensive care unit, highlighting the severity and complexity of the conditions encountered (Table 2).

Of all the patients, 78% had received adequate prenatal care, starting their control with a mean of 11.5 weeks of gestational age and a mean of 5 the number of prenatal cares. Fifty-seven percent of deliveries were by cesarean section. Previous pregnancies had a mean of 1.7 and the inter-gestational period had a mean of 68 weeks. Seventy-four percent had no significant past history. Regarding admission conditions, 60% were pregnant, and at the time of discharge, 94% were alive and without sequelae (Table 3).

A high rate of hemorrhage was observed, consisting of postpartum hemorrhage in 22% and uterine atony in 20%. Preeclampsia affected 28% of the patients and HELLP syndrome was present in 30% of the cases, which would have required timely prevention and management strategies. The percentage of infections was 15% (Table 4).

Table 2. Criteria for extreme maternal morbidity.

Criteria	n (%)
Cardiovascular compromise	
Shock	39 (39.0)
Vasopressors (noradrenaline)	39 (39.0)
Respiratory compromise	
Severe hypoxia	50 (50.0)
Intubation and ventilation	20 (20.0)
Intubation and ventilation (N° of days)	3.2 [2-5]
Renal compromise	
Oliguria	8 (8.0)
Hematologic/coagulation compromise	
Acute thrombocytopenia	41 (41.0)
Acute thrombocytopenia (count)	28 418 [19 000 – 47 000]
Massive transfusion	52 (52.0)
Transfusion (No. of units)	3.7 [3 - 4]
Hepatic compromise	
Acute hyperbilirubinemia	4 (4.0)
Neurological compromise	
Coma	2 (2.0)
Uterine dysfunction	
Hysterectomy	18 (18.0)
ICU admission > 72 hours	82 (82.0)

Values express n (%) or median [interquartile range].

Table 3. Obstetric characteristics of patients with EMM.

Characteristics	n (%)
Prenatal care	
Adequate prenatal care	78 (78.0)
Gestational age at start of prenatal care*	11.5 [9 - 19]
Number of PNC*	5.0 [3 - 8]
Gestational age in weeks*	29.6 [15 - 38]
Pregnancy outcome	
Abortion	8 (8.0)
Vaginal delivery	19 (19.0)
Cesarean	57 (57.0)
Exploratory laparotomy	14 (14.0)
Exploratory laparotomy	
Pregnant	60 (60.0)
Ectopic	14 (14.0)
Post-abortion	2 (2.0)
Postpartum	24 (24.0)
Discharge condition	
Alive without sequelae	94 (94.0)
Alive with sequelae	6 (6.0)

Values are expressed as n (%) or median [interquartile range].
** A population of 90 patients was considered.*
*** A population of 64 patients was considered.*
PNC: Prenatal care

Table 4. Maternal complications in patients with EMM.

Complications	n (%)
Hemorrhage	
Related to abortion	8 (8.0)
Placental spectrum disorder	13 (13.0)
Postpartum hemorrhage	22 (22.0)
Uterine atony	20 (20.0)
Ectopic pregnancy	14 (14.0)
Others	13 (13.0)
Hypertension	
Seasonal hypertension	6 (6.0)
Preeclampsia	28 (28.0)
Eclampsia	3 (3.0)
HELLP syndrome	30 (30.0)
Infection	15 (15.0)

Values express n (%) or median [interquartile range].

Oxytocin (54%), misoprostol (18%), ergometrine (15%) and other uterotonics (16%) were used to treat bleeding and magnesium sulfate (29%) for seizures. Antibiotic prophylaxis was applied in 53% of cases. The most frequent type of anesthesia in obstetric surgeries was general anesthesia (50%). Specialized care was required in 100% of the cases, reflecting the severity of the conditions presented.

In the years studied, 2 834 and 2 940 live births were registered, with a respective EMM ratio of 18.4 and 20.5 per 1 000 live newborns. The ma-

Table 5. Outcome indicators of patients with EMM at the Ayacucho Regional Hospital, from 2021-2023.

INDICATORS	2022	2023
MME ratio	18.4	20.5
Maternal mortality index (lethality)	3.6	7.9
MME/MM ratio	27	11.6
Percentage with three or more inclusion criteria	28	42

ternal mortality (case fatality) ratio was 3.6 and 7.9 per 100 EMM cases, respectively. The EMM/maternal death ratio was 27 and 11.6 cases of EMM per maternal death for each of the years described. And the percentage of cases with 3 or more inclusion criteria for EMM was 28% and 42%, respectively (Table 5).

Discussion

In this study, 100 cases of EMM were identified. The characteristics of the patient with EMM were a mean age of 28.3 years, most with only secondary education, cohabitants and with a previous cesarean section. These results are very similar to what has been published in other national research[10] but differ from other populations where ages older than 35 years are more common. They coincide in the low educational level, previous cesarean sections and multiparity, but differ in the higher rate of puerperal women compared to pregnant women[11,12].

Regarding prenatal controls, cases had an average of 4.6 controls, similar to national results[10]. However, previous studies have associated EMM with a lower number or absence of prenatal controls[11]. It is crucial to determine the quality and initiation of the prenatal checkups that patients receive, as well as adequate risk assessment during checkups.

The pathologies associated with EMM included mainly obstetric hemorrhage, hypertensive disorders such as preeclampsia and HELLP syndrome, uterine atony, postpartum hemorrhage, and ectopic pregnancy. These results are similar to those of national studies[10] also showing a progressive increase in intercurrent diseases. Data from Latin American countries[3,13,14] show a similar behavior with different prevalence rates, influenced by social and cultural characteristics, medical practices and health system performance. Postpartum hemorrhage and preeclampsia/eclampsia have also been found to be the most frequent obstetric complications with adverse maternal outcomes [14].

The most common EMM inclusion criteria were cardiovascular, respiratory, hematologic and coagulopathy dysfunctions, similar to other national results[15] that also evidenced liver dysfunction and that decreased over time with preventive strategies for hypertensive disorders and HELLP syndrome. Regarding management criteria, ICU admission, blood transfusions and hysterectomy predominated, data congruent with the published[15], where transfusions and management of obstetric bleeding became more frequent and necessary.

The ratio of EMM was 19.4 per 1 000 live births. Other national studies with smaller sample sizes found lower prevalences, between 3.57[16] and 9.43 per 1 000 live births[17]. These differences may be due to the current increase in prenatal care. More recent studies show rates between 15%[10] and 19.4%[15], knowing that the goal should be less than 8 per 1 000 live births[1]. A high prevalence related to the lack of response to severe complications is evidenced[9].

The average maternal mortality (case fatality) rate was 5.8% per 100 cases of EMM, high compared to national studies whose ranges are between 3.1%[10] and 1.9%[15]. The ideal target is less than 4%[1]. This elevation could be due to the high incidence of severe cases with higher inclusion criteria for EMM.

The ratio of extreme maternal morbidity/average maternal death was 19 cases of EMM for every maternal death, varying between 27 in 2021 and 11.6 in 2022, with a higher target of 35. This contrasts with other national studies that report ranges between 38.5[10] and 70[15], indicating a deficit in the quality of obstetric care in our region during the study years.

The percentage of cases with three or more inclusion criteria averaged 35% per 100 cases of extreme maternal morbidity, which points to the severity and degree of compromise in the health of patients with EMM and the high risk of maternal morbidity and mortality in the Ayacucho region. Furthermore, as a referral center for regions such as Huancavelica and Cuzco, it is likely that this is one of the causes that explain the high case fatality rates, in addition to pointing out the weaknesses in the maternal-perinatal health care system in our region.

We consider that our study stands out for its exhaustive approach and the use of validated collection forms, which strengthens the reliability of the results. However, being retrospective and based on medical records, it may have biases and limitations in data quality. Despite these limitations, the study highlights the need to improve obstetric care in the region and provides a solid basis for future research.

Conclusion

The present study provides a detailed analysis of the characteristics of extreme maternal morbidity (EMM) in the Regional Hospital of Ayacucho during the period 2021-2023. EMM occurred mainly in young women with secondary education and cohabitants, with severe hypoxia and cardiovascular compromise as the most frequent criteria. In addition, HELLP syndrome and postpartum hemorrhage were the most common complications, underscoring the importance of improving prevention and management strategies for these conditions. Outcome indicators such as the EMM ratio and maternal mortality ratio reveal critical areas for strengthening maternal care in the region. These findings emphasize the need to implement specific interventions to reduce the incidence of EMM and improve the quality of obstetric services, aligning with the goal of improving maternal health in Ayacucho.

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