

EDITORIAL

EPIDEMIOLOGY OF MATERNAL MORTALITY AND POOR PERINATAL OUTCOMES IN DIFFERENT REGIONS OF SUDAN

Elhassan M. Elhassan¹, Ahmed A. Hassan², Abd Elrahium D. Haggaz¹, Abdel Aziem A. Ali³, Ishag Adam²

1. University of Gezira, Wad Medani, Sudan.
2. Faculty of Medicine, University of Khartoum, Sudan.
3. Faculty of Medicine, Kassala University, Sudan

**correspondence:* Prof. Ishag Adam , Faculty of Medicine University of Khartoum, Khartoum, Sudan P. O. Box 102 ,Tel +249912168988, Fax +249183771211 E. mail: ishagadam@hotmail.com

ABSTRACT

Background: Both maternal mortality and poor perinatal outcomes (mainly; low birth weight, stillbirth and perinatal mortality) are health as well as obstetrics indicators. Thus, there is an urgent need to investigate epidemiology of maternal mortality and poor perinatal outcomes in the different regions of Sudan.

Objectives: To investigate the epidemiology of maternal mortality and poor perinatal outcomes in the different regions of Sudan.

Methods: Various cross- sectional, case -control, and Cohort studies were conducted during the last 7 years.

Results: Maternal mortality was ranged 442 (146/33034)-640 (63/9841) / 100000 birth in the different regions of Sudan, most of these were due to communicable diseases. Low birth weight was reported in 15.3% (80/524), 12.5% (260/2076), 12.6% (97/1224), 14.9% (64/430) 12.6% in New Halfa, Khartoum, Medani and Elfashir, respectively. Anaemia was risk factors for low birth weight in Elfashir and in Medani; it was risk factor for fetal anaemia in New Halfa and risk factor for stillbirth in Kassala. There were 21 (206/9841), 29 (981/34015), 35(46/1293)/ 1000 stillbirths and 33(44/1342)/1000 in Elfashir, Medani, Khartoum respectively and Kassala, respectively. There was 9.2% (46/500) perinatal death in New Halfa.

Conclusion: More effort should be paid to reduce the high maternal and perinatal mortality. More care should be toward nutrition, malaria prevention and other communicable diseases.

Keywords: maternal; mortality, low birth weight, perinatal, Sudan

EDITORIAL

INTRODUCTION

Each year more than 500 000 women die during pregnancy or childbirth [1] and more than four million babies die in the first 28 days of life, accounting for 38% of mortality in children aged less than five worldwide [2, 3]. The reduction of maternal deaths is a high priority for the international community, especially in view of the increased attention on the Millennium Development Goals [4]. Effective services to improve overall maternal health need targeted health and social policies and valid epidemiological data.

Low birth weight (LBW) is an important indicator of obstetric care and health status. It continues to remain a major public health problem worldwide especially in the developing countries. Low birth weight is an important determinant of child-hood morbidity, associated with death during infancy [5, 6]. Reducing the incidence of LBW neonates by at least one third between 2000 and 2010 is one of the major goals of the United Nations resolution “A World Fit for Children” and is an important contribution toward Millennium Development Goal (MDG) 4 of reducing child mortality by two thirds by 2015 [7]. It is estimated that annually four million infants die during the first month of life worldwide, the vast majority of these deaths occur in poor countries [8]. One of the Millennium Development Goals is to reduce the number of childhood deaths under the age of five years by two thirds by 2015 [7]. If this Goal is to be achieved, a substantial reduction in early neonatal deaths will be required. The first steps in improving early neonatal survival are to document rate of these deaths and to identify their causes. Addressing newborn health in rural parts of Africa offers particular challenges because of the inadequate public health infrastructure and lack of basic data such as LBW, and perinatal deaths.

Epidemiology of maternal mortality and poor perinatal outcomes is important for deciding the control strategies. Thus, studies investigating these parameters are vital and may be of great interest, so as to provide health planners and caregivers with fundamental guidelines for the implementation of preventive measures. Therefore, the aim of this work was to determine the epidemiology of maternal mortality and poor perinatal outcomes in different region of Sudan. As these studies were published before in various papers, it might be of great interest and of high value to summarize the main findings in one paper.

METHODS

During the last seven years various cross- sectional, case –control and cohort studies were conducted to investigate epidemiology of malaria and anaemia among pregnant women and to investigate the effect of malaria and anaemia on maternal and perinatal outcomes in the different region of Sudan, figure 1. These

studies have been designed to fit the desired objectives (cross sectional studies for prevalence and risk factors) as applicable and the details of these studies were mentioned individually in each case

EDITORIAL

and published before with referred references [9-19]. Likewise different statistical methods were used to analyze the data as applicable.

A maternal death was defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management. LBW was defined as birth weight < 2500 gm. stillbirths, defined as the delivery of a neonate after 28 weeks of gestation with no signs of life. Stillbirths were categorized as fresh (normal in appearance and with intact skin) or macerated (skin not intact), which implies that death occurred more than 24 hours before delivery. The stillbirth rate was calculated as the number of stillbirths per 1000 births in the time period of the study. Perinatal mortality was defined as death from 28-week gestational age (in-utero or outside) till 7 days after birth.

RESULTS

Maternal mortality was ranged 442 (146/33034)-640 (63/9841) / 100000 birth in the different regions of Sudan, most of these were due to hemorrhage, hypertension and various communicable diseases, table1..

Low birth weight was reported in 15.3% (80/524), 12.5% (260/2076), 12.6% (97/1224), 14.9% (64/430) 12.6% in New Halfa, Khartoum, Medani and Elfashir, respectively. Anaemia was risk factors for low birth weight in Elfashir and in Medani; it was risk factor for fetal anaemia in New Halfa and risk factor for stillbirth in Kassala, table 2.

In Khartoum hospital, the stillbirth rate was 35.5 per 1000 births (fresh and macerated stillbirth were equal), the early neonatal death rate was 15.4 per 1000 live births, giving a perinatal mortality rate was 51 per 1000 births. In Omdurman maternity hospital the stillbirth rate was 22 per 1000 deliveries. Likewise, over half (n=54.6, 52.4%) of these stillbirths were macerated stillbirths. In Wad Medani hospital the stillbirth rate was 29/1000 births; the majority of which (21/1000) 72.4% were macerated stillbirths. In Kassala hospital there were 33(44/1342) stillbirth; 33 per 1000. In Elfashir hospital the stillbirth rate was 21 per 1000 births and early neonatal mortality rate was 9.0 per 1000 live births and perinatal mortality rate 30 per 1000 births, table 3.

Table 1: Epidemiology of maternal mortality Sudan

| Region | Prevalence | Causes | Reference |
|---------|-----------------|--|-----------------------|
| Kassala | 644 (132/20485) | Lack of antenatal care, septicemia, hypertension, haemorrhage. | Ali et al, [9] |
| Medani | 442 (146/33034) | Septicemia, haemorrhage hypertension, malaria, anaemia. | Elhassan et al., [10] |

EDITORIAL

| | | | |
|----------|---------------|--|------------------------|
| Elfashir | 640 (63/9841) | Septicemia, haemorrhage hypertension, malaria, anaemia. | Haggaz et al., [11] |
|----------|---------------|--|------------------------|

Table 2: Epidemiology of low birth weight in Sudan

| Region | Prevalence | Risk factor/causes | Reference |
|-----------|------------------|-------------------------------|-----------------------|
| New Halfa | 15.3% (80/524) | Low body mass index | Adam et al., [12] |
| Khartoum | 12.5% (260/2076) | Lack of antenatal care | Hassan et al., [13] |
| Khartoum | Not applicable | Short interpregnancy interval | Adam et al., [14] |
| Medani | 12.6% (97/1224) | Anaemia | Elhassan et al., [15] |
| Elfashir | 14.9% (64/430) | Anaemia | Haggaz et al., [16] |

Table 3: Epidemiology of stillbirth Sudan

| Region | Prevalence | Risk factor/causes | Reference |
|-----------|----------------|------------------------|-----------------------|
| Kassala | 33(44/1342) | Anaemia | Ali et al., [17] |
| Medani | 29 (981/34015) | Not applicable | Elhassan et al., [10] |
| Khartoum | 35(46/1293) | Lack of antenatal care | Hassan et al., [13] |
| Omdurrman | 22(103/4760) | Malaria | Bader et al., [18] |
| Elfashir | 21 (206/9841) | Regardless to age | Haggaz et al., [19] |

DISCUSSION

The main findings of the current study were the high rates of maternal mortality and poor perinatal outcomes all over the investigated regions including the capital Khartoum. Almost similar causes were behind this high maternal mortality, where septicemia, haemorrhage, hypertension, malaria and anaemia were the identified causes. Because of surveys nature and the vast majority of these studies were noncontrolled ones, we failed to show predictors and risk factors for maternal mortality and causes were the main findings. However, the only exception of this is the Kassala where controls were investigated too. Thus, lack of antenatal care and lack of the education were the risk factors for maternal mortality in

Kassala

EDITORIAL

hospital [9]. Interestingly malaria and its related anaemia were beyond these high rates of maternal and perinatal mortality. Furthermore malaria and anaemia were observed as predictors for poor perinatal outcomes e.g. anaemia was reported as risk factor for fetal anaemia and low birth weight deliveries. Other communicable diseases were reported to have poor maternal and perinatal outcomes in most regions of Sudan e.g. viral hepatitis in Khartoum, visceral leishmaniasis (kala-azar) in the eastern Sudan and recently dengue in PortSudan [20-22]. Human immunodeficiency virus (AIDs) infection has become more prevalent and must now be considered as a possible etiologic factor for maternal and perinatal mortalities and it has to be considered among the causes of poor maternal and perinatal outcomes in Sub-Saharan Africa [23]. Previously, we have shown that pregnant women in central Sudan had low HIV prevalence and they were poor uptakes for HIV testing and counseling [24, 25]. This point- the poor uptake for HIV testing and counseling among pregnant women- could explain the scarcity of the data concerning HIV in Sudan. Sociodemographic factors like lack of education and antenatal care were reported to be intermingled with communicable diseases and poor maternal and perinatal outcomes e.g. lack of education and antenatal care were risk factor for poor perinatal outcomes in Khartoum and predictors for maternal mortality in Kassala [9, 13]. Interestingly, although malaria has big burden among pregnant Sudanese women regardless of their age and parity [26, 27], we failed to document a significant association between malaria and LBW. This point need to be investigated further perhaps using larger sample sizes study and PCR as diagnostic tool. Yet the author reported severe malaria and maternal mortality in New Halfa [28].

It is worth to be mentioned that, other non –communicable diseases and obstetrics emergencies were observed to have their impact on maternal mortality and poor perinatal outcomes e.g. eclampsia in Gadarif hospital, obstructed labour in Kassala hospital and preterm delivery in Oumdurman hospital [29,31]. However, all of these were hospital based studies, which might not present what was going on in the community.

Preventable causes highlighted the picture of maternal mortality and may be a tragedy to find septicemia among the causes of maternal mortality in Sudan. Thus, at the current tempo it is unlikely that the Millennium Development Goal related improving maternal and perinatal health will be achieved in this region by the year 2015.

In Summary, there was high prevalence of anaemia and malaria in these different regions of Sudan. Preventive measures should be employed urgently in order to reduce the communicable diseases and their impact on maternal and perinatal outcomes.

EDITORIAL

REFERENCES

1. World Health Organization (2004). Strategic Framework for Malaria Control during Pregnancy in the WHO Africa Region, Brazzaville:WHO Regional Office for Africa. AFR/MAL/04/01.
2. Lawn JE, Cousens S and Zupan J. Four million neonatal deaths: when? Where? Why? *Lancet* 2005; **365**: 891–900.
3. Adam T, Lim SS, Mehta S, Buhta ZA, Fogstad H, Mathai M et al. Cost effectiveness analysis of strategies for maternal and neonatal health in developing countries. *Brit Med J* 2005; **331**: 1107–1110.
4. United Nations General Assembly. United Nations Millennium Declaration. A/RES/55/2. 1-9-2000. UN General Assembly, 55th session, agenda item 60(b).
5. McCormick MC. The contribution of low birth weight to infant mortality and childhood morbidity. *N Eng J Med* 1985; **312**:82-90.
6. Kramer M S, Oliver M, Mclean F M, Willis D M, Usher R H. Impact of intrauterine growth retardation and body proportionality on fetal and neonatal outcome. *Pediatrics* 1990; **86**: 707-713.
7. Saving Newborn Lives. The state of the world's newborns: a report from saving Newborn Lives. Washington DC: Save the Children; 2001:14.
8. United Nations, General Assembly, 56th session. Road map towards the implementation of the United Nations Millennium Declaration: report of the Secretary-General. New York: United Nations; 2001.
9. Ali AA, Adam I. Lack of antenatal care, education and high maternal mortality in Kassala hospital, eastern Sudan during 2005 – 2009, submitted.
10. Elhassan EM, Mirghani OA, Adam I. High maternal mortality and stillbirth in the Wad Medani Hospital, Central Sudan, 2003-2007. *Trop Doct* 2009; **39**(4):238-9.
11. Haggaz AA, Radi EA, Adam I. High maternal mortality in Darfur, Sudan. *Int J Gynaecol Obstet* 2007; **98** (3):252-3.
12. Adam I, Babiker S, Mohammed AA, Salih MM, Prins MH, Zaki ZM. Low body mass index, anaemia and poor perinatal outcome in a rural hospital in eastern Sudan. *J Trop Pediatr* 2008; **54** (3):202-4.
13. Hassan AA, Abubaker MS, Radi EA, Adam I. Education, prenatal care, and poor perinatal outcome in Khartoum, Sudan. *Int J Gynaecol Obstet* 2009; **105** (1):66-7.

EDITORIAL

14. Adam I, Ismail MH, Nasr AM, Prins MH, Smits LJ. Low birth weight, preterm birth and short interpregnancy interval in Sudan. *J Matern Fetal Neonatal Med* 2009; **22**(11):1068-71.
15. Elhassan EM, Abbaker AO, Haggaz, AD, Abubaker, MS, Adam I. Anaemia and low birth weight in Medani, Hospital Sudan, Submitted.
16. Haggaz AD, Radi EA, Adam I Anaemia and low birth weight in western Sudan. *Trans R Soc Trop Med Hyg* 2010; **104** (3):234-6.
17. Ali AA, Adam I. Anaemia and Stillbirth in Kassala Hospital, Eastern Sudan. *J Trop Pediatr*, inpress.
18. Bader E, Alhaj AM, Hussan AA, Adam I. Malaria and stillbirth in Omdurman Maternity Hospital, Sudan. *Int J Gynaecol Obstet* 2010; **109** (2):144-6.
19. Haggaz AD, Radi EA, Adam I. High perinatal mortality in Darfur, Sudan. *J Matern Fetal Neonatal Med* 2008; **21**(4):277.
20. Ahmed RE, Karsany MS, Adam I. Brief report: acute viral hepatitis and poor maternal and perinatal outcomes in pregnant Sudanese women. *J Med Virol* 2008 ; **80** (10):1747-8.
21. Adam GK, Abdulla MA, Ahmed AA, Adam I. Maternal and perinatal outcomes of visceral leishmaniasis (kala-azar) treated with sodium stibogluconate in eastern Sudan. *Int J Gynaecol Obstet* 2009;**107**(3):208-10.
22. Adam I, Karsany MS, Jumaa AM, Maternal and perinatal outcomes of dengue in PortSudan, Eastern Sudan, Submitted.
23. Gibson RS, Abebe Y, Stabler S, Allen RH, Westcott JE, Stoecker BJ et al. Zinc, gravida, infection, and iron, but not vitamin B-12 or folate status, predict hemoglobin during pregnancy in Southern Ethiopia. *J Nutr* 2008; **138**:581-586.
24. Mahmoud MM, Nasr AM, Gasmelseed DE, Abdalrhafiz MA, Elsheikh MA, Adam I. Knowledge and attitude toward HIV voluntary counseling and testing services among pregnant women attending an prenatal clinic in Sudan. *J Med Virol* 2007; **79**:469-73.
25. Gasmelseed DE, Nasr AM, Homeida SM, Elsheikh MA, Adam I. Prevalence of HIV infection among pregnant women of the central Sudan. *J Med Virol* 2006 ; **78** (10):1269-70.
26. Adam I, Babiker S, Mohammed AA, Salih MM, Prins MH, Zaki ZM. ABO blood group system and placental malaria in an area of unstable malaria transmission in eastern Sudan. *Malar J* 2007; **10**; 6:110.
27. Adam I, Adamt GK, Mohammed AA, Salih MM, Ibrahim SA, Ryan CA. Placental malaria and lack of prenatal care in an area of unstable malaria transmission in eastern Sudan. *J Parasitol* 2009; **95**(3):7512.
28. Adam I, Elbashir MI. Maternal death due to severe pulmonary oedema caused by falciparum malaria: a case report. *East Mediterr Health J* 2004; **10** (4-5):685-7.
29. Adam GK, Bakheit KH, Adam I. Maternal and perinatal outcomes of eclampsia in Gadarif Hospital, Sudan. *J Obstet Gynaecol* 2009; **29** (7):619-20.

EDITORIAL

30. Ali, A., Adam, I. Maternal and perinatal outcomes of obstructed Labour in Kassala Hospital, Sudan. *Journal of Obstetrics and Gynaecology*, in press.
31. Alhaj AM, Radi EA, Adam I. Epidemiology of preterm birth in Omdurman Maternity hospital, Sudan. *J Matern Fetal Neonatal Med* 2010;**23**(2):131-4