EDITORIAL

Malaria As An Important Cause Of Maternal Mortality In Sudan

Mohamed EL Sanousi Mohamed EL Sanousi[1] , Abdul Rahman Abdul Hafeez AL Hassan[1] , Muawia Mohamed Ahmed Abd EL Salam[2]

ABSTRACT

This study was performed to highlight the role of malaria in pregnancy as an important cause of maternal mortality. It reviewed the previous studies, conference presentations and postgraduate thesis . Malaria found to be the cause of death of 10.26% to 46.7% of MM.

The 1998 to 2003 records of maternal deaths of Wad Medani Obstetrics and gynaecology teaching hospital (WMOGTH) was retrospectively studies (malaria caused death of 8.82% to 39.7%

The mean age was 27.57years , most of them were primigravidae and from rural areas. 37.8% of the deaths occured at 28-36 weak of gestation . The mean duration of stay in hospital was (3.22) days. 32.4% of deaths stayed for less than 24 hours This indicated severe and serious clinical presentations. The main causes of death due to malaria or its complication were anemae heart failure (24.3%), cerebral malaria (21.6%) and circulatory failure (8.1%). Others were pulmonary edema , hyperpyrexia , puerperal psychosis , abortion , severe epistaxes , cardiac arrest , black water fever, electrolyte imbalance, and hepatic failure. The study recommended effective prevention of malaria and an intensive care approach in its management.

ملخص الدراسة :

أجريت هذه الدراسة بغرض تسليط الضوء على الملاريا في الحمل كأحد الأسباب الهامة لوفيات الأمهات . بمراجعة الدراسات المنشورة عن وفيات الأمهات في السودان والأوراق العلمية المقدمة في مؤتمرات سابقة وبحوث طلاب الدراسات العليا وجد إن نسبة وفيات الأمهات بسبب الملاريا يتراوح بين 10.26% إلي 46.7% .وبمراجعة سجلات وفيات الأمهات بمستشفي النساء والتوليد التعليمي بود مدني في السنوات من (1998– 2003) تراوحت النسبة من 8.82% إلي 39.29%.

متوسط العمر للمتوفيات كان 27.57 عام. اغلبهن خروس (الحمل الأول) و من المناطق الريفية . 37.8% من الوفيات حدث في العمر الحمل من 28–36 أسبوعا.

كانت مدة الإقامة بالمستشفي قصيرة (3.22 يوم في المتوسط) وهناك 32.4% من السيدات توفين في غضون 24 ساعة من حضورهن المستشفي .هذا يعكس شدة الخطورة والحالة السريرية الوخيمة لتلك السيدات عند استقبالهن بالمستشفي .

تتسبب الملاريا في موت الأمهات من خلال هبوط القلب الناتج عن فقر الدم (24.3%) والملاريا المُخية (21.6%) وهبوط الدورة الدموية (13.5%) وهبوط الكلى (8.1%) وأسباب أخرى تتضمن الأتي :–

EDITORIAL

وزمة الرئة ، ارتفاع الحرارة الوخيم ، الذهان النفاسي ، الإجهاض ، الرعاف الوخيم ، توقف القلب ، حمي بيله خضاب الدم ، فقدان توازن الكهارل وهبوط الكبد.

key words :- maternal mortality , malaria , sudan , wad madani

---

[1]*Faculty of Medicine University of Gezira Department of Obstetrics and gynaecology*
[2] MSC in population and development and reproductive health ,University of Gezira , Population Studies Centre. (PSC)

Introduction. Maternal mortality (MM)is a major problem worldwide. In Sudan the estimated MM ratio is 509 per 100,000 life births. In Gezira, the figure is 689 per 100,000. The efforts to improve the situation must operate though the main causes of MM(1)
The aim of this study is to review the percentage of maternal mortality caused by malaria in the Sudan , and to study the demographic factors and characteristics of deaths and to identify the actual causes of maternal death due to malaria, so as to provide data that help in the achievement of safe motherhood initiative goal. That is lowering Maternal Mortality.

Acknowledgment. We would like to extend our thanks to all our colleagues in WMOGTH for their help and support. Our special thanks are due to Prof. Omer Ahmed Mirghani. We very much appreciate the effort of Mrs. Somia in keeping the files of M.M. Our thanks are delivered to the EDC- staff for processing this work, namely Egbal, Sabah and Omyma.

Methodology. This is a retrospective review study of maternal mortality due to malaria in Sudan. The published papers on maternal mortality together with presentation in conferences and postgraduate thesis on maternal mortality were reviewerd records . The percentage of malaria as a cause of death was obtained by simple calculations. The records of maternal mortality at Wad Medani Obstetrical and Gynaecology teaching hospital (WMOGTH) for the years1998-1999 -2000-2001-2002 and 2003 was reviewed. Those who died due to malaria were identified. A data sheet (master sheet) was designed to study these deaths according: to age, residence, gestational, age parity, duration of stay in hospital, actual cause of death due to malaria and the year of death. The details of 4 cases in the year 2002 were missing.
This data was processed using **SPSS** (Statistical Package for Social Science). Frequency distributions for all variables were made for all cases in addition to frequency distribution for cases in rural areas and urban areas. Chi-square test was used to study the relationships between the age of mothers and the following variables:

1. Duration of stay in hospital
2. Actual cause of death due malaria

*In the same way the relationship between cause of death and

EDITORIAL

1. The following variables duration of stay inhospital was studied
2. Parity

Results and statistics. This study showed that the percentage of malaria as a cause of maternal deaths in Sudan ranged between 46.7% and 10.26% in different previous studies, conference presentation and postgraduate thesis (table 1). In the records of WMOGTH the percentage of malaria as a cause of MM was highest in the year 1999 (39.29%) followed by the year 1998 (25.71%). These results state that the risk years of maternal deaths from the records were (1999, and 1998). In 1999 the percentage of mothers who died of malaria out of all mothers died due to other reasons is 39.29%, in 1998 was 27.715%, in 2002 was 24.14%, in 2001 was 19.44%, in 2000 was10.26% and in 2003 is 8.82%.For the whole period of six years (1998-2003) the percentage of mothers who died due to malaria out, of all mothers who died due to other causes was 24.40%. Table (2)

Table (2) No and percent of MM due to Malaria in WMOGTH records 1998-2003

Year	Number of deaths	Percent of deaths
1998	**9**	**25.71**
1999	**11**	**39.29**
2000	**4**	**10.26**
2001	**7**	**19.44**
2002	**7**	**24.14**
2003	**3**	**8.82**
Total	**41**	**20.4**

Descriptive analysis:
Demographic characteristics of mothers:

1. **The mother age .** The mean age distribution of mothers (18-40) was 27.57 years. This indicates that the mother age died due malaria in pregnancy on average was 28 years in the hospital records. According to the normal distribution test (or z-distribution) the expected mean age of mothers at risk of dying from malaria cause in the whole population of mothers in Gezira state will be in the range of (27.57 $\pm$(1.96)(0.9288) or (25.75-29.39) with 95% confidence level. The probability of finding a mother whose age is out of this range is 5% or 5 out of 100 mothers. (Table 3).
   The age group (20-34) is the risk age of mothers who died due to malaria. 32.4% of mothers were in the age of (25-26).the percentage of mothers in age less than 20 years and 40 years was 5.49 and 2.7% respectively. Table(3)

EDITORIAL

2. **Duration of stay in hospital.** The majority stayed in hospital for less than 24 hours before they die .The mean duration of stay in hospital was 3.27 days. The mean duration of stay in hospital for mothers (18-40) in the population is expected to be between (327±1.96(0-41)) or (4.07-2.47) days. Fig.No(1)

3. The mothers' residence. 70.3% of mothers who died, were admitted to hospital from rural areas. 29.7% of them from urban areas. (Table 5)

4. The parity of the mothers: more than one third of deaths were primigravidae (35.1%). 35.1% of dea ths were having 2-4 children only one. Eleven cases (29.7%) have 5 children and more. (Table3)

5. Gestational age of mothers. 37.8% of mothers were reported as having gestational age (28 to 36) weeks, 18.9% of them were reported as having gestational age below 28 weeks and 10.8% as having gestational age 36to delivery. 32.4% of mothers were in the puenperium. Table (3)

6. The actual cause of maternal mortality due to malaria. 30.8% of mothers died due to cerebral malaria, 34.6% of mothers died due to anaemia, 15.4% due to circulatory failure, 11.5% is 39.29%, due to renal failure, and 7.7% due to pulmonary oedma- in rural areas. 18-2% of mothers in urban areas died of hyperpyrexia. 81.8% of them died due to other diseases with equal percentage (9.1%) for each.

Inferential statistic Analysis:

1. The age of the mothers and duration of stay in hospital. The relationship between the age group of mothers and the duration of stay in hospital is statistically highly significant at 0.001 level of significance. Since chi-square is 127.907, d. f is 45and the level of significant is 0.000. This significant result states that the duration of stay in hospital is dependant on the mothers' age. 24.32% of mothers -3- stayed in hospital for 24 hours or less.

32.24% of mothers were reported to stay in hospital 3 days or less.

2. The age of mothers and the actual cause of maternal death due to malaria. The relationship between the age of mothers and the actual cause of maternal mortality due malaria is very strong. Since chi-square is 127-907,df is 45 and p. value is 0.000. This result is statistically highly Significant at 0.001 level of significance. That means the actual cause of maternal mortality due to malaria was strongly related due to the age of the mother. 66.7% of mothers in the age group (20- 24) died due to cerebral malaria , 50% of mothers in (25 – 29) died due to anaemia and 50% of mothers in (30- 34) died of circulatory failure.

3. Maternal mortality: Rural and Urban Comparison:

A. The mother age. 91% of mothers in urban area were in the age group (30-39) and only one woman (8%) was in age 40. In comparison 11.5% of mothers in rural areas in age (30-34). No mothers in the early ages (18-26) were from urban areas, whereas mothers who died from malaria in the age group (18-26) in rural areas were 88.5%.

EDITORIAL

Maternal characteristics	Rural	Urban	Total
Number of mothers	**26**	**11**	**37**
	%	**%**	**%**
Percentages of mothers **The age of mother**	**70.3** **%**	**29.7** **%**	**100** **%**
Less than 20	7.7	0	5.4
20-24	34.6	0	24.3
25-26	46.2	0	32.4
30-34	11.5	45.5	21.6
35-39	0	45.5	13.5
40-44	0	9.1	2.7
Total	**100**	**100**	**100**
Parity			
One child	46.2	9.1	35.1
2-4 children	46.2	9.1	35.1
5 children and more	7.7	81.8	29.7
Total	**100**	**100**	**100**
Gestational age			
Below 28 weeks	26.9	0	18.9
28 – 35	53.8	0	37.8
36-delivery	15.4	0	10.8
Puepenium	3.8	100	32.4
Total	**100**	**100**	**100**

Table (3) Demographic chrematistic of Deaths-

EDITORIAL

B. The parity of the mothers. 46.2% of mothers rural areas who died, had only one child. The same percentage had between 2 and 4 children. 7.7 % had 5 children or more. Although 92% of mothers in rural areas have small parity or low fertility experiences they are most mothers at risk of dying due to malaria. In urban areas 81.8% of mothers who died, had 5 children or more. Only 2 mothers or about 18.2% of mothers in urban areas had a parity of 1-4 children.

C. Gestational age. 53.8% of mothers had gestational age 28-36 weeks, 26.9% before 28 weeks, 15-4% are 36-week and only 3-8% were pueperium in rural areas. Whereas all the mothers in urban areas (II mothers) who were in the puepenium.

Discussion. The commonest cause of malaria in Sudan is plasmodium falciparum. Unfortunately this is the most problematic type of malaria in pregnancy. Malaria in pregnancy is more common, shows more atypical presentations, more severe and more fatal (2). In addition it has got special complications regarding the fetus and placenta. The treatment protocol must be critical.

In this study the short stay in Hospital indicated the grave situation of malaria .On presentation, there were high fatalities among primigravidae. This is in agreement with the established fact that in primigravidae the disease is more common and more severe and with more effects on the outcome. (3,4). there is due to the immunosuppressive effect of pregnancy. That is transient depression in cellular immunity aiming at prevention of rejection of the fetus, being an allograft (5). In addition there is sequestration of plasmodium falciparum infected red blood cells in the placenta. The multiparae are protected from this placental parasite due to formation of antibodies, as a result of previous infection that express a specific phenotype (plasmodium falciparum membrane surface protein) which allows them to cytoadhere to the glycosaminoglycans chondroitin sulfate A(CSA) and hyalouronic acid expressed by syncytiotrophoblasts. (6,7). The higher susceptibility of primigravidae is thought to be due to the expression of particular variant surface antigens (SAs) binding to CSA in the placenta. Antibodies against placental parasite are present in multigravidae in endemic areas(8). This view of decresed immunity explaing the high percentage of deaths due to cerbrol malaria (21.8%). On of the rwo top causes of death due to malaria in this study was anaemia. This is supported by the fact that malaria is a cause of 2% to 15% of maternal anaemia which increases the risk of maternal mortality; at is estimated that malarial anaemia causes as many as 10.000 maternal deaths in Africa (9).

The highest percentage of deaths due to malaria is observed to be in the third trimester before 36 weeks and in the puerperium. This is in contradiction with the established fact that the highest paracitaemia occurring during the second trimester. (10) In Gezira state, a positive blood film can be positive co-incidentally with any other problem. One must be

EDITORIAL

very careful in relating the death to malaria. In this study death due to obvious infections such as post operative septicaemia were not considered as malaria even when the treatment sheet of these include quinine. Identification and understanding the way or ways by which malaria killed these ladies is important for the improvement of management and hence prevention of deaths due to malaria in the future. Unfortunately this is not always possible either because of limited investigative facilities, short stay or absence of post-mortem examination.

Conclusion. Malaria is an important cause of maternal mortality in Sudan. It kills ladies by causing cerebral malaria, anaemia and circulatory failure. The primigravidae and ladies from rural areas are most at risk.

Recommendations.

1. Design protocols that cover prevention of malaria in pregnancy at all levels.
2. The short stay in hospital and the serious presentation calls for support of hospital to enable management of severe malaria in pregnancy through an intensive care approach.

References:

1. Safe motherhood survey 1999.
2. http://malariasite .com/malaria/pregnancy.htm.
3. McGregor iA: Epidememyology , malaria and pregnancy Am J Trop Med Hyg 1984,33:517-25
4. Brabin B : an assessment of low bithveight risk in primiprarae as an indicator of malaria central in pregnancy. Int J Epidemiol 1991 20;276-83 .
5. Meeusen EN , Bischof RJ , Lee CS : Comparative T – cell responses during pregnancy in large animals and humans. Am J Report Immunol 2001 , 46 : 169 – 79 .
6. Fried M, Duffy PE ; Adherence of plasmodium falciparum to chondroitin sulphate A in the human placenta. Science 1996, 227 : 1502 – 4 .
7. Beeson JG Rogers on SJ , Cooke BM , Reeder JC , Chi W , Lawson AM , Molyneux ME , Brwn GV : Adhesion of plasmodium falciparum infected erythrocytes to hyaluronic acid in placental malaria. Nat. Med 2000, 6:86-90 .
8. Maubert B , Fievet N , Tami G , Cot M , Boudinc , Deloron P : Development of

EDITORIAL

antibodies against chondroitin sulphate A – adherent to plasmodium. falciparum in pregnant women. Infect immune 1999 , 67 : 5367 – 71 .

9. UNICEF Malaria Technical Note 3 February 2003 .
10. Liaison Bulletin of the Malaria Programme WHO/AFRO Vol.3 No 1