



RESEARCH ARTICLE

MALARIA IN PREGNANCY: EFFECT ON MATERNAL AND FETAL OUTCOME IN
NORTH-WEST RAJASTHAN

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ABSTRACT

Background & Objective: Malaria infection during pregnancy is a significant public health problem with substantial risks for the pregnant woman, her foetus, and the newborn child. So we conducted this study to predict the complications and outcome of malaria during pregnancy.

Material & Methods: It was a case control type of study carried out at S.P. Medical College and Associate Groups of Hospitals, Bikaner, Rajasthan. 50 cases of pregnancy with malaria and 50 controls of pregnant females without malaria were chosen for study.

Results: The incidence of severe anaemia is 52% in cases and 4% in controls (p-value<0.0001). Thrombocytopenia was seen in 48% of patients. Jaundice was reported in 8% of cases. 6% of cases suffered from renal failure. The incidence of abortions is 10% in cases as compared to 4% in controls (p-value<0.21). The incidence of IUGR (Intrauterine growth retardation) babies is 18% in case group as compared to 2% in control group (p-value<0.01). The incidence of intra-uterine deaths is 10% in cases as compared to 2% in controls (p-value<0.10). As compared to the control group which has 16% babies in low birth weight category 50% of babies in case group had weight in low birth weight category (p-value<0.02). Early neonatal deaths were only reported in case group with an incidence of 6% (p-value<0.12).

Conclusion: Maternal malaria increases the incidence of severe anaemia, thrombocytopenia, renal failure, hepatic failure, multi organ dysfunction in pregnant females and also increases the risk of spontaneous abortion, intra-uterine growth retardation, intra-uterine death, premature delivery and low birth weight.

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INTRODUCTION

There were large reductions in the number of malaria cases and deaths between 2000 and 2015. In 2000, it was estimated that there were 262 million cases of malaria globally (range: 205–316 million), leading to 839 000 deaths (range: 653 000–1.1 million) (Table 2.1). By 2015, it was estimated that the number of malaria cases had decreased to 214 million (range: 149–303 million), and the number of deaths to 438 000 (range: 236 000–635 000). These figures equate to an 18% decline in estimated malaria cases and a 48% decline in the number of deaths during this period (WHO, 2015). In 2013 there were estimated 2.1 million new cases of HIV infection worldwide and global deaths total 1.5 million (Fauci and Lane, 2015). Malaria is transmitted in 107 countries containing 3.2 billion people and causing 1-3 million death each year. Thus, like HIV, Malaria is also global problem.

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Malaria has been a serious problem in India for centuries. Details of this disease can be found even in the ancient Indian medical literature like the "Charak Samhita". It remains to be the most important cause of morbidity and mortality in India with approximately 2-3 million new cases each year (Park, 2007). The major endemic areas in India are in the Northeastern States mainly due to topography and climate conditions being favourable for perennial malaria transmission (Govt of India Annual Report, 2003; Anon, 1997-2006). The most vulnerable sections of society are newborn infants and pregnant ladies.

Infection with malaria poses health risks for both mother and foetus and it is estimated that between 0.75-2 lacs infant death each year are due to maternal malaria infection. In the area of unstable transmission, like Bikaner, women have little acquired immunity and malaria is an important cause of maternal death, abortion, still birth, premature delivery and low birth weight.

Not much studies are available from areas of unstable transmission so the present study was undertaken to evaluate the impact of malaria in pregnancy on maternal and foetal health. We hope that the data obtained from our study will be helpful in planning new management guidelines for pregnant patients as a part of global malaria control strategy.

AIMS AND OBJECTIVES

To assess the Clinical course and spectrum of adverse effects of malaria during pregnancy and adverse pregnancy outcome attributable to malaria.

MATERIALS AND METHODS

It is a type of case control study done in a sample population of 50 cases and 50 controls and conducted in S.P. Medical College and Associate Groups of Hospitals, Bikaner, Rajasthan. We included the Pregnant women of >18 years of age who attend the OPD in P.B.M. Hospital and diagnosed as case of malaria and given the informed consent to participate in study. Patients having HbsAg positive, HIV positive, with pre-eclampsia or eclampsia, heart disease and Patients with hemoglobinopathies excluded from study. After that we obtained demographic obstetrical and clinical information (gestational age, parity, auxiliary temperature), a finger prick blood sample collected for thick and thin blood smear to determine parasitemia and/or rapid detection test (Card test) and relevant investigations were done like complete blood count, liver function test, renal function test, Serum electrolyte, Fasting Blood Sugar (FBS) and ESR. Urine complete and microscopic and Ultrasonography (USG) for foetal well being and gestational age are also done.

RESULTS

12% of patients in case group had Hb<4gm% as compared to none in control group. 40% of patients in case group had severe anaemia as compared to 4% patients in control group. 44% of patients in case group had moderate anaemia where as 36% of patients in control group had moderate anaemia. This relationship of anaemia and malaria infection in pregnancy is significant with a p-value of <0.0001. (Table 1).

Table 1. Distribution according to Haemoglobin estimation among cases and control

Hb level (gm%)	Cases		Controls	
	No.	%	No.	%
<4	6	12	-	-
4-7	20	40	2	4
7.1-10	22	44	18	36
> 10	2	4	30	60
Mean ± SD	6.61 ± 1.82		10.35 ± 2.16	
P value	0.0001			

Maximum number of patients in case group had platelet count in the range of 50,000-100000(44%). Only 4% patients had platelet count less than 50,000 in case group. No patient in control group had platelet count less than 50,000.

Thus our study concludes that incidence of thrombocytopenia is more in plasmodium infected cases as compared to normal pregnant controls. The relationship of thrombocytopenia and malaria infection in pregnancy is also significant with a p-value of <0.001 (Table 2).

Table 2. Distribution according to Platelet counts among cases and controls

Platelet counts (per cc)	Cases		Controls	
	No.	%	No.	%
<50000	2	4	-	-
50000-100000	22	44	1	2
100000-150000	12	24	15	30
>150000	14	28	34	68
Mean ± SD	128740 ± 64953.61		172180 ± 25409.86	
P value	0.001			

Our study showed a significant co-relation between the incidence of low birth weight babies and malaria infection in pregnancy (p<0.02). 4% of the babies in the case group belonged to extremely low birth weight category whereas none of the babies in the control group was below this limit. 6% of babies in case group were very low birth weight as compared to 2% in control group. As compared to the control group which has 16% babies in low birth weight category 50% of babies in case group had weight in low birth weight category (Table 3). Poor pregnancy outcomes in cases as compared to controls and the results are significant with a p-value of <0.0003. 10% of the cases suffered from intra-uterine deaths of fetus as compared to 2% of controls. 10% of cases suffered early pregnancy losses (abortions) as compared to 4% of controls. Early neonatal deaths were 6% in cases as compared to none in controls.

Table 3. Distribution of birth weight in cases and control (excluding abortions)

Birth weight	Cases (n=45)		Controls (n=48)	
	No.	%	No.	%
<1000 gms (extremely low birth weight)	2	4	0	0
1000-1499 gms (very low birth weight)	3	6	1	2
1500-2499 gms (low birth weight)	25	50	8	16
>= 2500 gms	15	30	39	78
Mean ± SD	2340 ± 460		2720 ± 490	
P value	0.02			

However preterm live birth was seen in only 26% of cases when compared to 10% of controls but this result could be biased because more number of patients suffered either early pregnancy failure or intrauterine deaths and were excluded from the criteria of preterm live birth. Only 48% of the cases experienced normal labour and delivery with a healthy newborn as compared to 84% of controls (Fig.1). Fig.2 shows the percentage of various medical complications in case group. 52% of patients suffered from severe anaemia. Thrombocytopenia was seen in 48% of patients. Jaundice was reported in 8% of cases. 6% of cases suffered from renal failure. Thus thrombocytopenia and severe anaemia were the most common complications noted in our study group.

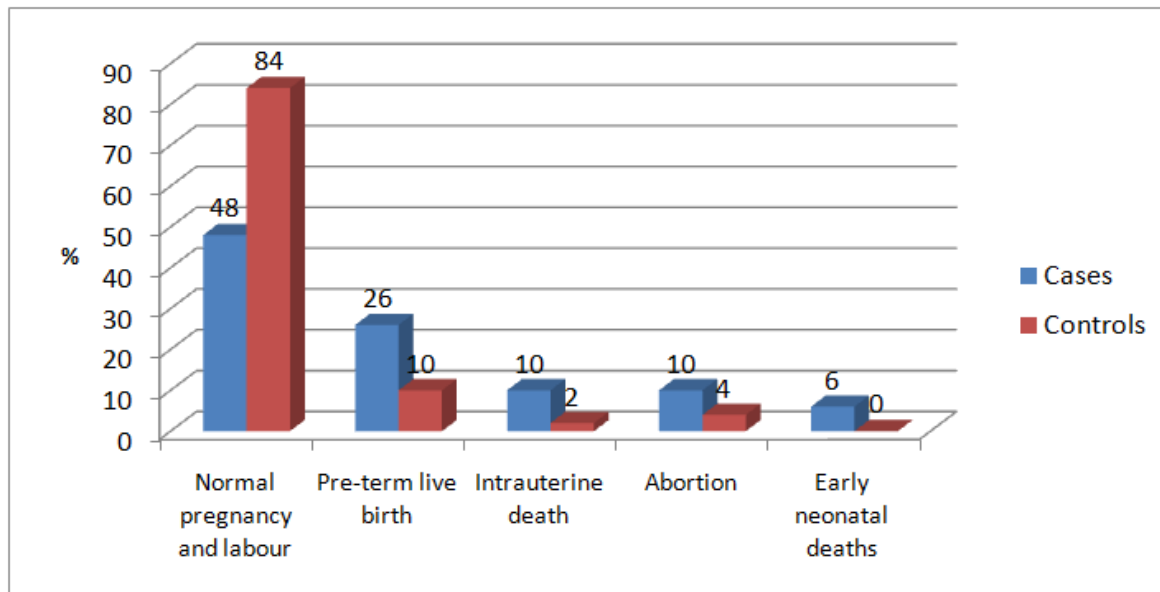


Fig.1. Pregnancy outcomes among cases and controls

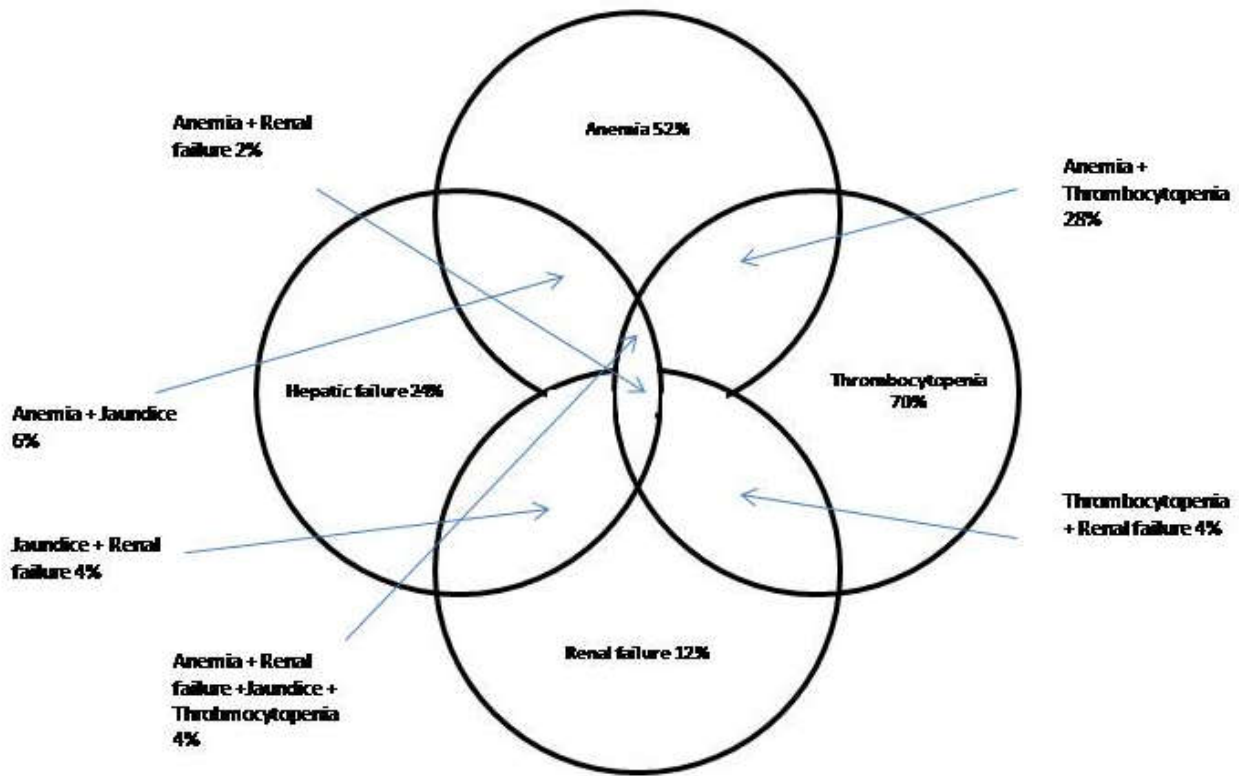


Fig. 2. Percentage of various medical complications in cases

DISCUSSION

Our study constituted of 50 pregnant patients who were either admitted or presented as outpatients with one or more complaints related to malaria infection. They were thoroughly studied and followed during their entire course of pregnancy and through delivery to carefully observe and record the maternal complications like anaemia, intra-uterine growth restriction, preterm labour, intra-uterine death as well as fetal

complications like low birth weight. Shulman *et al.* in 2005 in an another cross-sectional survey done in antenatal clinic of Kilifi District concluded that the prevalence of severe anaemia was 10%. Later in gestation at 33-39 weeks the frequency of severe anaemia was even higher at 17.5%. In our study 40% of patients in case group had severe anaemia as compared to 4% patients in control group. 44% of patients in case group had moderate anaemia where as 36% of patients in control group had moderate anaemia. O Erhabor *et al.* (2010) in 2010 in an

observational study conducted in department of medical laboratory sciences, college of Health Sciences, Niger Delta University reviewed the platelet counts in a cohort of healthy and malaria infected pregnant women attending anti-natal clinics. Our study concludes that incidence of thrombocytopenia is more in plasmodium infected cases as compared to normal pregnant controls. In our study 6% of cases suffered from renal failure while none in the control group suffered from this complication and hepatic failure was reported in 8% of cases and none of the controls. Mehta *et al.* in 2010 conducted a study in department of nephrology in Nair hospital, Mumbai and reported an incidence of ARF as 5.9% in malaria infected pregnant patients. Ali Hassan Abro *et al.* in 2010 evaluated the frequency and severity of jaundice with hepatic dysfunction in Plasmodium falciparum and vivax malaria in pregnant women and concluded that liver is commonly involved in acute malaria and hepatic dysfunction ranges from mild elevation of liver enzymes to the range of acute hepatitis (ALT>10 times of normal levels). In our study 10% of cases suffered early pregnancy losses (abortions) as compared to 4% of controls. R McGready *et al.* in 2011 reported results of his largest retrospective analysis to date of the effect of malaria infection and treatment in early pregnancy. He analyzed 25 years of data from the Shoklo Malaria Research Unit (SMRU) clinics on the Thai-Burmese border, including over 48,000 pregnancies. These findings showed that malaria infection (symptomatic and asymptomatic) was very important risk factor for miscarriage and the chances of miscarriage for symptomatic malaria women are at least four-times more likely. These results support our conclusion as well.

In our study the incidence of IUGR babies is 18% in case group as compared to 2% in control group (p-value<0.01). Most of the studies conducted in this respect support this result and only a very few have reported otherwise. Rijken MJ *et al.* in 2011 conducted a study on 3779 women living on the Thai-Myanmar border who delivered singleton live born babies and found that despite early treatment in all positive women, one or more symptomatic or asymptomatic malaria infections in first half of pregnancy result in a smaller than expected mid-trimester fetal head diameter thus indicating symmetrical IUGR. In our study 10% of the cases suffered from intra-uterine deaths of fetus as compared to 2% of controls which is significant with a p-value of <0.10. Newman *et al* in 2003 reported a seven fold increased risk of still birth in association with placental parasitemia in areas with unstable malaria transmission in Ethiopia. In our study extremely low birth weight in 4% cases and none in control and very low birth weight 6% in cases and 2% in control. These results are similar as seen in other studies. In sub-saharan Africa, the rate of low birth weight newborns ranges from 3.9% to 24% and malaria is thought to be an important contributor to the 3.5 million low birth weight babies born annually in sub-Saharan Africa which is endemic for malaria thus supporting the hypotheses that malaria is a cause of low birth weight (Newman, 2003; Brabin and Verhoeff, 2000). In our study early neonatal deaths were 6% in cases as compared to none in controls and almost all of the deaths were because of prematurity in our scenario. Guyatt HL *et al.* in 2001 studied the possible impact of placental malarial infection on neonatal mortality through reduced birth

weight. It was shown that a baby is twice as likely to be born of low birth weight if the mother has an infected placenta at the time of delivery, and that the probability of premature mortality of African newborns in the first year of life is three times higher in babies of low birth weight than in those of normal birth weight (16% Vs 4.6%).

Conclusion

Malaria adversely affects the both pregnant female as well as foetus. It increases the incidence of severe anaemia, thrombocytopenia, renal failure, hepatic failure, multi organ dysfunction in pregnant female and also increases the risk of spontaneous abortion, intra-uterine growth retardation, intra-uterine death, premature delivery and low birth weight. So all patients with fever in pregnancy must have screening for malarial parasite and treated adequately by medicine and supportive care to improve the maternal and foetal outcome.

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