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Original Research Article

A Retrospective Study to Evaluate the Maternal and Fetal Outcome of Malaria in Pregnancy

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Abstract

Aim: The aim of this study to evaluate the maternal and fetal outcome of malaria in pregnancy

Methods: this retrospective study of pregnant women was conducted in the Department of Obstetrics and Gynecology Katihar Medical College and Hospital,Katihar, Bihar, India . Detailed history and clinical examination was done to ascertain the cause of fever. Haemoglobin, total and differential leucocyte count, rapid diagnostic tests (RDTs) for malaria, routine urine examinations were done. Microscopy of blood smears was done for species identification for all malaria positive pregnant women. A total of 50 patients were found to be smear positive for plasmodium.

Results: A total of 12100 pregnant women attended our hospital during study period out of which 50 were positive for malaria. Prevalence of malaria in pregnancy during the study period was 0.41%. Among the malaria cases, 30 cases were primigravidae and 20 were multi-gravidae, accounting for 60% and 40% respectively. Out of 50 cases, *P. falciparum*, *vivax*, and mixed malaria accounts for 24%, 30% and 8% cases respectively showing the predominant pathogen as *P. vivax*. Out of 50 cases, maternal anemia was present in 16 cases of which 10 (20%) were primigravida and 6 (12%) were multi-gravida. Maternal thrombocytopenia was seen in 14 cases of which 10 (20%) were primigravida and 4 (8%) were multigravida. Complications caused by different pathogens accounted for maternal anemia were 83.33% and 16.67%, maternal thrombocytopenia were 42.86% and 57.14% of *P. vivax* and *falciparum* respectively.Obstetric complications caused by *P. vivax* and *falciparum* accounted for 33.33% and 66.67% of spontaneous miscarriage, 75% and 25% of preterm deliveries, 75% and 25% of low birth weight babies, 0% and 100% of perinatal deaths respectively.Obstetric outcomes includes, 10 cases (20%) of spontaneous miscarriage, all belonging to first trimester, 12 cases (24%) of preterm deliveries, 16 (32%) cases of low birth weight babies and 1 case (2%) of perinatal death.

Conclusions: We concluded that the malaria affects both pregnant female and fetus. So all patients with fever in pregnancy must have screening for malarial parasite and treated adequately by medicine and help to improve the maternal and fetal outcome.

Keywords: Fever, Malaria, Plasmodium, Pregnancy.

Introduction:

Malaria is the second most common cause of infectious disease–related death in the world, after tuberculosis. It is estimated to affect between 350 to 500 million people annually and accounts for 1 to 3 million deaths per year.[1,2] The vector-borne infectious diseases, malaria which disproportionately affect impoverished individuals and impose a major economic burden on developing nations.[3] Unfortunately, these infections are associated with an increased severity during pregnancy and worse materno fetal outcomes, an alarming issue that has only recently come to light and is currently being systematically studied.[4] The *Plasmodium* parasite is transmitted to humans from the bite of the female *Anopheles* mosquito with *P. falciparum* and *P. vivax* being the most frequently encountered species.[5]

Despite childhood exposure that leads to acquisition of immunity against malaria, first time pregnant mothers or primigravidas are again susceptible to the disease due to a combination of host and parasitic factors.[6] Malaria in pregnancy (MiP) results in placental infection, termed placental malaria (PM), which predisposes to placental injury and insufficiency. Placental insufficiency refers to poor placental function and is commonly observed in PM. It is also hypothesized to be a leading cause of low birthweight (LBW). A baby with LBW is defined as a live born who is <2,500 g regardless of gestational age.[7] LBW deliveries can be due to preterm birth (live birth < 37 gestational weeks) or small for gestational age (SGA) (birthweight < 10th percentile for its gestational age). Of note, the precise mechanisms behind MiPassociated preterm birth and SGA remains unclear. P. falciparum infection can cause inflammation and potentially disrupt the fine immunological balance required to maintain pregnancy to term.[8] On the other hand, SGA is often linked to placental insufficiency and there is also substantial evidence to suggest dysregulated placental development in mothers with MiP.[9] Interestingly, preterm birth does not commonly co-exist with SGA, further highlighting the complexity of MiP-associated birth outcomes.[10] Malaria in pregnancy threatens the well-being of the mother and her developing fetus, and an infected mother is likely to be an important reservoir of Plasmodium infection.

Material and methods

This retrospective study of pregnant women with fever was conducted in the Department of Obstetrics and Gynecology, Katihar Medical College and Hospital,Katihar, Bihar, India

For 1 year, Detailed history and clinical examination was done to ascertain the cause of fever. Haemoglobin, total and differential leucocyte count, rapid diagnostic tests (RDTs) for malaria, routine urine examinations were done. Microscopy of blood smears was done for species identification for all malaria positive pregnant women. A total of 50 patients were found to be smear positive for plasmodium. The patients were treated with tablet chloroquine, quinine or artemisinin combination treatment depending on species identification, trimester and severity of malaria. Maternal demographic details, maternal and fetal complications were noted during the study period. Maternal complication include anemia, thrombocytopenia, jaundice, shock etc., and fetal complications like miscarriage, low birth weight, Intra- uterine death etc. Data was obtained from outpatient records, case

sheets and labor records of the hospital, analyzed by calculation of percentages.

Inclusion criteria

Pregnant women diagnosed to have malaria by rapid diagnostic test or microscopy were included in this study. Microscopy of blood smears was done for species identification.

Exclusion criteria

Patients with Chronic anaemia, ITP, liver disorders, chronic hypertension Chronic diseases like renal disease, etc.

Maternal demographic Profile, maternal and fetal complications were evaluated during the study period.

Results

A total of 12100 pregnant women attended our hospital during study period out of which 50 were positive for malaria. Prevalence of malaria in pregnancy during the study period was 0.41%. (Table 1).

Table 1: Prevalence of malaria

Total no of patients	No of positive for malaria	%
12100	50	0.41

Table 2: Parity

Parity	**No. of patients**	**%**
Primigravida	30	60
Multigravida	20	40

Among the malaria cases, 30 cases were primigravidae and 20 were multi-gravidae, accounting for 60% and 40% respectively (Table 2.).
Out of 50 cases, *P. falciparum, vivax,* and mixed malaria accounts for 24%, 30% and 8% cases respectively showing the predominant pathogen as *P. vivax.* (Table 3.)

Table 3: Types of parasite causing malaria

Type of malaria	No. of patients	%
P. falciparum,	13	26
P. vivax	27	56
Mixed infection	7	14

Table 4: Maternal anaemia With parity.

Maternal anemia	**Primigravida % (no.)**	**Multigravida % (no.)**
Present	20% (10)	12% (6)
Absent	40% (20)	28% (14)

Out of 50 cases, maternal anemia was present in 16 cases of which 10 (20%) were primigravida and 6 (12%) were multi-gravida (Table 4).

Table 5: Maternal thrombocytopenia in relation to parity

Maternal thrombocytopenia	Primigravida % (no. of cases)	Multigravida % (no. of cases)
Present	20% (10)	8% (4)
Absent	40% (20)	32% (16)

Maternal thrombocytopenia was seen in 14 cases of which 10 (20%) were primigravida and 4 (8%) were multigravida (Table 5).

Table 6: Maternal complications caused by different malarial pathogens.

Type of maternal complication	*P. vivax* %	*P. falciparum* %
Maternal anemia(18)	15(83.33%)	3(16.67 %)
Maternal thrombocytopenia(14)	6(42.86%)	8(57.14%)

Complications caused by different pathogens accounted for maternal anemia were 83.33% and 16.67%, maternal thrombocytopenia were 42.86% and 57.14% of *P. vivax* and *falciparum* respectively (Table 6).

Obstetric complications caused by *P. vivax* and *falciparum* accounted for 33.33% and 66.67% of spontaneous miscarriage, 75% and 25% of preterm deliveries, 75% and 25% of low birth weight babies, 0% and 100% of perinatal deaths respectively.

Table 7: foetal complications among affected pregnant women in relation to parity.

Type of fetal complication	Primigravida % (no. of cases)	Multigravida % (no. of cases)
Spontaneous miscarriage	10% (5)	8% (4)
Preterm delivery	10% (5)	14% (7)
Low birth weight	20% (10)	12% (6)
Perinatal death	2% (1)	0% (0)

Obstetric outcomes includes, 10 cases (20%) of spontaneous miscarriage, all belonging to first trimester, 12 cases (24%) of preterm deliveries, 16 (32%) cases of low birth weight babies and 1 case (2%) of perinatal death (Table 7)

Discussion

The number of malaria cases worldwide seems to be increasing due to increasing transmission risk in areas where malaria control has declined, the increasing prevalence of drug-resistant strains of parasites, and in a relatively few cases, massive increases in international travel and migration.[11] The prevalence of malaria in pregnancy in the present study was 0.41% which comes under high transmission area.

Malaria is more often seen in primigravida than multigravida.[12] Multigravida women in endemic areas are somewhat protected from placental malaria and this may be the

result of maternal antibodies preventing cytoadhesion of the parasite to the placenta.[13] Similar finding was noted in studies by Desai M et al.[14]

Malaria is diagnosed by using different techniques like Conventional microscopic diagnosis by staining thin and thick peripheral blood smears, RDTs, serological test, and molecular diagnostic methods, such as polymerase chain reaction.[15] Some advantages and shortcomings of these methods have also been described, related to sensitivity, specificity, precision, accuracy, time consumed, labor intensiveness, cost-effectiveness, the need for skilled microscopists. Since the WHO recognized the urgent need for new, simple, quick, accurate, and cost-effective diagnostic tests for determining the presence of malaria parasites, to overcome the deficiencies of light microscopy, numerous new malaria-diagnostic techniques have been developed like RDTs. This, in turn, has led to an increase in the use of RDTs for malaria, which are fast and easy to perform, and do not require electricity or specific equipment.[16] RDTs appear as highly valuable, rapid malaria-diagnostic tool for healthcare workers; however, it must currently be used in conjunction with other methods to confirm the results, characterize infection, and monitor treatment. Microscopic detection and identification of Plasmodium species in Giemsa-stained thick blood films (for screening the presenting malaria parasite) and thin blood films (for species confirmation) remain the gold standard for laboratory diagnosis.[17]

In the present study, *P. vivax* accounts for 56% of cases followed by *P. falciparum* of 26% but other studies haven't found similar associations.[12]

In a study by Shulman CE et al, the prevalence of anemia among pregnant women with malaria was 38% whereas in present study it was 36%.[18] The cause of anemia particularly in pregnant lady is because of hemolysis of parasitized blood and increased demand of blood during pregnancy. Anemia increases perinatal morbidity and mortality and increased risk of postpartum hemorrhage.

Thrombocytopenia in malaria probably occurs through peripheral destruction, sequestration or excessive removal of the platelets by the spleen, as well as platelet consumption by the process of disseminated intravascular coagulation. Platelets have been reported to enhance clumping of *P. falciparum*-infected erythrocytes, and this process might lead to pseudo thrombocytopenia. 30% cases show maternal thrombocytopenia in malaria cases where as it had ranged from 50-56% in other studies.[19]

Malaria in pregnancy is thought to affect birth outcomes through two mechanisms, intrauterine growth restriction (IUGR) and preterm delivery, the former has been consistently associated with placental infection while the latter appears to correlate with systemic manifestations of malaria infection in the mother. However, accurate determination of gestational age is required to distinguish IUGR from preterm delivery.[19] In the present study, Obstetric outcomes includes, 10 cases (20%) of spontaneous miscarriage, all belonging to first trimester, 12 cases (24%) of preterm deliveries, 16 (32%) cases of low birth weight babies and 1 case (2%) of perinatal death. Obstetric complications caused by *P. vivax* and *falciparum* accounted for 33.33% and 66.67% of spontaneous miscarriage, 75% and 25% of preterm deliveries, 75% and 25% of low birth weight babies, 0% and 100% of perinatal deaths respectively.

Conclusion

The present study concluded that the malaria affects both pregnant female and fetus. So all

patients with fever in pregnancy must have screening for malarial parasite and treated adequately by medicine and Help to improve the maternal and fetal outcome.

Reference

1. Malaria facts. Centers for Disease Control and Prevention Web site. http://www.cdc.gov/malaria/ facts.htm. Updated April 11, 2007. Accessed August 1, 2009.
2. Malaria. The Global Fund Web site. http://www. theglobalfund.org/documents/publications/ diseasereport/disease_report_malaria_en .pdf Accessed August 1, 2009
3. BhuttaZA,SommerfeldJ,LassiZS,Salam RA,DasJK.Global burden, distribution, and interventions for infectious diseasesofpoverty. InfectDisPoverty. 2014;3:21.
4. Rogerson SJ, Desai M, Mayor A, Sicuri E, Taylor SM, van Eijk AM. Burden, pathology, and costs of malaria in pregnancy newdevelopmentsforanoldproblem. LancetInfect Dis. 2018;18(4):e107–e18.
5. Autino B, Noris A, Russo R, Castelli F. Epidemiology of malaria in endemic areas. Mediterr J Hematol Infect Dis.2012;4(1):e2012060.
6. World Health Organization. World Malaria Report 2019. Geneva: World Health Organization (2019).
7. Veenstra van Nieuwenhoven AL, Heineman MJ, Faas MM. The immunology of successful pregnancy. Hum Reprod Update. (2003) 9:347–57. doi: 10.1093/humupd/dmg026
8. McDonald CR, Weckman AM, Conroy AL, Olwoch P, Natureeba P, Kamya MR, et al. Systemic inflammation is associated with malaria and preterm birth in women living with HIV on antiretrovirals and co-trimoxazole. Sci Rep. 2019;9:6758.
9. Nkwabong E, Mayane DN, Meka E, Essiben F. Malaria in the third trimester and maternal-perinatal outcome. Int J Gynaecol Obstet. 2020;8:13261.
10. Unger HW, Hansa AP, Buffet C, Hasang W, Teo A, Randall L, et al. Sulphadoxine-pyrimethamine plus azithromycin may improve birth outcomes through impacts on inflammation and placental angiogenesis independent of malarial infection. Sci Rep.2019; 9:2260.
11. Murphy SC, Breman JG. Medicine Lowa State University. Gaps in the childhood malaria burden in Africa: cerebral malaria. Neurological sequelae, anemia, respiratory distress, hypoglycemia, and complications of pregnancy. Am J Trop Med Hygiene. 2001;64(1-2 Supply):57-67.
12. Singh N. Epidemiology of falciparum and vivax malaria in pregnancy in India. Paper presented at a Symposium on Malaria in Pregnancy in Kisumu, Kenya, organized by the Centers for Disease Control and Prevention (CDC), Atlanta, and the Kenyan Medical Research Institute (KEMRI), Kenya; 1997.
13. Beeson JG, Rogerson SJ, Elliott SR, Duffy MF. Targets of protective antibodies to malaria during pregnancy. J Infect Dis. 2005;192:1647.
14. Desai M, Ter Kuile FO, Nosten F, McGready R, Asamoa K, Brabin B, et al. Epidemiology and burden of malaria in pregnancy. Lancet Infect Dis. 2007;7:93-104.
15. Endeshaw T, Gebre T, Ngondi J, Graves PM, Shargie EB, Ejigsemahu Y, et al. Evaluation of light microscopy and rapid diagnostic test for the detection of malaria under operational field conditions: A household survey in Ethiopia. Malar J. 2008;7:118.
16. A rapid dipstick antigen capture assay for the diagnosis of falciparum malaria.

WHO informal consultation on recent advances in diagnostic techniques and vaccines for malaria. Bull World Health Organ. 1996;74:47-54.
17. Chotivanich K, Silamut K, Day NP. Laboratory diagnosis of malaria infection: a short review of methods. Aust J Med Sci. 2006;27:11-5.
18. Shulman CE, Dorman EK, Bulmer JN. Malaria as a cause of severe anemia in pregnancy. Lancet. 2002;360:494.
19. Abdalla S, Pasvol G. In: The Hematology of Malaria. Newton PN, Essien E, White NJ, editor. London: Imperial College Press. Platelets and blood coagulation in human malaria; 2004:249-276