Malaria Prophylaxis During Pregnancy In Primigravidae Using Sulfadoxine/pyrimethamine In Wad Medani-Sudan

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ABSTRACT

Objectives: To evaluate the efficacy of Sulfadoxine/pyrimethamine as a prophylactic intervention in prevention and control of malaria during pregnancy.

To compare effect on neonatal low birth weight (LBW) between intervention and control groups.

To determine the proportion of maternal, neonatal and placental parasitaemia among intervention control groups.

Material and methods: A prospective case/control interventional study of 113 primigravidae, 57 as a intervention group and 56 as a control group selected through a cluster sampling technique. After taking their verbal consent, the intervention group received two doses of sulfadoxine/pyrimethamine (SP) in the second and early third trimesters, and followed up according to the WHO antenatal care schedule.

The outcomes include the following:

Reduction of malaria episodes during pregnancy in primigravidae.

Reduction of prevalence of neonatal low birth weight.

Determination of the prevalence of maternal, neonatal and placental parasitaemia.

Results: The frequency of malaria episodes during pregnancy in primigravidae was found to be 14.6% and 29.7% for intervention and control groups respectively and there was a significant statistical difference between the two groups ($P< 0.00001$).

The proportion of LBW was found to be 3.5% and 35.8% for the intervention and control groups respectively and there was a significant statistical difference between the two groups ($Z=6.99$).

The proportion of maternal, neonatal and placental parasitaemia was found to be (10.9% and 54.9%),(11.1% and 54.9%) and (24% and 50%) for intervention and control groups respectively and there was a significant difference between the two groups regarding maternal and neonatal parasitaemia, while there was no significant difference regarding placental parasitaemia.

Conclusion: Sulfadoxine/pyrimethamine is an effective prophylactic intervention for reducing malaria episodes during pregnancy and improving neonatal birth weight.

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Introduction. Malaria constitutes a major threat to health. It affects all age groups. The disease causes anaemia in children and pregnant women and increases the vulnerability to other diseases.[1]

Malaria is a major disease that causes 300 million to 500 million new infections and 1.5 to 2.7 million deaths every year. [2,3,4.]

Plasmodium falciparum is the principal cause of severe disease, it may infect humans at any time from conception to adulthood. Malaria infection probably results in 3.5 million low birth weight (LBW) infants every year, since an estimated 24 million pregnant women live in malaria endemic areas.[5]

According to the WHO 585000 women die each year from pregnancyrelated causes, 99 % of whom are from developing countries. The maternal mortality rate is highest in West Africa (1,020 maternal deaths per100, 000 live-born) while it is 27/100,000 in industrialized countries. Direct obstetric causes account for 80 % of deaths: hemorrhage, infection, dystonia, hypertension and abortion. Indirect causes are essentially anemia, malaria hepatitis B and AIDS.[6]

It has long been realized that during first and second pregnancies clinically immune women are more susceptible as they develop high-density parasitaemia. [7.]

Pregnancy is associated with increased susceptibility to malaria. It is generally agreed that this increased risk ends with delivery. The incidence of episodes of malaria increases significantly during the second and third trimesters of pregnancy. The duration of fever during the episodes of malaria was longer and the prevalence and density of asymptomatic malarial parasitaemia were significantly higher during pregnancy and the early postpartum period than during the other periods.[8]

Pregnant women attracted twice the number of Anopheles gambiae complex - the predominant African malaria-carrying mosquito - than their nonpregnant counterparts. It is postulated that physiological and behavioral changes that occur during pregnancy are responsible for increased attractiveness, which could be important in intervention strategies aimed at protecting this high-risk group against malaria.[9] Malaria is associated with reduced birth weight, which was thought to be affect the result of placental insufficiency, which leads to intrauterine growth retardation (IUGR). [10,11]

Malaria contributes to antenatal anaemia and slowing of fetal growth, especially in primigravidae. It is thought that these effects harm the mother and the baby, and intervention to prevent and mitigate the effects of malaria are often recommended. [12]

Material and methods. A prospective case/control interventional study of 113 primigravidae, 57 as a intervention group and 56 as a control group were selected through a cluster sampling technique. The study involved two localties east and west of Wad Medani city, the eastern locality was selected randomly and it has 7 clusters, each around a health center from these centers, using a cluster sampling technique, two centers were selected for the study because they are well equipped especially for antenatal care (ANC) and laboratory facilities - Gezirat elfeel and Dardeg health centers - each has assigned one day for ANC weakly. (Period of the study1999 – 2001).

The first week was selected randomly for recruitment of intervention group and the second week for the control group and so on.

The two groups were matched regarding thes ociodemographic characteristics

Primigravidae at the beginning of their second trimester, after confirmation of the pregnancy with Ultrasongrahy and obtaining their verbal consent, were recruited in the study and then full history and detailed clinical examination were done.

The intervention group received two doses of sulfadoxine/pyrimethamine (SP) each consist of 3 tablets (500 mg Sulfadoxine + 25mg pyrimethamine / tablet) in the second and early third trimesters, and followed up according to the WHO antenatal care schedule.[13]

The side effects to SP were minimal, only nausea and vomiting were reported.

All studied women were screened monthly with blood film (BF) for malaria using giemsa stain, haemoglobin (Hb) in g/dl using colorometric method, urine for sugar and albumin, BF for malaria (species) + parasite count (u/l) , Hb and placental BF at the day of delivery. The newborn was also screened for malaria and its weight was recorded in Kgs within 24 hours of delivery.

All positive cases of malaria in the control group and their children or any medical problem had been managed on the spot.

Data was analysed by SPSS and tested with T-test, Chi-square test and Ztest.

Results & Discussion. In this study 117 primigravidae were selected, 59 as

intervention group and 58 as control group, 2 out of each group did not complete the study (one developed skin rashes and was withdrawn from the study and the other 3 delivered outside Wad-Medani city).
The age ranged between 17- 41 years with a mean of 25.03 +/- 4.83 for intervention group and 16 – 35 years with a mean of 24.92 +/- 4.68 for control group and there was no significant statistical difference between the two groups, so the two groups were matched regarding age.

Table 1: Number of attacks of malaria among intervention and control groups.

Malaria state	BF result	Intervention	Control	Sig./test
Maternal malaria percentage at enrollment.	+ve	16(28.1%) *n=57	14(25%) n=56	P>0.05 NS
Maternal malaria percentage post intervention at ANC visits.	+ve	36(14.6%) **n=246	69(29.7%)n=232	P<0.0001 Sig.
Maternal malaria percentage at delivery	+ve	6(10.9%) *n=55	28(54.9%) n=51	P<0.00000 3Sig
Percentage of newborn with parasites in heel blood at delivery.	+ve	6(11.1%) ***n=54	28(54.9%) n=51	P<0.00000 4
Placental malaria prevalence at delivery	+ve	6(24%) ****n=25	10(50%) n=20	P>0.05 NS

*n = number of women.
**n = number of visits.
***n = number of newborn.
****n = number of placentas.

The prevalence of malaria at enrolment was 16/57 (28.1%) and 14/56 (25%) for intervention and control groups respectively (table 1) and there was no

statistical difference between them (P > 0.05), and this reflected the similarity in exposure and susceptibility to malaria at the time of the first antenatal visit, [14] as clinical immunity is decreased during pregnancy due to immunosuppressive effects of human chorionic gonadotrophin HCG.[15, 16] The prevalence of malaria during pregnancy post intervention at antenatal care visits was 36/246 (14.6%) and 69/232 (29.7%) for intervention and control groups respectively and it is low in intervention group compared with the control group (table 1) following the administration of SP prophylaxis and there was a highly significant statistical difference between the two groups (P<0.0001) and this result was comparable with study conducted in rural Malawi,[17] using the same protocol and the same drug.

The prevalence of maternal malaria at delivery was found to be 6/55 (10.9%) and 28/51 (54.9%) for intervention and control groups respectively and there was strong significant statistical difference (P<0.000003). This result (intervention group) when compared with two similarly designed studies in Malawi[18] and Kenya[19] (assessed at 32/52) was high as they show a prevalence of 3% and 5.3% among intervention groups respectively[20]and this may be due to emergence of some strains resistant to sp.

The prevalence of neonatal peripheral parasitaemia was very low in intervention group 6/54 (11.1%) compared with the control group 28/51 (54.9%) and there was a significant statistical difference (P<0.000004), and it was very high in the control group compared with a study conducted in Nigeria which gave a prevalence of 21.6%. [21]

The prevalence of placental malaria (+ve BF) was 6/25 (24%) and 10/20 (50%) in the intervention and control groups respectively (table 1) and there was an obvious difference although it was not significant (P>0.05). The placental malaria in intervention group was high when compared with studies conducted in Malawi[18] and Kenya[22] which shows an incidence of 9% and 12% respectively.

Table2: Newborn weight distribution among intervention and control groups within 24 hours after delivery.

Newborn weight (kg)	Intervention	Controls
< 2.5	2 (3.5 %)	19 (35.8%)
≥ 2.5	55 (96.5%)	34 (64.2%)

	Total	57	53
Mean	2.91 +/- 0.41	2.44 +/- 0.29	
	Z= 6.99 Sig. (This test is a variety of t-test)		

Table (2) shows the mean birth weight for intervention and control groups. The incidence of low birth weight (LBW) was high in the control group 19/53 (35.8%) than the intervention group 2/57 (3.5%) and it was statistically significant (Z=6.99), pointing to the value of SP as an effective prophylaxis against malaria during pregnancy in primigravidae as malaria is a known cause of LBW.[23, 12,24] So SP prophylaxis reduced malaria frequencies and improved birth weight.[25] The incidence of LBW in the control group was high when compared with study conducted in Sudan which showed an incidence of 18.1%.[26]

The incidence of LBW in intervention group (3.5%) was very low when compared with a similar study carried out in Kenya which gave an incidence of 8% and this reflected the strong effect of SP in improving birth weight.[22,27]

Table 3: Progress of pregnancy and its outcome among intervention and control group.

Outcome of pregnancy	Intervention group	Control groups
Neonatal deaths.	1 (1.8%)	3 (5.4%) *
Premature	- -	1 (1.8%) *
Abortion	- -	3 (5.4%) *
Stillbirth	1 (1.8%)	0 0 *
Congenital malformations.	1 (1.8%)	0 0 *
Total	57 (100%)	56 (100%)
*P > 0.05 NS		

The neonatal death was 1/57 (1.8%) & 3/56 (5.4%), abortion was zero &

3/56 (5.4%) and prematurity was zero & 1/56 (1.8%) and they were more in the control group than the intervention group although the difference was not statistically significant (P>0.05).
The stillbirth in the intervention group followed prolonged obstructed labour and a congenital malformation occurred in a newborn of an elder primigravida (42 years age).

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