APPRAISAL ON THE PREVALENCE OF MALARIA AND ANAEMIA IN PREGNANCY AND FACTORS INFLUENCING UPTAKE OF INTERMITTENT PREVENTIVE THERAPY WITH SULFADOXINE-PYRIMETHAMINE IN KIBAHA DISTRICT, TANZANIA.

[1]Donath S.Tarimo

Abstract

Objective: To appraise the prevalence of malaria and anaemia in antenatal mothers; and explore the factors influencing coverage of intermittent preventive treatment (IPT) with sulfadoxine-pyrimethamine (SP) under operational conditions in the national programme for malaria control in pregnancy.
Design: Descriptive cross-sectional survey.
Setting: The reproductive and child health clinic in Kibaha district hospital, Tanzania
Subjects: Pregnant mothers on routine antenatal visits
Main outcome measures: Prevalence of malaria (peripheral parasitaemia) and anaemia, coverage of IPT with SP and the factors influencing coverage.
Results: A total of 395 mothers were recruited; 27.3% had malaria. Moderate anaemia i.e. haemoglobin (Hb) level 8.0 - 10.9 g/dl was detected in 56.7% of mothers; 34.2% had severe anaemia (Hb < 8.0 g/dl). Hb > 8.0 g/dl was strongly associated with negative parasitaemia while Hb < 8.0 g/dl was strongly associated with positive parasitaemia. About a third (40.0%) of the mothers did not receive SP for IPT because of unavailability. Of those receiving, about a third (40.0%) did not swallow the tablets at the clinic because of empty stomach and sharing of water cups. Majority (90.1%) were aware that SP was the drug for IPT and 77.2% held the perception that IPT with SP has health benefits; however, 70.0% were not aware on the timing for IPT.

Conclusion: Severe malarial anaemia is still a health problem in pregnancy, conceivably due to low coverage of IPT with SP because of erratic availability of SP. There is a major gap on appropriate timing for IPT with SP that should be corrected.

Key words: Pregnancy, intermittent preventive therapy, malaria, anaemia, Tanzania

Introduction

In malaria endemic areas of Africa, more than 20 million pregnant women are at an increased risk of malaria morbidity and early neonatal and infant deaths every year (1). In Tanzania, malaria is a major health problem in pregnancy, thus in holoendemic areas, more than half (63.0%) of pregnant mothers contract malaria (2). Malaria infection in pregnancy is associated with maternal anaemia which, together with placental malaria lead to an increased risk of intra-uterine growth retardation, abortion, pre-term delivery and low birth weight, still births as well as mother-to-child HIV transmission (3). Currently, in malaria endemic areas, SP is used for intermittent preventive treatment (IPT) in the national programmes for malaria control in pregnancy. Two doses of SP for IPT, 1st dose given in the 2nd trimester; 2nd dose at the begging of the 3rd trimester would significantly decrease the risks of maternal malaria to the foetus (4). Thus since August 2001, Tanzania adopted the policy of SP for IPT in pregnancy, the 1st dose being given in the 20th week of pregnancy and 2nd dose in between the 30th and 36th week under a directly observed therapy so as to improve coverage.

Although under research conditions IPT with SP was shown to be highly efficacious; it is not known how effective this tool is under operational conditions. Despite the very high rate (80.0%) of attendance to the Reproductive and Child Health (RCH) clinics in Tanzania, only 29.0% of mothers would receive and take SP for IPT (5); the picture being similar in other holoendemic settings (6). A number of socio-cultural factors such as awareness of the benefits, availability & accessibility at the RCH clinics, perceived efficacy & safety; and convenience for use might influence receipt and uptake of SP for IPT (7).

Receipt and uptake of SP IPT may conceivably face barriers to acceptance because often clients are worried about safety to the foetus and that in the absence of symptoms they would see no reasons to take medicines (8). This is further compounded by the widely held notion that SP is full of side effects especially severe skin reactions that are associated with HIV / AIDS (9).

This study appraised the prevalence of malaria parasitaemia and anaemia in pregnancy and explored the factors influencing receipt and uptake of SP IPT for the control of malaria in pregnancy under the operational conditions of the national malaria control programme.

Patients and methods

Study site and population sampling

The study was carried out at Tumbi Hospital, Kibaha district, along the coast of Tanzania, that is holoendemic for malaria. The study population comprised of antenatal mothers on their routine visits to the RCH clinic where mothers get their routine antenatal care. Each mother is sent to the laboratory for haemoglobin level and blood smear for malaria parasites, and would receive treatment depending on findings; if parasitaemic would receive SP treatment but however if not parasitaemic and is at the gestation age of 20 – 28 weeks or 30 – 36 weeks she would receive SP for IPT.

Correspondence to: Dr D.S.Tarimo, , P.O.Box 65217, Dar es Salaam,United Republic of Tanzania. E-Mail:dtarimo@muchs.ac.tz

[1]Department of Medical Parasitology & Entomology, School of Public Health & Social Sciences, Muhimbili University of Health & Allied Sciences, Dar es Salaam, Tanzania.

Consecutive consenting mothers at exit points from the RCH clinic were invited to participate in the study. The sample size was estimated based on a 50.0% prevalence of parasitaemia in pregnant mothers that would give the maximum sample size using the formula for cross-sectional surveys: $N = (Z^2 \text{ X } P \text{ X } q) / e^2$; where Z is the standard normal deviate set at 1.96, P = 0.5, q = 0.5 and e (error margin) = 0.05 that gives N = 385. In this study a sample of 395 antenatal mothers were recruited.

Exit review of antenatal records & interview of mothers

At the exit point, consecutive consenting mothers provided their antenatal visits books for review and they were interviewed on issues related to malaria and anaemia control in pregnancy. The information extracted included: gravidity and gestational age as well as findings of peripheral blood smear, haemoglobin level and whether SP for IPT had been prescribed. Then using a semi-structured questionnaire the socio-demographic characteristics (age, level of education, marital status & occupation) of each mother were recorded; the interview centred on awareness on the risks of malaria and anaemia in pregnancy and the benefits of IPT with SP in pregnancy; motivations for use and non-use and the perceived efficacy and safety of SP for IPT. The questionnaire included questions such as: Do you think when you are pregnant you are especially at a high risk of getting malaria and being anaemic? If you get malaria and anaemia while pregnant, do you think your baby would be affected? Are you aware of IPT with SP and the number of doses you should receive before delivery? Do you think SP is efficacious and safe for use during pregnancy? Did you receive and take SP for IPT in this visit and if not, why? The questions were translated into Swahili and back to English; the final Swahili version was pre-tested in the study population to ensure consistency and clarity to the respondents

Results

A total of 395 antenatal mothers were recruited; majority were married women aged 18 – 34 years with a primary education (Table 1). Malaria parasites were found in 27.3% mothers, 56.7% had moderate anaemia (Hb 8.0 – 10.9 g/dl) and 34.2% had severe anaemia (Hb < 8.0 g/dl) (Table 2). Having Hb > 8.0 g/dl was highly significantly associated with negative parasitaemia, while Hb < 8.0 g/dl was highly significantly associated with positive parasitaemia. This indicates that during pregnancy, moderate anaemia is contributed by factors other than malaria such as nutritional deficiencies while severe anaemia is strongly contributed by malaria (Table 3).

About a third (40.0%) of the mothers did not receive SP for IPT, the commonest reason being unavailability of SP at visit (Table 4). Of those receiving SP for IPT, there was the liberty to swallow the tablets under DOT at the clinic or go to swallow the tablets at home. About a third (40.0%) of the mothers receiving SP for IPT did not prefer to swallow the tablets at the clinic, main reasons being dislike to take medicines on empty stomach and sharing of water cups for swallowing medicines. The majority of the mothers (90.1%) were aware that SP is the drug for IPT, however, more than half of the mothers were not aware of the number of doses of SP IPT supposed to be received before term (Table 5). More than two thirds (70.0%) of the mothers were not aware of the timing for IPT with SP in accordance to the gestation age. Cumulatively, about three quarters (77.2%) of the mothers held the perception that IPT with SP has health benefits, implying that they would conceivably be willing to use SP for IPT. However, of the mothers who perceived SP had health benefits, about half of them mentioned benefits that were not directly related to SP while only a fifth (20.0%) mentioned benefits directly related to SP in terms of preventing malaria effects to the mother and the baby.

Discussion

Malaria in pregnancy is undoubtedly an important public health problem in malaria endemic areas of Tanzania, which prompted the Ministry of Health to introduce SP IPT for malaria control in pregnancy. This study appraised the prevalence of malaria and anaemia in pregnancy and the factors influencing receipt and uptake of SP for IPT at an antenatal clinic in a malaria holoendemic area. The presence of peripheral parasitaemia in 27.3% of the antenatal mothers indicates that there is the potential for placental malaria that would conceivably affect the foetus (4). Although other factors such as nutritional deficiencies contribute to maternal anaemia, the presence of peripheral parasitaemia would certainly contribute to anaemia hence the reason for more than three quarters of the mothers being anaemic with haemoglobin below 10.9 g/dL (3). In particular, having severe anaemia (Hb < 8.0 g/dL) was strongly associated with peripheral parasitaemia indicating that malaria was the most likely cause of anaemia. Severe anaemia carry serious consequences to the mother and the fetus (1) hence the need to scale up interventions for malaria control in pregnancy such as use of SP for IPT and insecticide treated nets.

A number of reasons such as non-receipt of SP for IPT due to unavailability at the clinic as well as other socio-cultural factors could explain why implementation of IPT with SP is not optimal. Thus, though about two thirds of the pregnant mothers received SP for IPT, about a third (40.0%) preferred to swallow the medicines at home raising doubts about compliance. Dispensing drugs for subsequent use at home may potentially lead to poor compliance hence the actual coverage would only include the mothers who swallowed SP for IPT under DOT. Strategies that would ensure mothers do not stay long in the RCH clinics till they are hungry as well provision of disposal cups for swallowing medicines would improve uptake of SP for IPT under DOT. The unavailability of SP as the reason for non-receipt of SP for IPT indicates the need to improve procurement and delivery of SP so as to ensure a constant availability during clinic visits. The actual coverage of SP IPT is the proportion of pregnant mothers who received and swallowed SP for IPT

at the clinic that is only 40.0%, which is below the Abuja target that envisaged a 60.0% coverage by the year 2005 (10).

Public health educational messages regarding use of SP for IPT in pregnancy seems to have been very well received as the great majority (90.1%) were aware that SP was the drug for IPT, and about 75.0% held the perception that use of SP for IPT has health benefits though only 20.0% linked this with prevention of malaria effects in the mother and the baby. The fact that 70.0% of the mothers were not aware on the timing of SP for IPT indicates a major gap in public health education regarding the appropriate gestation for taking SP for IPT. Lack of awareness on the correct gestation for the timing of SP for IPT may conceivably be related to late first booking and erratic attendance to antenatal clinics (11).

Conclusion

Despite the introduction of SP for IPT in pregnancy, severe malarial anaemia is still a major health problem among antenatal mothers in this area because of low coverage. To ensure optimal coverage, there is the need to improve stocking of SP tablets at the RCH clinics, sensitize mothers for early booking and ensure every antenatal mother due for IPT swallows SP under DOT.

Acknowledgment

Special thanks go the antenatal mothers attending to the Reproductive & Child Health Clinic at Tumbi Hospital, Kibaha for their acceptance and time devoted for participation in the study. Thanks go to the staff of the Reproductive & Child Health Clinic at Tumbi Hospital, Kibaha for their extended cooperation in this study. Thanks are due to the authority of Tumbi Hospital for giving permission to use the laboratory data from the antenatal mothers.

Table 1: Socio-demographic characteristics of the study population (N = 395)

Attribute	No (%)
Age group (years)	
< 18	19 (4.8)
18 - 34	349 (88.4)
35 - 40	27 (6.8)
Gravidity	
Primigravidae	146 (37.0)
Secundagravidae	115 (29.0)
Multigravidae	134 (34.0)
Gestation (weeks)	
< 20	44 (11.2)
20 – 24	147 (37.2)
25 – 29	98 (24.8)
30 – 36+	106 (26.8)
Marital status	
Married	275 (69.8)
Not married	68 (17.2)
Widowed, separated & co-habiting)	52 (13.0)
Educational level	
No formal education	52 (13.2)
Primary	278 (70.4)
Secondary	65 (16.4)
Occupation	
Peasant	165 (41.8)
Employed / petty business	90 (22.2)
Unemployed	142 (36.0)

Table 2: Laboratory characteristics of the study population (N = 395)

Attribute	**No (%)**
Peripheral malaria parasitaemia	
Positive	108 (27.3)
Negative	287 (72.7)
Haemoglobin	
≥ 11.0 g/dl	32 (8.1)
8.1 – 10.9 g/dl	224 (56.7)
≤ 8.0 g/dl	135 (34.2)

Table 3: Association of haemoglobin level with malariaparasitaemia status (N = 395)

Haemoglobin levels (g/dl)	Parasitaemia +ve No (%)	Parasitaemia –ve No (%)	P-value
> 8.0	40 (37.0)	220 (76.7)	0.001
< 8.0	68 (63.0)	67 (23.3)	0.001

Table 4: Distribution of antenatal mothers according to receipt and uptake of SP for IPT in the current visit (N = 395)

Attribute	N (%)
Receipt of SP IPT (N = 395)	
Received	250 (63.3)
Did not receive	145 (36.7)
Reasons for non-receipt (n = 145)	
SP not give	95 (65.5)
Gestation < 20 weeks	44 (30.3)
History of reaction to SP	6 (4.2)
Uptake of SP IPT (n = 250)	
Taken at clinic	154 (61.6)
Did not take at clinic	96 (38.4)
Reasons for not taking SP IPT at clinic	
Sharing of cups	41 (42.7)
Not taken food (empty stomach)	55 (57.3)

Table 5: Awareness on issues related to SP for IPT in pregnancy (N = 395)

Attribute	No (%)
SP as the drug for IPT	
Aware	356 (90.1)
Not aware	39 (9.9)
Number of SP IPT doses	
One dose	80 (20.3)
Two doses	93 (23.5)
Not aware	222 (56.2)
Timing for SP IPT	
5^{th} to 7^{th} month of pregnancy	82 (20.6)
8^{th} to 9^{th} month of pregnancy	37 (9.4)
Not aware	276 (70.0)
Perceived benefits of SP IPT	
Prevents malaria effects in mother & baby	79 (20.0)
Benefits unrelated to SP use	226 (57.2)
Not sure	90 (22.8)

References

1) **Guyatt HL, Snow RW. Malaria in Pregnancy as an indirect cause of infant mortality in sub-Saharan Africa. *Trans R Trop Med Hyg* 2001; 95: 569 - 576**
2) **Lipyoga R. Association between malaria in pregnancy and placenta abruption in Dar es Salaam, Tanzania. MMED Dissertation (Obs & Gyn), University of Dar es Salaam; 1995.**
3) **Steketee RW, Wirima JJ, Slutsker L, Khoromana CO, Heymann DL, Breman JG. Malaria treatment and prevention in pregnancy: indications for use and adverse events associated with use of chloroquine or mefloquine. *Am J Trop Med Hyg* 1996; 55(suppl.): S50-S56**
4) **Shulman CE, Dorman EK, Cutts F et al., Intermittent sulfadoxine-pyrimethamine to prevent severe anaemia secondary to malaria in pregnancy: a randomised placebo-controlled trial. *Lancet* 1999; 353 (9153): 632-6**
5) **Ministry of Health, Tanzania. National Malaria Medium Term Strategic Plan 2002 – 2007, Dar es Salaam, Tanzania 2002.**
6) **Guyatt H.L, Noor A.M, Ochola S.A, Snow R.W. Use of intermittent presumptive treatment and insecticide treated bed nets by pregnant women in four Kenyan districts. *Trop Med Int Health* 2004; 9(2): 255 – 261**
7) **Tarimo DS, Minjas JN, Bygbjerg IC (2001). Perceptions of chloroquine efficacy and alternative treatments for uncomplicated malaria in a holoendemic area of Tanzania: implications for the change of malaria treatment policy. *Trop Med & Int Health* 2001; 6(12): 992 – 997**
8) **Mnyika KS, Kabalimu TK, Lugoe WL. Perceptions and utilisation of malaria prophylaxis among pregnant women in Dar es Salaam, Tanzania. *East Afr Med J*. 1995; 72(7):431-5.**
9) **Raviglione MC, Dinan WA, Pablos-Mendez A, Palagiano A, Sabatini MT (1988). Fatal toxic epidermal necrolysis during prophylaxis with Pyrimethamine & Sulfadoxine in a human immunodeficiency virus infected person. *Arch Intern Med* 1988; 148 (12): 2683 - 2685**
10) **The Abuja declaration. Summit of Heads of States and Governments of African Countries, Abuja, Nigeria, 2000.**
11) **van Eijik AM, Ayisi JG, ter Kuile FO et al., Implementation of intermittent preventive treatment with sulfadoxine-pyrimethamine for control of malaria in pregnancy in Kisumu, western Kenya. *Trop Med Int Health* 2004; 9(5): 630 – 637.**

Received 15 January 2007, revised 10 May 2007; accepted for publication 20 May 2007