(REVIEW ARTICLE)

Review on the prevention of malaria among pregnant women attending antenatal clinic

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Abstract

The study visualizes the Prevention of Malaria among Pregnant Women Attending Antenatal Clinic. Malaria in pregnancy has been identified as a global health challenge because of the life-threatening complications it poses to both the mother and the unborn child. These complications include maternal anemia, premature delivery, low birth weight, miscarriage, congenital infection and perinatal mortality. Five different malaria parasite species cause malaria infection: Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, Plasmodium ovale and Plasmodium knowlesi. The increasing rate of malaria among pregnant women and the lack of adherence to malaria preventive measures have become a matter of great concern for health authorities and midwives. Different factors have been thought of as reasons for the increasing malaria rates. The study review malaria, malaria prevention and control during pregnancy, knowledge of pregnant women on risk factors of malaria, and the attitude of women about the risks of malaria during pregnancy. However, the study recommended that Health training institutions update their curriculum, considering the need for more education on malaria and its prevention policymakers.

1. Introduction

Approximately 60% of all pregnancies worldwide occur in malaria-endemic areas, leading to 125 million pregnant women at risk of malaria every year (Ogouyèmi-hounto et al., 2018). Whether clinically symptomatic or clinically symptomatic or not, malaria in pregnancy has been reported to be associated with a higher risk of preterm birth, low birth weight for gestational age, miscarriage, stillbirth, and maternal anaemia (Muhindo et al., 2016). These adverse outcomes lead to a higher risk of perinatal mortality and maternal mortality in areas with low or declining malaria prevalence compared to high transmission areas because of lower levels of premunition (Ogouyèmi-hounto et al., 2018).

In order to mitigate these adverse effects, efficacious treatments need to be clearly identified for pregnant women. However, several factors have limited the available evidence on anti-malarials efficacy during pregnancy. Pregnant women are usually excluded from randomized control trials (RCTs) of new anti-malarials mainly because of concerns about the safety for the fetus. Safety concerns were particularly critical for artemisinin derivatives, as animal studies observed fetal resorption (Muhindo et al., 2016). Quinine-based treatment (QBT) is still recommended as the first-line treatment for uncomplicated falciparum malaria in the first trimester, despite limited clinical data on its safety in the first trimester. Quinine's poor side effect profile and long treatment course of 5–7 days make it an undesirable choice for patients. Recently, data from prospective observational cohort studies suggest that artemisinin use in the first trimester did not increase the risks of stillbirth or congenital abnormality compared to quinine (Gobah & Zhang, 2011), bringing the question of comparative efficacy into center stage.

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Efficacy of anti-malarial drugs for treating uncomplicated malaria in non-pregnant patients has traditionally been assessed over a fixed follow-up period set by the current World Health Organization (WHO) recommendations at 28–42 days. However, this fixed period does not accommodate the pregnant condition as the placenta may become or remain parasitized (placental sequestration) after treatment completion. Currently, there are no standard guidelines on parasitological efficacy studies in pregnancy (Gobah & Zhang, 2011).

The researcher, practicing academia, observed that malaria occurrence among pregnant women is increasing as evidenced in table I of the current study. Although several interventions are put in place to reduce malaria in pregnancy in Ghana, malaria prevalence in pregnancy is still high, ranging from 35.9% in rural and peri-urban areas in the Southern part of Ghana to around 52% in the northern sector. The increase in malaria cases in pregnancy results from seasonal variation, late enrollment at the antenatal clinic, poor knowledge and attitude towards malaria and lack of information about malaria prevention and control (Yawson, 2015).

A report from the Nsawam Government Hospital in 2019 shows that 3,719 women had malaria compared with 2,295 in 2018, reflecting an increase of 29%. The data shows an increasing trend in malaria cases among pregnant women in the Municipality, regardless of the many ongoing malaria control interventions, such as the use of Insecticide Treated Nets (ITNs), Intermittent Preventive Treatment (IPT), and Indoor residual spraying (IRS) (Annual Report NGH, 2019). Table 1 represents a comparative data of malaria cases recorded in the Nsawam Government Hospital from 2016 to 2020.

Table 1 Comparative Data of Malaria Cases at the Nsawam Government Hospital

Year	Total Number of malaria cases recorded	Number of cases among pregnant women	Percentage in pregnancy
2016	9854	2321	24%
2017	10266	2772	27%
2018	11243	3485	31%
2019	12455	4110	33%
2020	488 First Quarter	143 First Quarter	29% First Quarter

Source: Nsawam Government Hospital Annual report/ statistical department

2. Malaria

Malaria is a preventable and treatable disease, it continues to remain the leading cause of outpatient department (OPD) attendance in Ghana (Gobah & Zhang, 2011). In 2010, WHO revised its' policy recommendation to conduct investigations (microscopy or RDT testing) for confirming presence of malaria parasite before commencement of antimalarial treatment. This was known as the test, treats and track strategy and was implemented to improve the quality of surveillance and care. This is considered very essential for reducing needless use of antimalarial drug. Early diagnosis and treatment of malaria prevents complications of malaria like cerebral malaria, acute renal failure, severe anemia, hypoglycemia, pulmonary edema, metabolic disorders and death (World Health Organization, 2015).

According to the World Malaria Report 2017 by WHO, Ghana, Nigeria, Côte d'Ivoire, Burkina Faso, Niger and Mali were the six (6) countries in West Africa that accounted for 85% of the estimated 111 million cases reported in 2016 and 2017. Plasmodium falciparum (one of the five species of plasmodium parasite) is responsible for about 90% of the severe cases of malaria. (Roman et al., 2015). The incubation period for malaria varies from 7-30 days but is much shorter with plasmodium falciparum. There are wide ranges of symptoms of malaria from asymptomatic to severe and eventually death if left untreated. Some of the clinical symptoms are fever, headache, chills, nausea, general malaise, vomiting, cough, abdominal pains. Initial symptoms may be mild but if left untreated can lead to severe (complicated) malaria and mortality (CDC, 2015).

Outdoor sleeping and other night-time social, cultural and economic activities that increase exposure to infective mosquito bites are possible contributors (Monroe, et al., 2015). To reduce the burden of malaria, there has been scale up of various treatment and preventive strategies such as rapid diagnosis of malaria using rapid diagnostic tests (RDTs), case management with artemisinin-based combination therapy (ACT), distribution of long-lasting insecticidal nets (LLINs) and also indoor residual spraying (IRS) which have an impact on infections and transmission of malaria

(Coleman et al., 2017; World malaria report, 2017). Previous management of malaria cases employed presumptive treatment with antimalarial drugs for febrile cases to reduce morbidity and mortality associated with malaria.

A study conducted in Zambia in 2014 suggested that despite scale of malaria control interventions and high coverage of these interventions, there is still a high burden of malaria. This was attributed to improvement in case reporting and access to the necessary care needed (Mukonka et al., 2014). Malaria is a public health concern especially in Sub Saharan Africa. It is a life-threatening condition and accounts for significant maternal and infant mortality. The National Malaria Control Programme (NMCP) in Ghana, reported in the first quarter bulletin in 2017 that there were 2.3 million reported suspected malaria cases at the OPD which is about 1.18% increase over cases reported during the same period in 2016 (NMCP,2017).

3. Malaria prevention and control during pregnancy

There are a number of measures to actively put into practice in order to prevent malaria infections. Most countries have implemented and are practicing the recommendations of the World Health Organization for preventing and controlling malaria in pregnancy. The World Health Organization recommends every pregnant woman to sleep in ITN throughout the pregnancy period, intermittent chemoprophylaxis with Sulphadoxine pyrimethamine (SP) and early diagnosis leading to effective treatment of malaria as the three main interventions to control malaria in pregnancy. The benefits of IPTp-SP intake include not only the prevention of malaria in pregnancy (MiP) but also prevention of mothers developing anemia, placental malaria and improve new born weight as well as reduction in neonatal mortality (WHO, 2012).

The initial recommended three doses of IPTp-SP was implemented in Ghana in 2005 (Nwaefuna, Afoakwah, Orish, Egyir-yawson, & Boampong, 2015). Although coverage has been an issue, the effectiveness of SP in preventing and controlling malaria has been showed in a number of studies (WHO, 2012). An evaluation studies by Hommerich et al., (2017) showed over 43% significant reduction in Plasmodium falciparum among women on SP. The number of SP doses has been increased to five doses as recommended by WHO following numerous evidences on its effectiveness in many studies. Sulphadoxine Pyrimethamine is given as a single dose medication starting from 16 weeks' gestation. It is a directly observed treatment drug and so the issue with compliance is not a problem since the healthcare worker directly observes the pregnant woman taking it. The current recommended five doses of SP was adopted in Ghana as a policy in 2014 and like the previous 3 doses, coverage is an issue in its early years of implementation. Administration of the SP starts at 16 weeks of gestation and is given at monthly intervals during antenatal visits until delivery.

To be able to get all the five doses means the mother must start ANC early (at 16 weeks) and attend at least 5 times at monthly intervals. A number of factors influence ANC visits and hence coverage of IPTp-SP, notable among these are: access to health facility providing such services, maternal educational level, socio-economic status, and attitude of health workers providing ANC services and religious beliefs of the pregnant women as well as cultural beliefs (Nsibu et al., 2016). Contraindications to SP intake during pregnancy include, women receiving cotrimoxazole and Glucose 6 Phosphate Dehydrogenase Deficiency (G6PD) patients (WHO, 2012). In addition, folic acid of 5mg or more should not be administered concomitantly with SP because of its counteraction, which reduces therapeutic efficacy for malaria treatment.

There has been increasing concerns of SP resistance with enormous studies conducted to determine molecular markers prevalence such as dihydrofolate reductase and dihydrofolate synthase (dhfr/dhps) and resistance to SP. Research conducted in Tanzania showed significant association between parasitemia levels of malaria in the placenta and resistant mutant allele at dhps codon 581 (Harrington, Mutabingwa, Kabyemela, Fried, & Duffy, 2011; WHO, 2012). Another malaria intervention, which is fast gaining promise in malaria endemic countries, is the vector control mechanism using chemicals to spray homes (indoor residual spraying-IRS). Although acceptability has been the concern in its early days, studies in areas where it has been implemented have shown reduction in the prevalence of malaria cases.

In Benin, a study recorded a decrease by 8% the incidence rate compared to 18% in areas that were not exposed to IRS (Ogouyèmi-hounto et al., 2018). This intervention offers protection in pregnancy as well. A study conducted in Uganda among pregnant women found a 16.8% higher prevalence of placental malaria (P=0.001) in those who had no IRS protection compared with women who had IRS protection (Muhindo et al., 2016).

4. Knowledge of pregnant women on risk factors of malaria

Knowledge regarding risk factors to malaria among pregnant women is important in the prevention of occurrence of malaria. Studies have revealed different results on risk factors to malaria. For instance, in Nigeria, a study was conducted on 200 participants using a descriptive design and a systematic sampling method. The objective was to assess women's knowledge on the risks associated with malaria during pregnancy, 83.9% of people had knowledge of the risks of malaria during pregnancy (Oladele, 2014).

Another study was conducted in Nigeria involving 403 women to ascertain the women's knowledge on the risks of malaria and preventive measures. The results revealed that preventive measures were 71.5%. Factor(s) that mediated their knowledge was educational status, as there was a significant association between knowledge of the risks of malaria during pregnancy and educational status (Akaba, et al, 2013). In another study in Kenya, individuals had sound knowledge of the causes and symptoms of malaria (Esse, et al., 2018). Similarly, Mazingo et al, (2010), in their study conducted in Uganda to assess the knowledge on malaria reported reasonable knowledge of malaria transmission, prevention and treatment in the population they sampled. Akinyele & Ajaye (2011) found more factors that influenced knowledge. These were occupation, education, months at first appearance at antenatal clinic and transportation cost.

A cross-sectional study aimed at exploring community members and health providers' perceptions and experiences with malaria tests in south east Nigeria. Findings from the study revealed that both providers and community members were familiar with malaria tests and identified malaria tests as an important step to distinguish malaria from other illnesses with similar symptoms and deliver appropriate treatment. However, the logic of test-directed treatment was undermined by cost of test and a lack of testing facilities but above all concerns over the reliability of negative test results, with community members and providers observing inconsistencies between results and symptoms, and providers attributing inaccurate results to in competencies of technicians. Recognition of malaria symptoms was deemed most important in determining the use of antimalarial drugs rather than the result of a malaria test (Ezeoke, et al., 2012).

There is the need to improve availability of information through proper community channels. Special attention should be given to illiterate community members (Mazingo, et al., 2010). Similarly, when a cross-sectional survey was carried out among 209 pregnant women in Nigeria, knowledge of malaria was found in 79.9% of participants. Nonetheless, of the 52.2% who had heard of intermittent preventive measures, 55.9% of participants had good knowledge whilst 44.1% had poor knowledge of those who had knowledge (68.9%) on ITN's (Akinyele & Ajaye, 2011).

Subsequently, when a descriptive cross-sectional study on pregnant women and caregivers of under-five children using a semi-structured questionnaire, 57.7% had poor knowledge of malaria prevention (Adebayo, Akyinyemi & Cadmus, 2015). Thus, it is important not only to test whether pregnant women have knowledge on malaria, but to rate the degree of knowledge (that is, right or wrong) as pregnant women could indicate that they have knowledge on malaria, but the knowledge they possess might be wrong. Since there is a propensity for wrong knowledge to be held as true, there is the need to differentiate.

Similarly, pregnant women with information about the negative implications of malaria in pregnancy were more likely to complete the maximum dose of IPT-sp according to a study conducted in Nigeria (Azizi et al., 2018). Educational attainment of pregnant women is directly correlated to the knowledge of malaria (Hill et al., 2013). Women with higher education show a better understanding of malaria than women with little or no education. Government efforts to reduce the burden of malaria in Ghana could be achieved if policies are tailored towards improving the educational level of its people (Oladimeji, Mahlako, Gwegweni, Ojewole, & Yunga, 2019). Women who are better knowledgeable about malaria control and prevention can serve as role models in heightening awareness in the home environment, which would lead to a low incidence and prevalence of malaria infection. Malaria prevention is an important key element in roll back malaria partnership (Frimpong, 2017).

In research conducted in Uyo, Nigeria to assess the knowledge of malaria among women, 71% had knowledge about malaria and its effects. Additionally, respondents indicated that knowledge of the factors responsible for malaria in pregnancy is directly proportional to educational status (Ojong, Iheanacho, Akpan, & Nlumanze, 2013). It must be mentioned that reports from malaria knowledge, attitude and practices indicate misconceptions about malaria. This has adverse effects on malaria prevention and control. Results from a study conducted in Nigeria revealed that even though the knowledge was high among pregnant women about 90%, it did not translate into their practice (Oladimeji et al., 2019).

A further study conducted in a teaching hospital in Abuja Nigeria revealed that knowledge and preventive measures of malaria among pregnant women was 71.5% (Akaba et al., 2013). Level of Education is associated with knowledge of malaria infection. In the same study, it was noted that women who reside in the cities are more knowledgeable than those who live in a rural area in relation to malaria (Akaba et al., 2013). This could be because women in the cities have more information and have higher education than women in rural areas (Goshu & Yitayew, 2019).

5. Attitude of women about the risks of malaria during pregnancy

Malaria in pregnancy (MiP) was also more interpreted into locally defined categories, probably according to their understanding of what it signifies to them, even though people had knowledge of the malaria-related symptoms and their association with mosquitoes. For instance, Ahorlu, (2012), in research on malaria among pregnant women reported that respondents linked the incidence of clinical malaria episodes with the heat from the sun. This brings to the fore the need to investigate the reasons for the deviation between knowledge and attitude towards the risks of malaria. Convulsions, a common complication of malaria, were perceived among community members of Uganda as a supernatural ailment (Nuwaha, 2012). Nsagha, et al. (2012) indicated that some mothers, before taking their children to a health facility, would first seek the services of soothsayers ("ngambe" men). A traditional healer may prescribe an array of treatments for a child with malaria including herbal remedies, such as prepared plants or roots (Berlander & Elverdan, 2011). While some children are treated with malaria medications from biomedical facilities as the World Health Organization recommends, others receive treatment at home or from traditional healers (WHO, 2006)

Dako-Gyeke and Kofie, (2015) discovered in their research in Ghana that there was no significant relationship between religious beliefs of participants and their malaria prevention and control practices. On the contrary, ethnicity, income earning, employment status and other socio- cultural conditions had a significant relationship with malaria prevention. The findings suggest the need to consider and integrate factors, such as poverty and poor living conditions in malaria prevention and control strategies. Enquiry into the disease-specificity of malaria now in Ghana should be carried out, in order to know the status. Previous researchers have reported that pregnant women poorly use ITN's.

DakoGyeke and Kofie, (2015), in their study on malaria preventive methods in Ghana, showed that the application of preventive methods by pregnant women is strongly affected by ethnicity and other socio-cultural factors. It is necessary, therefore, to find out the reasons for this, and identify ways to encourage pregnant women to use ITN's. Perceived causes of malaria were linked to the socio-economic status of households, with wealthier individuals reporting malaria more frequently than poorer households (Esse, et al., 2018). Similarly, Mazingo, et al., (2010) discovered that 56% of respondents associated the disease of malaria with mosquito bites, with a significant difference between educational level and knowledge of transmission. Willilo, et al. (2016) supports the study finding which discovered that routine screening of pregnant women may offer a practical strategy for continuously tracking malaria trends, particularly seasonal variation.

Knowledge of mosquito breeding areas was also associated with mosquito bites (literate, 22%; illiterate, 57%). High acceptance of indoor residual spraying and high level of bed net ownership should be taken as an advantage to improve malaria control (Mazingo, et al., 2010). People with sound knowledge of malaria still utilized traditional treatments. Only a few slept under treated nets. People beliefs however did not translate into disuse of formal medication. Perceived causes of malaria were linked to household socio-economic status. Bed nets were used in wealthier households, whilst poor ones contended with cheaper protective measures. It was advised that resources to help community members prevent and treat malaria should be equitably distributed. There was also the need for community-based approaches that matched services with that of the needs of the poor (Pell, et al., 2013).

A study on influence of education and knowledge on perception and practice to control malaria in Southeastern Nigeria by Dike et al. (2016) investigated whether people's level of education and what they know about malaria affects how they seek treatment and prevention for the disease. The study was undertaken in Adu, Ahanti, Amaettiti and Enugu-Akwis in Southeastern Nigeria. Questionnaires were used to collect data from a random sample of 300 respondents per village on relevant areas namely, knowledge on causes, symptoms, treatment and prevention of malaria. The study found that education and knowledge of malaria both play a role in people's perception and practice to controlling malaria. It was also shown that most of the more educated respondents in the study had only 4 – 5 years of education, which gave the indication that educational attainment needs not be necessarily very advanced to have a better knowledge, attitude and perception towards malaria.

Similarly, education increases the probability that households would purchase both treated and untreated mosquito nets. According to the researchers, the participants' identification of mosquitoes as the cause of malaria led to increased purchases of mosquito nets. However, there was a negative correlation of level of education with perception that herbs

could be used to treat malaria, because this represents a source of potential inappropriate treatment and people that are more educated were expected to be aware of this. In addition, there was a positive correlation of socio-economic status with correct perception and practice about malaria control (Adjei-Frimpong, 2018).

6. Conclusion

In conclusion, the knowledge level among pregnant women attending antenatal clinics regarding malaria during pregnancy was adequate. Women also demonstrated a positive attitude and desire to prevent malaria during pregnancy. Moreover, pregnant women attending antenatal clinics understood the common measures to be adopted to prevent malaria during pregnancy. The high knowledge of malaria and its preventive measures was attributed to the education pregnant women obtained regarding malaria prevention when attending antenatal services. It was crucial to further enhance the education of women using other means on malaria and its preventive measures, especially by using mainstream media to reach a larger audience.

Compliance with ethical standards

Acknowledgments

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