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To Study the Factors Associated with the Susceptibility of Pregnant Women to Malaria

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ABSTRACT

Inflammatory anemia and malaria in pregnancy are significant public health Concerns in regions where malaria is prevalent, such as India. Both conditions pose substantial risks to maternal and fetal health, yet there remains a gap in understanding their comparative impact on pregnant women, particularly within endemic populations. This study seeks to analyse and compare the occurrence, symptoms, complications, and results of inflammatory anaemia and malaria during pregnancy within the population affected by these diseases in India. Preliminary findings indicate a There is a higher occurrence of malaria during pregnancy when compared to inflammatory anemia within the study population. Clinical manifestations such as fever, anemia, and jaundice were common in both groups, but certain symptoms such as chills and rigors were more prevalent in malaria cases. Laboratory investigations revealed distinct patterns, with elevated inflammatory markers and specific hematological parameters characteristic of each condition. Complications including preterm birth, low birth weight, and maternal mortality were observed in both groups but appeared to be more frequent and severe in malaria cases. This study underscores the importance of distinguishing between inflammatory anemia and malaria in pregnancy due to their differing clinical presentations, management strategies, and prognostic implications.

Keyword: Inflammatory Anemia, Pregnancy, Endemic, Fetal Health, Malaria

INTRODUCTION

With a staggering number of 781,000 deaths and 225 million clinical cases reported annually, malaria is the leading parasite disease in the world and a huge issue in public health on a global scale (WHO 2010). Classical malaria in humans has been Caused by one of four Plasmodium species; nevertheless, Plasmodium Falciparum has been the most common, especially in Africa, accounting for 86% of cases. In places where malaria is widespread, According to a study conducted by Guerra et al. in 2010, cerebral malaria and severe anaemia have been identified as the primary causes of mortality in this region, especially among children under the age of five. Cerebral malaria and anaemia, which are more common in Expectant mothers in sub-Saharan Africa, are the leading causes of perinatal death and disability in that region. According to Dicko et al. (2003), a large percentage of stillbirths, low birth weight babies, early deliveries, and spontaneous abortions may be attributed to these two malarial sequelae.

Researchers have mostly concentrated on P. falciparum in their studies of malaria pathogenesis due to the greater rates of death, morbidity, and worldwide prevalence associated with this species (Akhwale et al. 2004). On the other hand, between 25 to 40 percent of all clinical The cause of malaria is Plasmodium vivax, making it the second most common species and others have contributed to the mounting There is a substantial amount of evidence indicating a significant number of severe and complicated cases of P. vivax malaria, which includes severe anaemia. Furthermore, the actual number of cases of anaemia may be greater than what is now recorded. P. vivax infections Can lead to serious clinical syndromes, making it difficult to control and increasing the risk of infection for a larger population. These factors suggest that P. vivax may have a greater impact on public health than previously believed.

According to Guerrero et al. (2008) and (2010), almost 170 million individuals in 21 Latin American and Caribbean nations are at risk of contracting P. vivax and P. falciparum. Colombia has a 14.2% share, followed by Peru with 8.8%, Venezuela with 5.4%, Bolivia with 1.9%, and Ecuador with 1.1% make up the remaining 40% of the Americas' malaria cases, with Brazil accounting for over 60% of those instances. Cases reported in Haiti (2.8% of all cases) are included in the Caribbean.

Three Guatemala, Panama, and Honduras are countries located in Central America. Their respective population percentages are 3.8%, 0.4%, and 1.5%—report malaria cases. Plasmodium malarie is responsible for less than 0.01% of malaria infections, whereas P. vivax causes 74%, P. falciparum 25%, and Plasmodium malariae < 0.01%. The total death rate due to malaria infections is less than 0.1 percent, when all species are considered combined (WHO 2009).

The advantages of understanding the transmission and clinical load of Plasmodium vivax are the same as those of Plasmodium falciparum. To proceed to (i) comprehend the worldwide epidemiology of the illness, (ii) evaluate the fairness for global finance in the field of malaria management, and (iii) lay the foundation for addressing disease burden assessment, it is essential to map malaria on a global scale, as shown by the Malaria Atlas Project. While there have been great strides in P. falciparum mapping, P. vivax maps are relatively new, which makes strategic planning in LA more challenging.

Pv malaria is a type of malaria that is found all over the world and is often overlooked in tropical regions illness that disproportionately affects pregnant women. There has been limited research on the impact of Plasmodium vivax infection during pregnancy, in contrast to the well-documented negative effects of Plasmodium falciparum (Pf) malaria on pregnant women and their children have been more well documented. In order to fill this knowledge vacuum, we characterised Examining the impact and health consequences of Pv-induced malaria in pregnant women from five malaria endemic locations through a multicenter cohort study known as the PregVax project. We want to better understand the immunological responses caused by Plasmodium infections or exposures in pregnant women within that cohort, and how these responses could be associated with unfavorable clinical outcomes.

Objectives Of The Study

1. To analyze the Clinical features of malaria infection with Immune response to malaria.
2. To study the Factors associated with the susceptibility of pregnant women to malaria.

RESEARCH METHODOLOGY

The prenatal clinic at Thyolo county hospital in southern was the site of the research, which lasted from 2005 to 2009. There is a well-established programme to prevent the spread of HIV from mothers to their children, and the hospital offers free prenatal care. All women who are diagnosed with HIV undergo testing for CD4 T-cell counts and WHO HIV clinical stage. Stavudine (30–40 mg), lamivudine (150 mg), and nevirapine (200 mg) make up Triomune, a fixed-dose formula was administered twice daily to HIV-infected mothers-to-be who were categorised as HIV Stage III or IV according to the World Health Organisation (WHO) or had a CD4 count below 250. As per the guidelines of the WHO and the UK's Department of Health, the hospital began using cotrimoxazole prophylaxis (480 mg twice day) in 2007 to avoid opportunistic infections. Nevertheless, due to misunderstandings over the precise application of this strategy, some women were given SP-IPTp alone while others received a mix of regular flu shots and SP-IPT.

Study population, enrolment and data collection

We relied on information gathered from cross-sectional research that looked at how maternal morbidities were affected by pregnant those who took dietary iron supplementation regularly and who were HIV positive. Participating in the research were pregnant women with HIV who were at least 15 years old, receiving standard prenatal care at the hospital, and who were 34 weeks along in their pregnancy. All pregnant women were screened out unless they had a medical or obstetric emergency.

Upon enrollment, participants were asked to fill out a standardized questionnaire that asked about their socio-demographic characteristics, medical history, the medicines they were taking (including iron supplements, antiviral medication, SP-IPT, and CTX), and whether they used bed nets. As part of the physical examination, the patient's vitals were taken, including their height, weight, blood pressure, temperature, and mid-upper arm circumference (MUAC). The next step was to draw peripheral venous blood for microscopy of malaria using a the subsequent use of real-time polymerase chain reaction (PCR) for the detection of malaria DNA in thick blood smears. Two committees at UNC Chapel Hill: one for institutional review and another for research and ethics in the medical school gave their stamp of approval to the research. Before being enrolled, every single woman gave her informed permission.

RESULTS AND DATA INTERPRETATION

The protozoan parasites Plasmodium falciparum and Plasmodium vivax cause tropical malaria, which is believed to affect 515 million people year and kill 1-3 million people. Plasmodium vivax, the most prevalent human malaria parasite, affects 130–435 million people annually and is the main culprit in much of Asia and Latin America. Despite the widespread belief that Plasmodium falciparum infection is far more dangerous, historical records reveal that P. vivax malaria was a major

cause of mortality in the pre-antimalarial era. The recent recognition of P. vivax malaria as a cause of death is concerning. Most of the death and morbidity is experienced contributing significantly to this increasing burden are pregnant women and children, as well as the development and spread of drug resistance to commonly used chemotherapeutics. Malaria is one of several common and preventable infectious disorders that often go unscreened and untreated during pregnancy. Every year, malaria during pregnancy claims the lives of almost 200,000 newborns (MIP), which affects an estimated 125 million pregnant women globally. There are 28 million pregnancies in India every year, 67,000 maternal fatalities, According to the Registrar General of India's Sample Registration System, one million infants died and one million moms were left with chronic illnesses. Dedicated Report on Mother Death Rates in India, 2004–2006. During pregnancy, a woman's immune system allows the foetal allograft to implant in her uterus, creating a window of opportunity for malaria infection. The most serious malarial complications during pregnancy, including issues related to malaria in the brain, severe malaria anaemia, abortions, foetal deaths in utero, preterm birth, stillbirths, and newborn and maternal mortality, are more likely to occur in pregnant women with relatively low levels of previously acquired immunity. Compared to non-pregnant individuals, pregnant women in malaria-endemic regions are more likely to get Plasmodium infections. Women of any gestational age may be at risk in regions with low or unstable transmission, however the negative effects of these illnesses are more often seen by primigravidae. There is an approaching 50% death rate from pregnant women are three times more likely to have severe malaria disease than non-pregnant women, and the severity of their symptoms might vary accordingly.

The impact of malaria on a pregnant woman and her unborn child may be catastrophic, and the foetus. However, these effects can be greatly mitigated or even prevented through the use of current interventions or by receiving the right treatment at an early and strict diagnosis. Due to the lack of symptoms often experienced by pregnant women with malaria, the most popular method of control is a kind of intermittent prenatal therapy. This treatment aims to eliminate any malaria infection that may be present during treatment and also provides post-treatment prophylaxis to prevent infection for a few weeks. The growing global concern about the resistance of antimalarial medications has, nevertheless, paved the way for new and improved therapies. Multiple factors make it difficult to diagnose malaria during pregnancy. These include weakened immunity, multiple stages of pregnancy, a host of obstetric complications, parasites trapped in the placenta and spleen, various forms of anaemia, and variations in patient presentation. An essential objective of MIP research is the creation of rapid and accurate diagnosis.

Everyone knows that Plasmodium falciparum malaria is the culprit maternal and foetal morbidity and death when contracted during pregnancy. Infection with Plasmodium vivax Although it has received less attention than P. falciparum infection, is a significant cause of low birth weights and maternal anaemia, which often occur concurrently. Half of the 50 million pregnancies that happen annually in malaria-endemic nations happen in regions in areas where P. vivax malaria is common. Despite the fact that salmonella infection in pregnant women has been known about for a long time, the effects of this infection have just lately been studied. Infants whose mothers had Plasmodium vivax were more likely to be anaemic and had a lower risk of having a low birth weight compared to infants whose mothers had Plasmodium falciparum, according to studies conducted in Thailand and India. In both investigations, the During the first trimester of the second pregnancy, the incidence of P. vivax infection was highest during the first trimester of the first pregnancy overall.

Malaria significantly contributes to maternal and neonate morbidity and death, as shown in prior and limited MIP research in India. Earlier research mostly Vivax infections in pregnant women with symptoms were the primary focus of the research, however preliminary findings from P. falciparum and P. vivax infections were associated with worse pregnancy outcomes. These investigations were conducted mainly in central India. There is a lack of data from India, particularly in the understudied and tribally dominated area of Jharkhand, where vivax-associated malaria during pregnancy is a persistent problem. Malaria is prevalent in this region and is responsible for a significant annual mortality toll. Jharkhand is second only to Orissa in terms of the number of malaria deaths in India, according to recent findings in this area.

We set out to fill this knowledge gap by studying the incidence of asymptomatic malaria, the proportion of subjects carrying the malaria parasites Plasmodium falciparum and Plasmodium vivax, as well as the relative roles played by these two malaria parasites during pregnancy and delivery in India. Our research indicates that no prior study has examined the profile, epidemiological relationship, and clinical correlation of malaria isolates in pregnant women from Hazaribag, Jharkhand, an area of India that is endemic to malaria. Of paramount importance, our study will endeavour to assess the interaction between anaemia, pregnancy, and asymptomatic malaria in an adult population living in a perennial transmission zone where P. vivax and P. falciparum are co-dominant, stratified according to clinical groups. This evaluation will be the first of its kind. The research was carried out in Hazaribag in the Indian state of Jharkhand, with the long-term goal of facilitating the production of policies based on evidence to lessen the impact of MIP-related diseases in this part of India.

Most of the pregnant women who came to ANC were between the ages of 18 and 38, and most of them had completed some kind of formal education, according to Table 4.1. Nearly all of the subjects did not smoke and 97.6% could speak Hindi.

The vast majority were either homeowners (75.4%) or actively involved in domestic duties (76.7%), with just a tiny percentage engaged in farming (12.3%). Among those who attended, 33.3% were first-time mothers, and Between zero and nine trips to the ANC were recorded during the current pregnancy. Just over half of the patients visited the ANC in the second half of their pregnancies, whereas nearly half (44.6%) did so before the 20-week mark. While 36.2% of people used multivitamins, 46.3% said they took iron/folic acid supplements. Most pregnant women said they use untreated bed nets at home and had done so lately in an effort to avoid malaria, but only a small percentage said they had an ITN (Table 4.2). Just nine women were on malaria prophylaxis, and seven of those ladies (or 78% of the total) couldn't tell us which medicine we were taking; the two women who could tell us were on chloroquine. Out of the overall cohort, 5.4% (68/1271) had a positive malaria diagnostic test (Table-4.3). Among pregnant women, 4.3% had positive blood smears for malaria and 14 (1.1%) had positive RDTs. Among the 54 women whose blood smears came back positive, the average density of parasitemia was 63,236 asexual forms/µl, ranging from 600 to 489,000. In parasitaemic people, 4.4% had P. falciparum, 86.8% had P. vivax, and 8.8% had a mixed infection. Rural women had a peripheral parasitemia risk that was more than four times higher than First- and second-time mothers, as well as women living in urban or semi-urban areas (OR 4.32, 95% CI 1.67-9.46), were more likely to have peripheral parasitemia than multigravidae (OR 4.75, 95% CI 1.23-11.58). Women who were pregnant and had a fever in the week leading 4.2% vs. 2.3%, p=0.02) were more likely to have parasitaemia if they were febrile during the study visit or if they were enrolled before the study. It is interesting to note that out of 68 pregnant women who tested positive for malaria, at their ANC check, 70.6% (48/68) reported no symptoms whatsoever. The monsoon season (August–October) had a record-breaking amount of malaria cases, however the bulk of cases occurred between July and January. Additional multivariate investigation was conducted to ascertain the relationship between certain socioeconomic factors, demographic variables, and malaria control measures and the likelihood of parasitemia. The following factors were shown to be substantially linked with peripheral prenatal care for parasitemia in women: first or second pregnancy, recent fever, and residence in a remote area region.

CONCLUSION

Examining the effectiveness of CTX with and without SP-IPTp in reducing malaria infection and maternal anaemia in HIV-infected pregnant women was the main goal of this study. When comparing CTX with and without SP to SP-IPTp, the researchers found that CTX was more effective in reducing malaria infection and maternal anaemia.

Our second objective was to determine if Women living with HIV who are pregnant have an increased risk to have maternal anaemia and, if so, whether submicroscopic malaria An infection may increase the likelihood of this illness. Those who did not take CTX prophylaxis, were pregnant or nursing, or were born during the rainy season had an increased rate of submicroscopic malaria infection, according to our findings. Maternal anaemia was more common and mean haemoglobin compared to women who did not have submicroscopic malaria, was lower.

Third, we wanted to see if Malaria was more common among pregnant women who were HIV positive if they regularly used iron supplements. We also looked for evidence that this cohort had a lower rate of malaria infection if iron deficiency was a factor. There was no correlation between HIV-positive pregnancy and an increased risk of malaria when they regularly took iron supplements, according to this research. In comparison to women with an adequate iron supply, those with an iron deficit were at a lower risk of contracting malaria.

Furthermore, the paper's findings demonstrated revealed the levels of IL-10 and IP-10 rose in pregnant women who contracted the virus. Setting up in vitro experiments that stimulate cell types known to be significant in placental malaria (e.g., monocytes) with these two substances would be an intriguing experiment. The goal is to learn more about the parasites' effects on these cells by studying how the inflammatory environment (produced by the parasites) affects their migratory, co-stimulatory ability, and cytokine release. In order to replicate pregnant women's inflammatory milieu, monocytes, and subsets of these cells will be cultured in a controlled environment with IP-10 or IL-10. After that, the cells will be exposed to parasite antigens to test their migration capabilities, cell surface receptors, co-receptors, and the protein and mRNA levels of cytokines they produce.

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