Prevalence of low birth weight (LBW) babies in malaria-infected pregnant women attending antenatal clinics in hospitals in Anambra State, south eastern Nigeria


1Dept of Prosthesis and Orthopaedic Technology, School of Health Technology, Federal University of Technology, Owerri, Imo State, Nigeria
2Dept of Obstetrics and Gynaecology, Anambra State University Teaching Hospital, Awka, Nigeria
3Dept of Parasitology and Entomology, Faculty of Biosciences, Nnamdi Azikiwe University, Awka, Nigeria
4Dept of Community Medicine, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State, Nigeria
5Dept of Human Biochemistry, College of Health Sciences, Nnamdi Azikiwe University, Nnewi campus, Nigeria

Email address
soloukibe@yahoo.com (Ukibe S. N.)

Citation

Abstract
The present study was a cross-sectional, case-control study designed to evaluate the prevalence of low birth weight (LBW) babies among pregnant women, attending antenatal clinics in some private and public hospitals in Anambra State, South-Eastern Nigeria. Altogether, 700 pregnant women aged 17-46 years were recruited by voluntary participation between January 2012 and March 2013. Blood samples were collected by venepuncture under sterile conditions and examined for malaria parasites using rapid immunoassay method and thick and thin smear microscopic methods respectively. The babies’ birth weights were extracted from the hospital records. The result showed that the prevalence rate of malaria among pregnant women was 73.1% while the prevalence rate of low birth weight babies was 6.6%. The birth weight of the babies ranged from 0.4-4.6Kg and all the LBW babies were from malaria infected mothers. The study concludes that malaria is a significant contributor to low birth weight babies among pregnant women in Anambra State, Nigeria. Vigorous public health education needs to be mounted so as to increase the level of ownership and use of ITNs and reduce the prevalence rate of malaria. This will go a long way to improve the current situation.
1. Introduction

Malaria has continued to arouse research interest all over the world probably because it is unarguably the World’s number one parasitic disease with pregnant women and children under the age of five years as the most affected or high risk groups [1, 2, 3, ]. One of the adverse effects of malaria in pregnancy is the reduction of birth weights of new born babies in affected women. Low birth weight (babies face some challenges in life which may include the risk of perinatal deaths.

A new born is said to have low birth weight if the weight at birth is less than 2.5kg [5]. The rate of LBW in Sub-Saharan Africa has been put at 3.9-24% [6, 7, 8, 9]. Previous studies on the incidence/prevalence and determinants of LBW babies in Nigeria [10, 11, 12, 13] have reported rates ranging from 6% to 32%. Some of the documented determinants of LBW babies include prematurity (which can be induced by malaria), low maternal age, height or weight. Studies conducted elsewhere have reported LBW rates as high as 40% [14]. The World Health Organization has put the World wide incidence of LBW babies at 15.5% [5].

Nigeria is a malaria endemic country with undesirable consequences on the pregnant population. This is an impediment to the achievement of the millennium development goals, especially in the South-Eastern zone. The present study was therefore designed to evaluate the prevalence of low birth weight babies among pregnant women attending antenatal clinics in Anambra State, South-eastern Nigeria.

2. Materials and Methods

Study area: The study was conducted in hospitals chosen from three different Local government areas in Anambra state, Nigeria, namely Awka South, Onitsha North and Nnewi North. Anambra state is located in the South Eastern zone of Nigeria with an estimated population of 4.9million people according to 2006 census [15]. The state is bounded by Delta state to the West, Enugu state to the East, Kogi state to the North and Imo state to the South [16]. The study locations: Awka, Onitsha and Nnewi are the three major cities of the state.

Study population- A total of 700 pregnant women aged between 17 and 46 years, who came for routine antenatal services were recruited by voluntary participation between January 2012 to March 2013 from five major private and public health institutions in the state namely General hospital/Anambra State University Teaching Hospital (ASUTH) Awka, Divine hospital and maternity Awka, Christ the King Specialist hospital Awka, Life specialist hospital Nnewi and General hospital, Onitsha respectively. These hospitals were randomly selected from the three major cities of the state.

Informed consent was obtained from the participants after due permission had been sought for and obtained from the hospital authorities. The faculty board of Ethical Committee approved the study.

2.1. Sample Collection

One ml of whole blood was collected through venepuncture from each participant under sterile condition and placed into EDTA bottle for malaria parasite examination.

3. Methods

3.1. Determination of Malaria Infection

3.1.1. *P. falciparum* Antigen Rapid Test Device

Principle- The principle of *P. falciparum* antigen detection is based on a rapid chromatographic immunoassay for the qualitative detection of circulating *P. falciparum* antigen in the whole blood. This method utilizes Gold conjugate to selectively detect Plasmodium antigen.

Procedure-The procedure was as described by the manufacturer (Paracheck, Orchid Biomedical System, Vena Goa, India). About 10µl of whole blood sample was added into appropriately labeled specimen cassettes containing sample wells. Subsequently, 3 drops of buffer supplied by the manufacturer was added into the sample wells. After 15mins the results were read.

Interpretation- The test device has inherent quality control that validates the result. The presence of two pink lines at the region of the control and test sample signifies presence of *P. falciparum* malaria infection while the presence of only 1pink line in the control region signifies absence of *P. falciparum* malaria infection.
3.2. Giemsa Stained Thick and Thin Blood Smear for Microscopic Detection of \textit{P. Falciparum} Parasites [17]

A small drop of blood was placed at the center of each slide to make a thick film. Using another slide the small drop of blood placed at the center of the slide was spread out to cover an area four times its original area to get a satisfactory thin film. The films were allowed to air dry thoroughly for 30 minutes at room temperature and then stained with Giemsa stain freshly diluted with buffered water of PH 6.8 (1:10 Dilution);

- The films were allowed to stain for 45 mins and then washed with clean distilled or buffered water and allowed to air dry in a draining trough;
- The blood films were then examined microscopically using the x10 oil immersion objective;

Interpretation: Malaria parasites, pigments and species were identified as ring forms using standard charts and reported as +, ++, +++.

3.3. Determination of Birth Weight of Babies

Babies were weighed as soon as they were born at the various hospitals and the birth weights were extracted from the mothers’ records.

4. Statistical Analysis

The version 16 of SPSS package was used for statistical analysis. The independent variables obtained in this study were expressed as mean (±SD). Chi square ($X^2$) and analysis of variance (ANOVA) were used to assess significant differences. The level of significance was considered at $P \leq 0.05$.

5. Results

Table 1. Prevalence of Malaria among pregnant women attending antenatal clinics in Hospitals in Anambra State, South-Eastern Nigeria.

<table>
<thead>
<tr>
<th>Hospital Location</th>
<th>Total No. examined</th>
<th>No MP Positive</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gen. Hospital/ANSUTH Awka</td>
<td>124</td>
<td>90</td>
<td>72.6%</td>
</tr>
<tr>
<td>Gen. Hospital Onitsha</td>
<td>159</td>
<td>123</td>
<td>77.4%</td>
</tr>
<tr>
<td>Life Specialist Hospital Nnewi</td>
<td>124</td>
<td>89</td>
<td>71.8%</td>
</tr>
<tr>
<td>Divine Hospital and Maternity, Awka</td>
<td>200</td>
<td>140</td>
<td>70%</td>
</tr>
<tr>
<td>Christ the King Hospital, Awka</td>
<td>93</td>
<td>70</td>
<td>77.8%</td>
</tr>
<tr>
<td>Total</td>
<td>700</td>
<td>512</td>
<td>73.1%</td>
</tr>
</tbody>
</table>

$N = 700, df = 4, X^2 = 56, (P < 0.05)$. Statistically significant

<table>
<thead>
<tr>
<th>Birth weight (Kg)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2.4</td>
<td>46</td>
<td>6.6%</td>
</tr>
<tr>
<td>2.5-3</td>
<td>270</td>
<td>38.6%</td>
</tr>
<tr>
<td>3.1-3.5</td>
<td>190</td>
<td>27.1%</td>
</tr>
<tr>
<td>3.6-4</td>
<td>173</td>
<td>24.7%</td>
</tr>
<tr>
<td>4.1-4.5</td>
<td>20</td>
<td>2.9%</td>
</tr>
<tr>
<td>&gt;4.5</td>
<td>1</td>
<td>0.1%</td>
</tr>
<tr>
<td>Total</td>
<td>700</td>
<td>100%</td>
</tr>
</tbody>
</table>

6. Discussion

The present study revealed that out of 700 pregnant women considered, 46 (6.6%) had babies weighing less than 2.5kg thus giving LBW prevalence rate of 6.6%. Previous studies [10, 11, 12, 13] have reported LBW rates higher than this figure. Low birth weight babies could be due to maternal malnutrition, intra-uterine growth retardation, prematurity and anaemia, all of which can be induced by malaria in pregnancy [18-21]. A previous study [11] has associated LBW with the sex of the baby, maternal age and height, and parity. Younger and shorter women are more likely to deliver low birth weight babies. Other factors that may influence the birth weight of malaria infected women include gestational diabetes and systemic hypertension. Severe malaria in pregnancy can also lead to premature deliveries which normally result to low birth weight babies irrespective of any other existing factors. Babies who are born preterm and are of low birth weight stand fewer chances of survival and this may increase the risk of perinatal mortality. This invariably has a negative impact on the achievement of the millennium development goals. Recently, LBW has been reported to be the most powerful predictor of perinatal mortality [22] and may have contributed adversely to neonatal mortality in affected countries.

In conclusion, the high prevalence rate of malaria in the study area contributes immensely to the incidence of low birth weight babies among affected women. The study suggests that measures such as increased use of insecticide treated bed nets be adopted to reduce malaria transmission and improve pregnancy outcome.

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References


