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Malaria Prevalence, the Use of Intermittent Preventive Therapy and Long Lasting Insecticidal Nets among Pregnant Women in Onitsha, Anambra State, Nigeria

Aribodor Dennis Nnanna[1], Ezenwa Patience Chinyeaka[1], Aribodor Ogechukwu Benedicta[2], Emelumadu Obiageli Fidelia[3] and Eneanya Obiora Augustine[1*]

[1]Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka, Nigeria.
[2]Department of Zoology, Nnamdi Azikiwe University, Awka, Nigeria.
[3]Department of Community Medicine, Nnamdi Azikiwe University, Awka, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author ADN devised the hypothesis. All authors took part in the design and interpretation. Author EPC performed the analyses. Authors EOA and ADN wrote the paper with input from authors AOB and EOF. All authors approved the manuscript.

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ABSTRACT

Malaria prevalence, the use of intermittent preventive therapy (IPT) and long lasting insecticidal nets (LLINs) was studied among pregnant women in Onitsha, Anambra State, Nigeria. Peripheral blood were obtained from 204 pregnant women and examined microscopically for malaria parasites. Structured questionnaire was used to determine the use of IPT and LLIN among the pregnant women. The results showed an overall malaria prevalence of 40.5% (99/204) in pregnant women. Prevalence varied markedly within age groups, with ages 15-19 recording a value of 75%.

**Corresponding author: Email: obiora.eneanya@outlook.com;*

Prevalence among the primigravidae was 55.1% compared to 39.5% for multigravidae. There was a statistical significance in prevalence by age and by parity (P<0.05). Compliance to the use of IPT was 53.9% (110/204). The result also showed that 79.4% (162/204) sleep under LLIN. Malaria was still a problem among pregnant woman and IPT reduced malaria during pregnancy.

Keywords: IPT; LLIN; malaria in pregnancy; primigravidae; multigravidae.

1. INTRODUCTION

Malaria is the world's most important parasitic disease ranking among the major health and developmental challenges for the countries of the world [1]. It is a disease condition caused by protozoan parasites of the genus *Plasmodium.* The most common and most dangerous of these parasites is *Plasmodium falciparum*, which causes most malaria related complications and deaths.

Malaria in pregnancy is an extremely important public health problem in malarious areas of the world. Malaria infection during pregnancy results in a wide range of adverse consequences for the pregnant woman and the newborn infant [2]. Every year, approximately 50 million women living in malaria endemic areas become pregnant, half of them in sub-Saharan Africa, mainly in area of intense *Plasmodium falciparum* transmission [3]. It is estimated that each year over 30 million women become pregnant in malarious areas of Africa, with most living in areas of Stable malaria transmission [4]. Although the vast majority of women with malaria infection during pregnancy remain asymptomatic, infection increases the risk of maternal anemia and delivering a low-birth -weight (LBW) babies [5]. LBW (<2,500 g) is an important risk factor for infant mortality especially in sub-Saharan Africa, hence the need for frequent studies. Severe maternal malaria increases the mother's risk of death, and malaria-related anaemia is estimated to cause as many as 10,000 maternal deaths each year in Africa [6].

Among the important measures to prevent malaria during pregnancy is the use of intermittent preventive therapy (IPT) and long lasting insecticidal nets (LLINs). LLIN has been shown to avert around 50% of malaria cases, making protective efficacy significantly higher than that of untreated nets which, under ideal conditions (such as those found in research settings), usually provide about half the protection of nets treated with an effective insecticide [7]. Intermittent preventive treatment describes the administration of a free therapeutic course of an anti-malarial to at risk subject at specified times regardless of whether they are infected or not. In many malaria endemic countries, the intermittent preventive treatment of malaria during pregnancy with sulfadoxine / pyrimethamine has been instituted and studies suggest that intermittent preventive treatment of malaria during pregnancy reduces the severe maternal anemia, low birth weight babies and infant mortality substantially.

The use of these tools has not been evaluated in the recent times. This study investigates the relationship between malaria prevalence and IPT and LLINs up take among pregnant women in Onitsha, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

This study is a hospital-based cross-sectional survey carried out in Onitsha South Local Government of Anambra State, Southeast Nigeria. It is located between latitude 6º & 6º10^{1}N and longitude 6º 47^{1}E, with an altitude of 63.14 m. Onitsha South L.G.A. has a population of about 137,191 people [8]. It is a lowland area located within the tropical rainforest zone, with annual temperature range of 26.72ºC-38.52ºC. The vegetation of the area are mostly rainforest type mixed with derived savanna vegetation. It has two marked seasons, 4 months of dry season, November-March, and 8 months of wet season, April-October. Onitsha is the biggest city in the southeastern Nigeria. Most of the inhabitants are traders. River Niger is one of the landmarks of Onitsha.

2.2 Sample Population and Size

The sample population was made up of pregnant women that attended antenatal care visits to hospitals in the LGA between the months of June – September 2014. Pregnant women not resident in the community and those who did not intend to deliver their babies in the hospitals selected for this study where excluded.

A total of 184 participants were required for this study. This sample size was calculated using the

statistical software, Epi-info. The following parameters were taken into consideration for sample size calculation; population size, expected frequency, confidence limit and clusters. The sampling was done once a week for a period of 16 weeks, between June and September. On each visit, 13 new participants were enrolled in the study. This was done using a systematic random sampling technique whereby participants were given a unique identification number and every 3rd person was chosen. 4 participants did not submit their questionnaire, thus were recorded as invalid. A total of 204 pregnant women participated in this study, and this comprised of both primigravidae and multigravidae.

3. DETERMINATION OF MALARIA PARASITES

3.1 Collection of Blood Samples

Using a lancet, peripheral blood was collected from pregnant women during antenatal care visits by trained health personnel. This was transferred immediately to a properly labeled glass slide and thick film microscopy as described by [9] was used to determine malaria parasites. When blood is viewed under the microscope, malaria parasite showed deep red chromatin and pale blue cytoplasm.

3.2 Determination of Use of Long Lasting Insecticidal Nets (LLINs) and Intermittent Preventive Treatment (IPT)

Structured questionnaire containing socio-demographic questions and questions on LLIN and IPT using sulphadoxine-pyrimethamine (SP) was used to determine the level of usage of long lasting insecticidal nets (LLINs) and intermittent preventive treatment (IPT) by pregnant women in Onitsha South LGA.

3.3 Analysis of Data

Data obtained were subjected to statistical analysis using SPSS. Results were presented as Chi-square and percentages. A chi-square test was used to determine whether there was a significant difference between malaria prevalence and the use of IPTT and LLIN among pregnant women.

4. RESULTS

A total of 204 participants were recruited for this study. The result showed that the prevalence of malaria among pregnant women was 48.5% (99/204).The age group 15 – 19 years had the highest prevalence of 75.0% (6/8), followed by the age group 35-39; 55.9% (19/34), 30 – 34; 55.0% (33/60), 25 – 29; 46.3% (25/54) and the least prevalence of 33.3% was among the age group 20-24 years as shown in Table 1. There was a significant difference ($p<0.05$) in malaria prevalence among the different age groups.

Table 1. Prevalence of malaria among pregnant women in Onitsha South L,G.A., Anambra state, Nigeria

Age (years)	No sampled	No positive	% positive
15 – 19	8	6	75.0
20 – 24	48	16	33.3
25 – 29	54	25	46.3
30 – 34	60	33	55.0
35 – 39	34	19	55.9
Total	**204**	**99**	**48.5**

It was also found that the prevalence of malaria among primigravidae was 55.1% (65/118) and that of multigravidae was 39.5% (34/86) as shown in Table 2. There was also a significant difference ($p<0.05$) between the prevalence of malaria inprimigravidae and multigravidae.

Table 2. Prevalence of malaria among primigravidae and multigravidae in Onitsha South L.G.A Anambra state

Parity	No sampled	No positive	% positive
Primigravidae	118	65	55.1
Multigravidae	86	34	39.5
Total	**204**	**99**	**48.5**

The result also showed that 78.9% (161/204) of the pregnant women knew about IPT and only 53.9% (110/204) showed compliance as shown in Table 3. There was also a significant difference ($P<0.05$) between women who know about IPT and those who showed compliance.

It was also found that pregnant women who attained tertiary education were the highest among those that slept under LLINs 94.1% (96/102). This was followed by those who attained primary education 66.7% (10/15) and the least were those who attained secondary education 64.4% (56/87) as shown in Table 6. There was, however, no significant difference ($p>0.05$) in sleeping under LLINs among the pregnant women with different education attainment.

Table 3. Knowledge and use of IPT among pregnant women in Onitsha south LGA Anambra state

Age (years)	No examined	Knowledge	Compliance	% compliance
15 – 19	8	3	3	37.5
20 – 24	48	41	28	58.3
25 – 29	54	46	35	64.8
30 – 34	60	43	28	46.7
35 – 39	34	28	16	47.1
Total	**204**	**161**	**110**	**53.9**

Table 4. Educational attainment and compliance to sleeping under LLINs among pregnant women in Onitsha south L.G.A., Anambra state, Nigeria

Age (years)	No sampled	Use of LLIN	% Use
Primary	15	10	66.7
Secondary	87	56	64.4
Tertiary	102	96	94.1
Total	**204**	**162**	**79.4**

It was also found that pregnant women who attained tertiary education topped the list of those who took IPT during pregnancy 65.7% (67/102), followed by those who attained secondary education 48.3% (42/87) and the least were those who attained primary education 46.7% (7/15) as shown in Table 5. There was, however, no significant difference ($p>0.05$) in compliance to IPT among the pregnant women with different education attainment.

Table 5. Educational attainment and compliance to IPT intake among pregnant women in Onitsha south L.G.A., Anambra state, Nigeria

Level of education	No sampled	Knowledge	Compliance
Primary	15	7	46.7
Secondary	87	42	48.3
Tertiary	102	67	65.7
Total	**204**	**110**	**53.9**

On the use of long lasting insecticidal nets (LLINs), it was found that 79.4% (162/204) of the pregnant women slept inside LLIN. The usage rate among the different age groups was as follows; 15 – 19 years 100%, 20-24 years 75%, 25 – 29 years 75.9%, 30 – 34 years 81.7%, and 82.4% for 35 – 39 as shown in Table 4. There was a statistical significance ($p < 0.05$) in the use of LLINs among the different age groups of pregnant women.

Table 6. The percentage of pregnant women sleeping under LLINs in Onitsha south LGA, Anambra state, Nigeria

Age (years)	No sampled	Use	% use
15 – 19	8	8	100.0
20 – 24	48	36	75.0
25 – 29	54	41	75.9
30 – 34	60	49	81.7
35 – 39	34	28	82.4
Total	**204**	**162**	**79.4**

5. DISCUSSION

The study of malaria prevalence and use of insecticide treated nets and intermittent preventive therapy among women was carried out in the rainy season of 2014 in Onitsha South L.G.A. in Anambra State, southeast Nigeria. A large government-owned hospital was used as the sampling site. Residents in and around the community prefer to use government owned hospital as their birthplace because these hospitals have qualified personnel and also very cost effective as compared to privately owned hospital. Furthermore, antenatal care in government-owned hospitals is free. This makes this site very popular amongst residents of Onitsha South LGA. This gives this study the right mix of participants.

The result showed a prevalence of 48.5% with the age group 15 – 19 years having the highest prevalence of 75.0%. A prevalence of 48.5% represents a decline from results obtained in past similar studies [5,10]. The reason for this decline may not be unconnected with an improved use of malaria preventive measures including LLIN and IPT by pregnant women. The highest prevalence found among the age group 15 – 19 years agrees with the findings of Agomo et al. [14] who reported that the highest malaria prevalence was seen in pregnant women < 20 years. This had been reported to be probably due to age – associated immunity which is found in older pregnant women and this helps in controlling

malaria during pregnancy. This could also be connected to the fact that young teenage pregnant girls have less knowledge on malaria prevention / protection. Educational level might also be a factor as teenage pregnancy is usually associated with school dropouts. Furthermore, a large number of teenage pregnant girls run away from their homes and community for fear of the stigma associated with their condition. They remain in hiding for the duration of their pregnancy, putting up with friends in living conditions not ideal for carrying a pregnancy. By so doing, they do not have the proper homecare from family and relatives, thus not adhering to proper malaria preventive measures.

From the study, the prevalence of malaria was higher in primigravidae than in multigravidae. This agrees with the study of [10,11] in which highest prevalence was found among pregnant women in the primiparae followed by multiparae and least in the control group. Younger maternal age has been documented as an independent risk factor for malaria in pregnancy. It is documented that immunity is acquired through consecutive pregnancies and this which plays an important positive part in controlling the infection during pregnancies.

The usage and compliance rate for LLINs and IPT was 79.4% and 53.9%, respectively. This represents a remarkable improvement when compared with results of similar studies among pregnant women from similar areas of 32.0% for insecticide-treated nets [12], and 19% for IPT [13]. This improvement could be attributed to public enlightenment on the use of these malaria preventive tools during pregnancy in Anambra State as evidenced in daily multiple radio jingles in both local and English languages. Another contributing factor could be that these malaria preventive tools are available for free for pregnant women during antenatal care visits. This however would require validation through further studies.

It was however instructive to observe that the age group 15 – 19 years, which had the highest prevalence of 75% for malaria infection showed less compliance to IPT but had the highest percentage of ITN users. The implication of this observation is that LLIN alone may not be enough to protect pregnant women from malaria attack. There is therefore the need to determine the contribution of each of the preventive tool in reducing the overall burden of malaria during pregnancy.

6. CONCLUSION

In conclusion, malaria prevalence at 48.5% among pregnant women, though a reduction from previous comparative studies, was still high and needs to be addressed as Nigeria matches towards malaria elimination. The uptake of IPT also recorded an improvement from past studies but still falls below national target of 80%, thus emphasizing the need for serious improvement. The observation of more malaria infection in a group with the highest level of LLIN usage calls for a serious research on the protective role of LLIN in pregnancy.

CONSENT AND ETHICAL CLEARANCE

Ethical clearance was obtained from the ethical review committee of the Nnamdi Azikiwe University, Nigeria. All participants for this study agreed to a written informed consent. All authors hereby declare that this study was done in accordance with the guidelines stipulated by the ethics board of the Nnamdi Azikiwe University, Nigeria.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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