# PREVALENCE, TREATMENT, AND GAMETOCYTE CARRIAGE IN CHILDREN WITH MALARIA AT ISHAKA ADVENTIST HOSPITAL


**BY**

**NANNUNGI FLAVIA**

**BPH/0014/113/DU**


**A REPORT SUBMITTED TO THE SCHOOL OF PHARMACY IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF A**

**BACHELORS DEGREE IN PHARMACY AT**

**KAMPALA INTERNATIONAL UNIVERSITY**

**WESTERN CAMPUS**

Kampala International University

**SPERVISOR:**

**ADEMOLA SULAYMAN**

**FEBRUARY 2016**

**DECLARATION**

I **NannungiFlavia** a final year pharmacy student at Kampala International University western campus declare to have written this report on my own with the aid of information i obtained from different sources and has not been fabricated or published anywhere else.

Signature ..... Date .....22nd/03/2015.....

BPH/0014/113/DU

**Mr.AdemolaSulayman**

Supervisor

Signature ..... Date .....

## DEDICATION

I dedicate this document and its content to my Parents (Mr. & Mrs. KalungiChristine) who have supported me throughout my education both financially and emotionally who have kept me focused towards life.

And most of the almighty God who has always been by my side to enable me persevere through the course without giving up

## ACKNOWLEDGEMENT

I would love to extend my sincere gratitude to the almighty God for having given me the courage, wisdom, perseverance, knowledge and patience throughout the time of developing this report.

I extend sincere appreciation to MrAdemolaSulayman for his guidance, time, academic support and tireless effort aimed at ensuring that i successfully finish the report.

In a special way I greatly thank my parents for the support they have given me throughout my life both financially and emotionally and kept me focused throughout my life.

## TABLE OF CONTENTS

## LIST OF FIGURES



## LIST OF TABLES

## ABSTRACT

### Background

Malaria is endemic in 107 countries and territories in tropical and subtropical regions, with sub-Saharan African hit hardest and is highly endemic in 95% of Uganda with approximately 90% of the population (estimated at 32 million people) at risk. The remaining 5% of the country consists of unstable and epidemic-prone transmission areas in the highlands of the south and west, along the eastern border with Kenya, and the northeastern border with South Sudan. Malaria transmission is persistently high in some areas of northern Uganda.

### Methodology

A prospective cross sectional study was carried out involving both qualitative and quantitative methods of data collection

### Results

The study found out that the prevalence rate of malaria among children treated at Ishaka Adventist Hospital was 23%, all children were given paracetamol most children were given coartem (Artmether Lumefantrine), some few were given iv artesunate and quinine Health Centre and the gametocytes carriage in children with malaria at Ishaka Adventist Hospital was 21%.

### Conclusion

The prevalence rate of malaria among children treated at Ishaka Adventist Hospital was low

coartem (Artmether Lumefantrine), iv artesunate and quinine were the drugs used to treat malaria

The gametocytes carriage in children with malaria at Ishaka Adventist Hospital was low.

The alternative hypothesis that determination of the prevalence, treatment, and gametocyte carriage is important in reducing the morbidity and mortality of children with malaria remains

## CHAPTER 1:

# 1.0 Introduction

## 1.1 Background

Malaria is a protozoan infection caused by the genus Plasmodium of which there is four human species: *P.falciparum, P.ovale, P.vivax, and P.malarieP.knowlesi .P.falciparum*is by far the most dangerous and is also the most common in Africa. Gametocytes are the sexual stage of malaria parasites. The generation of male and female gametes is necessary for transmission to the mosquito vector where sexual recombination and generation of new haploid progeny takes place. In acute infection with Plasmodium falciparum, gametocytes arise 7. to 15 days after the initial patent parasitaemia and last for a mean of 6.4 (range 2.5–22) days in the circulation, longer than the typical duration of asexual parasitaemia.

Malaria continues to be a problem for children returning or immigrating to industrialized countries from tropical regions. In no immune children, malaria typically presents with high fever that might be accompanied by chills and headache. Symptoms and signs may be more subtle in partially immune children, and anemia and hepatosplenomegaly may also be present. Children may present with respiratory distress and/or rapidly progressing cerebral malaria that manifests as altered sensorium and, sometimes, seizures (Charles d. Ericsson and Robert Steeffen*et*al., 2003).

Malaria is endemic in 107 countries and territories in tropical and subtropical regions, with sub-Saharan African hit hardest. Between 350 million and 500 million cases of clinical malaria occur each year, leading to an estimated 1 million deaths. Over 80 per cent of these deaths or around 800,000 a year occur among African children under age five(UNICEF2007).

Malaria is highly endemic in 95% of Uganda with approximately 90% of the population (estimated at 32 million people) at risk. The remaining 5% of the country consists of unstable and epidemic-prone transmission areas in the highlands of the south and west, along the eastern border with Kenya, and the northeastern border with South Sudan. Malaria transmission is persistently high in some areas of northern Uganda(President's malarial initiativeUgandaoperational plan FY*et al.*,2014).

According to Ministry Of Health 2012/ 2013 there wasan increase among Outpatients from 13,263,620 in 2011/12 to 15,997,210 in 2012/13 and in under five children mortality trends increased from 28% in 2011/12 to 30.7% in 2012/13. Malaria has remained themajor cause of morbidity and mortality in Uganda especially in children below five years with a high (25 per cent) frequency. Malaria remained the leading cause of morbidity and mortality among all age groups and accounted for 20.6% (5,079/24,651) of all inpatient deaths in 2012/13. The sector improved malaria case management through increased access to ACTs and use of Rapid Diagnostic Tests at HC IIs and IIIs without microscopes. Indoor Residual Spraying was conducted in the 10 target districts for the last 2 years with up to 92% coverage, protecting more than 2.6 million people. There was remarkable reduction of indoor resting vector population reduction as well as remarkable reduction of malaria prevalence in target districts. Malaria was still the leading cause of in-patient mortality for all age groups. The major causes of mortality in the age group are characterized in most cases by underlying malnutrition. Many of the children who die from malaria also have malarial anemia. Malaria has historically been a very serious health problem and currentl poses the most significant threat to the health of the people of Uganda.

Studies done in some hospitals like Mbarara University Teaching Hospital and Bundibugyo Government Hospital in Western Uganda show that more than 55 per cent of paediatric cases are due to malaria and currently accounts for 25% of all outpatients visits at the health facilities,20% of hospital admissions and 9.14% of inpatient deaths(J Vect, Borne Dis *et al.*, 2003*)*.

## 1.2 **Problem statement**

Malaria is an endemic disease in Uganda with young children accounting for the highest mortality and morbidity rates and is one of the diseases that contribute a large stake when planning for drug procurement. Without statistical information regarding the rates of occurrence, treatment or any information regarding disease progression, man runs the risk of suffering loss due to unknown costs, days off work due to disease or even death. This data when available can serve to avoid such losses at personal, community and national level. Itshould alsobe noted that different geographical areas and populations havevariations in the

prevalence rate, treatment and gametocyte carriage. These are crucial factors when making crucial planning decisions.

### 1.3.0 General objectives

To determine the prevalence rate, treatment and gametocyte carriage in children at Ishaka Adventist Hospital

### 1.3.1 Specific objectives

1. To determine the prevalence rate of malaria among children at Ishaka Adventist Hospital.
2. To determine how malaria is treated in children with malaria at Ishaka Adventist Hospital
3. To determine the gametocyte carriage in children with malaria at Ishaka Adventist Hospital

### 1.4.0 Study hypothesis

### 1.4.1 Null hypothesis

Prevalence, treatment and gametocyte carriage is high in children with malaria below 5 years attending Ishaka Adventist Hospital

### 1.4.2 Alternative hypothesis

Prevalence, treatment, and gametocyte carriage is low in children with malaria below 5 years attending Ishaka Adventist Hospital

### 1.5.0 Scope of the Study

### 1.5.1 Time Scope

The study was conducted between the months of June 2015 and December 2015

### 1.5.2 Content Scope

The study concentrated on determining the prevalence of malaria, gametocyte carriage and treatment given to children with malaria at Ishaka Adventist Hospital.

### 1.5.3 Geographical Scope

The study was conducted in Ishaka Adventist Hospital, western Uganda and included all children treated for malaria at Ishaka Adventist Hospital.

## 1.6 Justification the study

The study report will be submitted to the school of pharmacy of Kampala International University as a requirement in partial fulfilment of the requirement for the award of bachelor of pharmacy of Kampala International University. The study will provide additional resources and reference for future researchers in the same areas of interest, and the study results will provide information about the prevalence of gametocyte carriage in children seen at Ishaka Adventist Hospital.

## CHAPTER 2:

## 2.0 LITERATURE REVIEW

### 2.1 Malaria prevalence

Malaria is endemic in 107 countries and territories in tropical and subtropical regions, with sub-Saharan African hit hardest. Between 350 million and 500 million cases of clinical malaria occur each year, leading to an estimated 1 million deaths. Over 80 per cent of these deaths or around 800,000 a year occur among African children under age five (UNICEF, 2007).

Malaria is highly endemic in 95% of Uganda with approximately 90% of the population (estimated at 32 million people) at risk. The remaining 5% of the country consists of unstable and epidemic-prone transmission areas in the highlands of the south and west, along the eastern border with Kenya, and the northeastern border with South Sudan. Malaria transmission is persistently high in some areas of northern Uganda (President's malarial initiative Uganda operational plan *et al.*, 2014).

According to ministry of health 's annual health sector performance report financial year 2012/ 2013 with an increase among Outpatients from 13,263,620 in 2011/12 to 15,997,210 in 2012/13 and in under five children mortality trends increased from 28% in 2011/12 to 30.7% in 2012/13. Malaria has remained the major cause of morbidity and mortality in Uganda especially in children below five years with a high (25 per cent) frequency. Malaria remained the leading cause of morbidity and mortality among all age groups and accounted for 20.6% (5,079/24,651) of all inpatient deaths in 2012/13.

Studies done in some hospitals like Mbarara University Teaching Hospital and Bundibugyo Government Hospital in Western Uganda show that more than 55 per cent of pediatric cases are due to malaria and currently accounts for 25% of all outpatients visits at the health facilities, 20% of hospital admissions and 9.14% of inpatient deaths (J Vect, Borne Di *et al.*,2003).

People at risk of malaria children between 3 months and 5 years, Pregnant women, adults in hypo-endemic areas, non-immune immigrants into hyper-endemic areas, Red cell abnormalities e.g. SCD, G6PD deficiency (UNICEF, 2007).

## 2.2 Malaria and gametocyte carriage

Malaria is a protozoan infection caused by the genus Plasmodium of which there is four human species: P.falciparum, P.ovale, P.vivax, and P.malarie. P.falciparumis by far the most dangerous and is also the most common in Africa. The Centers for Disease Control and Prevention (CDC) confirms that "malaria is a mosquito-borne disease" (CDC, 2010) transmitted to humans by the bite of a female aneopheles mosquito which thrives in warm, tropical, and subtropical climate (MugerwaKasujja dissertation 2).

Gametocytes are the sexual stage of malaria parasites. The generation of male and female gametes is necessary for transmission to the mosquito vector where sexual recombination and generation of new haploid progeny takes place. In acute infection with Plasmodium falciparum, gametocytes arise 7. to 15 days after the initial patent parasitaemia and last for a mean of 6.4 (range 2.5–22) days in the circulation, longer than the typical duration of asexual parasitaemia(Roberts *et al.*, 2013).

Gametocytes are also integral to the transmission and propagation of disease resistance; compared with drug-sensitive infections, resistant infections are associated with increased rates of recrudescence and slower initial treatment responses, both of which increase gametocyte densities. This suggests that increased gametocyte carriage in infections caused by resistant parasites results in a transmission advantage that ultimately helps to drive the spread of resistance. Several factors are likely to influence the appearance of gametocytes at presentation, including age, host immune response (including co-infection with other pathogens), host anaemia, insecticide spraying, and mass drug administration (Makanga; 2014).

While gametocyte carriage is integral to the transmission of malaria it is important to note thattheir presence and detection in peripheral blood does not necessarily equate to infectivity. Gametocytes are invariably detected in fewer than 50% of clinical andasymptomatic plasmodium falciparum infections (Bousema*et al.*, 2011).

## 2.3Malaria treatment

Appropriate treatment after infection with the malaria parasite may lead to a faster recovery and avoid death. The following are the most important and most frequently used treatment methods in Uganda;

Home Based Management (HBM) of malaria.

HBM entails educating communityresource people (health workers, volunteers, mothers, drug vendors andshopkeepers) to recognize the symptoms suggestive of malaria and to deliverappropriate anti-malarial treatment. HBM aims to improve the self-medicationpractices in endemic countries. Treatment delays, such as distance to health centers, the child falling sick at night, costs involved in seeking care, and themother unable to seek care costing money are likely to be dealt with by HBM(Nsungwa-Sabiiti*et al.*, 2004).The four strategic components of HBM are:

• Ensuring access to effective anti-malarials (preferably pre-packaged) atcommunity level

• Ensuringthat community providers have the necessary skills andknowledge to manage malarial illness

• Ensuring a communication strategy to enable caregivers to recognizemalaria illness early and take appropriate action

• Ensuring mechanisms for supervision and monitoring of communityactivities, including supply of anti-malarials

Increasing access to WHO-recommended ACT has been reported; the number of delivered treatment courses has increased from 76 million in 2006 to 331 million in 2012. Despite all of the above measures during 2012 there were an estimated 207 million cases of malaria resulting in approximately 627,000 malaria deaths. An estimated 3.4 billion individuals remain at risk of malaria, primarily in Africa where 80% of cases occur(Makanga; 2014).

Since 2004, Artmether Lumefantrine (AL) has been the first-line treatment for uncomplicated malaria in Uganda. The second-line treatments are dihydroartemisinin-piperaquine (DP) and quinine. Artesunate suppositories are recommended for pre-referral treatment of severe malaria at the community level where parenteral therapy is not possible.

The National Malaria Control Policy continues to recommend AL as first-line treatment (with artesunate/amodiaquine as an alternative first-line), and recently adopted WHO guidance to introduce parenteral artesunate for treatment of severe malaria. Although intravenous (IV) artesunate is now recommended for treatment of severe malaria, the MOH is still trying to develop a plan for a sustained supply of artesunate, which is likely to be phased in over the next several years. Intravenous quinine continues to be used for treatment of severe malaria during this transition; unfortunately improper administration of quinine frequently occurs due to inadequate supplies of IV dextrose solutions, and may lead to overdosing patients. Quality of care in both public and private health facilities needs additional support and improvement. A PMI-supported health facility assessment showed that the clinical evaluation of patients presenting with fever is sub-optimal as evidenced by poor history taking, incomplete examination of such children, with few clinicians looking for danger signs. In addition the clinicians often did not provide an explanation of the diagnosis, treatment, and follow up. Another evaluation on treatment practices for severe malaria in east and mid-western Uganda showed a considerable gap in quality of care: with delays in prompt care (received in only 29% of patients); correct diagnosis of severe malaria in only 27% of patients; and appropriate administration of quinine in the correct volume of 5% dextrose in 18% of patients, with 80% of patients receiving more than one dose of quinine in one single bottle of dextrose. There is still a considerable amount of work to be done to improve quality of care for patients with malaria (STOP Malaria Project: 2011).

## CHAPTER 3:

## 3.0 METHODOLOGY:

### 3.1 Study Design

A prospective cross sectional study was carried out involving both qualitative and quantitative methods of data collection

### 3.2 Study Setting

The study was carried out in Ishaka Adventist Hospital which is located in Mbarara district in western Uganda

### 3.4 Study Population

The study population consisted of children below 5years who will present in the assessment center of Ishaka Adventist Hospital during the review period.

### 3.5 Sample Size

Using Kish and Leslie formula (1965): Sample size $N = \frac{Z^2 P (1-P)}{D}$

Taking into account the population of children that come to the Assessment Centre, the formula was modified into: $N = \frac{Z^2 \times P(1-P)}{D^2 + \frac{Z^2 P (1-P)}{N}}$

- Z = standard normal variant corresponding to 95% confidence interval and is 1.96
- P= Prevalence of Malaria estimated as 50%
- D= the required precision of the estimate (0.05)
- N= population estimated from records in the Assessment Centre is 100.

Therefore the sample size was:

$$N = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2 + \frac{1.96^2 \times 0.5 \times (1-0.5)}{150}}$$

$$N = 108$$

### 3.6 Inclusion Criteria

Children below 5years who were present at Ishaka Adventist Hospital during the study period

### 3.7 Exclusion Criteria

All children above the required age were not included in the study.

All children whose care takers or parents are not available for consent

### 3.8 Sampling Techniques

Systemic sampling was used through examining every child who was admitted in the health center during the review period.

### 3.9 Data Collection Procedures:

#### 3.9.1 Questionnaire

A structured questionnaire was used to collect the information mainly on the clinical history and socio demographic characteristics by a trained, experienced research assistant who is fluent in both the local language (lunyankole) and English.

The questionnaire was pilot tested prior to actual data collection. Patients were examined by the principal investigator and medical officer who recorded all the necessary data.The questionnaire consisted of the following sections five sections which includes: bio data, history section, physical examination section, laboratory section and treatment section

### 3.9.2 Laboratory Investigation

The following were carried out during laboratory investigations:

**a) Blood slide for malaria parasites**

- The cubital fossa was swabbed in concentric way with 70% alcohol and allowed to dry for 1 minute.
- Using a Gauge 23 hypodermic needle and a 5ml syringe, 1 ml of blood was put in a sequestrene bottle and rolled gently to prevent clotting for making thin and thick slides.
- The samples were sent immediately to the laboratory.

**b) Malaria parasitaemia.**

**Preparation of thick and thin blood films:**

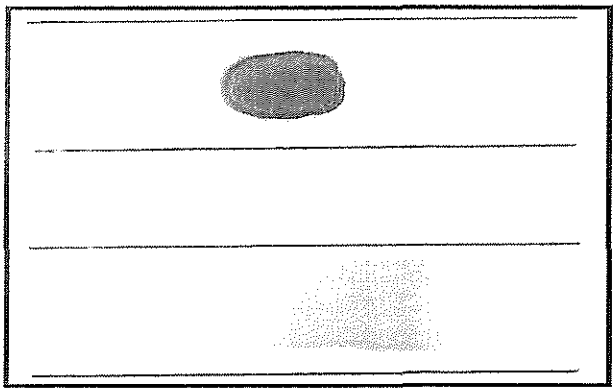
**Thick films:**

A drop of blood was placed in the middle of a clean microscope slide and with the corner of a second slide the drop was spread until it was about the size of a five cent coin and allowed to air dry in a protected chamber box.

**Thin films**

A drop of blood was placed on one end of the slide and spread using a spreader slide to disperse the blood over the slide's length.

The aim of this was to get a region where the cells are spaced far enough apart to be counted and differentiated.



**Staining of the thin and thick smears using field stainA (polychrome methylene blue) and eosin (B).**

**Thin smears**

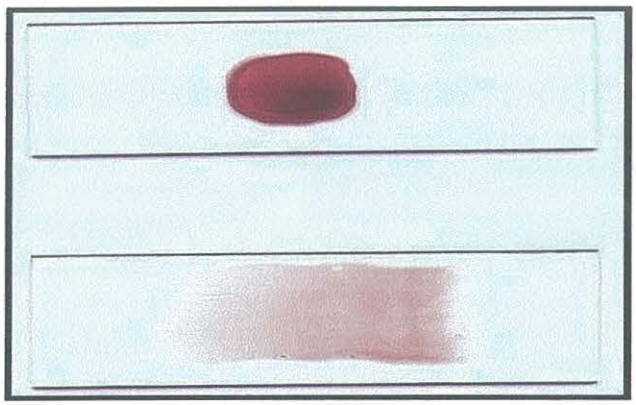
- . Thin smears were fixed with anhydrous methanol andstained with 0.5 ml of diluted field stainB.
- An equal volume of field stain A was added immediately and left for 1 minute then the stain was washed off with clean water and the back of the slide was cleaned placed on a staining rack to allow the film to air dry.

**Thick smears**

- The thick blood smears were dipped in field stain A for 5 seconds and the excess was drained off.
- They were then washed gently with clean water for 5 seconds and excess was drained off.
- Then dipped in field stain B for 3 seconds and excess was drained off, washed with clean water, the back was cleaned and allowed to air dry.
- The thick smears were not fixed since alcohol would lyse the cells which were in different layers.

**Evaluation the slides**

- Evaluation was done microscopically under a 100 x oil-immersion objective.
- An experienced microscopist, blinded to the patient's clinical status read all smears.



**Staining of the thin and thick smears using field stainA (polychrome methylene blue) and eosin (B).**

**Thin smears**

- . Thin smears were fixed with anhydrous methanol andstained with 0.5 ml of diluted field stainB.
- An equal volume of field stain A was added immediately and left for 1 minute then the stain was washed off with clean water and the back of the slide was cleaned placed on a staining rack to allow the film to air dry.

**Thick smears**

- The thick blood smears were dipped in field stain A for 5 seconds and the excess was drained off.
- They were then washed gently with clean water for 5 seconds and excess was drained off.
- Then dipped in field stain B for 3 seconds and excess was drained off, washed with clean water, the back was cleaned and allowed to air dry.
- The thick smears were not fixed since alcohol would lyse the cells which were in different layers.

**Evaluation the slides**

- Evaluation was done microscopically under a 100 x oil-immersion objective.
- An experienced microscopist, blinded to the patient's clinical status read all smears.

- The parasite densities were determined from thick blood smears :

$$\frac{\text{WBC count X parasites count against 100 WBC}}{100}$$

- Thin blood smears were used to determine parasite species(Monica Cheesebrough*et al.*, 2000).

### 3.10 Outcome Measures

- Proportion of children with positive blood smear for malaria parasitaemia.

### 3.11 Data Analysis Procedures

- Raw data was cross checked for completeness and correctly labelled daily.
- Data was entered and analysed using SPSS. Proportion of children with malaria parasitaemiawas obtained. It was reported overall and by age category.
- The treatment and gametocyte carriage was compared in children with and without parasitaemia using pie charts and flow charts. Continuous data was summarised as means and standard deviation and categorical data was presented as proportions and frequencies.
- All tests were 2 tailed and statistical significance was taken as $p<0.005$. Confidence Interval was calculated around the means and proportions assuming 95% level of significance

### 3.12 Ethical Considerations

- A Consent letter was obtained from school of pharmacy to the hospital and then forwarded to the district health officer.
- Consent was obtained from the children's guardians before the research was carried out.

## CHAPTER FOUR:

### 4.0 Study findings

### 4.1Introductions

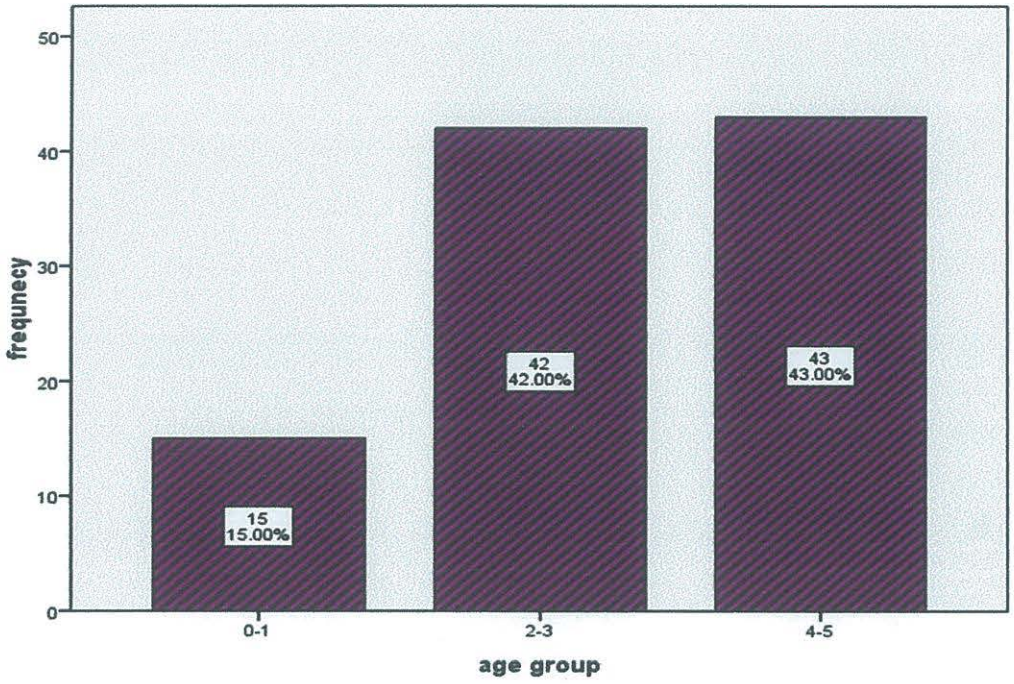
In this chapter, the researcher has presented the results of the study according to the specific objectives of the study. Results are here presented in the form of tables, graphs and charts.

### 4.1 Study Findings

**Figure 1distribution of respondents by sex**

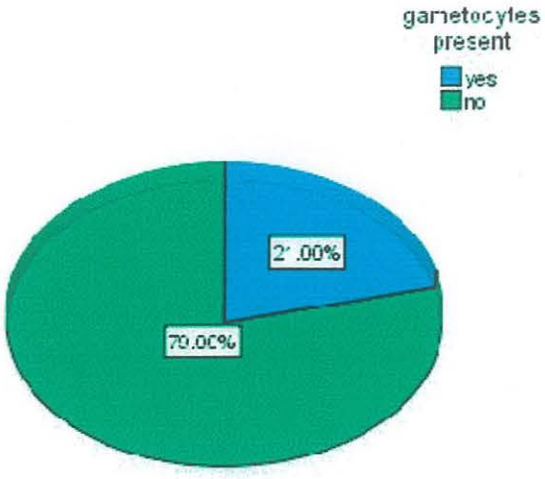

The above figure shows that majority of the children were females (62%), minority were males (38%)

**Figure 2: Distribution of respondents by age**




The above graph shows that majority were between 4-5 years old (43%) and minority between 0-1 years old (15%)

**Figure 3: Distribution of respondents by presence of gametocytes**




The above pie chart shows that majority did not have gametocytes (79%) and minority (21%) had gametocytes

**Table 1: Cross tabulation of presence of gametocytes and number of parasites present in the thick smear**

| | | gametocytes present | | |
|---|---|---|---|---|
| | | yes | no | Total |
| thick smear | 0-2 mps | 15 | 46 | 61 |
| | 2-4 mps | 6 | 33 | 39 |
| Total | | 21 | 79 | 100 |

The above table shows that of the 21 children how had gametocytes (15) had blood smear of 0-2 malaria parasites and (6) had blood smear of 2-4 malaria parasites

**Table 2: Cross tabulation of presence of trophozites of plasmodium falciparum and number of parasites in thick smear count**

| | | thin smear | | |
|---|---|---|---|---|
| | | Trophozites *p. falciparum* | no trophozites | Total |
| thick smear | 0-2 mps | 32 | 29 | 61 |
| | 2-4 mps | 17 | 22 | 39 |
| Total | | 49 | 51 | 100 |

The above table shows that 49 children had trophozites of plasmodium falciparum of the 49, 32 had thick smear of 0-mps 2 and 17 had thick smear of 2-4 mps

**Table 3: distribution by odds of thick smear 0-2mps /2-4mps and thin smear with trophozites of plasmodium falciparum**

| Risk Estimate | Value | 95% Confidence Interval | |
|---|---|---|---|
| | | Lower | Upper |
| Odds Ratio for thick smear (0-2 mps / 2-4 mps) | 1.428 | .636 | 3.204 |
| For cohort thin smear = trophozites p falciparum | 1.203 | .783 | 1.849 |
| For cohort thin smear = no trophozite | .843 | .575 | 1.234 |
| N of Valid Cases | 100 | | |

The above table shows that the odd ration for thick smear 0-2mps / 2-4mps is 1.428 and odds for thin smear having trophozites of plasmodiumfalciparum is 1.203 absent is 0.843

**Table 4: Distribution by odds of thick smear 0-2mps /2-4mps and thin smear with gametocytes presence**

| | Value | 95% Confidence Interval | |
|---|---|---|---|
| | | Lower | Upper |
| Odds Ratio for thick smear (0-2 mps / 2-4 mps) | 1.793 | .629 | 5.110 |
| For cohort gametocytes present = yes | 1.598 | .678 | 3.767 |
| For cohort gametocytes present = no | .891 | .733 | 1.084 |
| N of Valid Cases | 100 | | |

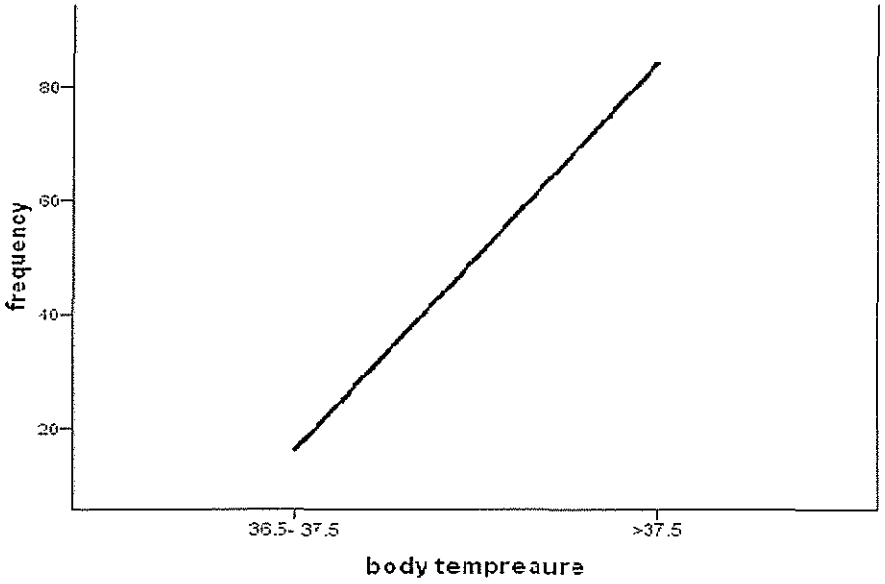
The above table shows that the odd ration for thick smear 0-2mps / 2-4mps is 1.793 and odds for gametocytes present is 1.598

**Table 5: Distribution by presence of other illness**

| Illness | Frequency |
|---|---|
| Fever | 100 |
| Diarrhoea | 18 |
| Cough | 14 |

The above table shows that all the children had fever 100, 18 and 14 had diarrhea and cough respectively coexisting with fever

**Figure 4: Distribution by body temperature**




The above graph shows that (85%) of children had temperatures above $37.5^0$c and (15%) had temperatures between $36.5\text{-}37.5^0$c

**Table 6: Distribution by treatment given**

| Treatment given | Frequency |
|---|---|
| Coartem | 87 |
| quinine | 10 |
| artesunate | 3 |
| paracetamol | 100 |
| amoxylcilne | 15 |
| albendazole | 5 |

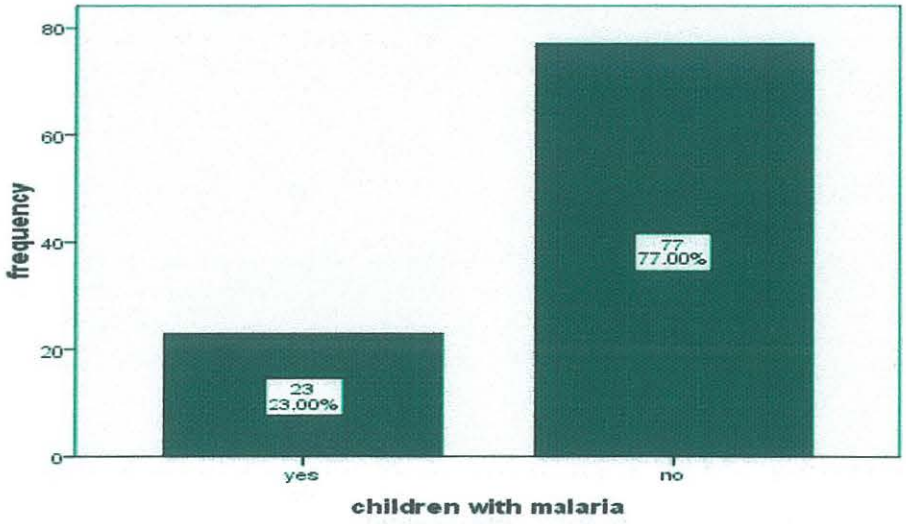
The above table shows that all children were given paracetamol, 87 were given coartem and only 3 were given artesunate

**Table 7: Regression analysis of treatment of malaria in those with blood smears 2-4 with coartem and quinine**

| | B | S.E. | Sig. |
|---|---|---|---|
| coartem | -21.812 | 16408.711 | 0.999 |
| quinine | 0.084 | 0.894 | 0.925 |
| Constant | 0.609 | 0.223 | 0.006 |

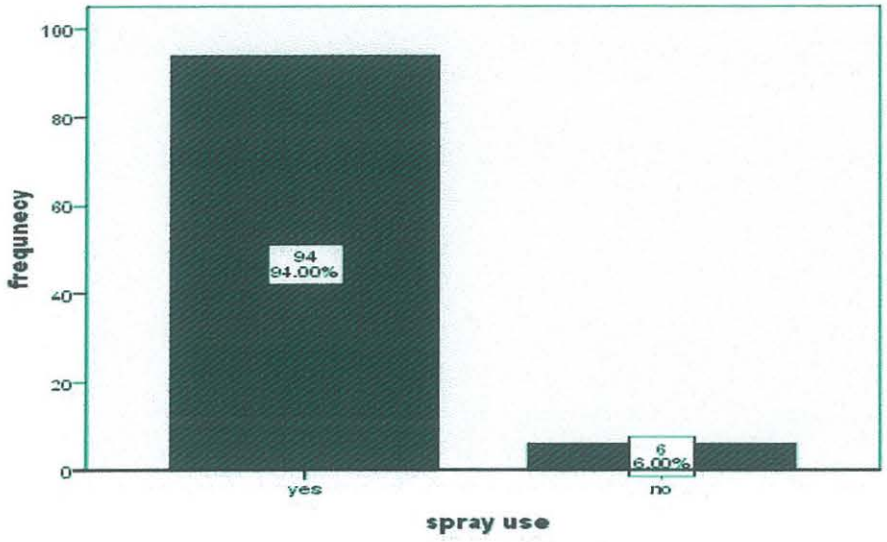
The above table shows that treatment with coartem decrease (-21.812) and that with quinine increase (.609) when blood smear is 2-4mps

**Figure 5: Distribution by children confirmed with malaria**



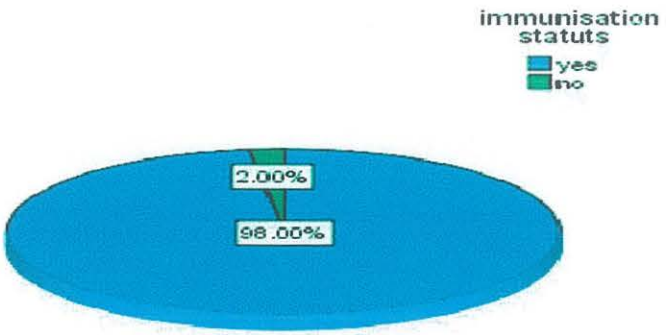

The above table shows that only (23%) 0f children who were treated for malaria had positive blood smear 77% were treated as clinical malaria

**Figure 5: Distribution house which have been sprayed**




The above table shows that 94% of children lived in houses which have been indoor sprayed in the past 6 months and only 6% come from un sprayed houses

**Figure 6: Distribution by immunization status**




The above pie chart shows that majority of the children were immunised 98% and only 2% were not immunized

## CHAPTER FIVE

## Discussions

### 5.0 Introductions

In this chapter, the researcher made a presentation of the discussions of the study findings. In short, the research had described the study findings, meaning of the findings and reasons as to why those findings may be that way and made impressions of those findings. These have been arranged according to the specific objectives, conclusions and recommendations have been placed at the end of this chapter.

### 5.1 Demographic charateristicts

The study found out that that majority of the children treated at Ishaka Adventist Hospital were females aged between 4-5 years old this is in line with a similar study done by UNICEF in 2007 which stated that children between 3 to 5 years are among the people at risk of getting malaria

### 5.2 Prevalence rate of malaria among children at Ishaka Adventist Hospital.

The study found out that the prevalence rate of malaria among children treated at Ishaka Adventist Hospital was 23% this is slightly lower than then that of a similar study by J Vect Borne Dis in western hospitals that documented malaria prevalence to be 25% of all outpatients visits at the health facilities, 20% of hospital admissions however all the children presented with fever indicating that fever is the commonest presentation of malaria in all children though some children may have diarrhoea and cough coexisting with fever. Majority of the children had hyperthermia 0f above $37.5^0$c confirming the presence of fever and meaning that malaria presents with high grade fever

According to study children treated at Ishaka Adventist Hospital lived in houses which had been indoor sprayed this could be the reason for the slight reduction in the prevalence of malaria at Ishaka Adventist Hospital and 98% of the children were immunised indicating good health seeking behaviour

### 5.3 treatment given to children with malaria at Ishaka Adventist Hospital

The study found out that all children were given paracetamol as evident by then all presenting with fever hence at Ishaka Adventist Hospital paracetamol is the main anti pyretic used in children to reduce fever, most children were given coartem (Artmether Lumefantrine), some few were given iv artesunate and quinine this finds concurs with what STOP Malaria Project, recommended for the management of malaria 'Artmether Lumefantrine (AL) has been the first-line treatment for uncomplicated malaria in Uganda. The second-line treatments are dihydroartemisinin-piperaquine (DP) and quinine. According to the regression analysis treatment of malaria with coartem decrease (-21.812) and that with quinine increase (.609) when blood smear is 2-4mps meaning coartem use decreases in severe malaria.

### 5.4 To determine the gametocyte carriage in children with malaria at Ishaka Adventist Hospital

The study found that the gametocytes carriage in children with malaria at Ishaka Adventist Hospital was 21% however this is even lower than what Bousema*et al.*, documented in a similar study that gametocytes are invariably detected in fewer 50% of clinical and asymptomatic plasmodium falciparum infections (2011).

Of the 21 %, (15%) had blood smear of 0-2 malaria parasites, the odd ration for thick smear 0-2mps / 2-4mps is 1.793 meaning there is high rate of finding gametocytes in children with simple malaria than those with complicated malaria and the samples were taken from those infection which has lasted more than 6 days as documented by Robert et al that infection with Plasmodium falciparum, gametocytes arise 7. to 15 days after the initial patent parasitaemia and last for a mean of 6.4 (range 2.5–22) days in the circulation, longer than the typical duration of asexual parasitaemia.

### 5.3 conclusion

The prevalence rate of malaria among children treated at Ishaka Adventist Hospital was 23%

All the children were treated with paracetamol for fever, coartem tablets (Artmether-Lumefantrine), IV artesunate and IV quinine

The gametocytes carriage in children with malaria at Ishaka Adventist Hospital was 21%.

## 5.4 recommendation

They staff should continue with their management of malaria

They hospital should try and test all children suspected for malaria before starting to treat them

The laboratory staff should improve their skill on peripheral smear examination and if possible they should be sent for workshops in their field

## CHAPTER SIX
## REFERENCES


AFM (2006).AFRICA FIGHTING MALARIA. Annual Report January 2007. Retrieved in February 2007 at:http://www.fightingmalaria.org/pdfs/2006%20AFM%20Annual%20Report.pdf

Annual Health Sector Performance Report 2012/13 FY Banek K, Lalani M, Staedke SG, Chandramohan D: Adherence to artemisinin-based combination therapy for the treatment of malaria: a systematic review of the evidence. Malar J 2014, 13:7.

Bousema T, Drakeley C Epidemiology and infectivty of plasmodium falciparum and vivax gametocytes in reletion to malaria control. Clin microbial rev 2011

Centers for Disease Control and Prevention.(2010). Malaria. Retrieved from http://www.cdc.gov/malaria/

Chunge, CN.; Ngige, S.; Bwibo, CR.; Mulega, PC.; Kilonzo, JF.; Kibati, F.; Owate, J. (Aug 1989). "A rapid staining technique for Leishmania parasites in splenic aspirate smears.". Ann Trop Med Parasitol **83** (4): 361–4

Embassy of the Republic of Uganda. (2007, April 25). Ugandan Ambassador Marks

Gertrude N. Kiwanuka Department of Biochemistry, Mbarara University of Science and Technology, Mbarara University, Mbarara, Uganda; gekiwa2001@yahoo.co.uk

Holy Rosary Hospital.(2010). Malaria Prevention and Control. Retrieved from http://www.holyrosaryhospital.org/ReadHealth.aspx?pid=0001

J Vect Borne Dis 40, March–June 2003, pp 16–19 Malaria morbidity and mortality in Uganda

Makanga: A review of the effects of artemether-lumefantrine on gametocyte carriage and disease transmission. Malaria Journal 2014 13:291

Malaria Awareness Day [Press . Release].Retrieved from http://www.ugandaembassy.com/news0425.html

Maude RJ, Pontavornpinyo W, Saralamba S, Aguas R, Yeung S, DondorpAM,Day NP, White NJ, White LJ: The last man standing is the most resistant: eliminating artemisinin-resistant malaria in Cambodia. Malar J 2009, 8:31.

Monica Cheesebrough: District laboratory practice in tropical countries 2000(5) 450-460.

President's malarial initiative Uganda operational plan FY 2014)

Report Project 286 Malaria prevention and treatment,\Busukuma, Uganda Coach: EpEding Commissioner: PimKantebeen Commissioning organization: NABUUR Bianca Dekker Charlotte van der Tak Judith Sitters Maaike van Agtmaal Mariette KooperRouyanneRas January – April 2007

Roberts et al.: Gametocyte carriage in Plasmodium falciparum-infected travellers. Malaria Journal 2013 12:31.

Sowummi A, Adedeji AA, Fateye BA, Babalola CP: Risk factors for gametocyte carriage in uncomplicated falciparum malaria in children. Parasitology 2004, 129:255.

STOP Malaria Project, September 2011. Health Facility Assessment Survey Report (unpublished). 15 Achan J, Tibenderana J, Kyabayinze D, Mawejje H, Mugizi R, et al. (2011) Case management of severe malaria A Forgotten Practice: Experiences fromHealth Facilities in Uganda. PLoS ONE 6(3): e17053.

Travel medicine Charles d. Ericsson and Robert steeffenetal 2003:37 15 November).

UNICEF malaria and children, progress in the intervention and coverage, 2007.

**CHAPTER SEVEN**

**APPENDIX 1**

**A QUESTIONNAIRE FOR THE DETERMINATION OF THE PREVALENCE, TREATMENT AND GAMETOCYE CARRIAGE OF MALARIA IN CHILDREN BELOW 5 YEARS**

**SECTION: A**

**BIODATA OF THE RESPONDANT**

NAME OF THE PATIENT ----------

SEX M ☐ F ☐

AGE 0-1 ☐ 2-3 ☐ 4-5 ☐

WEIGHT

HEIGHT

**SECTION : B**

**PATIENT HISTORY**

1. Does the child have any history of;
   a) Fever Yes ☐ No ☐

   If yes for how long ----------

   b) Diarrhea Yes ☐ No ☐

   If yes for how long ----------

   c) Cough Yes ☐ No ☐

   If yes was it productive or dry and for how long----------

   ---

2. Have you used any indoor spray and insecticide treated net in the past 6 months Yes ☐ No ☐

3. Has the child ever been immunized Yes ☐ No ☐

If yes which types of immunization were given to the child ----------

---

4. Has the child ever gotten any blood transfusion Yes ☐ No ☐

If yes what was the reason----------

5. Has the child been admitted for malaria or any other condition in the previous 3 months Yes ☐ No ☐

If yes which drugs were given for condition ----------

---

6. Medication history in the last one week, ----------

---

**SECTION: C**

**PHISCAL EXAMINATION**

Body temperature ----------

Pallor of mucous membranes ----------

Levels of consciousness----------

Does the child have jaundice Yes ☐ No ☐

Has the child been dehydrated Yes ☐ No ☐

Presence of convulsions Yes ☐ No ☐

**SECTION : D**

**LABORATORY INVESTIGATION**

Outcome of thin blood smear ----------

Outcome of thick blood smear ----------

Gametocyte carriage of the patient ----------

Others specify----------

**SECTION: E**

**TREATMENT MEASURES**

Which kind of treatment was given to the patient ;

Coartem ----------

Artesunate ----------

Quinine----------

Fansindar----------

Others specify ----------

**APPENDIX 2:**
**CONSENT FORM**

I **NannungiFlavia**, a final year Pharmacy student am conducting a research about **Determination of the prevalence , gametocyte carriage and treatment of malaria amongchildren below 5 years attending Ishaka Adventist Hospital .**

The purpose of this research is to determine the prevalence, gametocyte carriage and treatment of malaria among the study participants due to the presence of limited data available on infection in children in the study area.

The research involves answering a questionnaire and drawing a blood sample that will take a maximum of 10 minutes of your time. The questionnaire will contain specific information about socio-demographic information, detailed patient history about malaria, physical examination, laboratory investigation and treatment given to the patient. Information obtained is meant to provide information that can be used to design appropriate interventions to benefit children below 5 years in order to reduce on the prevalence of the infection, improve adherence, reduce resistance and reduce malaria related mortality in the hospital and the community at large.

I request you to share your knowledge and experience by answering these few questions.

The information will be kept confidential and please don't include your name.

The questionnaire will take approximately 10 minutes only. Participation is voluntary and you can decide to accept or decline to participate without any consequences of any kind.

Please indicate by the way of signing if you have understood the explanation.

Thank you for your assistance.

Date .....

**Signature... .....**