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Prevalence of Malaria and Typhoid Fever Co-Infection: Knowledge, Attitude and Management Practices among Residents of Obuda-Aba, Abia State, Nigeria

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Abstract A study of prevalence, knowledge**,** attitude and management practices of malaria and typhoid fever co-infection was carried out among residents of Obuda-Aba, Abia State, Nigeria, between July and September, 2014. Venepuncture technique was used for collection of the blood samples. A total of 245 persons comprising 120 males and 125 females were examined. Field stained thick and thin blood films were used to detect malaria parasites in the samples. Typhoid fever was diagnosed from each blood sample using Widal test kit. Out of the 245 persons sampled, 95(38.78%) tested positive for malaria, 105 (42.86%) tested positive for typhoid fever, 45(37.50%) were co-infected with malaria and typhoid fever among the males and 55(44.00%) were co-infected with malaria and typhoid fever among the females. Co-infection of malaria and typhoid fever was highest in the age group of 61-75 years, 4(100%) among the males and highest in the age group of 16-30 years, 15(83.33%) among the females. On the perception of the possible causes of malaria and typhoid fever, 24 respondents reported excessive fried oil as the cause while 17 respondents stated excessive intake of alcohol. On the perception of the sign and symptoms associated with malaria and typhoid fever, 77 respondents stated loss of appetite, 67 respondents stated fatigue and 70 respondents stated headache. On the practices available for protection against malaria and typhoid fever, 54 respondents reported routine treatments with drugs, 21 respondents stated good sanitary measures while 33 respondents reported access to safe food and water. There is need for massive health education campaign to educate the residents of Obuda-Aba to correct the wrong perception they have about malaria and typhoid fever for effective treatment and control of the diseases.

Keywords: *malaria, typhoid fever, co-infection, knowledge, attitude, practices*

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1. Introduction

Malaria and typhoid fever remain the diseases of major public health importance and cause of morbidity and mortality in tropical Africa [7,26]. Both diseases are common in many countries of the world where the prevailing environmental conditions of warm humid climate, poor sanitary habits, poverty and ignorance exist. These two diseases have been associated with poverty and underdevelopment [7].

Malaria is transmitted by the bites of infected female *Anopheles* mosquitoes from one person to another. It is one of the most severe public health problems worldwide and leading causes of diseases and death in many developing countries, where young children and pregnant women are the groups most affected [29]. Globally, an estimated half of the world population (3.4 billion persons) lives in areas at risk of malaria infection. Six countries in sub-Saharan Africa (Nigeria, Democratic Republic of the Congo, Tanzania, Uganda, Mozambique, and Cote d'Ivoire) account for an estimated 103 million malaria cases and 47% of the global total each year. Nigeria and the Democratic Republic of the Congo, together account for 40% of the estimated total global [12].

Malaria is holoendemic in Nigeria [25]. Ninety percentage (90%) of Nigeria's population are at risk of malaria and it contributes also to an estimated 11% of maternal mortality [29]. There are an estimated 100 million malaria cases with over 300, 000 deaths per year in Nigeria, about 100, 000 more than the deaths from HIV/AIDS [29]. It accounts for 60% of outpatient visits, 30% of hospitalizations among children under 5 years of age, and 11% maternal mortality [24].

Typhoid fever, also known as typhoid, is a symptomatic bacterial infection due to *Salmonella typhi [27]*. It is largely a disease of developing nations due to their poor sanitation and poor hygiene [27]. It is spread by eating food or drinking water contaminated with faeces of an infected person [28]. Transmission by flies such as *Musca*

domestica has also been reported [6]. The most prominent feature of the infection is fever [15]. Globally, typhoid fever is an important cause of morbidity and mortality in many regions of the world with an estimated 12-33 million cases leading to 216,000 – 600,000 deaths annually [21]. Co-infection of malaria and typhoid fever causes extra hardship to the health and economy of the victims.

Like malaria, there is a popular belief that typhoid fever is endemic and quite prevalent in Nigeria [17,18]. Patients, who fail to respond to the first line of malaria treatment usually suspect typhoid fever [18]. Malaria and typhoid fever usually present similar symptoms particularly at the beginning of typhoid fever [16,22]. Owing to the fact that it is sometimes very difficult to differentiate clinically the presentation of typhoid fever from that of malaria without laboratory support [23], many clinicians usually request that both tests be performed on individuals presenting with fever of typhoid/malarial signs and symptoms. Co-infection with malaria and typhoid is believed to be common and therefore the simultaneous treatment of both infections is quite rampant [14,16].

This study therefore sought to investigate the occurrence of Typhoid fever and Malaria co-infection among residents of Obuda-Aba, Abia State and to highlight people's knowledge, attitude and management practices utilized in treatment of Malaria and Typhoid fevers in the study area. The specific objectives were to determine:

1. Malaria infection through examination of stained blood films under the microscope.
2. Typhoid infections using widal agglutination kit.
3. Co-infections of malaria and typhoid through careful examination of the results and calculations.

2. Materials and Methods

2.1. Study Area

The study was carried out in Obuda-Aba Autonomous Community, Aba South Local Government Area of Abia State, Southeastern Nigeria from July to September 2014. The geographical coordinates for Obuda-Aba Autonomous Community are 5°07′N 7°22′E/ 5.117°N 7.367°E. It lies at an elevation of 205m (673ft) above sea level and has a rain forest belt with dry and wet seasons typical of the West African sub-region. The town has many bore holes as source of drinking water with many commercial fish ponds and agricultural farms. The majority of dwellers are traders and farmers; few are public servants and students.

2.2. Study Population

Advocacy visits to the traditional ruler of the community, H.R.H Eze (Rt.Hon.) C.B.C. Ajuzieogu, village heads and members of the community with an introductory letter from the Head of Department of Zoology and Environmental Biology, which helped in obtaining both permission to carry out the research and cooperation of the people. Participants were mobilized through town criers and announcements in the churches and market places. Informed consent of each adult participant was obtained before blood sample collection. Consent for screening of the children was obtained from their parents and teachers. A total of 245 subjects; (120 males and 125 females) blood samples were collected from subjects and questionnaires were administered to the subjects to obtain socio-demographic information, knowledge, attitude, and practices about malaria and typhoid fever.

2.3. Sample collection

The method of sample collection employed was venepuncture technique recommended by [11].

2.4. Laboratory Analysis

The collected blood samples were analyzed within 30 minutes to an hour of collection. Microscopic examination of stained thick and thin blood films for malaria diagnosis were prepared according to the technique outlined by [8] and described by [11]. A drop of each blood sample was placed in the center of a grease-free clean glass slide. Thereafter, the reverse side of the slide was cleaned with cotton wool and kept for air-drying and staining with field's stain. The slide was held with the dried thick film side facing downward and dipped in field's stain A (eosin) for 5 seconds. It was washed off gently in clean water and then dipped in field's stain B (methyl azure) for 5seconds and washed again in clean water. The back of the slide was cleaned with cotton wool and kept in the draining rack to air-dry. For thin film; A small drop of blood was placed on the centre of a grease free microscopic slide. The drop of blood was then spread with a glass spreader held at an angle of 30^0 to obtain a thin film with a smooth tail end. This was allowed to air dry in a horizontal position and then fixed with absolute methanol for two minutes. A Giemsa stain diluted with buffer for 30 minutes staining was applied on the thin film and allowed to air dry for 30 minutes. The stain was applied on the thin film and allowed to air dry for 30 minutes. The stain was then washed off using distilled water and also air dried. The stained thick and thin films were viewed using oil immersion at 100X magnification to observe for *Plasmodium* parasites. Presence of ring forms of *Plasmodium* and Trophozoites of *Plasmodium* indicate positive results. A blood smear was considered negative if no parasite is seen after 10 minutes of search or examination under 100 high power fields of microscope.

Typhoid fever infections were diagnosed using the participant's blood serum and Widal test kits. The Widal kit contained reactants with attenuated typhoid antigen which reacted specifically with the body's antibody.

2.5. Identification

Positive specimens were identified on the basis of microscope for malaria parasite. Using standard methods recommended by [6], a trained laboratory technician at Prince medical Laboratory Aba clinic interpreted the malaria blood slides. For typhoid fever, an agglutination reaction in any of the reagents was an indication that *Salmonellae* were present. The degree of agglutination was recorded in titres as follows:

Scanty agglutination	1:40
Slight agglutination	1:80
Heavy agglutination	1:160
Very Heavy agglutination	1:320

Prevalence of malaria parasite and typhoid fever were calculated as the proportion of sampled persons with a positive result divided by the number of persons who provided blood samples.

2.6. Data Analysis

The data generated from this study were presented using descriptive statistics. The results were analyzed in percentages.

3. Results

A total of 245 persons were examined for malaria and typhoid fever in Obuda-Aba, Abia State. Out of the number 95(38.78%) had malaria parasite and 105(42.86%) had typhoid fever (Table 1). The participants were aged between 1 and 75 years. More participants were in the age group of 1-15 years and the least were in the age group of 61-75years.

Table 1. Overall prevalence of malaria and typhoid fever among residents of Obuda-Aba.

Illness	No. Examined	No. Infected	Percentage of infection (%)
Malaria	245	95	38.78
Typhoid	245	105	42.86

The prevalence of malaria among the genders is shown in (Table 2). Of the 245 individuals examined, 41(34.17%) of the males were positive of malaria and 54(43.20%) of the females were positive of malaria. Among the age groups, 1-15 years had the highest malaria prevalence rate of 38(50.67%) while 61-75 years had the least malaria prevalence rate of 3(25.00%) (Table 3).

Table 2. Frequency and distribution of malaria parasite and typhoid fever between genders of Obuda-Aba.

Sex	No. Tested	No. Infected with malaria	Percentage positive (%)	No. Infected with typhoid fever	Percentage positive (%)
Males	120	41	34.17	57	47.50
Females	125	54	43.20	48	38.40
Total	245	95	38.78	105	42.86

Table 3. Age Incidence of malaria parasite and typhoid fever among residents of Obuda-Aba.

Age group	No. Tested	No. Infected with malaria	Percentage positive (%)	No. Infected with typhoid	Percentage positive (%)
1-15	75	38	50.67	32	42.67
16-30	45	13	28.89	18	40.00
31-45	53	17	32.08	22	41.51
46-60	60	24	40.00	29	48.33
61-75	12	3	25.00	4	33.33

The prevalence of typhoid fever among the genders is shown in (Table 2). Of the 245 participants examined, 57(47.50%) of the males were positive for typhoid fever and 48(38.40%) of the females were positive for typhoid fever. Among the age groups, 46-60 years had the highest typhoid prevalence rate of 29(48.33%) while 61-75 years had the least typhoid prevalence rate of 4(33.33%).

Out of the 245 participants examined for co-infection of malaria and typhoid fever (Table 4), 45(37.50%) of the males were co-infected while 55(44.00%) of the females were co-infected with malaria and typhoid fever. The age group of 61-75 years of the males had the highest co-infection 4(100%), and the age group of 46-60 years of the males had the least co-infection 7(31.82%) while the age group of 16-30 years of the females had the highest co-infection of 15(83.33%) and the age group of 46-60 years of the females had the least co-infection 7(18.42%).

Table 4. Rate of co-infection with malaria parasite and typhoid fever among the resident of Obuda- Aba.

Age Group	**No. Tested**	**No. Infected**	**Percentage positive (%)**	**No. Tested**	**No. Infected**	**Percentage positive (%)**
	Male	Male	Male	Female	Female	Female
1-15	43	14	32.56	32	17	53.13
16-30	27	11	40.74	18	15	83.33
31-45	24	9	37.50	29	11	37.93
46-60	22	7	31.82	38	7	18.42
61-75	4	4	100.00	8	5	62.50
Total	120	45	37.50	125	55	44.00

On the perception of the possible causes of malaria and typhoid co-infection fever (Table 5). 67(33.50%) reported mosquito bite as the cause of malaria and typhoid fever, 57(28.50%) stated that intake of contaminated food and water as the cause. On the knowledge of the signs and symptoms associated with malaria and typhoid fever (Table 6). 72(15.62%) reported that loss of appetite is the symptom associated with malaria while 28(6.32%) reported the same as the symptom of typhoid fever.

On the practices available for protection against malaria and typhoid co-infection fever, 54(27.00%) reported the use of routine treatments with drugs while 21(10.50%) reported good sanitary measures.

Table 5. Perception of the possible causes of malaria and typhoid fever among the resident of Obuda- Aba.

Causes Of Malaria And Typhoid	Number Of Respondents	Percentage Of Respondents (%)
Mosquito Bite	67	33.50
Intake of contaminated food and water	57	28.50
Excessive fried oil	24	12.00
Excessive alcohol intake	17	8.50
Exposure to hot condition	12	6.00
Infected blood transfusion	0	0
All of the above	23	11.50
Total	200	

Table 6. Perception of the sign and symptoms associated with malaria and typhoid fever

Signs/Symptoms Reported	Malaria	Percentage (%)	Typhoid	Percentage (%)
Loss of appetite	77	15.62	28	6.32
Fatigue	67	13.59	28	6.32
Headache	70	14.20	36	8.13
Constant fever	26	5.27	79	17.83
Nausea and vomiting	17	3.45	88	19.86
General body weakness	62	12.58	43	9.71
Constipation	67	13.59	38	8.58
Paleness of the eye	79	16.02	26	5.87
Dizziness	28	5.68	77	17.38
Total	493		443	
Practices available for protection against malaria and typhoid co-infection fever		**Frequency**		**Percentage (%)**
Routine treatments with drugs		54		27.00
Chemotherapeutic		10		5.00
Good sanitary measures		21		10.50
Ensure access to safe food and water		33		16.50
Use of insecticides in home		20		10.00
Use of more than one of the above practices		62		31.00
Total		200		

4. Discussion

Malaria and typhoid fever co-infection is a major public health problem in Obuda-Aba Abia state, Nigeria. The respondents indicated that malaria is the major illness for them and their family members. The prevalence rate of malaria in the study area is high. For the males, the number of malaria positive cases was 41(34.17%), while the number of positive cases recorded for the females was 54(43.20%). This is in agreement with [5,20] who reported the prevalence rates of 76% for males and 62% for females in Azia and Umudioka communities in Anambra state respectively.

Out of the 245 persons, 57(47.50%) males tested positive for typhoid fever, 48(38.40%) females tested positive for typhoid. This is in contrast with the work of [19] who reported 2(18.18%) among the males and 9(81.82%) among the females in Ekwulumili Community Anambra State, Southeastern Nigeria. Among the age groups, those within the age group of 46-60 years had the highest prevalence of typhoid fever 29(48.33%) while those in 61-75 had the least 4(33.33%). This is in contrast with the report of [19]. The higher prevalence among the age group of 46-60 years could be as a result of the individuals always in the market where they buy food from food vendors and drink any available water. Exposure to polluted drinking water, close proximity to human waste and refuse dumps, low standards of food preparation, and ignorance contribute to occurrence, prevalence and transmission of typhoid [10].

The co-infection of malaria and typhoid fever reported in the study area is very high, 100(40.82%) among whom were 55(44.00%) females and 45(37.50%) males when compare with report of [3] who reported overall co-infection rate of 10(5.0%), 2(20.0%) males and 8(80.0%) females in Ekwulumili. The higher co-infection rate amongst females agrees with the work of [3] who observed that most female farmers and traders spend their time in the farms and markets where they may have no other sources of drinking water and hence have to purchase sachet water. On the age group, 61-75 years had the highest co-infection rate 4(100%) in males and 15(83.33%) in females. This is in contrast with the work of [19], who had the age group of 1-10 years as the highest co-infection rate, 1(11%) and 51-60 years as the least, 1(2.78%).

The finding of this study indicated that people of this community were still ignorant of the causes, symptoms and the treatment of malaria and typhoid fever. This is shown in this study in which 57(28.50%) attributed the

cause of malaria to intake of contaminated food and water and 24(12.00%) reported excessive fried oil as the cause. This is similar to the report of [2,9,24] but in contrast with [1,13]. 67(33.50%) of the respondents stated that they got the infection through the bite of mosquitoes. This finding agrees with similar report from [4].

On the perception of the signs and symptoms, 77(15.62%) and 28(6.32%) respondents reported loss of appetite as the symptoms of malaria and typhoid fever respectively. This is lower when compare with the report of [9,24].

On the practices for prevention and control, 54(27.00%) reported routine treatments with drugs, 33(16.50%) reported access to safe food and water. The ignorance of the people might be responsible for the high prevalence of the disease in the study area, and probably this could be attributed to lack of health education programme as majority of the residents of Obuda-Aba are mainly traders and farmers.

5. Conclusion

The study revealed that malaria prevalence rate among the residents of Obuda-Aba is high. The rate of malaria and typhoid co-infection was equally high. These observations can be attributed to the wrong perceptions about the causes of malaria and typhoid fever. The findings pose a great challenge to the public health in Obuda-Aba. It is therefore recommended that the local health authorities intensify efforts at sensitizing the populace of Obuda-Aba on the causes of the diseases and possible preventives measures.

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