MALARIA OCCURRENCE AND AWARENESS AMONGST *ALMAJIRAI* IN SOME SELECTED TRADITIONAL *QUR'ANIC* CENTRES OF KANO MUNICIPAL AND GWALE LOCAL GOVERNMENT AREAs OF KANO STATE

[1]Amina Babayo Hamma* and [2] Zainab Tukur
[1,2]Department of Biological Science, Bayero University, Kano.
*Correspondence author: aminababayo@gmail.com

ABSTRACT
Malaria an infectious mosquito-borne disease of humans remains a great cause of poverty in Africa. This study aimed at assessing the occurrence of malaria Parasitaemia and anaemia among different aged group Almajirai in selected traditional Qur'anic centres residing in Municipal and Gwale L.G.As of Kano State. Total of 454 Blood samples from Almajirai of Municipal and Gwale Local Government Areas of Kano Municipal were examined for malaria parasitaemia (MP) using method for microscopic diagnosis of malaria parasites. Anaemia was diagnosed as mild and severe when Packed Cells Volumes (PCV) was below 33% and 25% respectively. Result of the blood (MP) from the two (2) local governments showed that only Plasmodium falciparum species, was encountered. The total positive sample recorded were 162 (35.7%). The highest occurrence 47.4% was recorded within 9-13 age group and the least 1.8% was recorded within 24-28 age groups in Gwale. Statistically no significant difference (P-value > 0.05) was observed among the various age groups of the two local governments. Anaemia was compared between malaria parasitized and non-parasitized subject, anaemia was observed to be associated with the severity of malaria infection. Almajirai should be given free malaria treatment in all government hospital so that those who could not go to hospital due to treatment cost will avail themselves of such opportunities received quality medical care. There is need to introduce appropriate intervention strategies against malaria and its vector, as well increase distribution of Insecticide Treated Nets to Almajirai.
Key words: Malaria, Almajirai, Tsangayu, Municipal, Gwale

INTRODUCTION

Tsangaya is a traditional *Qur'anic* centre where parents enrolled their young children so that they could get introduced to the teaching of Islam at an early age (Bashir, 2014). *Almajiri* refers to young pupils who purse *Qur'anic* education under the *Almajiranci* system. It is important to recalled the term *Almajiranci* is derived from the Arabic word "*Almuhajirun*" the migrants. It refers to a traditional system in Hausa land whereby people move from place to place for the sole purpose of studying the Holy Qur'an (Sunusi, 2005).

The *Almajirai* encounter a lot of difficulties and hardships during their period of scholarships. They normally sleep in an open space or in crowded rooms, at times people temporarily allowed them to sleep in the passage of their houses, most of them lived in areas where disease transmitting mosquitoes are present, *Almajirai* cope with severe weather conditions, these makes them prone to a lot of health hazards (Fadlullah, 2003). The attitude of *Almajirai* exposed them to various kinds of mosquitoes breeding sites and easy contact with mosquitoes. These conditions would result in contracting malaria, because all it takes is a single bite from an infected female *Anopheles* mosquitoes to get the infection (CDC, 2015).

This study aimed at assessing the occurrence of malaria Parasitaemia and anaemia among different aged group *Almajirai* in selected traditional *Qur'anic* centres residing in Gwale and Kano Municipal L.G.As of Kano State.

HYPOTHESES

There is no malaria amongst *Almajirai* in selected *Tsangayu* of Gwale and Kano Municipal Local Government Areas.

There is no variation in mean of malaria Parasitaemia and anaemia between different age group *Almajirai* of Gwale and Kano Municipal Local Government Areas.

MATERIALS AND METHODS
Study Area

The principal inhabitants of the community are Hausa people as in most part of Northern Nigeria. The houses were predominantly made up of mud and the community were characterised by overcrowding, inconsistent Municipal water supply, stagnant water bodies of Gwale and poor sanitation. Observation based findings showed major streets; several open spaces and even water ways are used as refuse dump sites. Majority of this are left unattended for long period of time, the wastes are blown around by wind or rainstorm making the environment dirty, sometimes the waste block drainage channels. The heaps of the solid waste serve as good hideouts for dangerous reptiles, rodents and insects.

Study Design

The study population were *Almajirai* of aged 9-28 years. Stratified random sampling technique was employed. Five different *Tsangayu* were randomly selected within the two Local Government Areas of the study. This was done by assigning a unique number to *Tsangayu*, The numbers were placed in a bowl and thoroughly mixed, then blind-folded researcher selected the number, *Tsangaya* having the selected number was included in the sample. For the *Almajirai*, there were grouped in strata according to their age group, this was done to ensure different aged *Almajirai* were included in the sample since is a homogeneous population, followed by random selection of individuals from each strata. The minimum sample size was calculated to be 226.7 using the formula according to Fishers *et al.*, 1996 as shown below

$$N = \frac{Z^2 pq}{D^2}$$

Where
N: Desired sampled size
Z: Standard normal deviate at 95% confidence level usually set at 1.96
P: Prevalence of 9 − 35 Years found to have malaria parasite in previous study as 17.7% (0.177)
Q: 1 − p = 1.0-0.177 = 0.82
D: Degree of precision or acceptable error margin (56 or 0.05).

$$N = \frac{(1.96)^2 \times 0.177 \times 0.82}{(0.05)^2}$$

N = 226.7

Ethical Consideration

Ethical approvals for the study were obtained from Kano State Hospital Management Board, *Qur'anic* and *Islamiyya* Schools Management Board as well as verbal consent seeks from each *Almajiri* participating in the study.

Blood Sample Collection

About 2ml of venous blood sample were obtained from a peripheral vein into an Ethylene Diamine Tetraacetic Acid (EDTA) bottle for the preparation of thick and thin blood film as well as pack cell volume (Cheesbrought, 2009).

Pack Cell Volume Estimation

Heparinized capillary tubes were used to obtained blood from blood sample already collected; one end of the capillary tube was sealed with plasticin gum. Several samples were assembled in the centrifuge (Heamatocrit Machine) and spinned at 5000 revolution per minutes for 5 minutes. (Ogbu *et, al.* 2015) PCV was read using Hawksley Micro-haematocrit reader.

Blood Films

Separate glass slide were used in making the thick and thin blood films. In preparing thin blood film. A drop of blood about the size of pin head was taken on grease –free clean glass slide to about 2cm from the right end. Second slide a spreader was used with the edge touching the drops of blood, the blood were allowed to run along the edge of the spreader slide. Pushing the spreader at an angle of 30 degree gently, evenly and quickly till the blood was exhausted. As the blood exhausted the film begins to form tails which end near about the centre of the glass slide, the films were allowed to air-dried (Arora, 2008). Precautions were taken to ensure equal volume of blood was used in each sample.

Thick blood films were made from larger volume of blood than thin blood film to increase the chance and speed of finding parasite (Cheesbrough, 2009). About 2-3 small drops of blood were taken near the centre on a slide. These were rapidly and evenly spread in to an area about 2cm using a corner of another slide. The blood was continuously stirred for about 30seconds to prevent formation of fibrin cloth. The thicknesses of the film were such to allowed new-print to be seen or the hands of a wrist-watch to be seen through the dry preparation (Cheesbrough, 2009).

Staining of Blood Films

Giemsa staining technique was used for staining both thick and thin blood smears. A stained with 1:10 dilution of Giemsa stain in buffered water for 30 munites were used for staining the slide preparations. Although the stock solution of Giemsa stain were methanolic, the working solution were aqueous, hence thin blood films were fixed before they are stained to avoid lysing of red blood cells or creating artefacts.

Microscopy of Blood Films

Both thick and thin films were examined microscopically using x40 and x100 objectives. When examining the stained preparations, the condenser was raised to focus light on the specimen, and illumination adjusted to reveal colours of specimen optimally, it is important to examine the right 'part' and to find it quickly. The right area can be located with low power objective (x40).

Generally the oil immersion (x100) objective was used in both stained preparations to detect and confirm the identity of malaria parasites (Arora, 2008).

The following plus (+) sign scheme was used to report the degree of parasitaemia: (+) for low parasitaemia (1-10 parasites per 100 high power fields), (++) for moderate parasitaemia (11- 100 parasites per 100 high power field) and (+++) for severe parasitaemia (1-10 parasites in every high power field) (Cheesbrough, 2009).

Identification of Malaria Parasites

In stained preparations of thick and thin blood smears, malaria parasite species have different morphology so therefore varied in their appearance at different stages of development. Malaria parasite appears framed by the red cells in thin films. *P. falciparum* were the most widespread species that were found in the tropics often with high parasiteamia. Infected red cells appear normal in size and shape; multiple parasitized red cells were common. Only the trophozoite (Ring form) and gametocytes were usually seen, schizont are rare seen in peripheral blood, only occasionally seen in severe infection with 16-30 merozoites. The trophozoite lie on red cell membrane often with double chromatin dots, delicate, small ring, and scanty cytoplasm sometimes at the edge of the red cells. Gametocytes are cresent or banana shaped, but appears round forms if films that dry slowly.

In thick film, the red cells were lysed, so their outlines were not usually apparent.

P.falciparum trophozoite often numerous delicate rings, all at the same stage of development. Rings turned to appear as exclaimation marks or propellers. Gametocytes were crescent shaped, may round up if the blood were taken several hours before films are made.

Parasite Density Estimation per Microlitre (µl) of Blood

The method of parasite enumeration was based on World Health Organisation (WHO) approved method. Using immersion oil objective (x100) systematically 200 white blood cells (WBC) were counted, estimating at the same time the number of parasites (asexual forms) in each field covered. The number of parasite per µl of blood was calculated as follows; parasite count multiple by 8000 µl (assumed WBCs count by WHO) divided by set range of WBC (Sugiarto *et al.*, 2008)

Data Analysis

Data collected were cleaned and entry was done using SPSS version 20.0.Chi square test was used to test for significant of association and a P-value of=0.05 was considered statistically significant.

RESULTS

The total positive sample recorded were 162 (35.7%). The highest occurrence 47.4% was observed within 9-13 age group and the least 1.8% was found within 24-28 age grouped in Gwale. Statistically no significant difference (P-value>0.05) was observed among the various age groups of the two local governments.

Table 1: Occurrence of malaria Parasitaemia by age among *Almajirai* in selected Traditional *Qur'anic* centres of Municipal and Gwale Local Government Areas of Kano state

Age Group	(years)	Examined M G	Infected M	G	Mean parasite density (µl) M	G	Percentage Parasitaemia (%) M	G	P - value
9 – 13		118	49	27	767	714	46.7	47.4	0.3617
14 – 18		82	28		759	678	26.7	33.3	0.2766
19 – 23		94	22	19	722	584	20.9	17.5	0.3300
24 – 28		43	6		653	520	5.7	1.8	0.2359
Overall		72	105	10	725	624	35	37	0.4228
		25		1					
		16							
		4		57					
		300							
		154							

Key:
µl = Micro litre
% = Percentage
M = Municipal LGA
G = Gwale LGA

Occurrences of malaria Parasitaemia by age among *Almajirai* in some selected traditional *Qur'anic* centres of Kano Municipal and Gwale Local Government Areas of Kano State is presented in Table 1. Total positive sample recorded were 105 (35%) and 57 (37%) from Kano Municipal and Gwale respectively. Statistically no significant difference (P-value >0.05) was found between the two local government areas for all age group's but rate of occurrence varied significant between age groups with highest rates (47.4%) occurring in the 9-13 age group and the least in 24-28 age group (1.8%).

Table 2: Intensity of malaria Parasitaemia (mp) in different age groups of *Almajirai* in selected Traditional *Qur'anic* centres of Municipal and Gwale Local Government Areas of Kano state

Age group (years)	MUNICIPAL L + (%)	M ++ (%)	S +++ (%)	GWALE L + (%)	M++ (%)	S+++ (%)	Mp-ve M	G	P-value
9 – 13	10 (28.6)	27 (50)	12 (75)	6 (28.6)	17 (54.8)	4 (80)	69 (35.4)	55(56.7)	0.0270
14 – 18	14 (40)	13 (24.1)	1 (6.3)	8 (38.1)	10 (32.3)	1 (20)	66 (33.8)	24 (24.7)	0.6057
19 – 23	9 (25.7)	10 (18.5)	3 (18.8)	6 (28.6)	4 (12.9)		50 (25.6)	15 (15.5)	0.7078
24 – 28	2 (5.7)	4 (7.4)		1 (4.8)			10 (5.1)	3 (3.1)	0.7945
Total	35	54	16	21	31	5	195	97	

Key:
Mp – ve = Malaria Parasitaemia negative
L (+) = Low Parasitaemia
M (++) = Medium Parasitaemia
S (+++) = Severe Parasitaemia
% = Percentage
M= Municipal Local Government
G= Gwale Local Government

The distribution of malaria Parasitaemia per high field in stained blood preparations is shown in Table 2. The intensity of malaria Parasitaemia varied considerably between age groups. The highest intensity recorded 80% (severe malaria Parasitaemia) was in the 9-13 age group and the least intensity recorded 4.8% (low malaria Parasitaemia) was in the 24-28 age group. Significant difference was observed P-value < 0.05 between subjects in the 9-13 age group for the two local governments, while for the remaining age groups no significant difference P-value > 0.05 was found.

Table 3: occurrence of Anemia among *Almajirai* in some selected Traditional *Qur'an* centres of Municipal and Gwale Local Government Areas in relation to age group.

Level of Anemia	9 – 13 years				14 – 18 years				19 – 23 years				24 – 28 years				TOTAL				P-value
	Mp+ve		Mp-ve		Mp+ve		Mp-ve		Mp+ve		Mp-ve		Mp+ve		Mp-ve		Mp+ve		Mp-ve		
	M	G	M	G	M	G	M	G	M	G	M	G	M	G	M	G	M	G	M	G	
Mild	19	24	28	1	4	1	19		3		5				5		26	25	57	1	0.0192
Severe	8		9						1								11		13		
Not Anemic	22	3	32	54	2		4		18	10	45	15	6	1	5	3	68	32	125	96	0.0004
					22	18	43														
					24																0.0308

Key:
Mp -ve = Malaria Parasitaemia Negative
Mp +ve = Malaria Parasitaemia Positive
M = Municipal L.G.A
G = Gwale L.G.A

Occurrence of anaemia among *Almajirai* of different age group in some selected traditional *Qur'anic* centres is presented in Table 3. Anaemia (PCV < 33% mild and PCV < 25% severe anaemia) was compared between malaria parasitized subjects and non-parasitized subjects. Total of 51 and 11 subjects were recorded to have mild and severe anaemia respectively among malaria parasitized subjects and total of 58 and 13 subjects were recorded to have mild and severe anaemia respectively among non-parasitized subjects. Statistically Significant difference P-value < 0.05 was observed between different age groups of the two local governments.

Discussion
The total positive samples recorded were 35.7%, highest occurrences recorded were 47.4% within 9-13 age groups and the least 1.8% recorded within 24-28 age groups. The result obtained from this study might be because both the study sites have common characteristics within the metropolis, same climatic conditions as well as environmental features. Other reason may be due to the fact that the research was conducted during rainy season. Findings in this present study were in lined with previous studies from Kano State, Gobir and Tukur, (2014) who reported 30.59%;

Bawa *et al*. (2014) observed 36.5%. In contrast other previous result reported low prevalence's 19.3% reported by Ladi *et al*. (2015) from Makarfi.
Estimation of the intensity of Parasitaemia in peripheral blood is essential as *P. falciparum* infection may cause fatal illness and hyperparasitaemia is a criterion for the WHO's definition of severe malaria (WHO, 2006). This may be due to lack of personal engagement of the *Almajirai* to fight malaria, *Tsangaya* structure which exposes the respondent to the mosquitoes. These findings were in consistent with previous reports Bawa *et. al*, 2014; and Daboer *et. al*, 2015; In contrast findings were not in lined with the results of Clarke *et. al*, 2003, in Gambia where ITNs utilization was found to be a routine in most households with low malaria incidence; Anaemia was observed as common haematological changes in malaria *P. falciparum* infection. This was consistent with previous studies. This could be attributed to different preference of the malaria parasite attack to erythrocyte of all ages. Results in the present study were in lined with a study by Jain, 2007, who showed that *P. falciparum* infection induced anaemia; Agravat and Dhruva, 2010, reports that 93% cases of anaemia were reported during *P. falciparum* infection. In contrast to the findings, study in Kenya among school aged children shown 80% anaemia due to iron deficiency (WHO/UNU/UNICEF, 2001).

Conclusion

Finding in the present study indicated high Occurrence 35.7% and *P. falciparum* was the only species encountered during the study. Municipal Local Government Area have 35% occurrence and Gwale Local Government Area have 37.0%. Statistically no significant difference (P-value > 0.05) was observed among the various age groups of the two local governments. Malaria Parasitaemia was observed to be associated with the intensity of malaria transmission. Anaemia was also observed as common haematological changes in malaria *P. falciparum* infection.

Recommendation

There is need to introduce appropriate intervention strategies against malaria and its vector. Community mobilization and health education regarding the importance of using ITNs to prevent malaria and saves lives should be considered.

Contribution of Authors

Hamma Amina Babayo write the manusript, Dr Zainab Tukur pro-read the manuscript and make corrections accordingly.

Conflict of Interest

The authors declare that there is no conflict of interest.

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