

Malaria Parasitaemia In Relation To Blood Grouping In Suleja, Niger State, Nigeria

MALANN, Yoila David

OGUNDELE, Abiola Samson

Department of Biological Sciences,
University of Abuja, FCT

USMAN, Alhaji Mohammed

Department of Integrated Science, College of Education,
Azare, Bauchi State

Abstract: A study was carried out to determine the status of malaria among 280 randomly selected patients visiting the Suleja General Hospital, Nigeria. Blood sample were obtained using 2ml syringes from the patients and tested for malaria parasites using thick and thin blood film. Blood group was also evaluated using commercial anti-sera ABD. The result showed that blood group O accounted for a highest prevalence (68.60%) of Malaria infection among patients visiting the General Hospital Suleja, Niger State. The age of the infected patients that are more prone to malaria infection ranged significantly from 0-5 years old with high prevalence of 86.67%. The study revealed the need to educate patients, on the severity of malaria and the risk of their susceptibility among the community.

Keywords: Malaria, blood group, Prevalence, Suleja, Plasmodium.

I. INTRODUCTION

Malaria is the most highly prevalent tropical disease, with high morbidity, mortality, high economic and social impacts (WHO, 2001). The disease remains a major public health problem in Nigeria. It is endemic in rural populations especially after rains and floods with stagnant water, overcrowding and improper sanitation predisposes people to malaria, as is in the case elsewhere in Africa (Klinkenberg *et al.*, 2005 and Mbanefo *et al.*, 2009). The disease accounts for 40% of public health expenditure, 30- 40% of in-patient admissions and up to 50% of out-patient visits in areas with high malaria transmission (WHO, 2005; Abdullahi *et al.*, 2009 and Atif *et al.*, 2009). Five species of *Plasmodium* cause human malaria; *Plasmodium vivax*, *P. malariae*, *P. falciparum*, *P. ovale* and *P. knowlesi* each with their geographical location and varied incubation periods (IP), from infection to manifestation of symptoms with *P. falciparum* causing 80% of infections and 90% of deaths worldwide (Davey and Lightbody, 2007).

Certain predisposing factors including for instance, location and type of housing with reference to vector breed habit, night travels in malarious areas, out-door sleeping,

migration and cooperation in control and eradication operations, all are factors that may determine presence or absence of infections (Ojiere *et al.*, 2010). In Africa, where 90% of the world's malaria cases exist, *Anopheles gambiae* is the main vector for the Plasmodia especially *P. falciparum* (Juliette *et al.*, 2005). This *Anopheles* species is highly anthropophilic (prefer to feed on humans) and survives longer than required *Plasmodium* incubation period (Meredith, 2007).

Regardless of the soaring malaria incidence in endemic regions, a certain group of individuals seem to have more immunity to malaria than others. This could be accounted by several factors including haemoglobin variants, ABO blood group system and enzyme action, among others (Otajevwo, 2013). The link between ABO blood groups and the incidence of malaria parasitaemia or immunity to malaria is still unclear (Akinboye and Ogunrinade 1987; Thakur and Verma 1992). Other studies have also shown that blood types A, B and AB are more vulnerable to *P. falciparum* malaria than the O blood type (Omotade *et al.*, 1999), whereas others have reported an equal vulnerability among the various ABO blood types (Otajevwo, 2013). There is, therefore, no consensus yet, hence the need for more research in this respect to help the understanding of malaria pathogenesis with regards to its

association with ABO blood type. These study is aimed at determined the blood group that is more prone to malaria parasite and *Plasmodium* species that is more common in the study area.

II. MATERIALS AND METHODS

STUDY AREA

The study was carried out in the General Hospital Suleja, Niger state. Suleja Local Government lies between latitude 9.183°N 7.183°E and longitude 911°E 711°E (Abdullahi and Ibro, 2008) and has a total area of 2,980km². According to 2006 census Suleja has a total population of 216,518. The hospital basically serves three (3) local government areas, Suleja, Tarfa, Gurara and some neighbouring states such as Kaduna, FCT, Nassarawa and Kogi.

BLOOD SAMPLE COLLECTION

After obtaining hospital management and patients consent, capillary or venous blood samples were collected from a total of 280 patients attending the Out-Patients Department of the Suleja General Hospital using 2ml syringes and EDTA containers

LABORATORY ANALYSIS

Blood samples were collected and analyzed within 2 hours of collection. Thick and thin blood films were prepared according to the technique described by Hanscheid (1999) and Cheesbrough (2006). A drop of each blood sample was placed in the center of a grease- free clean glass slide (CDC, 2007). The reverse side of the slide was cleaned with cotton wool, air- dried and stained with Field's stain. The slide was held with the dried thick film side facing downward and dipped in 3% Giemsa solution for 45 min, washed off gently in clean water and then dipped in Field's stain B (methyl azure) for 5s 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 eventual examination using standard methods under the microscope (CDC, 2007). The type of malaria parasite was identified using morphology futures of the parasite according to (CDC, 2016).

DETERMINATION OF BLOOD GROUP

The Coombs Direct Agglutination Method was used with commercially purchased ABD antisera (Anti-A, Anti-B and Anti-D Antisera). A drop of whole un-coagulated blood was mixed thoroughly with a drop of respective antiserum and the mixture rocked gently for one minute (Hudson and Hay, 1980).

STATISTICAL ANALYSIS

The Chi-square test was used to determined significant level at (P>0.05) while simple percentage was use to present the data obtained.

III. RESULTS

A total of two hundred and eighty (280) blood samples were examined, 151(53.93%) were positive to malaria parasite. Table1 shows that out of the 280 sample examined, the age group less than 5 had the highest prevalence rate of 41 (91.11%) followed by 6-12 years (68.57%), 13-20 years (48.00%) and 21 years and above had the least 20 (28.89%). There was a significant difference (P>0.005) in prevalence among the age groups observed.

The result from table 2 revealed the prevalence of malaria parasite in relation to blood group. Blood group O had the highest prevalence rate of 83 (68.60%) followed by A⁺ 34 (47.22%), A⁻ 6 (60.00%), B⁺ 22(40.00%), B⁻ 3 (33.3%) and AB has the lowest prevalence rate of 3 (23.08%), with a significant difference prevalence P<0.05.

Table 3 showed that out of the four types of human malaria; *Plasmodium falciparum*, was the most frequently encountered with a prevalence of 98.67%, followed by a very rare species *P. vivax* (1.32%) while every other species were completely absent.

Age(Years) Group	No. Examined	No. Positive	Prevalence (%)
<1-5	45	41	91.11
6-12	70	48	68.57
13-20	75	36	48.00
≥21	90	26	28.89
Total	280	151	53.93

There was a significant difference at P≤0.05

Table 1: Prevalence of malaria in relation to age of Patients

Blood Group	No. Examined	No. Positive	Prevalence (%)
O	121	83	68.60
A ⁺	72	34	47.22
A ⁻	10	6	60.00
B ⁺	55	22	40.00
B ⁻	9	3	33.33
AB	13	3	23.08
Total	280	151	53.93

There is significant difference P<0.05

Table 2: Prevalence of malaria parasite by blood group in patients' blood samples

<i>Plasmodium</i> Species	No. Examined N=280	No. Identified	Prevalence (%)
<i>P.falciparum</i>		149	98.67
<i>P.vivax</i>		2	1.32
<i>P. ovale</i>		-	-
<i>P. malariae</i>		-	-
Total	280	151	53.93

Table 3: Prevalence of *Plasmodium* species in patients' blood samples

IV. DISCUSSION

The ABO and Rhesus blood group systems are very important tools that are commonly used in blood transfusion, and they have special roles in genetics and hereditary diseases (Anstee, 2010; Liumbruno and Franchini, 2013). Some types

of blood groups have been reported to offer protection to common diseases like malaria whilst some have been shown to be particularly susceptible to certain infections (Wolofsky *et al.*, 2012; Güven *et al.*, 2014).

The prevalence of malaria in the present study was 151 (53.93%) which are consistent with the previous study of Ojo and Mafiana, (2005) which reported overall prevalence of 59.9% among children under 15 years of age in Abeokuta, in southwestern Nigeria and 51.5% reported by Epidi *et al.* (2008) among blood donors in Abakaliki, southeastern Nigeria but contradict the report of Anumudu *et al.* (2006) who reported 17% prevalence in eastern Nigeria and Umeaneato and Ekejindu (2006) 46% in Nwewi, Anambra State. The result also showed high prevalence rate among children less than five years 86.67% and this was similarly reported by Mbanugo and Ejim (2002).

Furthermore, the results of these findings revealed that blood group O was more prevalent with the parasite (68.60%) while blood group AB had the least infection recorded (23.08%). This is consistent with the report of Ilozumba and Uzozie (2009) which stated blood group prevalence rates of 2.63%, 12.05%, 21.0% and 63.83% for AB, B, A and O respectively. Otajevwo (1997) reported prevalence rates among ABO blood groups in Warri, Delta State to be 12(6.9%), 33(19.0%), 36(20.7%) and 93(53.5%) for AB, B, A and O respectively which were similar to findings of Zerihun *et al.* (2011) which recorded 3.3%, 21.9%, 23.5% and 51.3% for AB, B, A and O respectively.

This study has revealed that *P. falciparum* is more prevalent in the study area with (98.67%) and very few cases of *P. vivax* (1.32%), this finding were in total agreement with the previous studies of Erhabor *et al.* (2006) who reported *P. falciparum* and *P. vivax* in Southsouth Nigeria. Similarly, Molineaux *et al.* (1980) and May *et al.* (1999) reported *P. falciparum*, *P. malariae* and *P. ovale* in Garki, Northern Nigeria and in Ibadan Southwestern Nigeria respectively. Ademowo *et al.* (1995) reported *P. falciparum* and *P. malariae* in a rural community in Southwest Nigeria. To further establish the fact that *P. falciparum* recorded in this study is endemic in tropical Africa is consistent with Cheesbrough (1998) who reported that *P. falciparum* is the main species found in tropical and sub tropical Africa, part of central America and south America. This current study and that of Erhabor *et al.* (2006) contradict the reports of FMOH (2005) reports that *P. vivax* is not found among indigenous Nigerians (FMOH, 2005).

In conclusion, investigation into malaria in correlation with, for instance, ABO blood group has the potential of giving an insight into the pathogenesis of malaria and perhaps aid the control of this disease.

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