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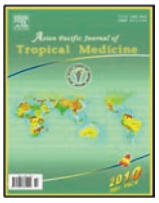

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Africa´s 9th malaria day celebration in 2009 and its bearing on most vulnerable groups

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ABSTRACT

Objective: To investigate the incidence of malaria and anaemia among children after the ninth malaria day celebration.**Methods:** Children attending primary healthcare centres in Makurdi for routine immunization purposes were recruited between September and November 2008 into the study. Thick and thin blood films from arterial blood were stained with Giemsa´s stain and examined microscopically; packed cell volume (PCV) was measured using haematocrit machine and body temperatures with the aid of paediatric thermometers; other anthropometric measurements were also taken. Other relevant information on the children and their parents were obtained with the aid of a structured questionnaire. Data obtained was analysed using Epi Info statistical software, P values $\leqslant$0.05 were considered significant. **Results:** The incidence of *Plasmodium falciparum* parasitaemia was 32.3% among the 502 children; 85.9% (n=139) of children with malaria parasites were anaemic and 88.9% (8/9) of the children with fever had malaria. Infections were commoner in children aged one year and above (P<0.05). Use of insecticide treated bed nets (ITNs) was 24.7% (n=124) while 27.9% (n=140) used untreated bed nets. There was no significant difference in malaria incidence among those who used ITNs, untreated nets and other unconventional control methods (P>0.05). Educational level of mothers had no significant impact on the incidence of malaria among the children (P>0.05), while occupation had (P< 0.05). **Conclusions:** Malaria and anaemia are still major health problems in Makurdi city as in several other parts of sub-Saharan Africa. Supply of ITNs and massive health education at the grass root should be stepped up, and possibly supply of facilities for rapid malaria diagnosis to the community should be considered.

1. Introduction

Nine years have passed since 53 heads of state and government of African countries assembled at Abuja, the capital city of Nigeria to renew their commitment towards addressing a major health challenge on the continent. The meeting which was held on April 25th 2000 was to domesticate the "Roll Back Malaria" initiative of the WHO on the continent and pledge accelerated commitment towards, among others, halving malaria related ailments and deaths by the year 2010[1-3]. Hitherto malaria had continued to bring pains and sorrows to several African families on daily basis with its high morbidity and mortality among pregnant women and children[4-6].

Malaria at present accounts for over one million deaths worldwide each year with at least 500 million sicknesses and another 3.75 billion people at risk of developing the disease[7-9].In Papua, New Guinea[10], *Plasmodium parasitaemia* was confirmed in 55.0% (17 201) subjects studied with majority aged less than 5 years. Similarly the

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prevalence of malaria in Cambodia was found to be up to 12.3% in some regions with *Plasmodium falciparum (P. falciparum)* being the commonest parasite encountered11. Also findings from a study on 13 endemic districts in Bangladesh showed a weighted malaria prevalence rate ranged 0.13%-15.07% also with *P. falciparum* being the commonest parasite encountered[12]. Findings from Vietnam showed a malaria prevalence of 13.6%[13], while in Ibadan Nigeria, 78% of the 302 children suspected to have malaria actually had malaria parasites in their blood[14]. In another study on 11 leading industrialised nations of the world (UK, USA, Canada, Australia, Japan, Germany, etc.), over 79% of reported malaria cases were traced to Africans from recent visits of the subjects to their places of origin[15]. Higher but varying malaria prevalences have been reported in Sudan[16], Tanzania[17], Chad[18], and Zambia[19], spanning the length and breath of the African continent.

Anaemia is considered a very significant contributor to the morbidity and mortality associated with malaria in Sub-saharan Africa[20,21]. Proper control of the disease in Nigeria would have a direct impact on the incidence of anaemia as well as anaemia related deaths among children[22]. In the present study, a review of socio-cultural factors that would impact on the burden of malaria and hence anaemia among children in Makurdi city was undertaken.

2. Materials and methods

The study was carried out in Makurdi, capital city of Benue state located in north central Nigeria. And between September and November 2008 it was performed on children 0-5 years old attending Primary Healthcare Clinics (PHCs) sited at Wadata, North bank, High level and Wurukum in four major locations of the city for their routine immunization exercises. Of the 502 children studied with age ranged from 2 weeks to 54 months, 213 (42.4%) were boys and 289 (57.6%) girls. Structured questionnaires were either self or interviewer administered to the mothers or accompanying relations with valid information on the children. Information such as age and sex of the child, marital status and literacy level of mothers, feeding habits and nutritional history of the children, methods of malaria prevention and mosquito control, and occupation of the parents were obtained. Children´s heights and body temperatures were measured, and physical examination was then carried out. Blood samples were collected from children who consecutively presented for their routine immunization exercise. Arterial bloods were obtained from the thumb or toe with the aid of a sterile blood lancet. Thick and thin blood films were made and stained using 30% Giemsa stain and examined for malaria parasites. The preparation was examined microscopically using×100 objective[23]. Packed cell volume (PCV) for each subject was also measured using microhaematocrit capillary tube 2/3 filled with capillary blood and centrifuged in haematocrit machine for two minutes.

Data obtained was analysed using Epi Info 2002 statistical software, P values < 0.05 were considered significant.

3. Results

The incidence of *Plasmodium falciparum* parasitaemia among the children was 32.3% (162/502), other species of *Plasmodium* were not encountered. Eight of the nine (88.9%) children with fever had malaria parasites ($P< 0.05$); sub-clinical malaria was recorded in 95.1% (154/162) of the children.

Based on age, 87.0% (247/284) of those aged 0-12 months were infected with malaria parasites; 32.3% (20/62) of 13-24 months; 30.3% (14/46) of 25-36; 44.0% (22/50) of 37-48; and 50.0% (30/60) of 49-60 months old children, respectively (X^2=42.11, OR=16.25, RR=1.80, P<0.001).

The rate of anaemia (PCV<28.0%) among the children was 36.7% (184/502); 85.9% (139/162) of those with malaria parasites were anaemic, compared to 15.0% (45/302) who were anaemic without malaria parasites present in their systems (X^2=391.82, OR=0.02, RR=0.12, $P< 0.001$). None had PCV less than 21.0%.

The rate of ownership and use of insecticide treated bed nets (ITNs) was 24.7% (124/502) and untreated bed nets 27.9% (140/502). Methods adopted by mothers for prevention and control with respect to the presence or otherwise of malaria parasites in their children systems showed that 24.2% (30/124) of those who used insecticide treated bed nets were infected while 25.7% (36/140) of those who used untreated bed nets; 47.7% (42/88) and 38.5% (50/130) of those who sprinkled Otapiapia and those who sprayed insecticides were similarly infected. Over all, rate of use of ITNs was 24.7% (124/502). Of those who used mosquito coil, 50% (2/4) were infected, while those who used local methods were infected by 33.3% (2/6) (X^2=0.09, OR=0.02, RR=0.12, $P> 0.05$).

A review of *P. falciparum* parasitaemia among the children based on occupation of mothers showed that 23.8% (10/42) of the children whose mothers were civil servants were infected, 39.2% (80/204) for traders, 44.9% (105/234) for farmers, 100% (17/17) for military/paramilitary, and 24.3% for others (X^2=4.72, OR=1.96, RR=2.12, P<0.05).

Analysis of presence of malaria parasites among children in relation to the level of educational attainment by mothers showed that 38.9% (14/36) of children whose mothers had no formal education were infected. and with 35.2% (50/142), 32.5% (78/240) and 23.8% (20/84) of those whose mothers attained primary, secondary and tertiary education, respectively (X^2=0.74, OR=0.61, RR=1.45, $P> 0.05$).

4. Discussion

The incidence of *P. falciparum* parasitaemia among children in Makurdi city was 32.3% of which 85.9% were anaemic (P<0.05). This high incidence of malaria among the children undermines the present global drive towards its effective control[23-25]. Though there are no readily available statistics of a similar work in the community for a favourable assessment of the control process, the actual prevalence in

the community may be higher. The association of anaemia with malaria has been legendary as the present study has also shown (85.9%, $P<0.05$). Besides nutritional and other factors, proper control of malaria among children has a significant impact on the morbidity and mortality associated with anaemia in African communities[26,27].

The findings from the present study compares favourably with that of Afolabi *et al* in Yaba Lagos, who recorded 32.7% prevalence of malaria and a significantly low average PCV (33.0%) among the 446 infants compared to their counterparts without malaria[28], Adediran *et al* in Ile-Ife, Nigeria who encountered a higher figure of 50% malaria parasitaemia among the 400 children requiring emergency blood transfusion at a hospital[29], Anumudu *et al* in Ibadan who found a much higher figuremalaria rate (78.0%)among the 372 patients studied with 28% anaemia rate14, and Erhabor *et al* in Port Harcourt who also found a higher value of incidence of anaemia (66.7%) among plasmodial parasitized Nigerians[30]. Similar findings have been recorded in Ouagadougou, Brkina Faso[31], Tanzania[32], and Mozambique[33]. The rapid malaria screening kits which have been advocated should be introduced in the Nigeria communities so as to enhance prompt diagnosis and subsequent treatment of the disease[34].

The rate of use of ITNs among the 502 children was found to be 24.7% and that of untreated bed nets 27.9%. There was no significant difference in malaria burden among children who used them and those who used other unconventional control methods such as Otapiapia and local methods ($P> 0.05$). Besides the rate of ownership and use of ITNs being low in the community, its correct application for optimum results is called to question. The ownership and correct use of ITNs being central to the realisation of the global "Roll Back Malaria" objectives should be given top most priority[34,35]. Its provision should be guaranteed and made readily available, and the people should be adequately educated on its correct application[36,37]. The successes recorded in the correct application of ITNs in Zambia[38] and Eritrea[39] attests to this fact; the low ownership and use of ITNs in most parts of Africa has largely been linked to the poor rating of Africa on the malaria control time table.

The incidence of malaria was not found to be significantly different among the children whose mothers had no formal education or barely attended primary school compared to those who were educated ($P> 0.05$). This could be an incidental finding peculiar to the sample population. It could also imply the need for special health education to the people on malaria control irrespective of their educational attainment. This would require carrying the message to the people at their door step and putting it to the understanding of each individual. Youth associations such as National Youth Service Corp (NYSC), Boys Scouts and Girls Brigade, And Rotary Club could embark on adult sensitization and health education on the best methods of malaria prevention and control. The significant association of malaria burdens among the children with mothers from different socio-economic backgrounds from the present study ($P<0.05$) stresses the benefit of economic empowerment among women towards the success of the present malaria war[40,41].

In conclusion, the twin problem of malaria and anaemia are prevalent in Makurdi city as in several African cities. Provision of ITNs, rapid malarial screening kits, and adult health education should be stepped up so as to bring the communities back to direction of the global control trend.

Conflict of interest statement

We declare that we have no conflict of interest.

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