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ASSESSMENT OF SOME ROLL BACK MALARIA INTERVENTION MEASURES ON PATIENTS ATTENDING AHMADU BELLO UNIVERSITY TEACHING HOSPITAL, ZARIA-NIGERIA

***[1]Osagiede, O. N. and [2]Yayock, H. C.**

[1]College of Agriculture and Animal Science, Ahmadu Bello University, Mando, Kaduna – Nigeria.
[2] Department of Biological Sciences, Kaduna State University (KASU), Kaduna.

*Corresponding authors' email: nicozuyi@gmail.com Phone: +2348023433006

ABSTRACT

Malaria is one of the common debilitating diseases in Nigeria. Thus, an assessment of roll back malaria intervention measures on patients attending GOPD clinic of ABUTH Zaria was conducted. A total of 650 Blood samples were collected and examined for malaria parasites. Research on methods of physical and chemical protection was investigated, the use of aerosol insecticide was most popular whereas the use of bed nets had least exposure risk to mosquitoes with a PAR Value (-1.63). The use of prophylactic measures was not significantly associated with malaria prevalence. There was a significant difference between malaria prevalence in individuals that did malaria blood test and those that did not ($p<0.05$). Of all the preventive measures used in malaria control, Insecticide Treated Nets (ITNS) were least known; only 27.5% of the individuals studied knew about them. It is suggested that the improper use of personal/ preventive measures probably led to the high prevalence of malaria. It is recommended that enlightenment control campaigns on the protective role of ITNS against mosquitoes be stepped up, as ITNS provide a remarkable degree of protection against malaria.

Keywords: Malaria, Prevalence, Preventive measures, ITNs, ABUTH-Zaria

INTRODUCTION

Malaria is a common and debilitating tropical disease caused by *Plasmodium* species. It is transmitted through the bites of female Anopheles mosquitoes that are infected (Zareen *et al.*, 2016). The protozoan parasites that cause malaria consist of various species, such as *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium malariae,* and *Plasmodium knowlesi*(Joste *et al.*, 2021). *Plasmodium falciparum* and *Plasmodium vivax* pose a serious challenge to global health (Kinoshita *et al.*, 2024).

In 2020 and 2021, malaria prevalence increased, as reported by the WHO. In 2020, there were 245 million cases and 625,000 deaths. The following year, these numbers rose to 247 million cases and 619,000 deaths in 85 countries where malaria is endemic (WHO, 2022). According to the 2023 WHO malaria report, the incident also increased, with a total of 249 million reported cases of malaria in 2022. These cases resulted in 608,000 deaths across 85 countries where malaria is endemic. The highest number of cases, specifically 233 million, was reported in the WHO African Region (Venkatesan, 2024). The report above clearly indicates that malaria remains a major global health issue, causing significant mortality, morbidity, and socioeconomic burden each year.

The World Health Organization (WHO) adopted the Global Technical Strategy for Malaria 2016-2030 (GTS) during the World Health Assembly in 2015 (WHO, 2015). The strategy centers on universal access to malaria testing and treatment, accelerating towards elimination when possible, enhancing surveillance efforts, promoting ongoing research and innovation, and making investments in infrastructure and capacity-building.

The WHO initiatives in malaria control such as roll back malaria (RBM) emphasizes the use of ITNs and environmental management to reduce the vector population as a key strategy for malaria prevention and control in sub-Saharan Africa (UNICEF, 2009). The most promising and yet most tasking of the WHO strategies for malaria control is the provision and use of ITNs, which has been described as an important and popular tool for malaria control programme (Patel *et al*., 2012).

In endemic areas, young children, pregnant women (especially first-time mothers) and migrants from areas with low prevalence of malaria should benefit from chemoprophylaxis. The drug recommended for chemoprophylaxis are chloroquine, amodiaquine and fansider administer on weekly doses or doxycycline daily (CDC, 2012).

The devastating health and socio-economic consequences of malaria scourge in many countries including Nigeria remain a matter of great concern to government and stakeholders in the health sector (WHO, 2011). Although there are indications that success have been achieved in the fight against malaria in Nigeria, surveillance and epidemiological data in support of such claims are scanty in many state including Kaduna State. These pieces of information are necessary to consolidate on the gains already achieved if any by the different control efforts, and to achieve complete eradication of malaria scourge in the country.

Information generated from this study will help to guide relevant agencies take appropriate decision to sustain the gains achieved in malaria control in Kaduna State. It is for this reason that the present study was designed to assess the association between some preventive measures and the prevalence of malaria.

MATERIALS AND METHODS

Area of Study

This work was carried out at the General Out-patient Department (GOPD) clinic of Ahmadu Bello University Teaching Hospital (ABUTH), Zaria.

Selection of Patients for Study

Two categories of patients (males and females) were selected for the study. The first category was made up of patients with symptoms of malaria referred for malaria parasite test; these were referred to as 'cases'. The second category was made up of patients that were referred for blood tests other than

malaria; these served as the control group. For every two such cases selected (that is patients with symptoms of malaria referred for malaria parasite test), one control was selected.

Collection of blood samples from patients

A haemotology Laboratory Technologists of ABUTH helped to collect 2mls of venous blood using a sterile 2mls syringe from each patient, specimen tubes were numbered serially for both cases and controls.

Questionnaire

Questionnaires prepaid by the researcher were used by the Laboratory Technologist to fill out their relevant information on the patients after collecting the blood samples from them.

Preparation of thick blood films

A drop off blood was placed in the center of a clean glass slide and spread out into a thick smear with the edge of another slide and allowed to dry. The dried smear was then covered with Field Stain A and left on for 5 seconds; it was then placed in distilled water for 5 seconds then removed and placed in field stain B for 3 seconds. After 3 seconds, the slide was washed in distilled water for another 5 seconds and then o air-dried. When completely dry, the slide was examined at x100 in oil immersion, for the ring form of the malaria parasite (Cheesbrough, 2008).

Data Analyses

The SPSS and Epi-info Software were used to calculate Odds Ratio (OR) as described by (O'Neill,1984). This was used to determine the association between the preventive measures and malaria prevalence, based on the two by two contingency of (O'Neill, 1984).

Yates corrected Chi-Square analysis was used to determine the statistical significance of the strength of associations between the preventive measures and malaria prevalence. Population Attributable Risk (PAR) presented in percentages was also used in determining the proportion of the study population exposed to malaria that is attributable to the factor(s)with the formula: PAR = (IE – IU) / IE where IE = incidence I the exposed group (those with the risk factor); IU = Incidence in the unexposed group (those without the risk factor).

RESULTS AND DISCUSSION

The results of 650 blood samples collected and analyzed revealed 425 were cases and 225 were controls. The variables considered were the knowledge and application of preventive measures against malaria.

The prevalence of malaria was generally higher in the unexposed groups of individuals that screened their houses (53.7%) and those that used aerosol insecticides (52.10), than exposed counterparts with prevalence of 51.3% and 50.4%, respectively.

House screening and insecticide use had no significant association with malaria prevalence (P>0.05). The use of bed nets was not associated with malaria prevalence (OR=0.97). The PAR value was highest for house screening (3.52%) while the use of bed nets had the lowest PAR value (-1.63%) (Table 1).

Table 1: House screening, insecticides (aerosols) and bed nets versus malaria prevalence

Preventive Methods	EXPOSED		UNEXPOSED		OR	95%CI	$\chi 2$	P-value	PAR%
	No. Examined	No. + ve	No. Examined	No. +ve					
House screening	231(35.5%)	124(53.7%)	419(64.5%)	204(48.7%)	1.22	0.87-1.71	1.29	0.26	3.52
Use of insecticide (aerosols)	71(10.9%)	37(52.1%)	579(89.1%)	288(49.7%)	1.10	0.65-1.85	0.06	0.80	0.51
Use of bed nets	611(94.0%)	308(50.4%)	39(6.0%)	20(51.3%)	0.97	0.48-1.93	0.00	0.95	-163

Key: Exposed = Do not use preventive measures; Unexposed = Uses preventive measures

Out of 650 patients examined, 179 (27.5%) had knowledge of ITNs while the remaining 471 (72.5%) had knowledge of ITNs (Table 2).

Table 2: Effect of knowledge of ITNs on the prevalence of malaria

Personal Protection	EXPOSED		UNEXPOSED	
	No. Examined	No.+ve	No. Examined	No. +ve
Knowledge ITNs	471(72.5%)	197(41.8%)	419(64.5%)	204(48.7%)

Key: Exposed = Had Knowledge of ITNs; Unexposed= Had knowledge of ITNs; +ve=positive

There was a higher prevalence of malaria in the unexpected group (52.3%) than in the exposed group (47.5%). There was no significant association between the use of prophylactic measures and malaria prevalence (Table 3).

Table 3: The effect of the use of prophylactic measures on the prevalence of malaria

Personal Protection	EXPOSED		UNEXPOSED		OR	95%CI	$\chi 2$	P-value	PAR%
	No. Examined	No.+ ve	No. Examined	No. +ve					
Prophylactic measures	217	103 (47.5%)	430	255(52.3%)	0.84	0.59-1.17	1.00	0.32	-5.39

Key: Exposed = Do not use prophylactic measures; Unexposed = Sometimes/always use prophylactic measure

The Prevalence of malaria was higher in the unexposed group (52.3%) than in the exposed group (33.1%). The difference between exposed and the unexposed group was significant (P<0.05), with a PAR value of 8.86% (Table 4).

Table 4: The effect of blood test for malaria parasites before treatment on prevalence of malaria

Personal Protection	EXPOSED		UNEXPOSED		OR	95%CI	$\chi 2$	P-values	PAR%
	No. Examined	No. + ve	No. Examined	No. +ve					
Malaria Blood (MB) Test	133	44(33.1%)	517	284(54.9%)	0.41	0.27-0.62	19.34	0.00	-8.86

Key: Exposed = Do not do the malaria blood test; Unexposed = Sometimes/always did the malaria blood test

Discussion

In the study of the three physical/chemical methods used against mosquito bites, most people preferred to use aerosol insecticides. This may be due to its availability and convenience of use. The use of bed nets was the best of the physical methods used probably because it provides a physical barrier between the mosquito and the sleeping individual. It is surprising that the unexposed individuals who used bed nets had a slightly higher prevalence than their exposed counterparts. There could be a number of reasons for this; for example, torn nets which would have rendered the nets useless as seen in a study from Ghana (Binka & Adonge 1997). Individuals who move about a lot in sleep could have exposed themselves to mosquito bites when the bed nets may not have been properly tucked under the mattress and either the bed nets are not the proper size for the bed, hence exposing the individual still to mosquitoes.

The low percentage of individuals who know about ITNs obtained in this study implies that not much has been done to enlighten the public on the importance of their use in the fight against malaria. Thiévent *et al.*, 2018 they reported that vector control using ITNs represents the cornerstone of malaria prevention, as ITNs provide a physical barrier between the user and mosquito vectors, and repel or kill mosquito vectors upon contact with the insecticide. This agrees with WHO, 2018 report. The authors deduced that mosquito nets treated with pyrethroid insecticides provided a remarkable degree of protection against malaria in Africa. An increase in the enlightenment campaign on the protective role of ITN against mosquitoes is expected to increase its use hence the subsequent reduction in malaria prevalence. The study conducted by (Ugwu *et al.,* 2013; and Obembe *et al.,* 2014) revealed that there is need for health education to encourage pregnant women and dispelled their fears of chemicals used in treating nets.

The fact that individuals who used prophylactic measures had a higher prevalence of malaria than those who did not, is surprising. However, this finding can be supported by the observation of Cohen *et al*. (2012) who remarked that the discontinuation of chemoprophylaxis after a month or two would result in more attacks. CDC (2020) also reported that the use of chemoprophylaxis should be done exactly on schedule. Missing or delaying doses may increase the risk of getting malaria.

The finding in this study on the use of prophylaxis imply that those who used prophylactic measures were probably inconsistent and therefore became more exposed rather than protected. Apart from the possibility that the individuals studied might have discontinued the use of prophylactic drugs, they could also have used fake drugs which abound in Nigeria today.

This study showed that individuals whose blood was screened for malaria parasites before treatment had a higher prevalence of infection than those whose blood was not screened before treatment. This is to be expected because the finding of malaria parasites in the blood would be a pointer to the source of symptoms and separate the ailment from other infections that show malaria-like symptoms. Treatment in such cases would target and destroy the malaria parasites. There have been instances in which symptoms of typhoid fever have been mixed up with those of malaria; in such cases it would have been proper to do a proper diagnosis through blood screening before treatment. Ogundipe (2003) concluded that blood testing/screening before treatment would help reduce the increase in the drug resistance of the malaria parasite.

CONCLUSION

the study shows that the improper use of personal/ preventive measures probably led to the high prevalence of malaria. Also, the study shows that the public were not enlightened enough to know the importance of ITNs in rolling back malaria.

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REFERENCES

Binka F.N and Adonge P. (1997). Acceptability and use of insecticide impregnated bed nets in Northern Ghana. *Tropical Medicine and International Health*, 2:419-507.

CDC (2012). Malaria Parasites. *U.S Centers for Disease Control and Prevention. Retrieved 28 December*, 2012: https://www.cdc.gov/malaria/new_info-2012-malariagreece_9-5-2012.html

Centers for Disease Control and Prevention (2020). *CDC Yellow Book: Health Information for International Travel*. New York: Oxford University Press; 2020.

Cheesbrough M. (2008). Parasitology Test: Examination of blood for malaria parasites: District Laboratory Practice in Tropical Countries; Part 1: Cambridge University Press, United Kingdom. Pp. 239-258.

Cohen J.M., Smith D.L., Cotter C., Ward A., Yamey G., Sabot O.J., Moonen B. (2012). Malaria resurgence: a systematic review and assessment of its causes. *Malaria Journal*,11:122-129

Joste, V., Bailly, J., Hubert, V., Pauc, C., Gendrot, M., Guillochon, E., Madamet, M., Thellier, M., Kendjo, E. & Argy, N. (2021). Plasmodium ovale wallikeri and p. Ovale curtisi infections and diagnostic approaches to imported malaria, france, 2013–2018. *Emerging infectious diseases*, 27**:**372.

Kinoshita, T., Espino, F., Bunagan, R., Lim, D., Daga, C., Parungao, S., Balderian, A., Micu, K., Laborera, R. and Basilio, R. (2024). First malaria in pregnancy followed in philippine real-world setting: Proof-of-concept of

probabilistic record linkage between disease surveillance and hospital administrative data. *Tropical Medicine and Health*, 52**:**17.

Obembe A., Anyaele O.O. and Oduola, A.O. (2014). Lessons from the implementation of LLIN distribution campaign in Ilorin Kwara State, Nigeria. *Biomed Central Public Health*,

Ogundipe, S. (2003). The role of artemisinin derivatives for malaria management. Vanguard Newspaper, September 17: 21.

O'Neill, R.J. (1984). Sample sizes for the determination of Odds ratio in unmatched Cases Control studies. American Journal of Epidemiology, 120:146-153.

Patel E.K., Gupta A. and Oswal R.J. (2012). A review on: Mosquito repellent methods. *International Journal of Pharmaceutical, Chemical and Biological Sciences*, 2(3): 310-317.

Thiévent K., Hofer L., Rapp E., Tambwe M.M., Moore S.and Koella J.C. (2018). Malaria infection in mosquitoes decreases the personal protection offered by permethrin-treated bednets. *Parasite Vectors*,11:284- 289.

Ugwu E.O, Ezechukwu P.C, Obi S.N, Ugwu A.O, and Okeke T.C (2013). Utilization of insecticide treated nets among pregnant women in Enugu, South Eastern Nigeria. Nigeria . *Clinical Practice* 16:292- 296.

UNICEF (2009). Partnering to roll back malaria in Nigeria's Bauchi State. *World Malaria Day, 25 April. Nigeria.*

Venkatesan, P.(2024). The 2023 who world malaria report. *The Lancet Microbe*,5(3):203.

WHO (2011). World Malaria Report. *Malaria Newsletter*, 3:2.

WHO (2015). *Global technical strategy for malaria 2016-2030*, World Health Organization.

WHO, (2018): Insecticide-treated nets to reduce the risk of malaria in pregnant women. http://www.who.int/elena/titles/bednets_malaria_pregnancy/en/

WHO (2022). *World malaria report 2022*, World Health Organization.

Zareen, S., Rehman, H. U., Gul, N., Zareen, H., Hisham, M., Ullah, I., Rehman, M. U., Bibi, S., Bakht, A. and Khan, J. 2016. Malaria is still a life threatening disease review. *Journal of Entomology, Zoology Studies* 105**:** 105-112.