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Knowledge of Malaria and Preventive Behaviour Amongst Allied Healthcare Workers at the Central African Republic

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ABSTRACT

Objective: to determine the knowledge of malaria and preventive behaviour among Allied Healthcare Workers at the Central African Republic.

***Study Design*:** Cross-sectional study.

***Place and Duration of Study*:** Central African Republic from Dec 2021 to May 2022.

***Methodology*:** Allied Healthcare Workers deployed at the Central African Republic as part of the International Organization for Peacekeeping were included in the study. A questionnaire was designed to determine the study participants' knowledge and preventive behaviour. Association was made between the previous history of malaria and preventive behaviour using the chi-square test.

***Results*:** A total of two hundred and twenty-one (n=221) study participants were included in the study with a mean age of 35.73±4.89 years (Range: 22 to 47 years). Forty-Nine (22.17%) Allied Healthcare Workers had a previous history of malaria. Tow hundred and twelve (95.9%) of the study participants had adequate knowledge about the mode of transmission and prevention practices. There was a significant association between the previous history of malaria and Allied Healthcare Workers' preventive behaviour $p<0.001$).

Conclusion: Most study participants had an adequate understanding of malaria, and those with prior malaria exhibited better preventive behaviour. In malaria-stricken regions, it is essential to take preventative measures.

Keywords: Central african republic, Endemic, Malaria, Preventive behaviour.

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INTRODUCTION

The World Malaria Report 2020 estimates that each year 229 million individuals become infected with malaria, with Africa accounting for 94% of all recorded cases.[1] As a result, about 94% of the world's 409,000 annual malaria deaths occur in Africa. Furthermore, the World Health Organization (WHO) estimates that the number of deaths from malaria in Sub-Saharan Africa will reach 769,000 in 2020, which is similar to the mortality level last seen 20 years ago as a result of the ongoing COVID-19 pandemic, which may potentially lead to the collapse of the national healthcare systems in many developing countries.[2,3]

The WHO estimates that 99.7% of malaria cases in Africa and 100% in sub-Saharan Africa are caused by *P. falciparum*. Therefore, rapid diagnostic tests (RDTs) targeting *P. falciparum* are commonly employed for diagnosing malaria in the region, per the WHO's recommendations.[4] Africa has struggled with malaria for a long time, and it now accounts for 9% of all recorded infections on the continent. The Central African Republic, a country with a population of 4.8 million people, is one of those places where malaria is thought to be responsible for as many as 40% of all reported illnesses and 10% of all registered deaths, especially among children.[5,6] More than 380,000 cases of laboratory-confirmed malaria are reported annually by the WHO in the Central African Republic, all of which appear to be caused by the *P. falciparum* species (the disease is transmitted through-out the year and in all parts of the country).[7,8] As a result, the (WHO) estimates a million malaria cases yearly in the Central African Re-public. However, the true figure may be several times higher due to extremely high rates of silent illnesses.[9]

The risk of malaria infection is especially high for military personnel in malaria-endemic regions. According to literature, thousands of service members developed malaria during World War II, the Korean War, and the Vietnam War.[9,10] The failure to follow preventive measures usually results in cases and epidemics. To maintain a successful malaria control programme, it is essential to measure the level of

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knowledge about malaria and their efforts to prevent it. Our study aimed to ascertain the level of malaria awareness and preventative measures taken by Allied Healthcare Workers at the Central African Republic as part of the International Organization for Peacekeeping.

METHODOLOGY

The cross-sectional study was conducted at Bangui Station, Central African Republic, from December 2021 to May 2022 after formal permission from the Ethical Review Committee (IERB certificate number: Pak Avn Unit-7CAR: Sep 6, 2022). The sample size was calculated through the WHO sample size calculator taking the global prevalence of malaria in Africa as 94%.[2] The non-probability consecutive sampling technique was employed.

Inclusion Criteria: Allied Healthcare Workers deployed at the Central African Republic as part of the International Organization for Peacekeeping were included in the study.

Exclusion Criteria: Those Allied Healthcare Workers, who were not willing to take part in the study, were excluded.

A questionnaire was designed to determine the Allied Healthcare Workers' knowledge and preventive behaviour. In order to determine the validity and reliability of a questionnaire, it was first tailored to the given conditions and then sent to two epidemiology experts for review. The questionnaire was developed to gather data regarding the study population's demographics (such as age, marital status, and duration of service) and to evaluate their level of malaria knowledge, attitude, and behaviour. The questionnaire was originally written in English. However, it has been translated into Urdu to benefit individuals who may have difficulty reading it. There were 25 questions in the study. The first 15 questions were about binary knowledge and coded as 1 or 2. The questions regarding attitude from 15 through 20, with strongly disagree, disagree, agree, and highly agree, serve as possible responses. The numbers 1, 2, 3, and 4 represent these categories. The following five questions (questions 21–25) were about preventative measures. These were represented by the numbers 2, 1, and 0 in the encoding.

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 23.00 and MS Excel 2016 software. Mean±SD were calculated for continuous variables. Frequency and percentage were calculated for categorical variables. The Chi-square test was employed to ascertain the association. The *p*-value lower than or up to 0.05 was considered significant.

RESULTS

A total of two hundred and twenty-one (n=221) Allied Healthcare Workers were included in the study with a mean age of 35.73±4.89 years (Range: 22 to 47 years). The mean duration of service was 15.93±4.67 years (Range: 5 to 25 years). In addition, 49(22.17%) Allied Healthcare Workers had a previous history of malaria. Most participants 167(76.6%) were married (Table-I).

Table-I: Demographic Characteristics (n=221)

Parameters	n (%)
Age in years (Mean±SD)	35.73±4.89
Service in Years (Mean±SD)	15.93±4.67
Married	167(76.6%)
Unmarried	54(23.4%)
Previous History of Malaria	
Yes	49 (22.17%)
No	172 (77.83%)

About 212(95.9%) of Allied Healthcare Workers had adequate knowledge about the mode of transmission and prevention practices. The responses of study participants to malaria knowledge items were shown in Table-II.

Table-II: Knowledge about malaria (n=221)

Questions	n(%)
Heard of malaria	
Yes	212(95.9%)
No	9(4.1%)
Do you know that CAR is endemic for Malaria?	
Yes	175(79.2%)
No	46(20.8%)
How Malaria infects a person / how it spreads?	
Mosquito	199(90.0%)
Drinking infected water	13(5.9%)
Coughing/sneezing	9(4.1%)
Mosquito bites more at which time	
Dusk	4(1.8%)
Down	202(91.4%)
All time	15(6.8%)
Sign / Symptoms of Malaria?	
Fever chills	64(28.9%)
Vomiting	6(2.7%)
Headache	84(38.0%)
Myalgia / Body pain	53(23.9%)
All	14(6.5%)
After how many hours repellent should be re-applied?	
Once a day	19(8.6%)
Reapplied after 3 hours	202(91.4%)

While the preventive behaviour towards malaria was shown in Table-III. There was a significant association between the previous history of malaria

and Allied Healthcare Workers' preventive behaviour $p<0.001$), shown in Table-IV.

Table-III: Preventive Behaviour towards Malaria (n=221)

Preventive Behaviour	Yes	No
Use of Mosquito repellents / coils?	207(93.7%)	14(6.3%)
Taking Mafloquine in Malaria-stricken area and 4 x weeks after going on leave?	192(86.9%)	29(13.1%)
Use Nets?	196(88.7%)	25(11.3%)
Provision of Nets from units?	194(87.8%)	27(12.2%)
Provision of Mosquito repellents from units?	211(95.5%)	10(4.5%)
Can you have Malaria during your stay?	189(85.5%)	32(14.5%)
Can Malaria cause death?	211(95.5%)	10(4.5%)

Table-IV: Association of Preventive Behavior towards malaria with previous history of Malaria (n=221)

Questions	Previous History of Malaria		*p*-value
	Yes (n=49)	No (n=172)	
Use of Mosquito repellents/coils?	36(73.5%)	171(99.4%)	0.001
Taking mafloquine in malaria stricken area and 4 x weeks after going on leave?	33(67.3%)	163(94.8%)	0.001
Use Nets?	33(67.3%)	161(93.6%)	0.001
Provision of Nets from units?	40(81.6%)	171(99.4%)	0.001
Provision of Mosquito repellents from units?	33(67.3%)	156(90.7%)	0.001
Can you have Malaria during your stay?	40(81.6%)	171(99.4)	0.001
Can Malaria cause death?	49(100)	162(94.2)	0.084

DISCUSSION

The World Health Organization has warned that the reported number of CAR malaria cases is likely significantly lower than the actual number of infections. This is mainly because many people in the area do not realise they have malaria.[11,12] After all, the disease does not cause any noticeable symptoms in them. Due largely to the consequences of frequent natural disasters (such as destructive floods during the rainy season), the epidemiological situation of infectious illnesses (malaria, TB, and measles) in the Central African Republic continues to deteriorate.[13] According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), as many as 57% of Central African Republic (CAR) citizens (2.8 million) will require humanitarian aid in 2021 due to food shortages, a lack of medical treatment, and the prevalence of diseases. The country's restricted access to healthcare stands out as one of the biggest challenges. According to a study by Hulland *et al.,* it takes more than 24 hours to travel to the nearest medical institution in several country sections, including the southwest, where the current study was conducted.[14] Under these conditions, it is impossible to obtain reliable information about the actual morbidity rates in the country. An up-to-date screening in the area confirmed the high malaria incidence among the local population. The majority (60.5%) of the 943,000 malaria tests conducted in Chad between January and September 2020 were positive, with mostly positive results coming from the southern portions of the nation, close to the border with the Central African Republic (Logone oriental, Mandoul, and Moyen-Chari). Rapid diagnostic tests (RDTs) are typically the only option for malaria diagnosis in areas where access to healthcare is limited and sophisticated laboratory techniques are not readily available.[15] Rapid diagnostic tests (RDTs) are immunochromatographic techniques that detect malaria antigens (such as *P. falciparum* histidine-rich-protein 2 (Pf HRP2) or the enzyme Plasmodium lactate dehydrogenase (pLDH)). Many scientists think that the accuracy of malaria microscopy tests varies widely across sub-Saharan Africa. The World Health Organization estimates that *P. falciparum* is responsible for up to 100% of all malaria cases in sub-Saharan Africa; nevertheless, it is important to note that many undiagnosed cases occur in the region due to widespread asymptomatic carriage of Plasmodium.[16,17]

In our study, 212(95.9%) of Allied Healthcare Workers had adequate knowledge about the mode of transmission and prevention practices. There was a significant association between the previous history of malaria and Allied Healthcare Workers' preventive behaviour $p<0.001$). Amusan *et al.*, in Nigeria confirmed this, finding that 253 (96.94%) of respondents had an in-depth understanding of malaria. On the other hand, in 2012, Qayum *et al.*, found that over 42% of the sample population was uninformed about malaria. Similarly, Allied Healthcare Workers' familiarity with malaria prophylaxis was far higher than reported in 2019 by the Tumbi referral hospital in Tanzania. Study participants in Munisi, Tanzania, had a dismal understanding of malaria prevention strategies, with only 38.6% correctly identifying long-sleeved clothing as protective against malaria and 52.7% correctly identifying spraying of insecticides as protective against malaria. Patients with malaria symptoms sought treatment at Tumbi Referral Hospital.[11,14,15]

The vast majority of participants in our study observed malaria as a major public health problem. According to the results of a study conducted in Bangladesh. Saha *et al.*, from Bangladesh, in 2019,

found that 87.5% of research respondents thought that anyone may be infected with malaria and that it was a life-threatening disease. The people who participated in their study were slash-and-burn farmers susceptible to malaria. The vast majority of the Allied Healthcare Workers in our study took preventative measures to ward against mosquito bites, especially between nightfall and dawn. Our research debunked some common myths about the study population's requirement for chemoprophylaxis and their regular usage of insect repellants. Chemoprophylaxis may be the most important factor in determining whether or not Allied Healthcare Workers in operational areas contract malaria. In contrast, Maia *et al*. (2018) reported limited evidence for the use of mosquito repellant as a protective measure, stating that it was unclear whether topical repellants gave any protection against *P.vivax* or *P. falciparum*.[11,17,18]

Malaria uncovered blind spots in the malaria control plan, namely the lack of awareness and preventative measures amongst the armed forces. Therefore, we concentrate upon the combined efforts directed towards an extended health education campaign for Allied Healthcare Workers, notably for other arms, to enhance their attitude towards malaria. In addition, we advise using chemoprophylaxis before entering malaria-endemic active regions for exercise/ war, making LLINs readily available, and adhering strictly to standard operating procedures. These combined efforts have the potential to make a big dent in the fight against malaria in the military.

CONCLUSION

Most Allied Healthcare Workers had an adequate understanding of malaria, and those with prior malaria exhibited better preventive behaviour. In malaria-stricken regions, it is essential to take preventative measures.

LIMITATIONS OF STUDY

Study was carried out for six months which was the major limitation of our study.

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Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

UA: & NSB: Conception, study design, drafting the manuscript, approval of the final version to be published.

RK: & AH: Critical review, drafting the manuscript, approval of the final version to be published.

AM: & AG: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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