

Malaria infection and associated factors affecting its prevalence rate in north Kosti Town, White Nile State, Sudan

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Abstract:

In Sudan, Malaria is the major health problem, almost, 75% of population is at risk of developing malaria. Malaria transmission is unstable putting the whole country under the risk of malaria epidemic. The possibility of epidemic increased with heavy rains, floods and in case of interruption of control activities, this study was conducted in north Kosti White Nile state to determine the prevalence of malaria and the effect of associated factors in north Kosti town, White Nile State, Sudan. Samples were investigated from the population who attending health centers and show the positive for malaria, and then the personal interview were conducted with them to fill out the questionnaire, the high prevalence of malaria was recorded in September, Further studies are needed to evaluate the independent effect of other possible special factors in the study area, which might favor the reproduction of malaria mosquito vectors.

Keywords: Malaria infection, associated factors, prevalence, autumn, Kosti, White Nile State, Sudan

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INTRODUCTION:

Malaria parasites, Plasmodium species, are generally transmitted by a bite of infected female mosquitoes of the genus *Anopheles*, members of the *An. Gambiae* complex [1] as well as *An. funestus* group, being the main vectors in sub-Saharan Africa [2, 3]. *An. funestus* transmits *Plasmodium malariae* in Sudan [4, 5] considered *An. nili*, *An. dthali*, and *An. rufipes* as probable vectors of malaria in the Sudan.

In Sudan, Malaria is the major health problem [6], with an estimated 7.5 million morbidity cases occurring annually and more than 35,000 deaths, most of these are children and pregnant women. *P. falciparum* is responsible for about 90% of malaria cases in addition to *P. malariae* and *P. vivax* [7]. Almost, 75% of population is at risk of developing malaria. Malaria transmission is unstable putting the whole country under the risk of malaria epidemic. The possibility of epidemic increased with heavy rains, floods and in case of interruption of control activities [8].

In 2015, 586,827 confirmed cases were reported from public health facilities out of the estimated 1,400,000 cases (970,000; 1,900,000). As well, 868 deaths were reported out of the estimated 3,500 deaths (130; 6800). The reported malaria cases represent 8.7% and 12.2% of the total outpatient attendance and of hospital admissions respectively. The disease proportional mortality was 4.3% in 2015 putting malaria as one of the main causes of death in Sudan [9].

The prevalence correlates with age, as children are 3 times more likely to get malaria than adults. Apparently there was no difference between male and female. Similarly, the lowest economic class is at higher risk. Internally displaced people and refugee camps reported prevalence doubled that in rural areas and 3 times higher than that in urban areas [8, 9].

The objective of this present study is to determine the prevalence rate of malaria disease and associated factors affecting it in north Kosti Town, White Nile State, Sudan.

MATERIALS AND METHODS

Study design:

A cross sectional study was carried out during the period of July to October 2021 at autumn season in Kosti Town, White Nile State, Sudan.

Study area:

This study was carried out in north Kosti town (Alhilla Algadida), White Nile State during the period of July to October 2021 at autumn season. Kosti town is located in Central Sudan. It lies between longitudes (13° 12' -13° 40'E) and between latitudes (13° 39' – 13° 45' N), and at altitude 382 m above sea level. It has a long rainy season which lasts for five months (June-October). The mean annual rainfall is 600 mm; the monthly mean temperature is 22.5°C in winter and 34.5°C in summer and the mean annual relative humidity is 55% [10].

Collection of blood samples:

Samples were collected from the three health centers (Abu-Bakr Satti Center, Abdel Rahim Adlan Center and Malaria Reference Laboratory Kosti locality) which it covered

the study area, from the people who attending these Centers during the study period and show the positive for malaria, and then the personal interview were conducted with them to fill out the questionnaire.

Statistical analysis

The collected data of malaria parasites, different age groups, sexes and species type were entered using Microsoft excel data sheet and were analyzed using SPSS version 20 (Armonk, NY: IBM Corp). Chi squire test was used to compare the difference in frequency of malaria prevalence.

RESULTS

Table 1: The prevalence of malaria disease in north Kosti at autumn in 2021.

| Month | Cases | Health Centers | | |
|-----------|-------------|----------------|-------------|-------------|
| | | A | B | C |
| July | (112)13.6% | (63)56.25% | (26)23.21% | (23)20.54 |
| August | (284)34.18% | (115)40.50% | (96)33.80% | (73)25.70% |
| September | (314)37.78% | (150)47.77% | (120)38.22% | (44)14.01% |
| October | (121)14.44% | (76)62.81% | (30)24.79% | (15)12.40% |
| Total | 831 | (404)48.62% | (272)32.73% | (155)18.65% |

The highest prevalence of malaria disease in Kosti town were recorded in September (314, 37.78), and the lowest prevalence it was recorded in July (113, 13.60) (Table 1). The highest prevalence of malaria 404(48.62%) was recorded in Abu-Bakr Satti center, and the lowest 155 (18.65%) was in Abel Rahim Adlan Health center.

Table 2: The effect of sex, age and educational level on the prevalence of malaria in Kosti town 2021.

| | Variable | Number of infection cases | Percent |
|-----------------|----------------------|---------------------------|---------|
| Sex | Male | 380 | 45.73 |
| | Female | 451 | 54.27 |
| | Total | 831 | 100.0 |
| Age | 1-10 year | 112 | 13.47 |
| | 11-20 year | 132 | 15.88 |
| | 21-30 year | 160 | 19.25 |
| | 31-40 year | 196 | 23.60 |
| | more than 41 | 231 | 27.80 |
| Education level | Total | 831 | 100.0 |
| | Illiterate | 106 | 12.75 |
| | basic education | 154 | 18.54 |
| | secondary education | 186 | 22.38 |
| | university education | 385 | 46.33 |
| | Total | 831 | 100.0 |

From this study, it was found that the prevalence of malaria in Kosti town is higher in females (54.27%) than males (45.73), as for the age groups, it was found that the highest prevalence (27.80%) of malaria infection was in the age groups over 40 years old, the lowest prevalence (13.47%) was in children who were the age group less than 10 years old. As for the educational level, it was found that the highest prevalence (46.33%) was recorded among people whose educational level is above university, and the lowest prevalence (12.75%) was recorded among people whose educational is illiterate (Table 2).

Table 3: The effect of the presence of mosquito nets on the prevalence of malaria in Kosti town 2021.

| | | Frequency | Percent |
|---------------------------|-------|-----------|---------|
| Presence of mosquito nets | Yes | 653 | 78.58 |
| | No | 178 | 21.42 |
| | Total | 831 | 100 |
| | | Frequency | Percent |
| Sleep at mosquito nets | Yes | 571 | 87.44 |
| | No | 82 | 12.56 |
| | Total | 653 | 100.0 |
| | | Frequency | Percent |
| Sleep at mosquito nets | Early | 132 | 20.21 |
| | Late | 521 | 79.79 |
| | Total | 653 | 100.0 |

From the study, it was found that (78.58%) of the study population have mosquito nets, 87.44% of those who have a mosquito nets prefer to sleep in them, and 20.21% only of those who prefer sleeping inside the mosquito nets they sleep early.

DISCUSSION

In this study, they was survived several health center to determine the prevalence of malaria disease during the study period. The highest prevalence of malaria disease in Kosti town was recorded in September. This finding agree with many authors [8, 11-13] they were recorded the high prevalence of malaria in mid of autumn. This is because the high density of anopheles vectors they occur at this time. Also this high prevalence of malaria suggests an additional malaria intervention strategies are required to achieve the intended goal of malaria elimination in the study area. The lowest prevalence of malaria was recorded in October because. The highest prevalence of malaria was recorded in Abu-Bakr Satti center; this finding shows that this center is the main health care center in the study area, according to its geographical location.

The study explained that the prevalence of malaria was more in females than the males; this finding was dis agree with [14] who indicated that malaria infections were more prevalent in malesthan in females. Similar studies indicated that males were more infected with malaria than females in differentpart of Ethiopia [15, 16].

From this study was found the prevalence of malaria was moreprevalent in individuals above the age group more than 41.This is in agreement with a retrospective study conducted in Ethiopia [17, 18]. And this finding does not agree with [19] they indicated that malaria parasite density decreased with increasing in age. This age group was considering productive ages are actively in the evening, which makes them vulnerable to outdoor Anopheles mosquito biting. Similarly, different reports indicated that outdoor activities in the evening contributed to high malaria transmission [14] mainly due to the fact that individuals with outdoor activities are exposed to outdoor biting by Anopheles mosquitoes [20].

In contrast, lower prevalence of malaria was reported in children less than 10 years of age. This finding agrees with [21] who work in guinea and found the prevalence was low in children less than 5 years age. The observed lower prevalence of malaria in children under 10 years of age might be because of their less likely exposure to infected mosquito bite due to good awareness and practices of their parents/care takers on malaria control and prevention activities. In addition, the partially acquired immunity

developed during childhood in such high malaria transmission area might have a protective role in this age group.

From the study, it became clear that the use of nets has a clear role in reducing the prevalence of malaria, as it was found that the prevalence of malaria disease was lower for people who use nets than for those who do not use the nets. This finding agrees with [8, 22-25] those who indicated that the use of long-lasting insecticidal net (LLIN) is one of the most successful means in controlling the malaria disease. However, we find that some people do not use mosquito nets, and some of them who used nets slept in them late at night, which contributes to an increase in the malaria disease. When the population is good knowledge of malaria disease, transmission routes and prevention strategies, it was good to protect them for malaria disease [25].

CONCLUSION

A high prevalence of malaria was observed during the study period. A general reduction in malaria prevalence in the earlier years might have demonstrated the effectiveness of the malaria control program implemented in the area. Further studies are needed to evaluate the independent effect of other possible special factors in the study area, which might favor the reproduction of malaria mosquito vectors.

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