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Research Article

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Survey on Awareness of Malarial Infection among Population of Kolkata, India

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ABSTRACT

Background: A female Anopheles mosquito carrying the malaria parasite bites a human as the bug gathers her blood meal to start the *Plasmodium* species infection process. Despite notable gains and advancements in human health and the reduction of the disease's burden, malaria continues to be a serious public health issue. It is among the top ten leading causes of illness and death in various age groups, including adults and children under five. Malaria is still a significant public health issue in South-East Asia, particularly India. Malaria affects about 36.3% of the world's population in 91 nations.

Methods: This survey was concluded in Kolkata city in India from December 2021 to December 2022. The researcher surveyed 2300 participants from communities in Kolkata and classified two categories: the participants who had a history of malaria, they determined microscopic positive demonstration and those who had no history identified Microscopic negative demonstration. Moreover, the researcher collected 1125 participants of positive and 1175 participants of negative microscopic demonstrations.

Results: Throughout the in-depth analysis, the researcher presented a few survey questions, such as sources of drinking water, sources of water, the purpose of other activities, use of mosquito nets among the positive and negative microscopic demonstrations. The researcher recognized the hemoglobin level of Microscopic positive and negative demonstration.

Conclusion: The study has concluded that mosquito net use, drinking water use, and other water use, have positive effects on malaria prevention. Also, the study has concluded that the haemoglobin levels of participants with positive and negative microscopic demonstrations, showing that 48.91% had malaria.

Key-words: *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium malaria, P. falciparum*

INTRODUCTION

Within 24 hours of the commencement of the illness, effective and economical treatment is advised for all malaria cases. Most "malaria" cases (fever) are self-diagnosed, and most treatments and fatalities occur at home. Ensuring that novel medicine combinations are exclusively utilized for legitimate instances of malaria is the most moral and economically sensible course of action. Although it is economical to increase the accuracy of malaria diagnosis, few simple, reliable, and affordable procedures are available, especially in underdeveloped areas in which they are most required [1].

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The major public health problem of malaria still results in disease and fatalities. One of the most prevalent diseases affecting people with low incomes in developing countries is malaria. The four most frequent parasite species that cause human malaria are *P. falciparum, P. vivax, P. ovale*, and *P. malaria* [2]. A fifth parasite species, *P. knowles*, a monkey parasite, is also known to cause malaria. Due to its extensive dispersion, *P. vivax* is mostly to blame for malaria infections. *P. vivax* is the only species among the four that may be found in climates that are tropical, subtropical, and temperate [3]. *P. falciparum* continues to infect individuals in tropical and subtropical regions, the most frequent cause of a lethal form of malaria. The main vector of malaria transmission is the *Anopheles* mosquito. The principal vector is *Anopheles arabiensis*, with *A. phronesis*, *A. nili, and A. funestus* as secondary vectors [4].

A female *Anopheles* mosquito carrying the malaria parasite bites a human as the bug gathers her blood meal to start the *Plasmodium* species infection process [5]. The likelihood of contracting an infection depends on the diversity and quantity of mosquitoes present in a particular area and the temperature. Periodic episodes of unstable malaria, indicative of malaria transmission, are caused by unanticipated weather changes, such as clouds or heavy rain, in the "Woina Dega" or temperate zone around 1500 m and 2500 m altitude. The "degas," or chilly zone, which makes up about 8.3% of the country and has a climate over 2500 meters, is malaria-free [6].

Despite notable gains and advancements in human health and the reduction of the disease's burden, malaria continues to be a serious public health issue. It is among the top ten leading causes of illness and death in various age groups, including adults and children under five. The most common reason for inpatient stays, outpatient visits, and fatalities is malaria. It is crucial to screen, identify, and treat individuals as quickly as possible to stop the disease's spread [7,8].

Malaria is still a significant public health issue in South-East Asia, particularly India. Malaria affects about 36.3% of the world's population in 91 nations. India accounts for 76.5% of the 2.5 million cases of malaria in the South-East Asian region, which contributes to the overall malaria burden. In 2013, 0.91 million cases were reported, with 127 million tests being done on the suspected cases. Of the infections, 53.7% were caused by *P. falciparum* and 47.5% by *P. vivax*. In the WHO South-East Asia Region, India accounted for 58.7% of all malaria cases. According to National Vector Borne Disease Control Program data, there are 500–1,100 annual deaths and 0.8–1.7 million confirmed malaria cases in India [9,10].

Malaria is a rare illness with a long history among people. Malaria practices and beliefs are frequently influenced by culture, which can affect how well control measures work [11]. Thus, implementing culturally acceptable, long-lasting, and successful therapies depends heavily on local knowledge and traditions of the disease [12]. Community perception, attitudes, and beliefs about malaria prevention, symptom recognition, treatment, and control impact attempts to address the disease and are frequently disregarded in control efforts. These factors differ from nation to country and among individual families [13]. If the society's knowledge, attitude, and practices (KAP) regarding malaria are not considered, the program may fail to achieve sustainable control. KAP can therefore be a crucial step in creating malaria prevention strategies [14].

MATERIALS AND METHODS

Research Design- This is a retrospective survey study conducted in Kolkata city, India by employing a questionnaire containing several queries about the socio-economic parameters of the participants and malarial infections. The study was done from December 2021 to December 2022. This retrospective study gathered information regarding form awareness of malaria survey among the 1125 and 1175 participants. On the other hand, the researcher surveyed different factors, including the source of drinking water, other purposes of water sources, mosquito nets, adoption of malarial prevention, etc. After that, the researcher classified the patients based on positive microscopic demonstration and negative microscopic demonstration. It was helpful to the researcher to collect blood samples and identify the participants' history and new case history. The researcher also determined that if the blood report implied the positive microscopic demonstration, it indicated that the participant had a history of malaria. On the other hand, if the participant had a negative microscopic demonstration, it did not have new malaria cases. As per survey studies, the researcher discovered that 1125 participants had past history and 1175 participants had no history.

Inclusion and Exclusion Criteria- The patients, who are in Kolkata city and malaria-prone areas were included. The patients who claimed to have a history of malaria, needed to submit blood report, microscopy result, records of physical examinations, and patient history were only included.

The patients who could not give enough reports, those who had blood disorders, and other underlying chronic conditions like carcinoma were also excluded. The uncooperative patients, those who did not complete the questionnaire, were excluded.

Statistical Analysis- The study used SPSS 25.0 for effective analysis. The study employed ANOVA and chi-square test for the analysis. Hemoglobin level was analyzed using ANOVA while other parameters were analyzed using the MS Excel for effective analysis.

The continuous variables were expressed as mean±standard deviation. The discrete variables were expressed as counts and their respective percentages. The hemoglobin level was considered in each group, and the mean value was calculated along with the standard deviation.

Ethical Approval- The authors throughly explained the study process to each participant and obtained written consent before gathering the information from them.

RESULTS

As per the survey, the researcher has collected information on the awareness of materials who had suffered from malaria. This survey concluded with 1125 positive microscopic demonstrations and 1175 negative microscopic demonstrations. The researcher found that 1125 positive microscopic demonstration participants had used main sources of drinking water: government supplies (25.8%), ponds (25.7%), self-owned pumps (24.5%), and Tube wells (23.8%).

On the other hand, 1175 participants were part of negative microscopic demonstrations; they had used the main source of drinking water: government suppliers (25%), ponds (25.7%), self-owned pumps (25.4%), Tube wells (23.4%). In addition, as per the survey, the researcher found that among 1125 Positive Microscopic demonstrations, people used water for their household activities from Government supplies (33.9%), self-owned pumps (32.1%), tube well (38.3%). Again, on the other side, among 1175 negative microscopic demonstrators who had used water for other activities from government supplies (31.6%), self-owned pumps (31.4%), Tube well (32.5%). Moreover, the survey found that 48.8% of Positive Microscopic demonstrations used mosquito nets and 51.2% did not use mosquito nets. Furthermore, among 1174 negative microscopic demonstration participants, who % had used mosquito nets 50.3%, and no user 49.6%.

Table 1: Findings on awareness of malarial prevention in the population studied

Main Questions on awareness	Positive Microscopic demonstration (%) (N = 1125)		Negative Microscopic demonstration (N = 1175)		p-value
Main Source of Drinking Water	Government Supplies	291 (25.8)	Government Supplies	294 (25)	0.695
	Pond	290 (25.7)	Pond	302 (25.7)	0.744
	Self-owned pump	276 (24.5)	Self-owned pump	303 (25.7)	0.743
	Tube well	268 (23.8)	Tube well	276 (23.4)	0.741
main source of water used by your household for other purposes	Government Supplies	382 (33.9)	Government Supplies	372 (31.6)	0.629
	Self-owned pump	362 (32.1)	Self-owned pump	370 (31.4)	0.699
	Tube well	431 (38.3)	Tube well	383 (32.5)	0.536
Does your household have any mosquito nets?	Yes	No	Yes	No	
	549 (48.8)	576 (51.2)	592 (50.3)	583 (49.6)	0.632

As per survey, the researcher had classified among participants who had positive and negative microscopic demonstrations. By the hemoglobin level test, the researcher had classified positive of past history of malaria and negative of no malaria of microscopic demonstrations of participants. However, the subsequent figure has demonstrated that in the past history of malaria and negative malaria participants, their hemoglobin level is below average from 8.47±1.2 g/dl of positive microscopic demonstration as well as 9.56±1.2 g/dl of negative microscopic demonstration (P=0.421), which was a significant difference.

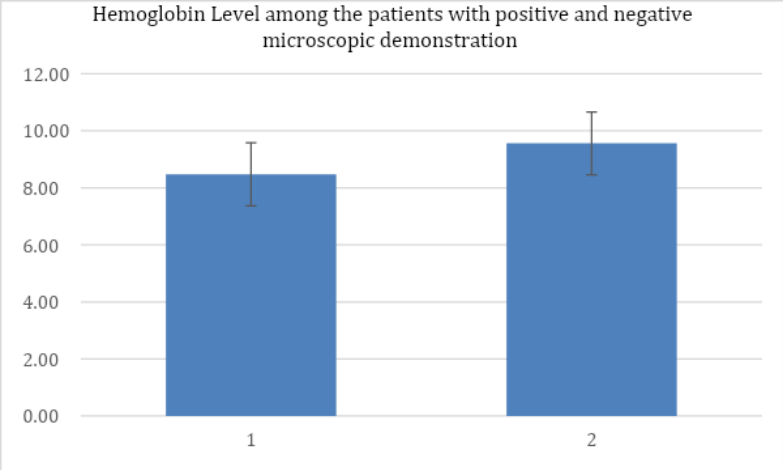

Figure 1: Hemoglobin Level among the patients with positive and negative microscopic demonstration

DISCUSSION

Two-thirds of the population in Myanmar is in danger of contracting malaria, which has a high prevalence there. Early identification and treatment within 24 hours of fever are two fundamental components of the Roll Back Malaria Initiative. A crucial component of malaria prevention, control, and increasing treatment-seeking behavior are raising public awareness of the disease. According to a new study, there are some misconceptions regarding how malaria is transmitted, even though mosquito bites are a fairly well-known route of transmission and malaria prophylaxis. People with inadequate malaria knowledge exhibit poor treatment-seeking behavior. A sizable portion of respondents seek assistance from unofficial carers and do so after hours [15].

Many causes, including quickly spreading antimalarial drug resistance, changes in the climate, and rapid urbanization, are likely to blame for the recent rise in malaria in endemic regions with exploding epidemics in many parts of Africa. *Anopheles* gambiae complex, and *P. falciparum* are parasites that cause and spread malaria in Africa. The control efforts have been uncoordinated and dispersed. For the development of antimalarial medications and vaccines and for a deeper comprehension of the disease's pathophysiology, vector dynamics, epidemiological, and economic aspects [16].

The asymptomatic parasite reservoirs are the focus of malaria elimination efforts in the Greater Mekong Sub-region (GMS). Community engagement design depends on knowing how the local population views asymptomatic diseases and strategies that target this reservoir. In communities in southern Savannakhet Province, Laos, where malaria is endemic, a study was conducted to investigate knowledge, attitudes, perceptions, and practices related to asymptomatic diseases and mass drug administration (MDA). The study concluded that there was little knowledge of asymptomatic malaria infections and MDA as a technique to eradicate malaria. To educate target populations about asymptomatic infection and identify asymptomatic malaria transmitters for eradication efforts in the GMS, supporting community outreach must involve government stakeholders, influential locals, and community members. Executing and maintaining the management and eradication initiatives requires training community members and giving them responsibility [17].

In many areas of India and the Indian subcontinent, malaria is extremely common. Malaria is endemic in Mangaluru, a city in India's Karnataka state's southwest coastal region, and the nearby districts, with an annual parasite index of 10–12. Despite the significant endemicity, the epidemiology and burden of malaria in this region have received very little attention to date. *P. vivax* is a more common malaria species than *P. falciparum* in the Mangaluru region for the entire year. It was discovered that the rainy season had a higher infection prevalence. Infection rates were noticeably greater in men than in women, especially in people between the ages of 16 and 45, compared to both older and younger age groups. Additionally, compared to the native population, immigrants had a higher incidence of malaria [18].

In the Mangaluru region, where immigrant laborers and people from low socioeconomic status are concentrated, malaria rates are primarily limited to a few hotspot locations of the city. These places have poor sanitation and persistent water stagnation, which support a high

density of vectors and raise the risk of infection. Additionally, few people in these regions use preventative measures like bed nets. In areas with high vector densities, extended working hours that go into the evening and minimal clothing use are to blame for the high prevalence of malaria in adults. The risk of procuring infections in such areas and expanding to other areas may be significantly decreased by governments implementing increased preventive public measures and raising awareness about preventive barrier protection and environmental hygienic measures through educational programs [18,19].

Relative to severe falciparum malaria, *P. vivax* rarely causes severe consequences. But serious vivax malaria requires immediate, intense care and treatment like acute falciparum malaria. This systematic review aimed to investigate the prevalence rate of serious vivax malaria and assess the possible variables for individuals who experienced severe manifestations. The WHO defines severe anemia as the most typical main *P. vivax* malaria presentation. Patients with *P. vivax* experienced severe anemia less frequently than those with *P. falciparum*. Patients with severe vivax malaria may have poor outcomes if they have renal failure, anuria/oliguria, jaundice, complications during therapy, mean days of fever, and higher pulse rates upon presentation [20].

CONCLUSIONS

The study has concluded that mosquito net use, drinking water use, and other water use, have positive effects on malaria prevention. Also, the study has concluded that the haemoglobin levels of participants with positive and negative microscopic demonstrations, showing that 48.91% had malaria. This survey's researcher used open-ended questionnaires. The researcher divided malaria-positive and malaria-negative subjects into two groups. This in-depth statistical analysis also helped researchers discover 1125 subjects with positive microscopic demonstrations and 1175 with negative ones.

This retrospective survey in Kolkata, India used a primary questionnaire with open-ended questions to enhance malaria awareness. The researcher also explored malaria's cause and prevention.

CONTRIBUTION OF AUTHORS

One author is only contributed in this article.

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