

Detection of Malaria Parasites in Different Age and Gender Groups Using a Light Microscopy

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ABSTRACT

Background: Malaria is the world's most frequent tropical infectious illness and serious public health concern in Pakistan. Malaria prevention in tropical regions depends on effective Plasmodium infection diagnosis. The purpose of this study was to use microscopy to determine the prevalence of malaria in various age and gender categories.

Materials and Methods: A cross-sectional study of 1000 people was undertaken to detect malaria. Thick and thin blood smears were prepared and stained with freshly made Giemsa stain before being examined under a light microscope.

Results: Malaria parasites were identified in 40.3% of the total number of suspected cases. The age group 41-60 years had the highest proportion of malaria-infected people (45.1%), whereas the age group >60 years had the lowest proportion (21.7%). Males were found to be more affected, accounting for 45.7% of the total 525 people, while females accounted for 34.3% of the total 475 people.

Conclusion: It has been determined that malaria parasites infected more adults and males than children and females. In developing regions, light microscopy is the sole feasible method for malaria diagnosis. Accurate malaria diagnostic procedures have a significant impact on reducing the number of malaria-infected people. As a result, reinforcing microscopist training is critical for establishing accurate malaria diagnoses.

Keywords: Malaria, Light Microscope, Plasmodium, Pakistan

INTRODUCTION

Malaria is one of the most common number one causes of morbidity and mortality inside the universe. It is a vector-borne disease and the vector accountable for the transmission of malaria is female anopheles mosquitoes¹. Every year malaria kills approximately 781,000 humans and there are greater than 225 million cases of malaria every year according to WHO 2010 survey Organization's World Malaria Report². It had expected 219 million cases and 660000 deaths in 2010, worldwide 3.3 billion humans were vulnerable to malaria in 2011, and about 80% of cases and 90% of all deaths happened in Africa³.

Malaria is one of the most important health problems in the tropical and subtropical areas of the world. Pakistan occurs approximately in the central part of malaria because most of the Pakistani people live in rural areas between the tropical and sub-tropical countries. It has a reasonably widespread summary of malaria which was the second most commonly reported disease in the public health sector³. In Pakistan, malaria is common in July and August. Most people in Pakistan live in rural areas. Malaria has been widespread in Baluchistan, Sindh, and Khyber Pakhtunkhwa. The frequency of malaria is greater in Baluchistan and federally administered tribal areas (FATA) whereas Khyber Pakhtunkhwa (KPK) and Sindh have a middle center for the frequency of malaria. Out of 123 districts of Pakistan, 91 districts (86.7%) are malaria endemic¹.

Plasmodium species can be transmitted physiologically by the bite of a female anopheles mosquito which is called malarial vectors¹. Present about 400 varieties of anopheline mosquitoes are present in the world only concerning 60 or significant vectors of malaria under normal circumstances. Vectors of malaria differ from position to position a vector in one position requires not essentially taking action as a vector in an additional position⁴. Temperature is linked to malaria mosquito and parasite essential raters and accepting. The function of temperature in malaria transmission is most important in light of atmosphere change⁵. To examine where highland malaria transmission occurs and where is spreading we acquire to have precise acceptance of the interaction connecting the highland environment and transmission. What time the temperature drop lower the minimum for parasites development, transmission ceases although the presence of malaria vectors⁶.

Malaria is widespread in Pakistan and makes a national health priority⁷. The diagnosis of malaria is based on a microscopic assessment of blood, by using both thick and thin Giemsa-stained smears. The benefit of a thick smear is used for the identity of species. The identification of species is so essential due to the fact the treatment of different species can range⁸. Malaria rapid diagnostic tests (RDTs) which want much less training begin to be used for routine malaria testing. Requiring the most effective drop of blood RDTs identify antigens unique to plasmodium species. WHO diagnosed that about 40% of malaria-affected people worldwide looking for a remedy to malaria in the private sector, which incorporates concord health facilities, pharmacies, and other drugs. But this plan has very little awareness of the correct analysis of affected persons with malaria. It is, therefore, necessary that both public and private sectors are cautious in studies investigating the result of diagnostic equipment on community health results⁹.

Those patients who suffered from plasmodium vivax malaria responded to chloroquine phosphate drug while those suffering from plasmodium falciparum malaria and other mixed infection not including difficulty were provided tab quinine sulfate and doxycycline¹⁰. Plasmodium vivax malaria is more common across a great area of the world and potentially affects a greater number of people than plasmodium falciparum malaria¹¹. plasmodium falciparum is connected with the highest morbidity and mortality and is characterized by a high degree of parasitemia than the risk of the other four species¹².

The people who live in Pakistan, and India are at the highest risk of plasmodium vivax species whereas the people living in Saudi, Yemeni, and Sudanese plasmodium falciparum were the predominant species. Malarial problem is most common in the tropical and sub-tropical region as the temperature in rainfall supports the continued existence of malaria-causing plasmodium parasite, it is estimated that a worldwide overloaded of 1.6million cases occurred per year¹³. Therefore, this study was conducted to find the frequency of malaria in different age and gender groups through microscopy.

MATERIAL AND METHODS

This cross-sectional study was carried out for a duration of six months (August to December). A total of 1000 suspected patients were screened for malarial parasites irrespective of age and

gender. Suspected patients of the malarial parasite were included in the current study. While patients having antimalarial treatment were excluded from the study.

With the usage of sterile needle and syringes, two milliliters (2ml) of venous blood turned into accumulated from each patient, and the blood sample was gathered using the venipuncture technique (by applying a tourniquet across the upper arm and sterilizing the arm with 70% ethanol to sterilize and increase blood pressure inside the veins) had been allotted into ethylene-diamine-tetra-acetic acid (EDTA) anticoagulated blood containers, well blended using the standard method and labeled to ensure blinding.

Slides put together thick and thin smear, thick blood films had been made on grease loose microscope slides (after suitable labeling) and allowed to air dry on the laboratory bench. Slides have been organized on a staining rack and flooded with 10% (v/v) Giemsa stain solution for 15 minutes. Thin and thick smears of the samples had been organized on sterile slides and at the end stained with Giemsa at PH 7.2. The thick smears had been considered beneath x100 objective lenses of the microscope to come across the presence of malaria parasite (plasmodium spp); sooner or later, the thin smear was used to identify the species of the parasite.

The data was analyzed through the statistical package for social sciences version 21. The proportion was shown in percentage.

RESULTS

A total of 1000 male and female patients were screened for malarial parasites. Out of the total, 403 (40.3%) were positive and 597 (59.7%) were screened negative. In all positive cases, the plasmodium vivax was observed see table 1.

Table 1: overall frequency of malaria

Parameters	Frequency	Percentage
Positive	403	40.3%
Negative	597	59.7%
Total	1000	100%

Patients were examined according to age wisely. A total of 511 patients of age less than 20 years were screened for the malarial parasite of which 212 (41.5%) were positive and 299 (58.5%) were negative. From 21 to 40 years of age, a total of 344 patients were screened of which 131 (38.1%) were positive and 213 (61.9%) were negative. From 41 to 60 years of age, a total of 122 patients were screened of which 55 (45.1%) were positive and 67 (54.9%) were negative and above 60 years of age a total of 23 patients were screened in which 05 (21.7%) were positive for plasmodium vivax and 18 (78.3%) were negative for plasmodium vivax. The highest frequency was observed among the aged 41-60 (45.1%) whereas the lowest (21.7%) frequency was observed above 60 years of age.

Table 2: Age-wise classification of malarial- parasite

Age (Years)	Positive	Negative	Total
Below 20	212 (41.5%)	299 (58.5%)	511
21-40	131 (38.1%)	213 (61.9%)	344
41-60	55 (45.1%)	67 (54.9%)	122
Above 60	05 (21.7%)	18 (78.3%)	23
Total	403 (40.3%)	597 (59.7%)	1000

Gender-wise patients were also investigated. A total of 525 males patients were screened for the malarial parasite in which 240 (45.7%) males were positive for malarial parasite and 285 (54.3%) males were negative for malarial parasite and a total of 475 females patients in which 163 (34.3%) females were positive for malarial parasite and 312 (65.7%) females were negative for the malarial parasite. In Gender wise classification the highest frequency (45.7%) was observed among males while the lowest frequency (34.3%) was observed in females.

Table 3: Gender-wise classifications and their frequency

Gender	Positive	Negative	Total
Male	240 (45.7%)	285 (54.3%)	525
Female	163 (34.3%)	312 (65.7%)	475
Total	403 (40.3%)	597 (59.7%)	1000

DISCUSSION

Almost 300-500 million malaria cases are suggested every year and there are about 1-2 million deaths every year. Pakistan has been categorized as a country with moderate malaria prevalence and a relatively properly installed manage programmed. Even then Pakistan reports around 0.5 million malaria instances and 50,000 deaths yearly¹⁴.

A total of 1000 suspected patients were screened for malarial parasites out of 1000 samples 403 (40.3%) were positive for plasmodium vivax and 597 (59.7%) were negative for plasmodium vivax. Of 525 males 240 (45.7%) were positive while 285 (54.3%) were negative for the malarial parasite. Of 475 females 163 (34.3%) were positive for malarial parasite and 312 (65.7%) were negative. In the present study, males were more prevalent (45.7%) than females (34.3%) which might be a result of increased exposure to mosquitoes. As males spend extra time sitting out of doors inside the night in the course of the peak biting duration of mosquitoes. Similarly, male ruled kind of work along with agricultural work extending to the nighttime or sleeping away from settlements, especially in forests may also increase the chance of malaria in many males and subsequently makes men extra susceptible than women. On the other hand, due to social customs females are limited at home and protected themselves properly which are not exposed. Moreover, the female has better immunity to parasitic diseases than the male. Even though malaria can infect human beings at any age and irrespective of gender¹⁵.

In the current study, the highest frequency was found in the age group 41 to 60 years of age because the people of this age mostly go out for work and most of them they work in the field and participated in different activities or other marshy place due to this reason they get malaria more while the lowest frequency was obtained in the age group above 60 year of age because the peoples whose age is above 60 year mostly they are limited to home due to this reason they get the lowest ratio of malaria. In Pakistan, common observations indicate that P. vivax is more typical than P. falciparum. The occurrence rate of P. vivax represents a critical well-being danger because not just P. vivax disease yet contamination with P. falciparum additionally may prompt genuine complications like cerebral malaria¹⁶. A similar study was performed by Yasinzai in Zhob Baluchistan, in that study mixed infections were not found¹⁷.

However, mixed infection of P. vivax and P. falciparum was not seen in the present study, as the mixed disease of 3.4% was observed in Abbottabad by Idris et al in 2006¹⁸, Yar et al (1998)¹⁹ and Zarchi et al (2006)²⁰ conducted studies and observed mixed infection 2.3% in Multan and 18.3% in Iran respectively²¹. A study conducted in 2017 at District Shangla, Malakand division showed that 13.99% prevalence of malaria parasite found which is more common in the male population (65.24%) than female population (34.76%)¹. Another study was conducted in Lal Qilla district Lower Dir, which revealed that the prevalence of malaria parasite was 17.32% with a ratio of (58.7%) male and (41.3%) were female. The high number of malaria cases was recorded in ages 15-64 years (76.72%) while the lowest numbers of malaria cases were recorded in age > 65 years (9.52%)²². Some reports showed high while others revealed the lower prevalence of the malarial parasite in Pakistan as compared to the present study. Prevalence of malarial parasite in Bannu is 4.28%, and 39% in south Punjab, Zohb 51.8%, Kohlu 58.9%, Multan 60.5%, Ziarat 88.5%, Muzafarabad 90.4% (Kashmir), Okara (98%)^{17, 21}.

CONCLUSION

It was concluded with the results of the present study that males were more affected than females due to exposure to the open

surrounding while the female is restricted to their domestic due to this reason they are not exposed to mosquito bites as more. The excessive frequency of malaria in district Lower Dir was the use of inappropriate antimalarial, spray poor hygienic state, sharing of the house with livestock and inappropriate diagnosis high temperature of the area and load shading also play a major role in the spread of malaria in district Lower Dir. Knowledge and appropriate treatment are required to manage the disease. This study will help in increasing the awareness among the health community about the most common infectious disease in Pakistan and preventing and treatment of malaria in the future.

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