

## Frequency of Smear Positive Malaria and Socio-demographics Factors of Patients Visiting the Microscopy Center of a Tertiary Care Civil Hospital, Khairpur

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### Abstract

**Objective:** The aim of the study was to determine the frequency of smear positive malaria and socio-demographic factors of patients visiting the Microscopy center of Civil hospital Khairpur.

**Methods:** A cross-sectional study was conducted January 2016 to April 2016 by using structured questionnaire to assess frequency of smear positive malaria among patients visiting Microscopy center of Civil Hospital Khairpur. About 138 patients who were prescribed Malaria Parasite (MP) Test by the doctors were selected by using consecutive sampling technique and interviewed regarding their socio-demographic characteristics. Data was entered and analyzed by using SPSS version 21.

**Results:** Out of total 138 participants, 55.5% were males, Majority were less than forty years of age with highest range of 25-40 years. Malaria parasite test was found to be positive in 6.5 % participants and the most common identified species was Plasmodium Vivax.

**Conclusion:** This study suggests that Malaria is endemic in certain areas of Khairpur District and Plasmodium Vivax is the most common species affecting the people who visited Microscopy centre for the Malaria Parasite (MP) test. Health education and community participation would be needed to eliminate the Malaria from community.

**Keywords:** Frequency of Malaria, endemic, insecticide treated nets, microscopy, Roll Back Malaria

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### Introduction

Malaria is endemic in Pakistan especially in rainy season. Pakistan joined Roll Back Malaria campaign of World Health Organization by founding Microscopy and Rapid diagnostic center in 2001. Malaria is common public health problem in many parts of World, including Pakistan<sup>1</sup>. Malaria is the third top killer disease and it is estimated that 1 million people die globally each year, the majority

of which are children<sup>2</sup>. According to World Health organization 350 million people suffer from acute Malaria each year<sup>1</sup>. In endemic areas women had severe anaemia during pregnancy if infected with malaria<sup>3</sup>. Malaria is still hyper endemic in Pakistan while many countries have joined zero indigenous cases in 2014 as per World Health Organization, 2015 report majority of the countries are moving towards elimination of malaria. However, Argentina and Kyrgyzstan commenced the WHO process for certify action of malaria elimination<sup>4</sup>. Pakistan falls in Eastern Mediterranean Regional Office (EMRO) region while Iran and Saudi Arabia have qualified the elimination phase of malaria<sup>2</sup>. According to WHO 2014 report, since 2000, the financing and adoption of Roll Back Malaria Initiative has increased remarkably<sup>5</sup>.

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Globally it is estimated that Malaria case incidence rates decreased by 30% between 2000 and 2013, while estimated mortality rates reduced by 47%<sup>6</sup>. In 2012, about 130,000 confirmed Malaria cases reported in Pakistan while according to WHO 1.6 million malaria cases may occur in Pakistan and 350 million acute malaria cases occurs annually worldwide<sup>7</sup>. The prevalence of malaria is witnessed high due to irrigation networks, population growth & aberrant urbanization. Pakistan is actively engaged in malaria control activities since 1950<sup>8</sup>.

According to WHO Report of 2014 *Vivax* and *Falciparum* are the most common species of malaria in Pakistan; Furthermore malaria is still hyper endemic in many areas of Pakistan affecting women and children at unprecedented scale<sup>1</sup>. Another study conducted in Sindh to determine the prevalence of malaria which found frequency of smear positive malaria was 9%<sup>9</sup>. Recently, many countries are targeting to become malaria free and reporting zero indigenous cases while in Pakistan no serious initiatives are taken to achieve MDG 6 goal<sup>10</sup>.

Malaria began to increase from 1969 with collapse of malaria eradication program and the National malaria Control program started in 1975 (MCP). The WHO started Roll back Malaria in 1998 as global initiative to reduce burden up to 50% by 2010. Developed by the Roll Back Malaria (RBM) Partnership, the first Global Malaria Action Plan (GMAP) - for a malaria-free world 2008-2015 was endorsed by world leaders and malaria committee. GMAP became a valuable advocacy tool that provided the malaria committee with a roadmap for progress, and an evidence-based strategy for delivering effective prevention and treatment. In 2001 Pakistan joined Roll Back Malaria initiative by establishing Microscopy centers in several tertiary care and district health centers of Pakistan<sup>2</sup>.

The rural population of Pakistan is suffering from vector transmission due to ill planned irrigation network. Also agriculture products encouraging mosquito breeding and less functional municipal corporations to combat malaria are present; hence research initiatives are required by institutions to control mosquito's rapid breeding and bottlenecks causing obstacles in controlling vector. The current

study was designed to investigate the magnitude of the malaria occurrence along with the type of *Plasmodium* species mainly affecting the people of Khairpur district as malaria has found to be one of the commonest reasons for referral to tertiary care hospitals across Pakistan.

Hence, there was a need to highlight the burden of disease in the district of Khairpur where mixed urban-rural population seeks health care at the biggest tertiary care Hospital of Khairpur. To the best of our knowledge no such study has been conducted in this district. This study will provide evidence-based baseline information which will be helpful in formulating strategies for control of vector spread, easy access to the diagnostic centers and ultimately achieving the goal of Roll back Malaria Partnership to reduce 90% of the mortality rate, incidence and help Pakistan become a malaria free country by the Year 2030. The objective of the study was to determine the frequency of smear positive malaria and socio-demographic factors of patients visiting Microscopy center of Civil hospital Khairpur.

## Material and Methods

A cross sectional study was conducted from January 2016 to April 2016 by using consecutive sampling technique at the Microscopy centre of the Civil Hospital Khairpur which is the biggest centre of the Khairpur District and it serves about 30 patients daily. The patients who visited Microscopy center of Civil Hospital Khairpur for the Malaria Parasite (MP) test, which were referred by the qualified physicians were included in the study. The approval was taken from the research committee of Dow University of Health Sciences. Written consent was obtained from the adult participants and from the parents/ guardian of those patients who were less than 15 years of age after describing the procedure and purpose of the study. WHO Sample size calculator calculated the sample size of 138 by using the prevalence of malaria to be 10%<sup>1</sup> with 95% confidence interval and 5% margin of error. About 138 participants were included in the study by using consecutive sampling technique. Those patients who did not give consent and had chronic illness like Tuberculosis, HIV and any other autoimmune disease were excluded from the study. Infor-

mation regarding socio-demographic characteristics was obtained through pre-designed questionnaire adopted from Pakistan Demographic Health Survey 2013<sup>11</sup>. Those participants whose Malaria test was positive through microscopy Malaria Parasite test with Geimsa staining thick film were labelled as malaria positive patients and then thin peripheral film test was performed to determine the species of Plasmodium. Data was entered and analyzed by SPSS version 21.00. Mean and standard deviation were calculated for quantitative data. Frequencies and percentages were calculated for categorical data.

## **Results**

Out of 139 participants, 55.5% were males and 44.5 % were females, with mean age of 26.78 ± 16.26 years. Majority of participants were below 40 years of age with 29.7% were range between 26-40 years. About 27% of the participants were the children less than 15 years of age and were accompanied by their parents or guardian. About 54.3% of study participants were illiterate. Nearly half of the patients were residents of the rural areas nearby Khairpur District. Out of 99 patients who were more than 15 years of age, seventy-two (27.2%) were married. About 51% were earning less than 10,000 rupees monthly and only eighteen participants reported their household income more than 20,000. About 80% people were using bore water for drinking purpose and more than 97% of the patients reported that they were using unboiled water for drinking (Table 1).

Out of 138 participants who were prescribed Malaria Parasite test only 9 (6.5%) were found to have smear positive malaria test identified on the thick film while 93% had smear negative (Table 2).

Amongst those 9 smear positive patients 7 (77.7%) were found to have Plasmodium Vivax in their smear and 2 (22.2%) had Plasmodium Falciparum. Other species of Plasmodium i.e Ovale or Malariae were not identified in any peripheral blood film (Table 3).

## **Discussion**

In this study Plasmodium Vivax was found to be most common species of malaria affecting

people in Khairpur district. Several studies reported that malaria is common among less than five years of age children and this is consistent with the findings of our study. A study conducted in Kenya reported that majority of the patients of malaria were children less than 5 years of age and 49% had a positive blood film<sup>12</sup>. Another study from Tanzania regarding complex relationship between intensity of malaria exposure, age, clinical manifestations, and fatality of malaria, suggested that age-related factors influence susceptibility to severe malaria independent of acquired immunity among under five year children<sup>13</sup>. The children were mainly attacked by anopheles mosquito probably because of lack of protective measure against malaria and their exposure to breeding areas while playing outside.

The literacy rate has pivotal role in reduction of disease burden in any country. The literature reported that malaria has very strong association with literacy ratio. The prevalence of malaria was reported low in literate nations<sup>14</sup>. It could be due to adequate knowledge, organized health education practices and preventive strategies adopted for malaria. In our study more than half of the participants were found to be illiterate. In illiterate communities where malaria is endemic, health education must be taken into account for desired outcomes in malaria control. A study conducted in Nepal showed that majority of the respondents were found to be illiterate and Illiteracy had a profound influence on perception and cause of disease, which determines their health seeking behavior for malaria<sup>15</sup>. A study conducted in South Indonesia regarding knowledge showed that limited knowledge and inappropriate practices of malaria were found to be related to lack of education and socioeconomic status of community<sup>16</sup>. It is observed with serious concerns that illiterate people have different understanding of malaria and health seeking behavior across the globe. A study conducted in Kenya showed similar results with highest frequency of Malaria among less privileged, illiterate and poor people. In addition behaviour, formal education, wealth (livestock value), and knowledge on malaria cause and transmission increases the number of malaria preventive practices adopted in a male-headed household than females as reported in the study by Sharma et al<sup>17</sup>. Furthermore, women and children were found in a

**Table 1.** Sociodemographic characteristics of the study Participants N=138

| Characteristics                                  | Frequency (N=138) | Percentage (%) |
|--|-------------------|----------------|
| <b>Age in years</b>                              |                   |                |
| <5 years   | 15                | 10.9           |
| 5-15 years                                       | 24                | 17.4           |
| 16-25 years                                      | 30                | 21.7           |
| 26-40 years                                      | 41                | 29.7           |
| >40 years  | 28                | 20.3           |
| <b>Gender</b>                                    |                   |                |
| Male   | 77                | 55.7           |
| Female   | 61                | 44.3           |
| <b>Marital status of adult population (n=99)</b> |                   |                |
| Single   | 27                | 22.72          |
| Married  | 72                | 72.28          |
| <b>Educational status</b>                        |                   |                |
| Illiterate                                       | 75                | 54.3           |
| Primary  | 33                | 23.9           |
| Intermediate                                     | 17                | 12.3           |
| Graduation/post-graduation                       | 13                | 9.5            |
| <b>Total household income in Rupees</b>          |                   |                |
| <10,000  | 71                | 51.4           |
| 10,000 - 20,000                                  | 49                | 35.5           |
| 21,000-35,000                                    | 18                | 13.1           |
| <b>Area of residence</b>                         |                   |                |
| Khairpur city                                    | 61                | 44.2           |
| Luqman   | 7                 | 5.1            |
| Rural area                                       | 61                | 44.2           |
| Outside Khairpur                                 | 9                 | 6.5            |
| <b>Source of drinking water</b>                  |                   |                |
| Bore   | 113               | 81.9           |
| Water supply                                     | 22                | 16.1           |
| Unsafe open water                                | 3                 | 1.5            |
| <b>Type of water</b>                             |                   |                |
| Boiled   | 3                 | 2.2            |
| Un- boiled                                       | 135               | 97.8           |

**Table 2.** Frequency of Smear positive Malaria among study participants N=138

| Malaria test Result | Frequency (N=138) | Percentage (%) |
|---------------------|-------------------|----------------|
| Smear Positive      | 9                 | 6.5            |
| Smear Negative      | 129               | 93.5           |

**Table 3.** Frequency of types of Plasmodium specie among smear positive Patients (n=9)

| Type of Plasmodium Specie | Frequency (n=9) | Percentage (%) |
|---------------------------|-----------------|----------------|
| Vivax                     | 7               | 77.77          |
| Falciparum                | 2               | 22.22          |

high risk group and a number of women due to malaria suffered from complications due to malaria during pregnancy worldwide<sup>18</sup>. Malaria is found fatal for pregnant women and neonate reported in global burden of disease analysis<sup>4</sup>.

It is commonly believed that malaria is directly associated with poverty<sup>19</sup>. In fact it has close association with socio-economic conditions in getting access to health care provider, quality anti-malarial drugs and diagnosis of infection<sup>20</sup>. In our study we found that half of the participants were earning income below ten thousand monthly, showed that majority belong to low socioeconomic class. The socio economic factor plays major role in sanitation and cleanliness of surrounding environment. The economic disparities and social inequalities are highly responsible for affecting health and related conditions of human being. The people living in deplorable conditions in suburban areas were found mostly infected with malaria. However in contrast to our study another study from Sudan suggested that socio-economic inequalities had not much significant effect on the endemicity of the malaria<sup>21</sup>.

In Pakistan, the two endemic species of plasmodium are Vivax and Falciparum, However, in our study the most common identified species was Plasmodium Vivax, Plasmodium Ovale and Malariae was not identified in any thin film of peripheral blood smear. Similar results have been reported by the previous studies from Hyderabad and interior Sindh in which the majority of the patients were infected by the Plasmodium Vivax, identified in the Microscopy test<sup>22-23</sup>. In contrast to this study and other studies from African and EMRO region in Northeastern Tanzania and eastern African state have reported Falciparum to be the most common plasmodium species affecting the community with the wide range of complications and high morbidity<sup>24-27</sup>.

There were several limitations of the study firstly it was a cross-sectional study so temporal association cannot be established. Secondly, it was a single-centered study of tertiary care hospital so results cannot be generalized over the entire population of Khairpur District. It is recommended that strategies of Roll Back Malaria Initiative should be adopted at each basic unit of health to become a Malaria Free State. Furthermore interventional studies are recommended to develop better strategies for Malaria eradication.

### Conclusion

This study suggests that malaria is endemic in the Khairpur District, and Plasmodium Vivax is the most common species, affecting the people who visited Microscopy centre for the MP test. Health education and community participation would be needed to eliminate the malaria from community.

### Conflict of Interest

Authors have no conflict of interests and no grant/ funding from any organization for this study.

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