

PREVALENCE OF HUMAN *PLASMODIUM* INFECTION IN UNION COUNCIL OF GHALADER DISTRICT MARDAN, KHYBER PAKHTUNKHWA PAKISTAN

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ABSTRACT: Malaria is one of the most common health problems especially in developing countries. The present study was carried out to estimate the prevalence of human plasmodium infection in Basic Health Unit of village Ghala Der, District Mardan Khyber PakhtunKhwa, Pakistan. A total of 845 patients were screened for malaria over the period from 1st June to 2009 to 31st March 2014. All patients underwent screening for *Plasmodium species* by Rapid diagnostic test (RDT). The overall prevalence of malaria was found to be 13.9 %. High prevalence of *P. vivax* 41(9.03%) was found in males followed by females 26(7.9%) with statistically non-significant association ($P > 0.05$). Moreover, the higher prevalence of *P. vivax* was recorded in patients with age group of 5-14 years was 30(8.13%), followed by age group of patients greater than 14 years 26(11.3%). Non-significance association was found among them ($P > 0.05$). Furthermore mixed species infections and some cases of with complicated sign and symptoms were also reported. In conclusion, *P. vivax* is the predominant species in these areas of District Mardan. It is recommended that public health authorities should educate the general public regarding prevention.

KEYWORDS: Prevalence, plasmodium species, District Mardan

INTRODUCTION

Malaria is one of the major health problems worldwide especially to a population across the tropical and subtropical areas. It has irresistible importance in the developing countries and causes over millions of deaths per year (Soomro *et al.*, 2009). The infectious disease malaria is mosquito-borne and causes infection in human and some other animals by parasitic protozoans of the genus *plasmodium* (Ferri, 2009). Five species of Plasmodium can cause infection and be transmitted by humans. The majority of deaths and severe problems are caused by *P. vivax* and *P. falciparum*, whereas *P. ovale* and *P. malariae* cause a generally milder form of malaria that is frequently not lethal (Mueller *et al.*, 2007; Collins, 2012).

Usually it is transmitted by a bite from an infected female Anopheles mosquito, which introduces the organisms from its saliva into a person's circulatory system and may result in a wide variety of symptoms, ranging from mild symptoms typically include headache and fever, to severe cases or even death. Malaria can be classified as uncomplicated or severe cases (complicated) (Jamieson *et al.*, 2006).

The diagnosis of malaria is commonly by the microscopic examination of blood using blood films or with antigen-based rapid diagnostic

tests. Molecular techniques that use the polymerase chain reaction to detect the parasite's (plasmodium) DNA have also been developed, but these molecular methods are not widely used due to their complexity and cost (Kattenberg *et al.*, 2011; Wilson, 2012).

Malaria is endemic in some regions of the Americas, many parts of Asia, and much of Africa i.e. 85–90% (Layne, 2007). Pakistan is a humid agricultural country where greater part of the population lives in rural areas with irrigation system and improper discarding of garbage and other wastes causal to malariogenic potential (Soomro *et al.*, 2009). In Pakistan, two species of plasmodium, *P. vivax* and *P. falciparum* are more prevalent and dangerous (WHO, 2009).

World Health Organization (WHO) stated that the proportion of malaria in Pakistan credited to *P. falciparum* increased from 34% in 1987 to 54% in 1990 (Kattenberg *et al.*, 2011) and the incidence of *P. falciparum* rose from 45% in 1995 to 68% in 2006 in the city of Quetta in Balochistan province and in Jhangara city of Sindh province (Kattenberg *et al.*, 2011). Furthermore in 2010, 73,857 (31%) of 240,591 total reported malaria cases in Pakistan were *P. falciparum* (Kattenberg *et al.*, 2011).

Khyber PakhtunKhwa province exemplified high prevalence of malaria and other studies also

revealed high proportion of cases recognized to *P. falciparum*. This may be due to fact that cross-border migration from Afghanistan into Khyber Pakhtunkhwa (Kattenberg *et al.*, 2011). These large movements of vulnerable populations may have altered the distribution of malaria and malaria-susceptible people. Keeping in view the importance of this disease the aim of present study was to estimate the prevalence of malaria in visiting patients to basic health unit (BHU) at district Mardan Khyber Pakhtunkhwa, Pakistan.

MATERIALS AND METHODS

2.1. Collection of samples

A study was carried out in Basic Health Unit (BHU) Ghala Der, District Mardan, Khyber PakhtunKhwa Pakistan from 1st June 2009 to 31st March 2014 where clinically suspected patients were tested for Malaria. Individual information on history, sex and age were obtained by interviewing the patients.

2.2. Rapid diagnostic test for malaria

A total of 845 Blood samples of patients were screened for Malaria by Rapid diagnostic test (RDT), according to the instruction of the manufacturer. RDT positive patients were classified in complicated and uncomplicated cases on the bases of symptoms.

2.3. Statistical analysis

Data were analyzed using SPSS 16.0 statistical software. Chi-square was utilized in assessing statistical significance of association.

RESULTS

Prevalence of malaria in present study were classified according to questioners were assembled in sex, age wise and severity based. Out of 782 patients, a total 109 (13.9%) patients were found positive for malaria. Among these 23 (2.94%), 67(8.56%) were positive for *P. falciparum* and *P. vivax* respectively. Moreover

19 (2.42%) patients had mixed infection (Figure 1).

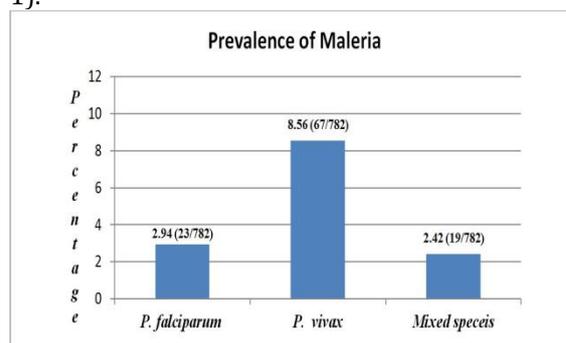


Figure 1: Showing the overall prevalence of plasmodium species.

Out of 782 patients, 454 were male and 328 were female. Among males patients *P. falciparum* and *P. vivax* were found in 14 (3.08%) and 41 (9.03%) patients respectively and 11 (2.42%) was found with mixed infection. The overall prevalence of malaria was found in males 66 (14.5%) (Table 1). Similarly among females patients *P. falciparum* and *P. vivax* were found in 9(2.7%) and 26(7.9%) respectively with overall prevalence of 43(13.1%). A statistically non-significant association was found among them (Table1).

The *P. falciparum* frequency regarding the age group of patients ranging from <5, 5-14 and greater than 14 years of age was found 04 (2.17%), 10(2.71%) and 09 (3.93%) respectively (Table 2). Similarly, *P. vivax* in patients with age group ranging from 0<5, 5-14 and greater than 14 years of age was found 11 (5.97%), 30 (8.13%) and 26 (11.3%) respectively. Moreover, mixed infection was found in patients with age group of <5, 5-14 and greater than 14 years of age was found 03 (1.63%), 04 (1.08%) and 12 (5.24%) respectively. Statistically non-significant association was found among these (Table 2).

Table 1: Sex wise prevalence of malaria in screened patients

Sex	Total no. of Samples	Positive Samples			
		Total no. of Positive	<i>P. falciparum</i>	<i>P. vivax</i>	Mixed Species
Male	454	66 (14.5%)	14(3.08%)*	41(9.03%)	11(2.42%)*
Female	328	43(13.1%)	9(2.7%)	26(7.9%)*	8(2.43%)
Total	782	109(13.9%)	23(2.94%)	67(8.56%)	19(2.42%)

Statistical analysis: Chi-Square = 0.9554, Significant ♦ (P<0.5), Nonsignificant * (P>0.05)

Table 2: Age wise distribution of malaria in screened patients

Age groups	Total no. of samples	Positive samples			
		Total no. of positive	<i>P. falciparum</i>	<i>P. vivax</i>	Mixed Species
<5 years	184	18 (9.7%)	4(2.17%)*	11(5.97%)	3(1.63%)
5-14 years	369	44(11.9%)	10(2.71%)	30(8.13%)*	4(1.08%)
>14 years	229	47(20.5%)	9(3.93%)	26(11.3%)	12(5.24%)*
Total	782	109(13.9%)	23(2.94%)	67(8.56%)	19(2.42%)

Statistical analysis: Chi-Square = 0.7692, Significant ♦ (P<0.5), Nonsignificant * (P>0.05)

Out of 782 patients 13 were complicated 96 were uncomplicated patients. Among the complicated

patients *P. falciparum*, *P. vivax* and mixed infection were found 4 (3.6%), 5 (4.5%) and 4

(3.6%) respectively in patients. Similarly, among the uncomplicated patients *P. falciparum*, *P. vivax* and mix infection was found 19 (17.4%), 62 (56.8%) and 15 (13.7%) respectively (Figure 2).

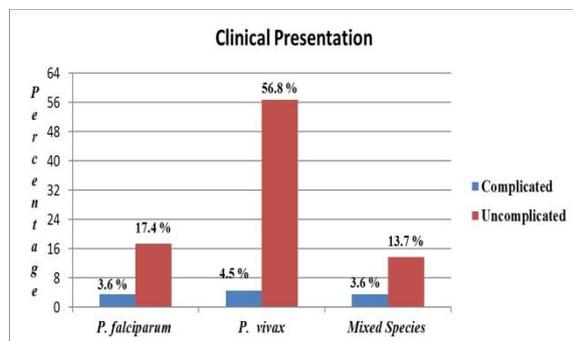


Figure 2: Showing the prevalence of plasmodium species on the basis of clinical presentation of patients.

DISCUSSION

Malaria is one of the most important public health problem occurs primarily in tropical and subtropical areas. Pakistan is almost in the middle of malaria belt around the globe among tropical and subtropical countries where majority of population is living in rural areas (Soomro et al., 2010). In towns the defaulted sewerage system, stagnant water, improper dumping of garbage contribute to the spread of malaria (Soomro et al., 2010). Among four species of malarial parasite *P. vivax* and *P. falciparum* are common in Pakistan.

In the present study, the overall prevalence of malaria was found 13.9%. High prevalence of was found 8.56% 2.94%. Present study confirmed the findings observed in previous studies regarding the high prevalence of *P. vivax* followed by *P. falciparum* (WHO, 2009; Kattenberg et al., 2011; Yasinzai and Kakarsulemankhel, 2008). Mixed infection of *P. vivax* and *P. falciparum* was also observed in the present study as reported in many other studies, where adjacent environment might be marshy because the marshy areas are suitable sites for mosquitoes breeding.

Present study also revealed high prevalence of malaria in males 14.5% compared to females 13.1%. The high prevalence of malaria infection in males has also been observed in many studies (Yasinzai and Kakarsulemankhel, 2008). It has been suggested for the disproportionate cases of malaria in male patients might be due to increased contact because males are more expected to work outside furthermore males not be as well covered as females which might be the possible reason for infected Anopheles bites. Individuals aged greater than 14 years of age found highest prevalence of malaria followed by the age group of 5-14 years and less than 5 years

of age. Finding of the current study were in agreement with findings of many previous studies (Yasinzai and Kakarsulemankhel, 2008). The malarial infections may also be associated with some degree of complicated sign and symptoms included prostration, any impairment of consciousness, convulsions or any manifestation of shock, decreased urinary output, respiratory distress or abnormal bleeding should be treated with parenteral rather than oral drugs (Pasvol, 2006). In the present study some complicated cases of malaria was also reported. In conclusion *P. vivax* is more common in the rural areas of District Mardan, which is mainly affecting the male population more as compared to female population. The reason for the coming cases of malaria in those particular rural areas is that of poor sewerage system, dumping of wastes in the open public places and stagnant water of different sources and lack of proper health education which might be the main reasons for spread of malaria. So it is recommended that public health authorities should educate the general public regarding prevention. Moreover wastes products and stagnant water should be properly disposed of and sprayed.

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