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Prevalence of Malaria in district Shangla, Khyber Pakhtunkhwa, Pakistan

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Abstract

Malaria is one of the major health problems caused by a vector-borne eukaryotic protist of the genus *Plasmodium*. *Plasmodium* is a parasite which is transmitted naturally by the bite of a female mosquito anopheles called malarial vectors. The present study was aimed to determine the prevalence of malaria in local population of District Shangla, Swat (KPK-Pakistan). A questionnaire was designed to collect the demographic and clinical information of the study subjects. A total of 1336 study subjects, expected to have malarial symptoms, were included in this study during the June to August, 2014. The identification of malarial parasite was carried out by using both Rapid Diagnosis Test (RDT) method and microscopic examination. After proceeding for clinical diagnosis, out of the total (n=1336) 187 (13.99%) samples were found positive for malarial parasite and 1149 (86.01%) were found negative. The malarial infection was found more common in males (112; 65.24%) as compare to females (65; 34.76%) in the study population. The month wise distribution of malaria in the present study indicated that malarial cases were high in the month of August (15.19%) followed by July (14.82%). Furthermore, the most prevalent age group for malaria in the study sample set was Group B (51.34%) followed by Group A (33.68%). However, 98.93% of the cases had *P. Vivax* and other malarial parasites like *P. ovale* and *P. malariae* were not detected in this study.

Keywords: Female mosquito Anophele, *P. Ovale*, *P. Malariae*, *P. Vivax*, *Plasmodium*

1. Introduction

Malaria is one of the most common leading causes of morbidity and mortality on the earth surface, cause by the vector-borne eukaryotic protist of the genus *Plasmodium* [1]. *Plasmodium* is a parasite which is transmitted naturally by the bite of a female mosquito anopheles called malarial vectors [2]. The mosquito has more than 3,000 species in which about 100 are the vectors of human diseases. For the development of her eggs, the anopheles takes a blood feed to provide nutrient and transmit the disease in the form of parasite. The parasite is a unicellular microorganism which is different from bacteria and viruses, which has a cell, nucleus and more complex life cycle. *Plasmodium* parasite has different types which are *Plasmodium vivax*, *Plasmodium falciparum*, *Plasmodium ovale*, *Plasmodium Malariae* and *Plasmodium knowlesi* [3]. It is found in both tropical and subtropical regions including some parts of America, Asia, and Africa. *P.falciparum* and *P.vivax* are mostly common in all over the world. In Pakistan *P. falciparum* and *P. vivax* malaria are the major health problems and the leading cause of death. The dangerous form of malaria which is caused by *P. falciparum* is mostly found in Africa, whereas *P.vivax* is found worldwide but is less dangerous [4]. Historically malaria has been predicted since ancient time. From the start Egyptians wrote about it on papyrus and were described it in detail by Hippocrates (famous Greek physician). With the decline of the Roman Empire malaria hide intemperate climates of ancient Rome. People were blaming about the unhealthiness on decline and rot that float out on awful air. However, the name malaria is derived from the Italian word, “mal aria,” or bad air. The French scientist Alphonse Laveran discovered single-celled parasite “*plasmodium*” and suggest that *plasmodium* is the cause of malaria. Twenty years later, scientists discovered Anopheles mosquitoes in India and Italy and showed that this mosquito is responsible for the transmission of malaria [5]. Malarial parasite (*Plasmodium*) has a very complicated life cycle. This parasite depends on both human and insect host. *Plasmodium* reproduces sexually in *Anopheles* mosquitoes while in human it reproduces asexually.

Mainly malaria is a disease of indigence that is more prevalent in the rural areas, where the majority of populations live in poverty. This disease mostly occurs in the months of July and August in Pakistan [6]. Every year half a billion people living in 109 countries in Africa, Asia and Latin America were suffering from malaria [7]. In 2010, 219 million cases and 660,000 deaths have been estimated [8]. According to a report, in 2011 3.3 billion people were at risk of malaria throughout the world, out of which 80% of cases and 90% death occurred in Africa [3]. In South East Asian malaria has been considered a big health problem whereas 1256 million people are at risk [9]. In tropical and subtropical areas of world malaria is one of the major public health problems. In Pakistan, majority of people live in rural areas. In Pakistan malaria is the second most reported disease from the public health sector. Malaria has been epidemic in Khyber Pakhtunkhwa, Baluchistan and Sindh. The incidence of malaria is high in Baluchistan and Federally Administered Tribal Areas (FATA) while Sindh, Khyber Pakhtunkhwa (KPK) has a medium incidence of malaria. Out of 123 districts of Pakistan, 91 districts (86.7%) are at malaria endemic [8]. In 186 million population of Pakistan, 95 million people are living in malaria –endemic region. After the efforts for eradication in the 1960s, malaria suddenly goes back to an epidemic level in 1970s. Recently in 2010 an increase in malaria may be partially attributed to flood affected 20 million people in over 60 districts [10]. *P.vivax* and *P. falciparum* is two commonly reported causes of Malaria responsible for approximately 64% and 36% of infections in Pakistan, respectively [10]. Globally about 2 billion people are at risk of malarial disease. About 0.3 to 0.5 billion cases and 0.02 billion deaths have been estimated per annum [11].

2. Materials and Method

The present study was carried out on malarial patients of District Shangla during the month of June to August; 2014. Shangla is situated in Swat, the northern area of Khyber Pukhtunkhwa (KPK) Pakistan. It’s geographically coordinate at 34° 53’ 12” towards North and 72° 36’ 0” towards east. It has two Tehsils; Tehsil Alpurai and Tehsil Puran. Shangla is approximately 2000 to 3000m above the sea level having low pressure due to which the weather of Shangla is colder than other areas of Khyber Pukhtunkhwa. The winter season is longer than summer in this region. A total of 1336 samples were collected from the subjects who have signs and symptoms of malaria. The samples were collected from different health care centers of District Shangla from both

males and females of different age groups. A questionnaire (Annexure A) was designed to collect the demographic and clinical information including name, gender, age, locality, sleeping environment, sign and symptoms, past malarial history, and also about ponds and lakes around their residence of the patients. An informed consent form was signed by each participant and the study was approved by the Institutional Review Board (IRB) of University of Swat. The identification of malarial parasite was done by both thick and thin smear through Rapid Diagnosis Test (RDT) method and microscopic examination. The data was divided into different age groups and was analyzed for association of malaria with different variables.

3. Results

A total of 1336 study subjects were ascertained from different regions of District Shangla during the months of June to August; 2014. After proceeding for clinical diagnosis 187 (13.99%) samples were found positive for malarial parasite and 1149 were found negative. The prevalence of malaria has been shown in Figure 3.1.

In the present study it was found that the malarial infection was most common in males (112; 65.24%) as compare to females (65; 34.76%) in the study population. The gender wise distribution of malaria has been shown in Figure 3.2.

The month wise distribution of malaria in the present study indicated that malarial cases were high in the months of August (15.19%) followed by July (14.82%) have been shown in Figure 3.3.

The present study shows that malaria can infect all age groups of the population. In order to determine the most prevalent age group in the study population, the study subjects were stratified in to different age groups that are Group A (<1-20), Group B (21-40), Group C (41-60) and Group D (61-80). It was found that the most prevalent age group was Group B (51.34% of the total infected) followed by Group A (33.68%). The age wise distribution of malaria has been shown in Figure 3.4.

The clinical diagnosis of the study subjects (with RDT and Microscopic examination) shown that 98.9% of the cases had *P. vivax* where as 1.07% of the subjects were positive for *P. falciparum*. In the present study among positive cases (187) *P. vivax* was more prevalent (98.93%). Other malarial parasites like *P. ovale* and *P. malariae* were not detected in this study. Species wise distribution has been shown in Figure 3.5.

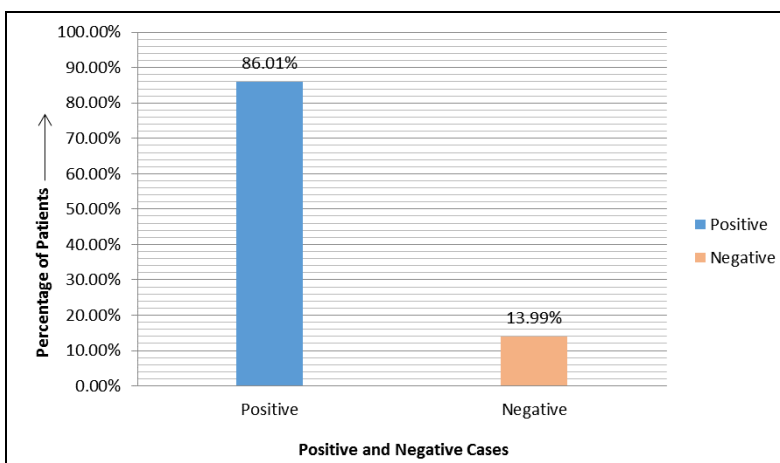


Fig 3. 1: Prevalence of malaria in total subjects

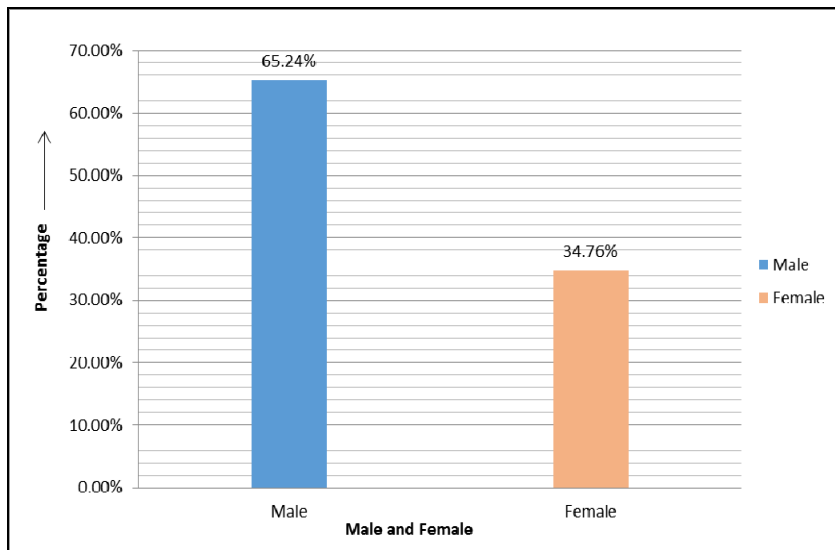


Fig 3.2: Gender wise distribution of malaria in study sample set

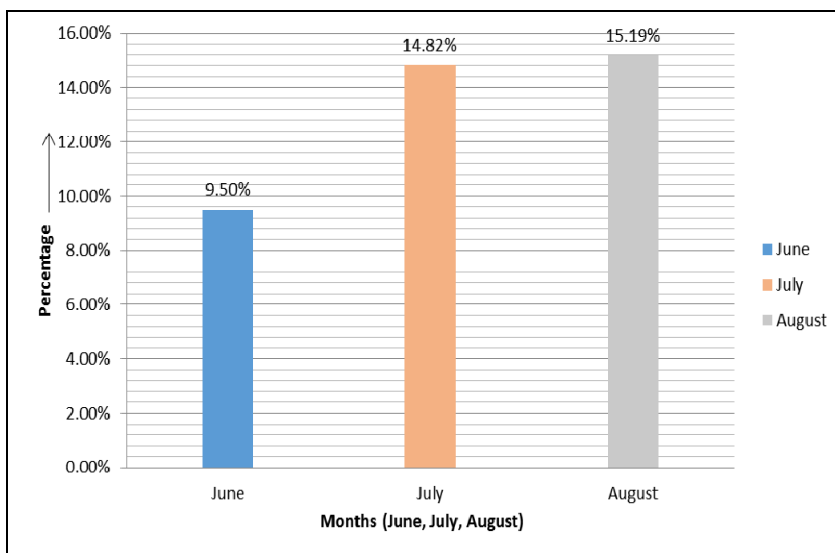


Fig 3.3: Month wise prevalence of malaria

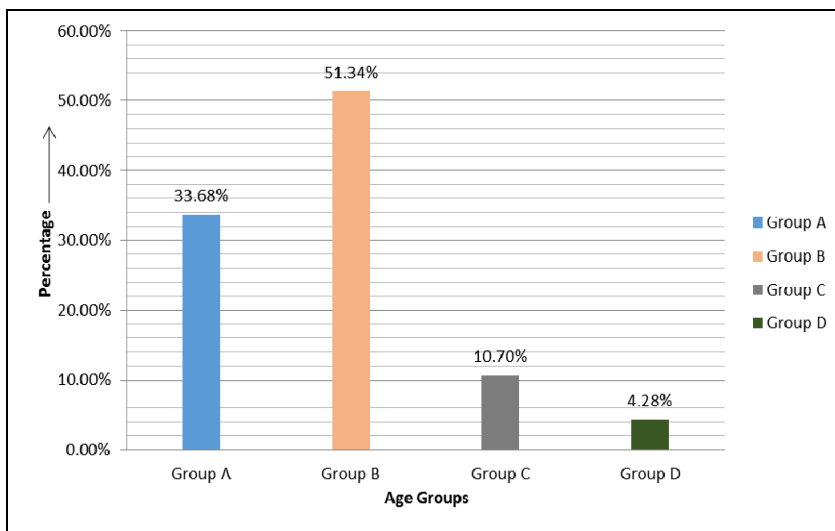


Fig 3.4: Age wise distribution of malarial cases

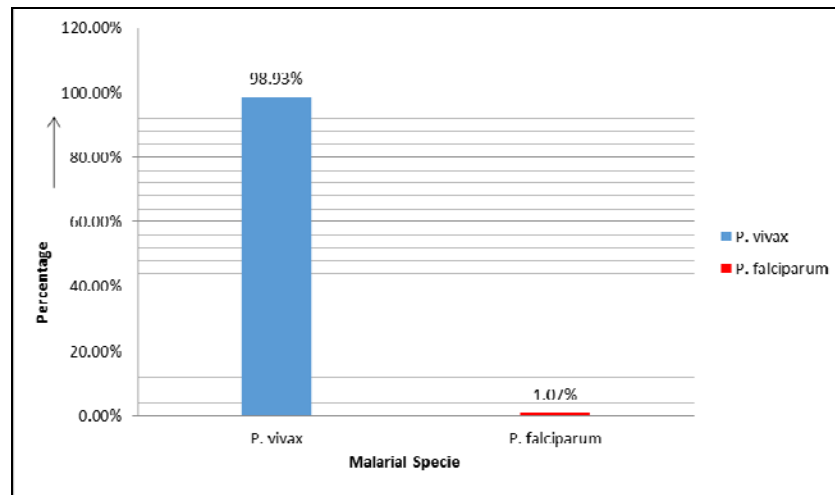


Fig 3.5: Species wise prevalence of malaria in the study sample set.

4. Discussion

Out of the total 1336 subjects, 187 (13.99%) were positive for malaria in which 112 (65.24%) were males and 65 (34.76%) were females. We have measured higher prevalence rate than a previous investigation that is 3.61% [12] which might be due to the difference in sample size and the weather factors. Similarly, a study conducted in Lal Qilla Dir lower Pakistan, reported that prevalence of 17.2% [8] which is a bit higher than findings of this study. The difference in prevalence rate of malaria can be attributed to the difference in study design, sample size and weather factors.

In the current study, the data was collected during the months of June to August, 2014. The month wise distribution of malaria showed that the rate of prevalence was higher in the month of August (15.19%) followed by July (14.82%) and lower in June (09.50%). A similar higher rate was previously reported where the prevalence was 41% in August, 23% July and 22% in June [13]. The present study indicated that malaria was more prevalent in males (65.24%) than females (34.76%) of the study subjects. This higher prevalence in males may be because males mostly go out and work in open environment without covering their bodies. On other hand due to social costumes female are limited to home and covered themselves well which are not exposed to mosquito bites in most. A study conducted by [1] showed that similar higher prevalence of malaria in males (62.12%) than females (37.88%). Similarly, another report published in 2013 investigated that malaria is more common in males (58.70%) than females (41.27%) [8]. In the current study malarial infection was investigated in different age groups of the subjects. It was found that although malaria can infect patients at any age but was found most prevalent in age group B (21- 40 years) that is 51.34% followed age group A (<1-20 years) that is 33.68% and was less prevalent in age group C (41-60 years; 10.70%) and age group D (61-80 years; 04.28%). Previously, it has been shown that malaria is more prevalent in age group of 21-30 years (42.65%) followed patients in age <1-10 years (21.03%) [14]. On the other hand *P. falciparum* produced sexually which required at least 10 days to produces their gametocytes in the host, and is a tropical species which does not extend to the temperate condition. Previous studies conducted in Pakistan have shown the same higher prevalence of *P. vivax* (71.7%) than *P. falciparum* (28.2%) [15]. A report showed that *P. vivax* (70%) is the more predominant species in Pakistan, about 88.69% cases with *P. vivax* in district Kharan Pakistan have been reported [7].

5. Conclusion

From the present study it can be concluded that *P. vivax* is the most dominant species among the study sample set. The male individuals were more commonly affected than female because of their exposure to open environment. The use of inappropriate antimalarial sprays, poor hygienic state, sharing of the house with livestock and inappropriate diagnosis play a major role in the spread of malaria in District Shangla. The findings of this study would be helpful in awareness of the public about malarial infection its risk factors.

6. References

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