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Current status of malaria in district Pishin, Balochistan

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Abstract

Malaria is one of the most serious health problem in the world, caused by the vector borne disease of genus, *Plasmodium*. Malaria is a word derived from the Italian words 'mala' and 'aria' means bad air. Five species of *Plasmodium* parasites, *P. vivax*, *P. falciparum*, *P. ovale*, *P. malariae* and 5th specie *P. knowlesi* have been reported in various countries. Malarial parasite completes their life cycle in 2 hosts, one is female anopheles' mosquitos (insect vector) and 2nd is human beings. Malaria is reported from June to September and also reported to be more common in rural areas as compared to urban areas in Pakistan. A total of 3,031 blood smears were prepared from 13 different areas of Pishin district. *Plasmodium* slide positivity's status was (18.8 %), *P. vivax* infection was higher (90.7%) as compared to *P. falciparum* (4.8%) and was also seen a mixed infection (5.4%). The highest *P. vivax* positivity rate (95.8 %) was found in Pishin Civil Hospital and the lowest in Al Shifa Lab Pishin (82.8 %). Age-wise high positivity rate (26.42%) was shown in 21-30 years age group and lowest in 1-10 age group (16.29%) due to less outdoor activities. The statistical analysis ($P > 0.000$) showed that *P. vivax* and *P. falciparum* found a significant association at a significance level of 5 %.

Keywords: Blood infection, *Plasmodium vivax*, *Plasmodium falciparum*

Introduction

Malaria is one of the serious health problems triggered by a vector-borne parasite of the *plasmodium* genus throughout the world. Malaria is derived from dual Italian words 'mala' and 'aria' meaning bad air. Malaria is endemic in Pakistan and most common species is *Plasmodium vivax*. Malaria is also one of the infectious diseases with exclusive morbidity and mortality rates [1]. Five *Plasmodium* species cause human malaria infections; *P. vivax*, *P. falciparum*, *P. ovale*, *P. malariae*, and the 5th specie *P. knowlesi* have been reported in many countries [2]. *Plasmodium* parasite cause disease of human malaria in the red blood cells spread by the bite of female anopheles' mosquitoes, signs include chills, fatigue, high fever, exhaustion, yellow skin and vomiting [3]. Pakistan is one of the highly prevalent countries of malaria, including Somalia, Yemen, Sudan, and Afghanistan, with 96% of clinical cases reported [4]. The 60% population of Pakistan is living in malarial-endemic areas. *Plasmodium vivax* contributes 81.3% to the malaria outbreak in Pakistan, 14.7% *P. falciparum* and 4% mixed infection [5]. World Malaria Report revealed that in 2017 there were recorded 219 million cases of malaria and 4, 35000 confirmed mortality. Most of these deaths occurred in the region of Africa (92%), followed by South-East Asia (5%) [6]. There was no diagnosis of the cause of malaria in public; its attacks are still dangerous especially in malaria zones [7]. Malaria is usually diagnosed with the use of light microscopic examination using blood films or standard diagnostic tests based on the antigen [8].

Both species (*P. falciparum*, *P. vivax*) are still an important and serious health problem in Pakistan unless they are timely treated, because of the enormous growth of mosquito from July to November, the disease continues to grow stronger compared to the whole year. Infection with *P. vivax* causes many cases, whereas *P. falciparum* causes a few cases. According to a study, *P. vivax* rise between June and September and again between April and June, while the *Plasmodium falciparum* incidence increases from July to November [9].

Malaria parasite require two hosts, human and insect vector female anopheles' mosquito for completion of their life cycle; malaria becomes more common in rural areas than in urban areas in Pakistan reported from June to September [10-11].

Malaria is widespread in tropical and subtropical areas, which covers sub-Saharan Africa, Europe, and Latin America. Around 2000 and 2015, nearly 90% of malaria infections in Africa dropped by 37 %^[12]. In 2012, 207 million malaria cases were reported, of which about 0.78 million were killed with the majority of children^[13].

In the middle of the temperate zone, Pakistan also exists, with most residents living in rural communities. In tropical and subtropical regions, heavy rainfall strongly favors malaria parasites.^[14-15] Aim of this study was to spot the current status of malarial infection in District Pishin Balochistan for immediate effective policies.

Research Methodology

The entire study was conducted in Pishin (Rural and Urban) district. Blood samples were obtained using pricking method to detect malaria with the use of a light compound microscope.

Data collection

There are usually two techniques PCD and ACD, used to diagnose malaria cases.

PCD (passive case detection) was succeeded by analyzing patient's blood that showed signs and symptoms of malaria to health laboratories.

For ACD (active case detection), home visits followed by examining the victim's blood with signs and symptoms of malaria or a history of current or near past malaria indication was used.

Blood film examination

Blood slides were prepared, thick and thin films and these stained slides were examined in the lab for further identification^[16].

Results

A total of 3031 Blood smears was prepared from 13 different locations of district Pishin. Variations between different locations and various hygienic conditions was evident. The present analysis (Table 1) showed that the current positivity status of *Plasmodium* slide was 18.8%,

while (Fig. 1), *P. vivax* was greater (90.7%) as compared to (Fig. 2), *P. falciparum* (4.5%), and mixed infection (5.4%). The lowest ratio (82.3%) was found in Al-Shifa Lab Pishin (Graph.1) and highest (95.8%) of *P. Vivax* was found in Civil Hospital Pishin. The Age-wise malarial status was higher in 21-30 years (26.42%) and lowest in age groups of 1-10 years (16.29%) (Table 2, Graph 2). There were similarities between different types of malaria parasites and Chi-square analysis applied in age groups^[17].

$$\left[\chi^2 = cal \sum \frac{(fo - fe)^2}{fe} = 38.003 \right]$$

The value of chi-square, 38.003 (p-value= 0.000) was analyzed. There was a strong correlation at 5 % level of significance between the two attributes (*P. vivax* and *P. falciparum*). The current status of *P.vivax* malaria infection was greater than in other forms.

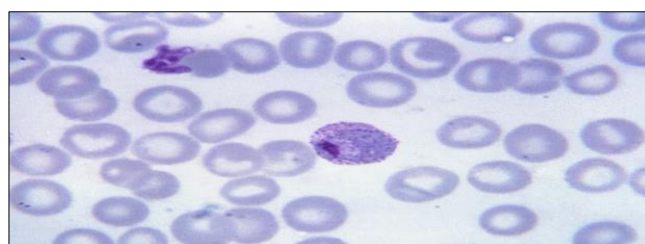


Fig 1: *Plasmodium vivax* (Gametocyte stage)

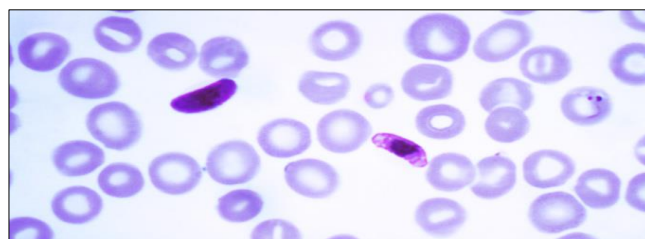


Fig 2: *Plasmodium falciparum* (Gametocyte stage)

Table 1: Localities-wise status of malaria in Pishin District

S. No	Name of Area	No. of slides Studied	Overall no. Of +ve Slides	<i>P.vivax</i>	<i>P. Falciparum</i>	Mixed inf.
1	Manzari	231	46 (19.9%)	42 (91.3%)	-	04 (9.5%)
2	Pishin City	237	35 (14.7%)	32 (91.4%)	-	03 (9.3%)
3	Huramzai	246	56 (22.7%)	53 (94.6%)	03 (5.6%)	-
4	Agha Lab Karbala	278	65 (23.3%)	59 (90.7%)	-	06(10.1%)
5	Saranan Pishin	252	56 (22.2%)	52 (92.8%)	04 (7.69%)	-
6	Yaro Pishin	245	41 (16.7%)	36 (87.8%)	-	05(13.8%)
7	Kakar Medical Khanozai	242	42 (17.3%)	39 (92.8%)	03 (7.61%)	-
8	Al-Shifa Lab Pishin	176	34 (19.3%)	28 (82.3%)	06 21.4%)	-
9	Barshore City Lab	161	24 (14.9%)	19 (79.1%)	-	05(26.3%)
10	Dr Saleem Lab Thrata	271	53 (19.5%)	46 (86.7%)	07 (15.2%)	-
11	Saqib Lab Ghershinan Road Pishin	234	36 (15.3%)	34 (94.4%)	-	02 (5.8%)
12	Civil Hospital Pishin	214	48 (22.4%)	46 (95.8%)	02 (4.3%)	-
13	Danish Lab Manzaki	244	35 (14.3%)	32 (91.4%)	-	03 (9.3%)
	Total	3031	571 (18.8%)	518(90.7%)	25 (4.8%)	28 (5.4%)

Table 2: Age-wise status of malaria in Pishin District

S. No.	Age groups	A total number of observed slides	Total number of slides (+ ve)	Complete % in fraction	Inf. <i>P. vivax</i>	<i>P.falciparum</i> Inf.	Mix Inf.
1	1-10	724	118	16.29	109	-	9
2	11-20	775	160	20.64	150	10	-
3	21-30	753	119	26.42	117	2	-
4	31- 60	779	174	22.33	166	-	8
	Total	3031	571	18.83	542	12	17

Table 3: Statistically Analysis

Malaria parasite type					
S. No.	Age groups	A (fo) (fe)	B (fo) (fe)	C (fo) (fe)	Total
1	1-10	109 112.0	-	9 3.5	118
2	11-20	150 151.8	10 3.3	-	160
3	21-30	166 165.1	-	8 5.1	174
4	31-60	117 112.9	2 2.5	-	119
	Total	542	12	17	571

Discussion

Pakistan is facing challenges in malaria control due to the shortage of experienced health workers, laboratory facilities and presumed medicines [2]. The current study showed a positivity rate of 18.8%, where *P. vivax* was higher (90.7%) compared to *P. falciparum* (4.8%) and mixed infection (5.4%). Civil Hospital Pishin was found having the highest *P. vivax* infection (95.8%), while the lowest ratio (82.3%) was found in Al-Shifa Lab Pishin. This disease infected most of the rural areas of Pakistan, the reason behind that is people working in open places, un-hygienic environment and low economic level of people. Age-wise malarial status was higher in 21-30 years (26.4%) and lower in 1-10 age groups (16.9%), due to less outdoor activity.

Similar results were shown by [18] in Killa Saifullah, with 20.0% occurrence of positive *Plasmodium* slides, where-as *P. vivax* frequency was found higher (64.7%) than *P. falciparum*, also *P. vivax* was found higher (70.5 %) in Killi Dolatzai and the lowest ratio was found in Nalisar (48.9 %). A recent work carried out by [1] in Quetta (city) district of Balochistan depicted overall positivity of 19.56 %, whereas *P. vivax* was higher (84.52%) than *P. falciparum* (6.01%) and mixed infection (12.29 %). Another work was carried out in Killa Saifullah district in Balochistan with 19.5 % effective reports, comparatively higher in *P. vivax* (64.6%) than *P. falciparum* (34.65%) and mixed infection (0.7%) [19].

In Khyber Pakhtunkhwa (2011), there were 325 cases reported, followed by Punjab (157) and 1/3 to 1/2 cases were reported in the other three locations [9]. Another analysis of District Buner, Khyber Pakhtunkhwa, Pakistan revealed a higher infection rate in the age group 1-10 years (11.58%) [20]. A high incidence in the age group (5-10 years) was recorded in Larkana (Pakistan). Improved mobility and outdoor activities can be linked to children in this age group, leading to increased chances of mosquito exposure leading to malaria [21].

Conclusion

It is concluded that in District Pishin, Balochistan. *P. Vivax* was higher than the *P. falciparum* & mixed infection. To inhibit further prevalence of malarial parasite, all these areas visited and nearby should be checked for larval and adult mosquitoes.

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