CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1257636

Available online at: http://www.iajps.com Research Article

PREVALANCE OF MALARIA IN EASTERN AREAS OF BALUCHISTAN AT BORDERS OF OTHER PROVINCES

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Abstract:

Objective: *The objective of the study was to decide the occurrences of parasites causing malaria in far flung human populations of Balochistan.*

Methodology: *A large group of 3340 subjects was examined for malarial parasites by testing the blood samples during the timeframe of 2 years i.e. July 2015 to June 2017.*

Results: *The laboratory tests revealed that 1095 (32.78%) cases were diagnosed with malaria out of total suspected sample of 3340. Among 1095 infected cases, 579 were due to Plasmodium falciparum infection and 516 cases were infected with Plasmodium vivax. No other malarial parasites (P malariae and P ovale) were noticed in our case.*

Conclusion: *The incidences of falciparum and ovale plasmodium were observed in Barkhan and Kohlu border areas of Balochistan. The existence of P. falciparum and P. vivax is a great health hazard because both the infections are closely associated with drastic complications such as cerebral malaria. No significant relation could be developed among the malarial parasites and subjects' age groups.*

Key Words: *Malarial parasite, Plasmodium falciparum, P. vivax.*

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Please cite this article in press Fatima Altaf et al., ***Prevalance of Malaria in Eastern Areas of Baluchistan at Borders of Other Provinces,*** *Indo Am. J. P. Sci, 2018; 05(05).*

INTRODUCTION:

Malaria is considered as a serious public health issue caused by the blood infections. The infection is common in all parts of the world and its effect on the morbidity and mortality are inevitable in the area. Malaria is declared as a major killer by World Health Organization causing 1.5 to 2.7 million deaths annually. Approximately 300 to 500 million cases of malaria are being recorded in a year. 270 million cases add up every year to this number giving it a multiplier effect. In Pakistan, malaria patients are mostly infected from P.falciparum and P.vivax [1]. The increase in falciparum cases has increased six times during the last 10 years. NMCP (National Malaria Control Program) has reported that almost half of the malaria cases (42%) are caused by plasmodium falciparum in Pakistan. Nearly 39 districts of Sind and Balochistan are labelled as high risk from malaria. The poor health care facilities in the backward areas of Sind and Balochistan are responsible for the spread of disease to an uncontrollable level [2].

Different studies have been conducted on human related malaria in different parts of the country. Bano & Mufti conducted a study on the same subject in Peshawar, KPK. Hadi and others focused the children of Punjab for common malaria. Suleman found that the prevalence of malaria in Afghan refugees in Pakistan was considerably higher than the local people. Cerebral malaria cases were studied by Nizamani *et al* in the children of Liaqat Medical College Hospital, Jamshoro, Sind. Similar studies have been conducted for the 'Quetta', provincial capital of Balochistan [3]. The current study is focused on the areas which are backward and often ignored. The Baarkhan and Kohlu areas were selected for the study because these are declared at a higher risk in connection to spread of malaria.

METHODOLOGY:

The malarial parasites were discovered from the suspected malarial patients in the Barkhan and Kohlu districts of Balochistan. The activity was carried out from July, 2015 to June, 2017.

The detection was driven by applying two techniques- Passive case detection (PCD) and Active case detection (ACD) techniques. In PCD method, patients' blood sample were collected and laboratory tested for presence of parasites. The patients were suspected malarial client with fever and shivering. In ACD technique, a malaria team visited the community and located the people suffering from apparent symptoms of malaria. The blood samples for the suspects were then obtained on thick and thin blood slides. The slides were then processed under the guidelines of Manson- Bahr and Bell. Identification of malarial parasites was done in the last stage of diagnosis.

RESULTS:

Blood samples of 3340 suspects were collected from July 2015 to June 2017. The patients were divided into 3 categories in respect of their ages (a) 1-10 years (b) 11-20 years and (c) greater than 21 years. The subjects were from different places of Barkhan (Table-I-II) and Kohlu (Table-III & IV) districts respectively. Slight variations pertaining to hygienic conditions at both places were observed.

In the Barkhan district of Balochistan, the instances of positive plasmodium (Table-I-II) was 32.78% which means 1095 patients out of 3340 suspects were suffering from malaria. Further analysis exposed that among these malarial patients 52.87% were having the plasmodium falciparum and rest 47.12% were diagnosed with *P. vivax*. The P. falciparum was found in children up to 10 years in 60.11% cases and *P. vivax was measured in* 39.88 % cases. Plasmodium P. falciparum (Fig-I) was the major and most common diagnosis of the parasite available in all age groups especially in the patients of 21 years or older. *P. vivax* (Fig-II) was noticed in the study but its prevalence was not as great as the P. falciparum. The P. vivax was found in 43.20 % cases in the age group of 11-20 years and 34.19 % in the upper age range.

Table-I: Month wise incidence of malaria infection in Barkhan

Month	No. of slides examined	Total No. of +ve	P. vivax (%)	P. falciparum (%)
July, 2015	240	87	23 (26.43)	64 (73.56)
August	273	108	29 (26.85)	79 (73.14)
September	311	134	45 (33.58)	89 (66.41
October	221	83	34 (40.96)	49 (59.03)
November	143	62	19 (30.64)	43 (69.35)
December	86	37	20 (54.05)	17 (45.94)
January	63	24	16 (66.66)	8 (33.33)
February	39	19	14 (73.68)	5 (26.31)
March	47	11	7 (63.63)	4 (36.36)
April	61	23	16 (69.56)	7 (30.43)
May	77	29	18 (62.06)	11 (37.93)
June, 2017	89	35	14 (40)	21 (60)
Total	**1650**	**652**	**255 (39.11)**	**397 (60.88)**

Table-II: Age wise over all incidence of malaria infection in Barkhaan

S. No.	Age years	No. of slides examined	Total No. of +ve	Over all % Infection	Infection by	
					P. vivax (%)	P. falciparum (%)
1	1-10	435	178	40.91	71 (39.88)	107 (60.11)
2	11-20	649	243	37.44	105 (43.20)	138 (56.79)
3	21-above	566	231	40.81	79 (34.19)	152(65.80)
	Total	1650	652	39.51	255 (39.11)	397(60.88)

Table-III: Month wise incidence of malaria infection in Kohlu

Month	No. of slides examined	Total No. of +ve	P. vivax (%)	P. falciparum (%)
July, 2015	234	78	45 (57.69)	33 (42.30)
August	241	75	41 (54.66)	34 (45.33)
September	264	63	42 (66.66)	21 (33.33)
October	191	51	29 (56.86)	22 (43.13)
November	152	22	13 (59.09)	9 (40.90)
December	56	7	4 (57.14)	3 (42.85)
January	38	2	2 (100)	0
February	27	3	2 (66.66)	1 (33.33)
March	81	22	12 (54.54)	10 (45.45)
April	93	27	16 (59.25)	11 (40.74)
May	139	34	21 (61.76)	13 (38.23)
June, 2017	174	59	34 (57.62)	25 (42.37)
Total	**1690**	**443**	**261 (58.91)**	**182 (41.08)**

Table-IV: Age wise over all incidence of malaria infection in Kohlu

S.No	Age (years)	No. of slides examined	Total No. of +ve	Over all % Infection	Infection by P. vivax (%)	Infection by P. falciparum (%)
1	**1-10**	363	62	17.07	39 (62.90)	23 (37.09)
2	**11-20**	670	197	29.4	107 (54.31)	90 (45.68)
3	**21-above**	657	184	28	115 (62.50)	69 (37.50)
	Total	1690	443	26.21	261 (58.91)	182 (41.08)

Fig-I: Showing gametocyte and Ring stage of Plasmodium falciparum in blood smear (100x) of malaria patient of Barkhan.

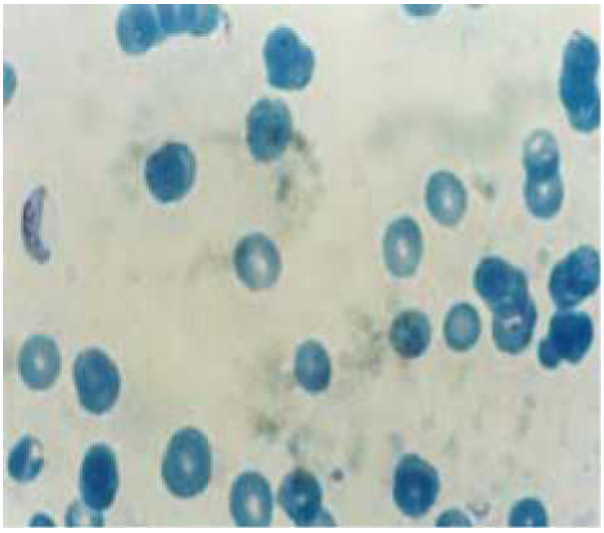

Fig-II: Showing gametocyte and Ring stage of Plasmodium vivax in blood smear (100x) of malaria patient of Barkhan.

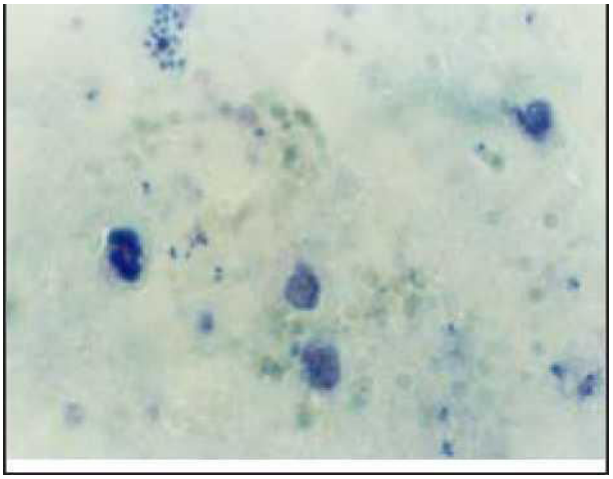

Fig-III: Showing gametocyte and ring sta ge of Plasmodium Vivax in bood smear (100x) of malaria patient of Kohlu.

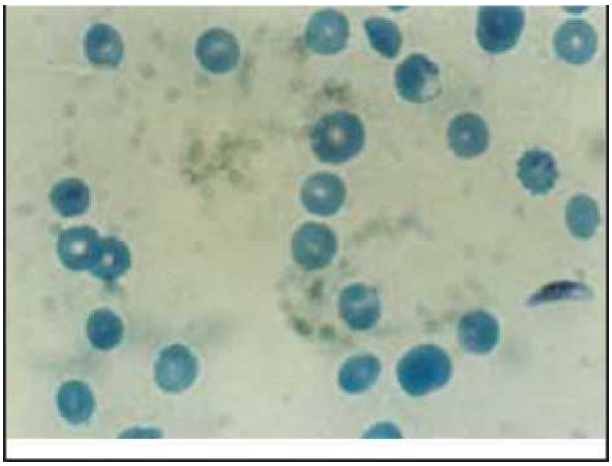

Fig-IV: Showing gametocyte and ring sta ge of Plasmodium falciparum in bood smear (100x) of malaria patient of Kohlu.

Statistical calculations were made to ascertain if there is any relevance among the age groups and the prevalence of parasites but found no specific relation between the two. The 5% significance level was measured at X^2, X^2 calculated as 4.1009 and compared with the table value of X^2= 5.991 (Table I &II). As the measured value is less than the actual value therefore, it is evident that the type of infection and age groups are independent variables with respect to each other.

DISCUSSION:

A study conducted by Yasinzai and Kakarsulemankhel on malarial parasites in Quetta city revealed the P. falciparum as the major contributor in malarial infections (55.55%) whereas a low incidence of *P. vivax* (44.44%) has been observed [3]. Akbar and Hozhabri study delivered that malarial infection in most part of the country such as Combined Military Hospital Multan, D.G. Khan, Muzaffargarh, adjoining areas of Balochistan; Sehwan area of Dadu has a relatively higher plasmodium *falciparum* than any other species of the malarial kind**.** The patients from Kohlu district of Balochistan revealed the opposite results (Table-III-IV) [4]. Four hundred and forty-three suspects were diagnosed with malarial infection out of a total of 1690. The P. vivax (Fig-III) was found in most of the suspects as compared to the P. falciparum (Fig-IV). Among the diagnosed sample 62.90% children (1-10 years) were having P. vivax and 37.09% were suffering because of *P.* falciparum [5]. The *P.vivax was the major contributor in this case having the* highest prevalence of 62.50% in the upper age group and 54.31% in the age group of 11-20 years. However, *P. falciparum* was was also observed in this area with a relatively low occurrence rate [6].

No significant relation was found between the age group and the type of infection at Kohlu area (Table-III, IV). Statistical methods were applied to check the relevance among the two factors through X^2 at 5% level of significance, the value calculated for X^2 was 3.1069 and the table value was X^2= 5.991. The table value was greater than the calculated value which showed that there is no relation between the age and type of infection at Kohlu area [7].

Correspondingly, Yar studied the results from multan and exposed that *P. vivax* was found to be highest in Multan district than *P. falciparum.* Similarly, another study focused the parasites in Kashmiri refugees in Muzzafarabad observed matching results as in case of Multan [8]We did not come across any situation where a patient had both types of infection vivax and falciparum. Some studies showed such mix infections as in the case of Yar et al where 2.3% of the patients were diagnosed with both type of infections [9]. In our study, no instances of other type of malarial infections such as *P. malariae* or *P. ovale* infection were detected. The study led by Yar at Multan yielded the similar results with nil P. malariae and nil P. ovale. The incidences of P.falciparum at Barkhan and P. vivax at Kohlu district in our study , the prevalence rate of 52.87% (579/1095) of *P. falciparum* carries a major health risk which can lead to malarial complications including cerebral malaria [10].

CONCLUSION:

The incidences of falciparum and ovale plasmodium were observed in Barkhan and Kohlu border areas of Balochistan. The existence of P. falciparum and P. vivax is a great health hazard because both the infections are closely associated with drastic complications such as cerebral malaria. No significant relation could be developed among the malarial parasites and subjects' age groups.

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