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Incidence of Malaria Infection in Rural areas of District Quetta, Pakistan

Mohammad Iqbal Yasinzai and [1]Jamu-Khan Kakarsulemankhel
Department of Zoology, University of Balochistan, Quetta, Pakistan
[1]Leishmaniasis and Mosquitoes Zoology Lab, University of Balochistan, Quetta, Pakistan

Abstract: The present study reports the prevalence of malarial parasites in the human population of rural areas of Quetta District. ***Plasmodium falciparum*** was observed to be with a higher incidence (17.77%) in the age group of 21 years and above. Mosquitoes of the genus Culex was found to be more prevalent (95%), genus ***Anopheles*** was observed to by 3.48% and genus ***Aedes*** was found to be less prevalent (1.35%).

Key words: Malaria, *Plasmodium falciparum*, *P. vivax*, mosquitoes

Introduction

Pakistan is almost in the middle of the malaria belt around the glob encompassing tropical and subtropical countries. Some 270 million new cases of malaria occur very year of which 95% are reported from these areas (Anwar ***et al.***, 1994). Abbasi ***et al.*** (1996) reported cerebral malaria in hospitalized children from Larkan. Afridi ***et al.*** (1998) studied incidence of malaria in an urban slum of Peshawar. Ahmed and Ahsan (1997) studied Computed Tomography (CT) and Magnetic Resonance imaging (MRI) in cases of cerebral malaria in Karahi. Ahmed and Zareen (1996, 1997) diagnosed falciparum malaria in pregnancy xase in Mansehra on bone marrow examination and relevant aspects of cerebral malaria. Khan (1997) pointed out the problems of multi drug resistant malaria in Pakistan. Memon (1997) investigated dominant malarial parasite species in hospitalized children in Nawabshah. Shah and Ahmad (1995) studied twenty complicated cases of falciparum malaria admitted and managed in Medical Unit. ll, J.P.M.C. Karachi. In Balochistan too, cerebral malaria is a major community problem. Durrani ***et al.*** (1997) studied epidemiology of cerebral malaria and its mortality in patients of Quetta city. Nawaz and Yasmin (1987) reported malaria infection in Afghan Refugees residing in Quetta and also from the students residing in the University Hostel. However, the present study carried out about the incidence of malarial parasites in human population residing in the rural areas of district Quetta.

Materials and Methods

A survey was conducted during Dec. 2000 to Dec. 2002 in the rural areas of district Quetta to record and screen species of malarial parasites from the blood of human patients suffering from malaria. Malaria cases were detected by adopting two ways. Passive case detection (PCD) technique is the technique where in blood films were taken from the patients presenting themselves to a health station with symptoms or a histron suggestive to malaria. The other technique is Active case detection (ACD) in which home visits were made to the persons with

sign or symptoms of malaria and blood films were prepared. Slides were taken back to the laboratory where they were stained and examined. Seasonal preparation of blood slides both thick and thin were made twice a month in each area of study and in the health station. Staining of slides with Giemsa's stain were made following the techniques described by Manson-Bahr and Bell (1987). Identification of species of malarial parasites and mosquitoes were made from the keys of Cheng (1986), DuBose and Curtin (1965), Service (1986), Sood (1989) and White (1987), respectively.

Results and Discussion

A total of 2196 blood smears were prepared from age groups ranging from 1 year to 21 years and above residing in thirteen different localities (Table 1 and 2). However, variations were observed among different localities having different environment and hygienic conditions. The commonest species observed was *Plasmodium falciparum* (Fig. 1) with a highest incidence of 17.77% in the age group of 21 years and above whereas, in the age group of 1 to 10 years, was observed to be 9.09% and the lower was found to be 7.02% in the age group of 11 to 20 years. *P. vivax* (Fig. 2) was also observed to be present in our study but comparatively with a less prevalence ration viz., 7.83% in the age group of 21 years and above, 6.06% in the age group of 1 to 10 years and 3% in the age group of 11 to 20 years. However, a negligible mixed infection of *P. falciparum* and *P. vivax* was also observed. Durrani *et al.* (1997) reported 64% incidence of P. falciparum in children and thirty six percent in adults of Quetta and found no significant differences in the incidence of cerebral malaria, in Karachi and Quetta. Malaria Control Program (1998, 1999, 2000) reported 329+ve *P. vivax*, 29+ve *P. falciparum*and 383+ve *P. vivax* and 3+ve *P. falciparum* and 609+ve *P. vivax*, 44+ve *P. falciparum* out of 10763, 18000, and 16400 blood slides of patients from Quetta districts respectively. Abbasi *et al.* (1996) observed 53% of the study population cases of cerebral malaria in children of 1-5 years of age group admitted in Children Hospital, Larkana.

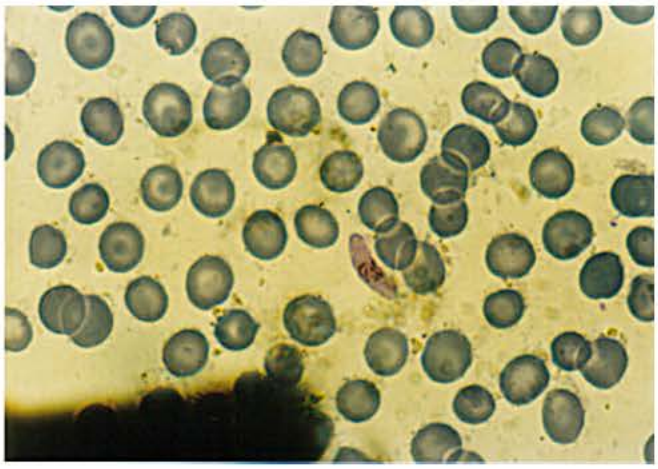

Fig. 1: Showing gametocyte of *Plasmodium falciparum* in blood smear (100x)

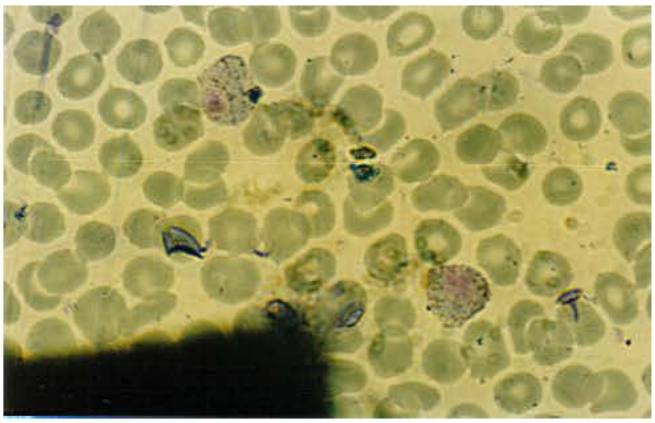

Fig. 2: Showing gametocytes of *Plasmodium vivax* in blood smear (100x)

Table 1: Age wise over all incidence of malaria infection in Quetta (rural)

No. of slides examined	Total No. of +ve	Over all % infection	Infection by *P. vivax*	Infection by *P. falciparum*
924	140	15.15	56 (6.0%)	84 (9.09%)
698	70	10.02	21 (3.0%)	49 (7.02%)
574	147	25.60	45 (7.83%)	102 (17.77%)
2196	357	16.25	122 (5.55%)	235 (10.70%)

Statistical analysis: Types of Infection

	A		B		
Age group in years	(fo)	(fe)	(fo)	(fe)	Total
1-10	84	92.2	56	47.8	140
11-20	49	46.0	21	24.0	70
21-above	102	96.8	45	50.2	147
Total	235		122		357

$$X^2_{cal} = \sum \frac{(fo-fe)^2}{fe} = 3.245$$

Table 1 (rural areas) was statistically analyzed to test whether there is any association between types of infection and age groups through X^2 at 5% level of significance. X^2 calculated as 3.245 and compared with the table value of X^2=5.991. Since calculated value of X^2 is less than the table value so it is concluded that there is no association between types of infection and age groups. Therefore, it can be said that the incidences of any type of infection can happen to any age group person independently.

Amongst all the four species of malarial parasite, *P. vivax* and P. falciparum are more common in Indo-Pak subcontinent (White and Breman, 1994). Infection with *P. falciparum* is more serious than other species because of high frequency of severe and fatal complication namely cerebral malaria.

Table 2: Age and Area wise incidence of malarial parasites in Quetta (rural)

Area	Age group in years	No. of slides examined	Total No. of +ve	No. of positive Species wise		% Infection
				P. vivax	*P. falciparum*	
Killi Sabzal	1-10	96	7	2	5	7.29
	11-20	89	10	5	5	11.23
	21-above	71	19	8	11	26.76
Hudda	1-10	33	5	2	3	15.15
	11-20	27	0	0	0	0.00
	21-above	25	3	2	1	12.00
Brewary	1-10	89	4	2	2	4.49
	11-20	86	11	4	7	12.79
	21-above	47	11	3	8	23.40
Kharotabad	1-10	92	7	4	3	7.60
	11-20	66	3	1	2	4.54
	21-above	51	11	3	8	21.56
Kakar Colony	1-10	32	2	2	0	6.25
	11-20	23	1	0	1	4.34
	21-above	20	3	0	3	15.00
Killi Alam Khan	1-10	77	5	3	2	6.49
	11-20	63	1	0	1	1.58
	21-above	30	2	0	2	6.66
Killi Chashma	1-10	62	4	0	4	6.45
	11-20	57	5	1	4	8.77
	21-above	26	2	1	1	7.69
Samungli	1-10	33	4	2	2	12.12
	11-20	23	3	0	3	13.04
	21-above	29	5	5	0	17.24
Killi Sariab	1-10	22	57	25	32	46.72
	11-20	91	18	3	15	19.78
	21-above	99	56	20	36	56.56
Killi Kirani	1-10	77	5	2	3	6.49
	11-20	53	5	3	2	9.43
	21-above	30	6	0	6	20.00
Killi Kanak	1-10	87	12	4	8	13.79
	11-20	49	5	3	2	10.20
	21-above	61	13	1	12	21.31
Chiltan	1-10	51	13	3	10	25.49
(Hazarganji)	11-20	32	2	0	2	6.25
	20-above	27	5	1	4	18.51
Dasht	1-10	73	15	5	10	20.54
	11-20	47	6	1	5	12.76
	21-above	50	11	1	10	22.00

A total of 517 mosquitoes comprising in 3 genera and four species were collected during the present survey. Species wise distribution of mosquito fauna has been given in Tables 3 and 4. Genus ***Culex*** was found to be more abundant (forming 95% of the total), followed by genus ***Anopheles*** (3.48%) and genus ***Aedes*** (1.35%). ***An. culicifacies*** and ***An. stephensi***. Aslam Khan (1971)

Table 3: Area wise distribution of mosquito species in Quetta (rural)

Area	Total No. of mosquitoes collected	*Anopheles*	*Culex*	*Aedes*
Killli Sabzal	44	2	41	1
Hudda	25	0	25	0
Brewary	37	1	35	1
Kharotabad	53	3	49	1
Kakar Colony	27	0	27	0
Killi Alam Khan	34	1	33	0
Killi Chashm	61	2	58	1
Killi Samungli	29	0	29	0
Killi Sariab	58	3	53	2
Killi Kirani	62	4	57	1
Killi Kanak	32	1	31	0
Chiltan (Hazarganji)	24	0	24	0
Dasht	31	1	30	0
Total	517	18	492	7

Table 4: Species wise distribution of *Anopheles* mosquitoes in Quetta (rural)

Area	Total No. of species	*Anopheles culicifacies*	*Anopheles stephensi*	*Anopheles pulcherrimus*	*Anopheles superpictus*
Killli Sabzal	2	1	1	0	0
Hudda	0	0	0	0	0
Brewary	1	1	0	0	0
Kharotabad	3	2	0	1	0
Kakar Colony	0	0	0	0	0
Killi Alam Khan	1	1	0	0	0
Killi Chashm	2	1	1	0	0
Killi Samungli	0	0	0	0	0
Killi Sariab	3	1	1	1	0
Killi Kirani	4	0	2	1	1
Killi Kanak	1	1	0	0	0
Chiltan (Hazarganji)	0	0	0	0	0
Dasht	1	1	0	0	0
Total	18	9	5	3	1

reported prevalence of 134 species of mosquitoes in west Pakistan but species from Balochistan Province were few. ***Pyretophorus*** nigrifasciatus. Theobald, 1907 [=***Anopheles (Cellia)*** multicolor Cambouliu, 1902; female from Pishin Balochistan], ***P. Nursei***, Theobald, 1907 [=***Anopheles (Cellia) superpictus*** Grassi, 1899, female from Quetta, Balochistan], ***Culex (Neoculex)*** quettensis Mattingly, 1955, male from Quetta, ***A. habibi*** mulligan and Puri, 1936, (female from Hudda village on banks of Habib Balah, Quetta) were mentioned (Aslamkhan, 1972). Malaria Control Program (1999, 2000) reported the prevalence of ***An. culicifacies***, ***An. stephensi***,, ***An. Pulcherrimus***, ***An. subpictus***, ***An. habibi***, ***An. superpictus*** in Balochistan. The most common species were ***An. culicifacies*** and ***An. stephensi***. Afridi ***et al.*** (1958) reported An. stephensi and Aslamkhan and Baker (1969) recorded ***An. subpictus*** from Karachi.

In conclusion, it can be said that infection with ***P. falciparum*** was noted to be more prevalent in our study whereas ***P. vivax*** was observed to by more common in the study conducted Malaria control Program (1998, 1999, 2000). Our results showing more prevalence of ***An. culicifacies*** and ***An. stephensi*** in Quetta district is very much coincides with the results of Malaria Control Program (1999, 2000).

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