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Prevalence of malarial parasite in District Buner

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Abstract

The current study was carried out in DHQ hospital Daggar Buner and some private clinics from January 2017 to June 2017. A total of 3574 patients were tested in which 1941 were males and 1633 were females of different age. Total positive cases were 421/3574; the overall incidence rate was 11.8% in different age groups of males and females. All the positive cases in our research were due to Plasmodium vivax. The results show that District Buner is at risk of malaria especially by Plasmodium vivax. The common symptoms and clinical investigations in all patients include, sever shaking chills, fever, sweating, vomiting, headache and diarrhea. We can stop the high rate of occurrence of malaria infection by knowing its types, ways of transmission and different preventing methods that could help us in preventing the infection in this area. In total of 421 positive cases which were examined during in the current study, all the positive cases were caused by Plasmodium vivax in which 170 were female and 251 were male positives. It is concluded that in the local area of District Buner malaria is common health problem Plasmodium vivax is found in high proportion. Its incidence increases from April to June (22.4% to 32.4%). The higher rate of infection was found in age group of 21-30 years (39.41%). The lowest infection rate was noted in the month of February.

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Introduction

Malaria is a common health problem. Its prevalence, morbidity and mortality are at high level in tropic and sub tropic region (Cabe, 2001). It is a Vector-borne irresistible sickness brought on by a peripheral blood protozoan parasite of the genus Plasmodium. Malaria accounts for 85% global infective disease burden (Snow *et al.*, 2005). But still the disease is preventable and also treatable. Within the developing countries of the tropical zones malaria remains a primary public health concern. The disease occurs worldwide mostly in 109 countries. Out of those 35 countries are blamable for the maximum of total yearly worldwide deaths from malaria infection. Most sub-Saharan region of Africa and South East Asia are at high risk. The maximum infection rates which account for 50% of total worldwide deaths mostly occur in Nigeria, Democratic Republic of the Congo, Uganda, Ethiopia and Tanzania. For other highly affected countries malaria is still a severe danger to mankind and also a tough load on the economic and health systems (Role Back Malaria project, 2009).

A high infection rate of malaria within a country promoting poverty condition, as malaria can harm infant growth; badly disturb intelligent development and schooling opportunities. All of which can ultimately reduce worker efficiency (Hotez *et al.*, 2006). It has been estimated that malaria can decrease the gross national products of countries with high infection rates by as much as 1.3%, while accounting for up to 40% of yearly public health expenditures (World Health Organization, 2009).

Several co-infections are also linked with malaria. Severe anemia can cause by it, which is related with reduced physical and cognitive improvement in children and high death rates among pregnant women. Impaired immune functioning and school performance are also risk factor of malaria the presence of malaria also put children indirectly at a higher risk for HIV infection, because severe anemia often warrants blood transfusions. Due to the unscreened blood this is a serious factor. In less developed countries blood screening is not common. 15 percent of HIV infection occurs in those children who had received blood transfusions and only 2 percent in those children who did not received blood transfusion (Snow *et al.*, 1999). 21st century first great human tragedies are the connection among cases of severe malaria and HIV-related tuberculosis which is grown high (Hotez *et al.*, 2006). Infants are the most vulnerable to lethal infections from the disease due to the nature of malaria. Pregnant females and individuals with HIV are similarly extremely susceptible to co-infections and complications. The death rate is 20% in adults (World Health Organization, 2009). Pakistan has been categorized as a country with moderate malaria prevalence. WHO has played vital role in its control. Even though, still 10% deaths occur every year in Pakistan (Integrated Regional Information Networks, 2007). Annually round about 1.5 million cases of malaria are reported from Pakistan (World Health Organization, 2005). In exceedingly endemic settings, it influences kids under five years and pregnant women, constituting the primary target population of new malaria control methodologies (World Health Organization, 2010). In spite of advances in medicinal sciences, malaria is still an overall worldwide challenge bringing on a loss of life of around one million every year (Enserink, 2008). More than one billion people live in those areas which have high malarial risk (Graham *et al.*, 2010).

Around 3.3 billion individuals were at danger of malaria. Populations living in sub-Saharan Africa have the highest Risk of obtaining malaria. In 2010, 81% of cases and 91% of deaths are assessed to have happened in the African Region. Anyhow youngsters under five years' old and pregnant ladies being most extremely influenced (World Health Organization, 2011). Out of 5.7 million cases in eastern Mediterranean region 17% were counted in Pakistan (World Health Organization, 2010). In different areas of Pakistan malaria is prevalent, but still in the most recent decade, there has been a six fold increment in falciparum malaria, which now involves 42% of all malaria cases recorded by National Malaria Control Program (Shah *et al.*, 1997).

In Pakistan 39 districts have been named high hazard zone which are mostly from Baluchistan and Sindh. Malarial potential in many areas is enhance by monsoon rains and vast irrigation network (Tasawer *et al.*, 2003).To exactly evaluate the incidence of different types of malaria in Pakistan, Epidemiological data from different regions is insufficient (Muhammad and Hussain, 2003). However In 2004, lower malaria incidence was confined to Punjab and Azad Kashmir whereas Baluchistan and Federally Administered Tribal Areas (FATA) were reported with highest malarial incidence, while Sindh and KPK were reported with moderate incidence (Kondrachine, 2008).

Materials and methods

Study area

Data for this study was collected from DHQ hospital Daggar and other private laboratories in District Buner. District Buner is located between the district Mardan, Sawabi, Swat and district Shangla and lies between 34-9 and 34-43N latitude and 72-10 and 72-47E longitude and 120 km distinct from city Peshawar in the northern area of province Khyber Pukhtonkhwa Geographically, district Buner is surrounded by highly mountain ranges which are full of pinus and many other coniferous trees. Population of Buner as per 1998 census is 506048. Mostly Buner have pleasant weather except June, July, August during which temperature is high (44 degrees centigrade) and December, January and February during which temperature is low (-2 degrees centigrade). There is 106 cm yearly rainfall.

Study population

This work was completed during the year of 2017 (January to June) in DHQ Hospital Daggar, and some other Private clinics of district Buner. Patients of all age groups who visited the hospitals with signs and symptoms of malaria (fever, chills, headache, sweats, fatigue and vomiting) and advised test by the doctor were included in the study. For the explanation of clinical analysis, a proforma was designed for each patient that contains full information about the patient such as; age, sex, address, symptoms and risk factors for malaria.

Microscopy

Through microscopy blood samples were examined. The finger-tips of the patients were cleaned with an alcohol-moistened swab and pricked with disposable lancet. Both thick and thin blood smears were prepared on the same slide, stained with Giemsa stain, wash with ethanol and examined under 100X oil immersion objective.

Statistical analysis

All the data is statistically analyze on SPSS 16 version. All the tables' and graphs are also design in SPSS and then copied to the Microsoft Word 2010.

Results

Gender wise analysis of total patients

A total of 421 subjects out of 3574 were found positive. 1941 subjects were male in which 251 were positive and 1633 subjects were females having 170 positive cases as shown in table 1.

Table 1. Gender wise analysis.

			Data Analysis		
	Samples		Positive	Negative	Total
Gender	Male	Count	251	1690	1941
		% in Total	7.0%	47.3%	54.3%
	Female	Count	170	1463	1633
		% in Total	4.8%	40.9%	45.7%
Grand Total		Count	421	3153	3574
		% in Total	11.8%	88.2%	100.0%

Age wise analysis of total patients

All the collected samples were arranged age wise into 7 different groups, from age-group 1-10 to the age of above 60. Age group 21-30 has the high level of positivity that is 166 positive cases out of 421 (Fig. 1).

The total positive cases for male population were 251. In male the rate of positivity in age-group 21-30 was 99/251 (39.44%) which is higher than other age-groups (Fig. 2). The rate of positivity in female population is lower as compare to male population. Total tested samples in females are 1633 in which total positive cases are 170. In female the rate of positivity in age-group 21-30 is 67/170 (39.41%) which is also higher than other age-groups in current research (Fig. 3).

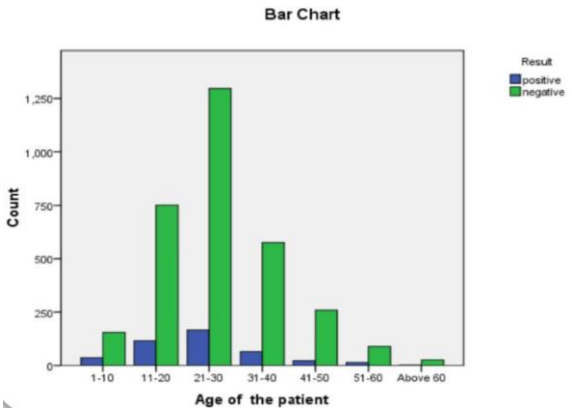

Fig. 1. Age wise analysis of total patients.

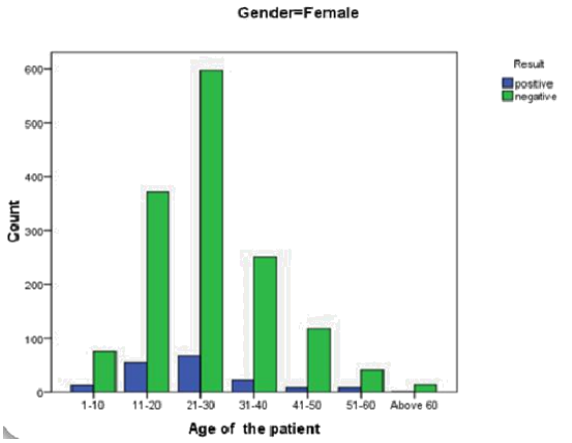

Fig. 2. Age wise analysis of Female patients.

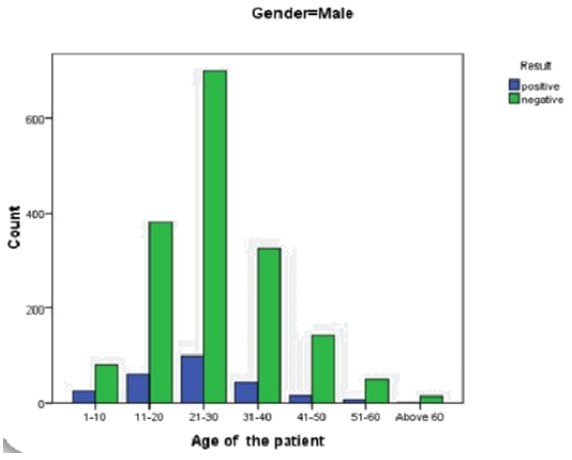

Fig. 3. Age wise analysis of Male.

Tehsil wise analysis of all patients

In all five tehsil councils, Daggar, Gagrah and Gadezi, are badly infected from malaria. Among these three tehsil councils, Daggar has a large number of malarial patients that is 1296 (36.3%); Positive cases in this area were 156 (37.1%). In Gagrah, total tested samples were 1265 (35.4%) in which positive cases were 123 (29.2%). We can summerize the results of tehsils as 10.2% < 10.7% < 12.8% 29.2% < 37.1% for Khudokhel < Mandanr < Gadezi < Gagra < Daggar respectively. (Table 2)

Table 2. Tehsil wise analysis of total patients.

Data Analysis					
	Samples		Positive	Negative	Total
Location	Dagger	Count	156	1140	1296
		% With Result	37.1%	36.2%	36.3%
	Gagra	Count	123	1142	1265
		% With Result	29.2%	36.2%	35.4%
	Gadezi	Count	54	404	458
		% With Result	12.8%	12.8%	12.8%
	Mandanr	Count	45	270	315
		% With Result	10.7%	8.6%	8.8%
	Khudokhel	Count	43	197	240
		% With Result	10.2%	6.2%	6.7%
Total		Count	421	3153	3574

Month wise analysis of total patients

In table 3 all samples are classified month-wise from January to June, total tested as well as total positives are also entitled for each month. The rate of positivity is in ascending order from January to June. The following table show that most suitable month for the occurrence of malaria infection is June in district Buner in which total tested samples are 574 (16.1%) with 131(3.1%) positive cases. The number of tested samples is higher in month of April, 783/3574 in which positive cases are 115 (27.3%). Total positive cases in every month are, January 16 (3.1%), February 10 (2.4%), March 21 (5.0%), April 115 (27.3%), May 128 (30.4%) and June 131 (31.1%) out of 421 positive cases.

Table 3. Month wise analysis of total patients.

Data Analysis					
	Samples		Positive	Negative	Total
Months	January	Count	16	489	505
		% With Result	3.8%	15.5%	14.1%
	February	Count	10	487	497
		% With Result	2.4%	15.4%	13.9%
	March	Count	21	494	515
		% With Result	5.0%	15.7%	14.4%
	April	Count	115	668	783
		% With Result	27.3%	21.2%	21.9%
	May	Count	128	572	700
		% With Result	30.4%	18.1%	19.6%
	June	Count	131	443	574
		% With Result	31.1%	14.1%	16.1%
Total		Count	421	3153	3574

Discussion

Malaria infection is caused by a member of phylum protozoa namely Plasmodium, an insect (anopheles mosquito) is the carrier agent for this parasite (Snow *et al.*, 2005).

The discovered species of Plasmodium till today are Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, Plasmodium ovale, Plasmodium knowlesi are the cause of malaria infection in humans (Singh *et al.*, 2004). General malaise, fever, vomiting and headache primarily arise to a malarial patient while pulmonary edema, anemia and cardiovascular collapse arise to a patient in severe malaria.

Nearly all the people in Pakistan are familiar to malaria infection especially in rural areas. Epidemiological data from different regions of Pakistan are insufficient to exactly evaluate the occurrence of various types of malaria (Khadim, 2002).

By Ansar *et al.*, in 2010 in Gadap Region there were 58% cases obtained in male population and 42% cases were obtained in female population. By Jonejo *et al* in 2012, at Larkana 183 samples were collected from females while 117 samples were collected from males. In 2007, Idrees, Sarwar and Fareed and another researcher Hozhabri *et al* in 2000 reported that males show dominancy over females in Jahangeera. The percentage of malaria infections in male population was 7.18% is higher than the percentage of infections in female population that is 6.66%. (Awan and jan, 2008). In current research work the rate of tested samples is higher in males than females. In males the total tested samples are 1941 and in females 1633 samples were collected out of 3574 total samples. The rate of positivity is also higher in male as compare to female population. In males 251 positive cases are obtained out of 421 total positive cases while in females 170 cases are counted as positive.

The rate of positivity in age-group 21-30 is 99 (39.44%) in total of 799 tested samples in this group which is higher than other age-groups in male population. While in female population the rate of positivity in age-group 21-30 years is 67 (39.41%) in 664 tested samples in this group which is higher than other age-groups. By the study of Ahmad *et al.*, during 2013, in Lal Qilla showed that most suitable month for malaria infection was June in which 23.38% malaria cases were obtained while a very low rate of malarial; cases were obtained in January which was 8.34%.

According to our research work in 2017, high positivity rate was also obtained in the month of June in which total positive cases were 131 in total of 574 tested samples in this month, in which 76 were male positives in 313 total tested and 55 female positives in 261 total tested while the rate of positivity is lowest in February than all other months in which total positive cases were 10 in total of 497 tested samples, in which 261 were males in which 6 were positive and 236 females out of which 4 were positive.

According to the investigation of khan *et al* in 2013 at Bannu in total of 9864 tested samples, positive cases were 1712 in which 1567 cases were of Plasmodium vivax and 128 were of Plasmodium falciparum and 17 cases were of both of these species. According to finding of Kakar and Yasinzai, (2009), there were 3765 total tested samples in which the percentage of positivity was 26.8%. In current research work the results are different, in current work total positive cases in all the data are 421 in which 251 cases are in male population and 170 cases are in female population and all the 421 positive cases are due to Plasmodium vivax.

The current work was done in different hospitals namely; DHQ Hospital Daggar which is main regional hospital, government hospital Pir baba (Gadezi), government hospital Chamla and different private clinics of district Buner to investigate the present scenario of this fatal disease among different age-groups in district Buner. Plasmodium vivax is most common in district Buner that caused infection in 421 persons out of 421 positive cases.

In Korea 282 patients were treated, in which 137 were infected due to Plasmodium vivax and 45 were due to Plasmodium falciparum (Kim *et al.*, 2008).

The above result showed that the occurrence of Plasmodium vivax is high which show similarity to the results obtained from our study because Plasmodium vivax infection is in large number in district Buner. The large number of malaria infection in district Buner is perhaps due to poor living standard and open savages near houses, schools and hospitals another cause may be sleeping without mosquito nets.

In current research work, from all of five discovered species of Plasmodium, there is only one species appeared, Plasmodium vivax. It is maybe due to climate, temperature or geographical distribution that is not favorable for other Plasmodium species.

Prevalent Plasmodium species in Pakistan are Plasmodium falciparum and Plasmodium vivax (World Health Organization, 2012). In tribal areas of Khyber Pukhtunkhwa malaria is very common; this infection is found mostly in Sindh and Baluchistan (Kakar *et al*., 2010). In summer season the rate of malaria transmission is very high as Malaria transmission upgrades during June to September as well as April to June (Bouma *et al*., 1996). In current work we have also a large number of positive cases during May and June.

According to Ibrahim *et al* 2014 in District Buner the high cases of malaria wer found in the age of 31-40 years 202 (21.88%), followed by 41-50 years 185 (20.04%), 51-60 years 177 (19.17%), 21-30 years 147 (15.92%), 11-20 years 110 (11.91%) and low infection was found in 1-10 years 102 (11.05%). In current study the high cases of malaria are found in age group of 21-30 years which is 99 (39.44%), followed by 11-20 years 61 (24.30%), 31-40 years 43 (17.13%), 1-10 years 25 (9.96%), 41-50 years 15 (5.97) and rare cases are found in 51-60 years 7 (2.78%).

Conclusion

It is concluded that in the local area of District Buner malaria is common health problem plasmodium Vivax is found in high proportion. The male population is more affected than females. Its incidence increases from April to June (22.4% to 32.4%). The higher rate of infection was found in age group of 21-30 years (39.41%). The main causes of this infection are, providing a suitable medium to mosquitoes, due to open savages, sleeping without mosquito nets and due to sleeping in open areas.

Recommendation

After current study we realized that in district Buner the pathogenicity of malarial parasite is high. Spread of malaria can be control in local area, by adopting the measures which are proper in preventing this infection. To control the possible spread of this infection the decisions and actions which must taking should on the basis of, properly collected data, Awareness of the people against malarial infection, Treatment of the infected person, Usage of mosquito nets and Usage of anti-malarial spray. In the last government should provide all those facilities in the local areas which protect the people from malarial parasite.

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