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Frequency and risk factors of malaria infection in Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan

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Abstract

Background: Nearly, half world's people are at high risk from malaria disease and around 1 to 2 million people die from malaria every year.

Objectives: The current study was conducted to determine the frequency of malarial disease in Dera Ismail Khan, Pakistan.

Methods: The cross-sectional study was carried out to examine the malarial infection in the blood of 3398 suspected malarial patients from January to July, 2017. Statistical analysis was done by SPSS.

Results: Among 3398 suspected patients, 415(12.2%) were positive for *Plasmodium*. Out of these, 96.6% (n= 401) cases were due to *Plasmodium vivax* (*P. vivax*) infection and only 3.4% (n= 14) had *Plasmodium falciparum* (*P. falciparum*). In seasonal variations, *P. vivax* infection was highest (n=121) in July and lowest (n=15) in February. Prevalence of disease was 52.8% (n=219) in less than 14 years ages peoples and 47.2% (n=196) in above 14 years ages. Males (n=286, 68.9%) were highly infected by *Plasmodium* as compared to females.

Conclusions: Malaria infection was considerably frequent in Dera Ismail Khan, one of the hottest areas of Khyber Pakhtunkhwa, Pakistan. The high incidence rate of *P. vivax* is significantly threat to humans' population in Dera Ismail Khan and may lead to serious health problems, including cerebral malaria.

Keywords: Malaria; *Plasmodium vivax*; *Plasmodium falciparum*; Frequency; Dera Ismail Khan

Introduction

Malaria is a mosquito-borne life-threatening issue triggered by *Plasmodium* parasite [1]. Malaria is observed as one of the world's deadliest parasitic diseases and privileges more lives than any other infectious disease apart from tuberculosis [2]. Malaria accounts for millions of dollars in term of medical costs in Africa and also other developing countries. Malaria, however, is a treatable disease if instantly diagnosed and congruously treated [3]. Approximately 3.2 billion people which accounts for about half of world's population, are at greater risk of malarial infection [2]. Neatly 300-500 people acquire Malaria annually, 1 to 2 million people die annually due to Malaria, and 2 billion people are resident in areas exposed to malarial infection [4].

Malaria is quite common in Pakistan and epidemiological data is scarce to accurately evaluate the prevalence of malaria [5]. Pakistan's populations of 60% live in regions endemic with malarial infection [6].

In spite of well-established malaria control programs in Pakistan, fifty thousand malaria deaths and Five Lac malaria infections have been reported annually [7]. The number of cases along the Afghanistan and Iran border is about 37% [8]. Pakistan has a climate from tropical to temperate and along the southern coast has dry conditions [9], and altitude ranges from sea level to almost 9000 meters [10]. In Pakistan, there are two most prevalent *Plasmodium* species such as *P. vivax* around 64% and *P. falciparum* 36% are responsible for malaria infections [11].

Pakistan is often exposed to natural hazards like droughts, cyclones and floods. Inappropriate political decisions, economic reasons, declined control programs of malaria, agriculture sector, poor irrigation and drainage system, an adaptation of mosquito/parasites to pesticide drugs and environmental changes, all these contribute to the development and increase of the malaria

disease. Other factors contributing to this disease comprises increase resistance among parasites that is initiating need for new drugs, also re-emerging of the infection in areas where it has been previously eradicated. Different moods of parasitic transmission in this scenario include transmission via mother to her fetus “congenital” malaria, transmission through organ transplant, or blood transfusion or via shared use of syringes contaminated with parasitic blood, [12].

Dera Ismail Khan with a hot climate situated in the province Khyber Pakhtunkhwa province situated in of Pakistan facilitate favorable areas for breeding of mosquitoes due to ill managed drainage. Although compared to enteric fever and tuberculosis, malaria is cause of fever more prevalent in that area; therefore current study was conducted to reveal the situation of malaria in D.I. Khan, KP, Pakistan.

Materials and Methods

This is a cross sectional study and was conducted at District Headquarter (DHQ) Hospital Dera Ismail Khan from January to July, 2017. A total of 3398 blood specimens were collected from malaria suspected patients. The 3 ml blood specimens were obtained by disposable syringes and collected in EDTA (Ethylene diamine tetra-acetic acid) anticoagulant-coated tubes after informed consent. Designed questionnaires were filled from suspected patients, contained limited variables including gender, age, symptoms. We included in this study, patients all age groups and sex with malaria signs and symptoms (chills, headache, fever, nausea, fatigue, vomiting and sweats).

The malaria cases were detected by thin and thick blood films techniques described by Paniker [13]. These techniques were described by Paniker [13] and Chiodini *et al.* [14], for identification of malaria parasites species.

Results

A total of 3398 samples were collected from various localities in D.I. Khan. Out of total 3398, 415 (12.2%) were found positive for *Plasmodium*. *P. vivax* was observed in 401 (96.6%) while *P. falciparum* was 14 (3.4%) out of positive cases (Fig.1). In case of *P. vivax* malaria, one circle was formed and one spot was present on slide as determined under compound microscope, while in *P. falciparum* case, two circles were formed and two spots were present.

Out of total, 219 (52.8%) positive cases of malaria in patients below 14 years of age as compared to above 14 years ages were recorded (Table 1). The incidence of malaria infection could happen to any age and did not vary significantly in statistical analysis. In gender out of total, males were highly infected (n= 286, 68.9%) as compared to females (n=129, 31.1%) (Fig.1).

However, seasonal variations were also noted, *P. vivax* infection was the highest (n=121) in July and the lowest data (n=15) in February. No reported case of malaria patients including the types of malaria species such as *Plasmodium malariae* and *Plasmodium ovale* was detected in our study (Fig.2).

Discussion

Malaria disease is still considered as a severe health issue in developing countries such as Pakistan [15]. Malaria infection is moderately endemic in Pakistan. The Punjab province reports less than 10% cases with about 52% of population as compared to other provinces of Pakistan [16]. In the same

report, Baluchistan province which constitutes 5% of the population contributes more than 30% of the malaria cases and Sindh were as regards 30% with 25% population of the Pakistan [17]. This cross study was conducted to present current information on malaria disease in areas of Dera Ismail Khan having a very hot climate in the province of Khyber Pakhtunkhwa (KP) of Pakistan.

In our study, males (68.9%) were more infected by *Plasmodium* which is consisted with other studies conducted in Khyber Pakhtunkhwa (18-21). The possible reason may be that males are more exposed as compared to females [22].

The current study showed that 52.8% positive cases of malaria in patients below 14 years of age as compared to above 14 years ages. Statistical analysis showed that the incidence of malaria infection could happen to any age and did not vary significantly.

During the current study, *P. vivax* was recorded to be high (96.6%) in comparison to *P. falciparum* (3.4%) with similar to other study which stated that *P. vivax* was the leading species [17]. Our results about *P. vivax* which is more prevalent in the current study is comparable to other research studies conducted in various area of Pakistan (23-26), however differing from some other study in which *P. vivax* was lower than *P. falciparum* [27, 28]. These differences may be because of collecting of samples in different times as *P. falciparum* frequency is high starting from August and upto December while *P. vivax* peaks between April and September [6, 29-31].

In this study, no case of malaria patient including the types of malaria such as *Plasmodium malariae* and *Plasmodium ovale* was detected which is parallel to Yar *et al.* studied in Multan [21] and Yasinzai and sulemankhel in Balochistan [25].

Improved diagnosis and proper treatment is very important to control malaria, particularly in developing countries like in Pakistan because misdiagnosis of mixed species infections of malaria can results in inappropriate or incomplete treatment, where chloroquine is used to treat against *P. vivax* however known to be ineffective against *P. falciparum*. Malaria is diagnosed by microscopy in Pakistan, so the evaluation of the quality of microscopy may assist in identifying area for better diagnosis and treatment in the endemic area of Plasmodium species.

Table 1: Age wise incidence of malaria infection in District D. I. Khan in 2017

S. No.	Age	No. of +ve malaria cases	Male	Female
1	<14	219	157(71.68%)	62(28.31%)
2	>14	196	129(65.81%)	67(34.18%)
Total		415	286 (68.9%)	129(31.1%)

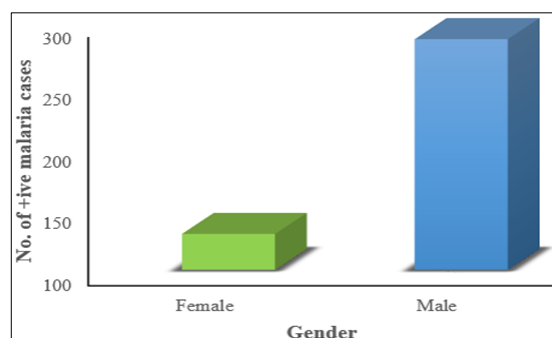


Fig 1: Gender wise comparison of malaria infection in District D. I. Khan in 2017

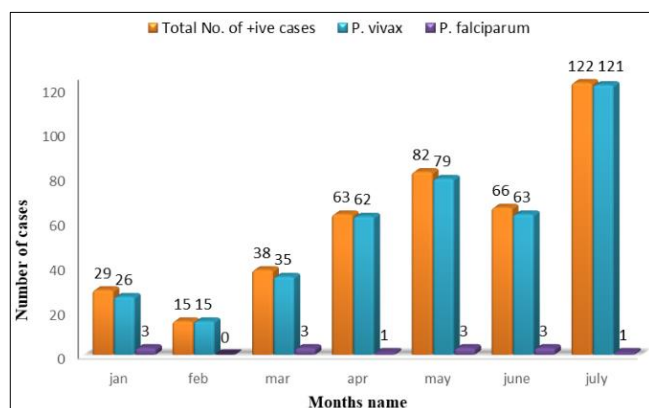


Fig 2: Monthly wise incidence of malaria infection in District D. I. Khan in 2017

Conclusion

Pakistan faces a number of challenges in control and management of malaria. The result of our study indicates that infection with *Plasmodium* was found to be more prevalent in Dera Ismail Khan areas and this high prevalence poses a significant public health hazard. So National and Provincial malaria control program effort should be paying attention on Khyber Pakhtunkhwa especially Dera Ismail Khan a very hot area of KP, with a highlighting on improving species diagnosis and treatment for *P. vivax*.

References

1. Awan ZR, Khan AK, Shah AH, Suleman M, Khan MA. Assessment of malaria prevalence among school children in rural areas of Bannu District Khyber Pakhtunkhwa, Pakistan. *Pakistan Journal of Zoology*. 2012; 44(2).
2. WHO. World malaria report 2014. WHO World Malaria Programme, WHO, Geneva, Switzerland. http://www.who.int/malaria/publications/world_malaria_report_2014/wmr-2014-no-profiles.pdf
3. Lalloo DG, Shingadia D, Pasvol G. UK malaria treatment guidelines. *Journal of Infection*. 2007; 54(2):111-21.
4. Centers for Disease Control and Prevention. Treatment of malaria (guidelines for clinicians), 2011.
5. Federal Research Division. Country profile: Pakistan. Library of Congress, 2012.
6. Williams O, Meek S. Malaria: country profiles. London: Department of International Development, 2011.
7. Mukhtar M. Killer number one: the fight against malaria: malaria strategy lags behind the global goals, Humanitarian news and analysis a service of the UN Office for the Coordination of Humanitarian Affairs. Nairobi: IRIN, 2006.
8. Kakar Q, Khan MA, Bile KM. Malaria control in Pakistan: new tools at hand but challenging epidemiological realities. *East Mediterr Health J*. 2010; 16(Suppl):S54-S60.
9. Federal Research Division: Country profile: Pakistan. Library of Congress, 2012.
10. Land surface elevation extremes by country. http://en.wikipedia.org/wiki/List_of_elevation_extremes_by_country.
11. White NJ. Plasmodium knowlesi, the fifth human malaria parasite. *Clinical Infectious Diseases*. 2008; 46(2):172-173.
12. Bozdech Z, Llinas M, Pulliam BL, Wong ED, Zhu J, De Risi JL. The Transcriptome of the Intra erythrocytic Developmental Cycle of malaria, 2003.
13. Paniker CKJ. Text Book of Medical Parasitology. 5th ed. New Delhi: Jaypee Brothers, Medical Publishers (P) Ltd, 2002.
14. Chiodini PL, Moody AH, Manser DW. Atlas of Medical Helminthology and Protozoology. 4th Edition. London, New York: Churchill Livingstone: Edinburgh, 2001.
15. Khatoun L, Baliraine FN, Bonizzoni M, Malik SA, Yan G. Prevalence of antimalarial drug resistance mutations in *Plasmodium vivax* and *P. falciparum* from a malaria-endemic area of Pakistan. *American Journal of Tropical Medicine and Hygiene*. 2009; 81:525-528.
16. Metha D, Desai N. Laboratory Diagnosis of Malaria; various method and It's comparison. *Natural Journal of Integrated Research in Medicine*. 2013; 4(3):138-143.
17. Murtaza G, Memon IA, Memon AR, Lal MN, Kallar NA. Malaria morbidity in Sindh and the Plasmodium Species distribution. *Pakistan Journal of Medical Sciences*. 2013; 25(4):646-649.
18. Howard N, Durrani N, Sanda S, Beshir K, Hallett R, Rowland M. Clinical trial of extended-dose chloroquine for treatment of resistant falciparum malaria among Afghan refugees in Pakistan. *Malaria Journal*. 2011; 10:171.
19. Suleman M. Malaria among the students of religious schools of Bannu District, Khyber Pakhtunkhwa, Pakistan. *Pak Journal Zoology*. 2012; 44:959-62.
20. Yasinzai MI, Kakarsulemankhel JK. Incidence of human malaria infection in northern hilly region of Balochistan, adjoining with NWFP, Pakistan: district Zhob. *Pak Journal Biological Sciences*. 2008; 11:1620-1624.
21. Yasinzai MI, Kakarsulemankhel JK. Prevalence of human malaria infection in Pakistani areas bordering with Iran. *Journal of Pakistan Medical Association*. 2013; 63:313-316.
22. Khattak AA, Venkatesan M, Nadeem MF, Satti HS, Yaqoob A, Strauss K *et al*. Prevalence and distribution of human Plasmodium infection in Pakistan. *Malaria journal*. 2013; 12(1):297.
23. Malaria Control Program Balochistan (MCPB). District-wise surveillance data of MCP Balochistan, 2004, pp. 1.
24. Shehzadi S, Akhtar T, Hanif HA, Sahar S, Niaz S. Molecular surveillance of malaria in south Punjab with higher proportions of mixed infections. 31st Pakistan Cong. Zoology (Int.), Univ. AJK, Muzaffarabad. 2011; Abstract: 101.
25. Yar HM, Masood K, Maqbool A, Malik GQ. Prevalence of malaria parasite species in Multan district. *Professional Medical Journal*. 1998; 5:183-7.
26. Jan AH, Kiani TA. Haematozoan parasites in Kashmiri refugees. *Pakistan Journal Medical Resources*. 2001; 40:10-2.
27. Mahmood K, Jiramani KL, Abbasi B, Mahar S, Samo AH, Talib A *et al*. Falciparum malaria: various presentations. *Pakistan Journal Medical Sciences*. 2006; 22:234-7.
28. Faiz R, Rehmat B, Yousuf MJ. Prevalence of Malarial Parasite in Human Blood. 31st Pakistan Cong. Zool. (Int.), Univ. AJK, Muzaffarabad, Abstract, 2011, 163.
29. DMC. Malaria case management desk guide for clinicians and health care providers. Islamabad:

Directorate of Malaria Control, 2007.

30. Khatoon L, Baliraine FN, Bonizzoni M, Malik SA, Yan G. Genetic structure of *Plasmodium vivax* and *Plasmodium falciparum* in the Bannu district of Pakistan. *Malaria Journal*. 2010; 9:112.
31. Mukhtar M. Guidelines for antivevector interventions for monsoon season. Pakistan: Directorate of Malaria Control, Ministry of Health, 2009, 1-14.