Original Article

Clinical Profile Of Fever Cases For Malarial Infection In A Non-Malarious Region Of Himachal Pradesh

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Abstract

Background: Malaria is a major public health problem in India though it is both a preventable and treatable disease. Temperature, precipitation, and vegetation have changed rapidly in the Himalayas as part of global climate change leading to vector species spreading into new breeding habitats in high elevations. **Aims and Objectives:** To study clinical profile of fever patients among the tribes of Kinnaur and to screen for malaria among the fever cases. **Material And Methods:** This Cross-sectional observational study was conducted at three health facilities namely CHC Baba-Nagar, PHC Tapri, Sub-Centre Chaura of Nichar block in district Kinnaur of Himachal Pradesh from July, 2016 to August, 2017. The study included all patients who presented with febrile illness to the OPD of these institutions. Demographic and clinical data were collected through pretested and semi-structured questionnaire. Blood samples were collected from the febrile patients for RDT, Smear and routine investigations. Data was entered in the excel sheet and analysed using statistical software Epi Info version 7. **Results:** A total of 445 patients of febrile illnesses were screened, out of which 405 were enrolled. Mean age of the patients was 37.00± 14.87 years. Majority of the patients were females , had gone to primary school , belonged to schedule tribe, was in clerical job/shop man/farm owner , belong to Hindus religion and above poverty line. Nearly three fourth of the patients presented with continuous fever for less than 7 days..Nausea and vomiting was the most common complaint. Most of the patients had no history of travel outside the study area. All of the patients were found negative for malaria in rapid diagnostic test as well as in blood smear for malarial parasite test .Nearly one third of the patients were diagnosed as having URTI and 9.9% of the patients were diagnosed as having tuberculosis. **Conclusion**: High level of suspicion is warranted for patients presenting with fever, while at high altitude or after returning from a high altitude areas, when travel or transit included exposure to malaria zones.
Key words: Malaria, climate change , high altitude ,Himachal Pradesh

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INTRODUCTION

Malaria is an acute parasitic illness caused by Plasmodium falciparum, P. vivax, P. ovale and P. malariae.[1] It is a major public health problem in India though it is both a preventable and treatable disease. As per the WHO estimates 214 million cases of malaria occurred globally in 2015 (range 149-303 million) and 4,38,000 deaths (range 2,36,000- 6,35,000); about 80 per cent of these cases were found in African countries and 13 per cent in South East Asia Region (SEAR) countries.[2] India contributes to 61 per cent of malaria cases and 41 per cent of malaria deaths in SEAR countries. In India, approximately 539 million people reside in high transmission areas, i.e. defined as more than one case per 1000 population. All parts of India are at risk of malaria except areas 1700 m above mean sea level.[3] Temperature, precipitation, and vegetation

phenology have changed rapidly in the Himalayas as part of global climate change. The average annual mean temperature in the region has increased by 1·5°C and precipitation by 163 mm in the past 25 years.[4] A surge in temperature can lead to vector species spreading into new breeding habitats in high elevations [5] and extend the transmission season for the disease. It has been shown that an increase in average temperature of 1°C is associated with a 25% rise in malaria incidence in the region.[6] As per the state data of national vector borne disease control programme, no malaria surveillance activities have ever been conducted in our study area, district Kinnaur, Himachal Pradesh. The district health authorities also did not report any malaria cases in district Kinnaur, so there was no residual focal spray to control mosquitoes or other arthropods was done. Two Mega Hydropower projects have already been established and many small hydropower projects, road and house construction work was in progress in the district during the study period. Many migrant laborers were working in these construction sites that generally stayed in the temporary make shift dwellings.

Keeping all this in mind, a one year cross-sectional study was conducted to find out the clinical profile of fever cases for malarial infection in a non-malarious region of Himachal Pradesh among patients attending Outpatient Department of Community Health Centre Baba-Nagar, PHC Tapri and Health Sub-Centre Chaura of Nichar block in district Kinnaur of Himachal Pradesh which is located along the bank of Satluj River from July 2016 to August2017.

AIMS AND OBJECTIVES
1. To study clinical profile of fever patients among the tribes of Kinnaur.
2. To screen for malaria among the fever cases.

MATERIAL AND METHODS
Study Area: Study was conducted at three health facilities namely Community Health Centre of Baba-Nagar, PHC Tapri, Sub-Centre Chaura of Nichar block in district Kinnaur of Himachal Pradesh which is located along the bank of Satluj River.Block Nichar is having a population of 27683, and 85 villages as per 2011 census. This area is ranging in altitude from 1500 to 2500meter above the sea level.[7]
Study Design: Cross-sectional observational study

Study Duration: The study was conducted from July, 2016 to August, 2017.
Sample Size and sampling methodology: Sample and data were collected by the research team with the help of laboratory technician and health workers of the respective health facility through pre-tested semi-structured questionnaires. The study included all patients who presented with febrile illness to the OPD of CHC Baba-Nagar, PHC Tapri, and Sub-Centre Chaura of Nichar block from July, 2016 to August, 2017. All eligible patients fulfilling the inclusion criteria and giving written informed consent were enrolled in the study.
Inclusion Criteria:
1. All Febrile patients, irrespective of age and sex, who were seeking treatment from health facilities like Community Health Centre of Nichar block and residing in the study area for one year.
2. Willingness to participate in the study.
Exclusion Criteria:
1. Visitors, tourists who came from endemic area were treated but not included in the study.
2. Patients who refused to participate in the study.
Data Collection Method: Before commencing study, the medical officer (MO), health supervisors, health workers and laboratory technicians were sensitized on malaria infection and other aspects of malaria. Training for bivalent rapid diagnostic test and making thick and thin smear slides of malarial parasites was imparted. Demographic and clinical data were collected through pretested and structured questionnaire comprising of type of fever, symptoms associated with fever, socio-economic characteristics, history of travel in month preceding the interview, and place of travelling.
Blood Collection And Slide Preparation: Blood samples were collected from the febrile patients who satisfy the definition of malaria case (suspect). RDT with the bivalent kit used under NVBDCP in Himachal Pradesh was done for all the patients enrolled from PHC Tapri and Sub-Centre Chaura of Nichar block. Both thick and thin smears were made and identified by microscopic examination at CHC Baba-Nagar. At PHC Tapri and Sub-Centre Chaura, slides were prepared and sent to the Community Health Centre Baba-Nagar for detection of malarial parasite due to non-availability of Lab Technicians at these centres. Then these slides were transported to department

of microbiology, IGMC Shimla for cross **Quality Assurance** : All the slides for malarial parasites were cross checked at microbiology department IGMC Shimla for quality assurance.

Statistical Analysis: Data was entered in the excel sheet and analysed using statistical software Epi Info version 7.2.2.6. In the study various socio demographic and clinical variables were compared by using appropriate statistical methods. The categorical and continuous variables were reported as percentages and Mean ± Standard deviation, respectively.

Ethical Considerations: Ethical considerations according to the guidelines set up by ICMR (1994) and Helsinki declaration (modified 2000) were adhered to in all the patients enrolled in the study. They were informed of the aims, methods, the anticipated benefits and potential risks and written informed consent was obtained from all the patients before including in the study with a right to abstain from participation in the study or to withdraw consent to participate at any time of the study. In patients age <18 years, written informed consent was obtained from the guardians. Blood Samples drawn at the time of study were used only for the purpose of malarial parasite detection and nothing extra was done from the blood samples.

RESULTS

A total of 445 patients of febrile illnesses were screened, out of which 405 patients who fulfilled the inclusion criteria after giving written informed consent were enrolled into the study. A total of 230 patients were enrolled from CHC Baba-Nagar, 120 patients fromPHC Tapri and 55 patients from Health Sub-Centre Chaura. The age of the patients ranged from 4 years to 71 years with mean age of 37.00± 14.87 years. Maximum number of the patients (34.6%)were in age group 31-45 years followed by 30.9% patients who were in age group >45 years and 22.2% in the age group of 18-30 years. In the present study nearly two third of the patients were females and one third patients were males.Majority of the patients had gone to primary school while 6.2% of the patients were illiterate and only 1.2% of the patients had any professional/post-graduate degree . Half of the patients belonged to schedule tribe and nearly one third patients belonged to schedule caste. Maximum number of patients (29.6%) was clerical job/shop man/farm owner followed by un-skilled workers, semi-skilled workers and semi-professional workers. Only 4.0% of the patients were unemployed . Majority of the patients were

examination.
Hindus by religion while one tenth patients were Buddhist .The income limit for households for qualifying as a beneficiary under the BPL (below poverty line) list has been pegged at about Rs. 27,000 per annum. Most of the patients belonged to above poverty line while only less than one tenth of the patients were living below poverty line . Nearly three fourth of the patients presented with continuous fever and one fourth of the patients had intermittent fever.Three fourth of the patients had fever for less than 7 days while one fourth of the patients had fever for more than 7 days .Nausea and vomiting was the most common complaint in more than half of the patients followed by headache (44.4%), cough (34.6%), myalgia (27.2%) and diarrhea (23.5%).Rest of the patients had chills & rigors and rashes. None of the patient had seizure and hepato-splenomegaly. Most of the patients had no history of travel outside the study area while less than one tenth of the patients had history of travel All of the patients were found negative for malaria in rapid diagnostic test done at CHC Baba-Nagar, PHC Tapri and HSC Chaura. All of the patients were also found negative for malaria in blood smear for malarial parasite test done at CHC Baba-Nagar Mean hemoglobin was found 14.5± 2.6. It was in normal range in nearly two third of the patients and it was less than normal range in one third of the patients as per WHO criteria.Total Leucocytes Count (TLC) and differential Leukocytes Count (DLC) were found increased in more than three fourth of the patients while decreased in 5.9% of the patients. ESR was found increased in one third of the patients . Nearly one third of the patients were diagnosed as having upper respiratory tract infections. One fourth patients were having typhoid. Almost one tenth patients had urinary tract infections. No patients were diagnosed as having malaria as per IDSP Criteria. Out of the total, 9.9% of the patients were diagnosed as having tuberculosis.

DISCUSSION

In the present study, age of the patients ranged from 4 years to 71 years with mean age of 37.00 ± 14.87 years. Similar to our study, Abrahamsen et al.[8] found that mean age of the patients was 37.4 years . Majority of the patients (34.6%) were in age group 31-45 years followed by the patients (30.9%) who were in age group of >45 years and patients who were in the age group of 18-30 years (22.2%). Similar to our study, Salagre et

al.[9] observed that maximum patients in the age group of below 35 years 208 (75.4 %). Two third

Table-1: Socio-demographic characteristics of study participants

Variables	No. of patients (n=405)	Percentage (%)
Age distribution (Years)		
<18	51	12.6%
18-30	90	22.2%
31-45	139	34.6%
>45	125	30.9%
Gender		
Male	142	35.1%
Female	263	64.9%
Level of education		
Professional degree & Post graduate	5	1.2%
Graduate	20	4.9%
Intermediate, Post high School Diploma	68	16.7%
High school certificate	68	16.7%
Middle school compulsion	77	19.1%
Primary school or literate	143	35.2%
Illiterate	24	6.2%
Caste		
Schedule Caste	113	27.8%
Schedule Tribe	203	50.1%
Other Backward Class	10	2.5%
Others	79	19.6%
Occupational Status		
Professional	2	0.5%
Semiprofessional	50	12.3%
Clerical/Shopman/Farm owner	120	29.6%
Skilled worker	44	10.9%
Semiskilled worker	72	17.8%
Unskilled worker	101	24.9%
Unemployed	16	4.0%
Religion		
Hindu	362	89.4%
Buddhist	43	10.6%
Annual income (INR)		
Below poverty line (Annual Income Rs- $\leq$ 27,000)	35	8.6%
Above poverty line	370	91.4%

Table 2: Clinical Profile of Study Participants:

Variables	No of patients (n=405)	Percentage (%)
Type of fever		
Intermittent	115	28.4%
Continuous	290	71.6%
Duration of fever		
Less than 7 days	307	75.8%
More than 7 days	98	24.2%
Signs and Symptoms		
Headache	180	44.4%
Nausea & Vomiting	220	54.3%
Pain in abdomen	75	18.5%
Myalgia	110	27.2%
Chills & rigors	97	24.1%
Cough	140	34.6%
Rash	57	14.2%
Diarrhea	95	23.5%
Seizure	0	0
Hepato-splenomegaly	0	0
History of travel		
Yes	32	7.9%
No	373	92.1%

Table 3: Laboratory Parameters for malaria diagnosis among Study Participants:

Rapid Diagnostic Test (RDT)	No of patients (n=405)	Percentage (%)
Negative	405	100%
Positive	0	0
Smear for Malarial Parasite Test	**No of patients (n=405)**	**Percentage (%)**
Negative	405	100%
Positive	0	0

Table-4: Routine investigations of the patients (n=230)

Routine investigations *	Normal	Raised	Decreased
Hb (gm/dl) (Male-14 to 18 gm/dl)	156(67.9%)	0	74(32.1%)
TLC (4,100 to 10900/cmm)	30(13.1%)	186 (81%)	14 (5.9%)
DLC (N=48-77%, L=10-40%, E=0.3-7%, M=0.6-9.6%, B=0.3-1%)	30(13.1%)	186 (81%)	4 (5.9%)
ESR (10-18 mm hg)	152 (65.9%)	78(34.1%)	0

Table-5: Probable diagnosis of the patients

Probable diagnosis*	No of patients (n=405)	Percentage (%)
Malaria	0	0
URTI	130	32.1%
UTI	65	16.0%
Typhoid	97	24.1%
Others	72	17.9%
Confirmed diagnosis*	**No of patients (n=405)**	**Percentage (%)**
TB	40	9.9%

*As per IDSP Criteria

of the patients were females and only one third patients were males. Contrary to our study, Singh et al [10] noted that patients who were suffering from acute febrile illnesses 54.2% were males and 45.8% were females. Most of the patients had gone to primary school while 6.2% of the patients were illiterate and only 1.2% of the patients had any professional/post-graduate degree. Dhimal et al [11] noted that the median year of completed school education was grade 10; 12% of the participants were illiterate. Majority of the patients were Hindus by religion while one tenth patients were Buddhist. Similar to our study Dhimal et al [11] noted that the majority of the participants belonged to the Hindu religion (70%) followed by Buddhist (23%).In our study, we noticed that half of the patients belonged to schedule tribe and nearly one third patients belonged to schedule caste. Similar to our study, Chaturvedi et al [12] noted that most of their respondents were Hindus (93.6%) and ethically belong to different tribal and non-tribal communities. Nearly one third of the patients were clerical job/shop man/farm owner. One fifth patients were semiskilled workers, almost one third were unskilled workers while one tenth were skilled workers. Similar to our study, Chaturvedi et al. [12] noted that majority of the respondents were farmers (38.6%), followed by service class (22%) and self-employed (12.6%) people. Most of the patients belonged to above poverty line while only less than one tenth of the patients were living below poverty line. In the present study, on assessing the clinical profile of the patients we observed that, nearly three fourth of the patients presented with continuous fever and one fourth

patients had intermittent fever. Three fourth of the patients had fever for less than 7 days and almost one fourth patients had fever for more than 7 days. However, Abrahamsen et al.[8] found that the mean fever duration was 5.4 weeks. 34% of their patients had fever for less than 1 week, 30% had between 1-4 weeks while 35% had for more than 1 month. In our study, while observing the signs and symptoms of the patients, we noticed that nausea and vomiting was the most common complaint in half of the patients. Headache was the second most common complaint observed by almost half of the patients. Nearly one third of patients had complaints of cough while one fourth patients had complaints of myalgia and diarrhea. Similar to our study, Salagre et al.[9] found that the most common symptoms reported by the patients were generalized body ache (85.9%), headache (77.4%), vomiting (73.4%), abdominal pain (50%), high colored urine (34.2%), breathlessness (32.1%), loose motion (25.1%) and altered sensorium by (8.8%). In the present study, we noted that more than three fourths of the patients had no history of travel and only one tenth of the patients had history of travel. Contrary to our study, Khan et al.[13] observed the history of traveling outside in 25% of their cases. In our study, to screen the malaria cases in the febrile patients, we carried out smear examination and rapid diagnostic test for malarial parasites and found that all of the patients were found negative for malaria in both the tests. Similar to our study, Murdoch et al.[14] noted that none of the thin blood smears prepared was found positive for malaria. In routine laboratory test we noted the mean hemoglobin was 14.5± 2.6gm/dl. It was in normal range in nearly two third of the patients and decreased in one third patients. Salagre et al[9] noted that mild to moderate anaemia was frequent but most of the patients had haemoglobin of >12 gm% (44.1%).This was on the lower side from our study. Total Leucocyte Count (TLC) and differential leucocyte was (DLC) found increased in two third of the patients. ESR was found increased in one third patients. Khan et al.[13] noted the Lecocytosis was present in 35% of cases and count <4000 per microliter of blood was recorded in 20% of cases. In the present study, we have found no malaria cases. We noticed that nearly one third of the patients were diagnosed as having upper respiratory tract infections. One fourth patients were having typhoid. Almost one tenth patients had urinary tract infections while rests of the patients were diagnosed as having

tuberculosis. Similar to our study,Murdoch et al.[14] noted that enteric fever (27%), lower respiratory tract infection (31%), upper respiratory tract infection (10%), urinary tract infection (14%), and meningitis/encephalitis (1%). None of the thin blood smears prepared was found positive for malaria. High level of suspicion is warranted for patients presenting with fever, while at high altitude or after returning from a high altitude areas, when travel or transit included exposure to malaria zones. We stressed the need of vigilance toward the detection of malaria, even in high altitude non-malarious areas, and, the importance of taking a detailed recent and distant travel history that encompasses the previous 5 years. Pre-travel advice for journeys to very high altitude should take into consideration any risk for malaria due to transit through malaria zones, and when appropriate, accurate preventive recommendations provided to the traveler. However, significant challenges remain. An outbreak of malaria may occur at any time, even in low risk areas, following severe changes in the ecology or extreme weather events and that there is a continuous rise in the numbers of imported cases of malaria. In addition, the risk of malaria transmission in the temperate regions may increase because global warming has more pronounced effects in the higher altitudes of Himachal Pradesh.

Recommendations

The negative findings cannot deny the possibility of having such malarial infection in this geographical area in the recent past as well as it poses a potent threat in the near future. No measures for the prevention and control of malarial infection is being carried out with the presumption of no threats of having the infection in this part of the state, which in fact needs to be given the thought to prevent the outbreak of the infection in the near future. ASHA and health care workers should be trained in a way to diagnose suspected malaria cases and to refer them to the nearest health center without any delay. Locally appropriate case definition of malaria should be used for research and surveillance purpose. Although, the study could not find the numerical presence of infection in the area but its purpose and interpretation, if seriously and timely given thought is enough to raise the bells of our health system to need of having active surveillance mechanism in the control of malaria infection in our state. Another independent survey is required

which includes an epidemiological study as well as an entomological survey to detect anopheles vectors presence in this region.

Limitations

Though conducted with a relatively sound methodology, this study nonetheless has few limitations. Due to a relatively small sample size, the findings of this study need to be corroborated in larger sample studies. The study being a part of a time bound project, could not afford larger sample size. We could not get any patients suffering from acute malarial infection in our study but the status of patients with chronic infection could not be detected due to the limitation of diagnostic tests employed. This was a cross sectional descriptive study. A prospective study design with entomological survey should be planned to see the wider prevalence of malaria.

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