

Malaria infection in district Hardwar of Uttarakhand state (India)*Pankaj Saini¹, Bishambhar D. Joshi² and T. Sharma³¹Dept. of Environmental Science, Dev Sanskriti University, Hardwar (Uttarakhand), India²Dept. of Zoology and Environmental Sciences, Gurukul Kangri Vishwavidyalaya, Hardwar, India³National Institute of Malaria Research (Field Station), Hardwar, India*E-mail: sainip1984@gmail.com

Abstract: The present study was conducted to find out the instances of malaria in different ecological zones in district Hardwar during the year of 2009. A survey was conducted to find out the instances of malaria in selected two different zones i.e. (i) Industrial area (IA) of BHEL township (ii) Rural area (RA) of Bahadarabad village of district Hardwar. During the present study, maximum (80) and minimum (32) instances of malaria were from RA and IA, respectively. It was also observed that males of between 21-30 years of age range showed higher infection of malaria as compared to females from the same areas.

[Pankaj Saini, Bishambhar D. Joshi and T. Sharma. **Malaria infection in district Hardwar of Uttarakhand state (India)**. *Rep Opinion* 2013;5(11):45-47]. (ISSN: 1553-9873). <http://www.sciencepub.net/report>. 5

Keywords: Malaria, Poor, Correlation,

Introduction:

Malaria has been a major public health problem in India even though modern medical science has reached its peak. Except for areas situated 5000 ft. above sea level malaria is endemic all over India. The endemicity varies from place to place depending on survival condition of malaria vector as well as its longevity. In spite of a century of research and control efforts, malaria is still a major global health problem and an obstacle to social and economic development (Kondrachine and Trigg, 1997).

In one of the four Vedas of the Hindus, malaria is referred as “a disease most dreaded affliction, king of disease.” While Chinese referred to the disease as “Mother of Fevers.” The relationship of fever to swamps and low-lying water was also recognized by the Greeks in the sixth century (Sharma *et al.*, 1996).

Malaria has been a major public health problem in our country even though modern medical science has reached its peak. Except for areas situated 5000 ft. above sea level malaria is endemic all over India. The endemicity varies from place to place depending on survival condition of malaria vector as well as its longevity (Saini *et al.*, 2010)

The most prevalent parasite is *Plasmodium vivax* (65%) followed by *P. falciparum* (35%), while *P. malariae* cases are only a few thousands, recorded from some foot hill areas in Orissa state. Occurrence of *Plasmodium ovale*, the forth malaria parasite species, has not been very common in India and till date only three reports of *P. ovale* are available from Kolkata, Orissa and more recently from Delhi. Among the four parasites found in India, *P. falciparum* is the most dangerous. It may cause serious illness and death, diagnosis is often difficult and almost all deaths due to malaria are caused by *P. falciparum*. This parasite has

also become resistant to chloroquine and resistance to long acting sulphha drugs has also been reported. *Plasmodium vivax* also produces serious illness but death is very rare (Prakash *et al.*, 2003).

In India, occurrences of epidemics and focal outbreaks have worsen the malaria situation. During the first half of the twentieth century, malaria has affected every walk of life so much that became one of the major problem before developing countries. According to an estimate in 1935, out of 100 million malarial cases, one million deaths occurred in Indian subcontinent. Another estimate in 1947 about 75 million cases of malaria (21.8% population) were found and 8, 00,000 deaths. It is notable to mention that India's malaria situation is very important in the world scenario as the peak of malaria cases in India in 1976, was also a peak year at global level (WHO, 1990). India had an estimated 10.6 million cases in 2006 that account for approximately 60% of cases in the whole of the South-East Asia Region. The states most affected with this epidemic are Uttar Pradesh, Bihar, Karnataka, Orissa, Rajasthan, Madhya Pradesh and Pondichery (WHO, 2008).

Over the last one decade the land use and related environmental scenario of district Haridwar has drastically changed due to growth and development projects including growing urbanization and floating population. In the North India, the main vectors of malaria are *Anopheles culicifacies* and *A. stephensi*, *A. fluviatilis* (Saini *et al.*, 2010). The permanent changes in local malaria endemicity are always due to man-made environmental changes in the areas. Sometimes the problem arises up to the extant, which takes the shape of epidemic. Entomological, parasitological,

clinical related issues are looked into to bring down the morbidities and loss to human lives.

A true epidemiological picture of malaria instances is required for planning and execution of its control operation and to obtain feed-back of effect of intervention methods. Therefore, the true instance of disease is important for:

- **The success of control operations.**
- **In incorporating timely corrective measures.**
- **Tackling the epidemics.**

Materials & Methods:

Study area:

The area of present study is spread within the district Hardwar, situated between latitudes 29° 45' – 29° 58' N and longitudes 77° 52' – 78° 75' E. The area of the district is 2360 sq Km. Hardwar district is located in Garhwal Region of Uttarakhand state in India. Population and its density is 14,44,213 and 612 per sq Km, respectively (as per 2001 census).

Spots for survey:

To assess the instances of malaria in communities of different zones viz., (i) Industrial Area / Zone of BHEL Township and (ii) Rural Area of Bahadarabad village, surveys were conducted during 2009.

Methods for field work:

To assess the burden of malaria in community of different ecological zones, survey method was used, which was conducted during 2009, through consulting local medical practitioners, hospitals, nursing homes, pathologist of selected ecological zones in Hardwar district. In each ecological zone, randomly selected households were also surveyed to find out the infected patients of malaria and method of prevention and treatment at house level. Head of the household was the first choice as respondent. The residential areas of these reported patients were also surveyed to find out the sanitation condition in their living areas.

Results & Discussion:

In the present study, maximum (80) and minimum (32) instances of malaria were found from RA and IA zones, respectively. Out of 112 malaria patients found from these two different Zones of district Hardwar, 12 patients (10.71%) were found infected by *P. falciparum* (*P.f*), while rest 100 malaria patients (89.28%) were found infected by *P. vivax* (*Pv*). It was also observed that about 66 % of malarial patients in selected zones of Hardwar district belonged to below poverty line (BPL) category. The distribution of malaria patients in correlation to age, sex are depicted in Table 1. In the present investigation relatively fewer cases

were found in winter season and maximum cases of malaria were recorded during monsoon and post-monsoon months of the year.

During the present study, rainfall play an important role in the growth and transmission of disease than ambient temperature, as has been postulated by few earlier works from different places. But it was also observed that proper management can fight against this dominant favorable factor of malarial infection. This can be easily explained in case of township of industrial area of BHEL where a well managed plan is in good functional condition rain water harvesting and drainage. The management of BHEL is working in collaboration of National Institute of Malaria Research (NIMR) to control malaria on a large scale since 1986. It is on account of the obvious fact that the township has a human workforce related population of about 10-15000(including house hold family members). This necessarily warrants a solution of good health for the whole population of the industrial area. On the other hand, the rural area was low-lying area and many breeding sites of mosquitoes were spread with stagnant water holes in and around this zone. On account of this, the man – mosquitoes contact reaches at higher level, increasing the instances of malarial infection. The present findings are in accordance with the study of **Lieshout, et al.,(2004)** and **Tyagi, et al., (2005)** who have observed that climatic condition and socio-economic status play main role in malaria infection.

It was observed that about 66% of malarial patients were from Low Income Group (LIG) and most of them were residents of slum localities in different environmental zones of Haridwar district.

Thus it is clear that poor economic conditions and poor habitation conditions provide supportive environment and congenial ambience for malaria. On account of their poverty and slummy area, they can not afford to any variety of mosquito repellants and other preventive measures to control mosquitoes. On the other hand the people of upper economic class live in well maintained housing colonies and can spend an adequate amount of money to repel the mosquitoes. The infection of malaria in males and females revealed that the males were more prone to malaria. There were more cases of malarial infection in males as compared to females. The sex-wise difference in the infection may be due to the reason that comparatively males are more exposed to the risk of acquiring malaria because of the out door life they lead. Secondly, females in India mostly wear more covered clothes than males. Clothing and

covering of the body was also found playing an important role in malaria transmission. During present study, instances of malaria differed in different age-groups. Malaria infection was maximum in the 21-30 years age groups and minimum in 0-10 years age groups. The infants had less malaria infection. It is

mainly due to the fact that infants are generally kept well protected with cloths and nets. In different age groups which were studied during the present study, the maximum cases of malarial fever were mostly among the poor patients of 21-30 year age.

Table 1: Instances of malaria in selected areas with reference to sex & age groups during the year 2009

Age Group (in years)	No. of Malarial Cases					
	Males		Females		Total	
	<i>Pf</i>	<i>Pv</i>	<i>Pf</i>	<i>Pv</i>	<i>Pf</i>	<i>Pv</i>
0-10	1	4	0	4	1	8
11-20	2	9	1	7	3	14
21-30	4	45	2	13	6	44
>30	1	10	1	8	2	16
Total	8	68	4	32	12	100

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References:

- Sharma RS, Sharma GK, Dhillon GPS. Epidemiology and Control of Malaria in India. Government of India Ministry of Health & Family welfare NMEP (Directorate General of Health Service). 1996.
- Saini, P., Joshi, B. D. and Sharma, T. An investigation on instances of malaria in two different environmental ambiances of district Haridwar of Uttarakhand state. Indian J. Env. Bio-Sci, 2010; 24 (1):9-12
- Prakash, A., Mohapatra, P.K., Bhattacharyya, D.R., Goswami, B.K. and Mahanta, J. Plasmodium ovale: First case report from Assam, India. Curr. Sci. 2003; 84(9): 1187-1188.
- World Health Organization. Global estimates for health situation assessment and protections, 1990; WHO/HST/902. pp: 25.
- World Health Organization; World malaria report 2008. WHO/HTM/ GMP/2008.1. pp: 1-25.
- Saini, P., Joshi, B. D. and Sharma, T. . Socio-economic conditions act as dominant factors for the occurrence of human malaria: A case study from India. Researcher, 2010; 2 (6):50-53.
- Lieshout, M.V., Kovats, R.S., Livermore, M.T.J. and Martens, P. Climate change and malaria: analysis of the SRES climate and socio-economic scenarios. Global Environmental Change, 2004; 14: 87-99.
- Tyagi, P., Roy, A. and Malhotra, M.S. Knowledge, awareness and practices towards malaria in communities of rural, semi-rural and bordering of east Delhi. J. Vect Borne Dis., 2005; 42: 30-35.
- Kondrachine, A. and Trigg, P.I. (1997). Control of Malaria in the world. Indian J. Malariol., 34:92-110.

11/2/2013