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Original Research Article

Scenario of malaria in Andaman and Nicobar Islands

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ABSTRACT

Background: Malaria is an important vector borne disease persisting to be a major public health problem in India. The objective of this study is to find the present scenario of malaria in Andaman and Nicobar Islands.
Methods: Retrospective data mining of records from the year January 2010 to December 2016 from 35 primary and community health centres existing across Andaman and Nicobar Islands.
Results: A total of 517303 samples were examined from 2010 to 2016 out of which this 8397 samples were found microscopically positive of which *P. vivax* cases were 5631 (67.06%) and *P. falciparum* cases were 2766 (32.94%).
Conclusions: There is gradual decrease in number of positive malarial cases as well as decrease in API.

Keywords: Malaria, Andaman and Nicobar Islands, API

INTRODUCTION

Malaria is a mosquito-borne illness which remains an important public health problem in both under developed and developing countries and a major cause of morbidity and mortality in both rural and urban areas. It spreads to people through the bite of female Anopheles mosquitoes. The four important species that cause human infection are *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae* and *Plasmodium ovale*. Malaria is endemic in India and the most common species spreading infection are *P. falciparum* and *P. vivax*. A typical attack of malaria comprises of - cold stage, hot stage and sweating stage.[1] Clinical symptoms can vary from head ache, fever, shivering, vomiting, hemolytic anaemia, jaundice, hematuria, altered sensorium and convulsions.[2]

As per malaria report there were an estimated 198 million cases of malaria globally (range 124–283 million) in 2013, and an estimated 584 000 deaths (range 367 000-755 000).[3] South Asia itself reports about 2.48 million malarial cases annually, of which 75% cases are reported from India alone.[4,5] As per National vector borne disease control programme, there are approximately 0.7- 1.6 million confirmed malaria cases and 400-1,000 deaths annually due to malaria.[6,7]

Due to the complications arising from *P. falciparum*, it is considered more fatal than *P. vivax*.[8] The geographical location and climatic conditions are favorable for transmission of malaria in India like climate, season, temperature, humidity, rainfall, altitude and host factors like gender, race, population mobility, housing, occupation socioeconomic status etc having an influence on malaria epidemiology.[9,10] Andaman and Nicobar Islands is endemic for both *P. falciparum* and *P. vivax*.[11]

Studies on incidence and various forms of it are scant and with this background we conducted the present study to know the incidence of malaria in Andaman and Nicobar Islands.

METHODS

In this retrospective data mining the researchers collected data from the year January 2010 to December 2016 from 35 primary and community health centers existing across Andaman and Nicobar Islands.

Andaman and Nicobar Islands is divided into 3 districts-South Andaman, North and Middle Andaman & Nicobar district. Patients with fever as chief complaint, who either attended OPD or patients admitted in ward and have undergone microscopic examination for the diagnosis of malaria were included in the study. Thick and thin smears were prepared. The data included number of blood samples collected, no. of samples tested positive for *P. vivax* and *P. falciparum.*

Calculation of the annual parasite index

The annual parasite incidence (API) is a malariometric index to express malaria cases per thousand populations. It measures malaria incidence in a community, based on both active and passive surveillance, and cases are being confirmed by blood examination [10].

$$API = \frac{\text{Confirmed cases during one year}}{\text{Population under surveillance}} \times 1000$$

Ethical clearance was taken from institution ethics committee. The data was cleaned and entered in MS-Excel spread sheet and analyzed using IBM SPSS 20.0 software (Chicago).

RESULTS

A total of 517303 samples were examined from 2010 to 2016 out of which this 8397 samples were found microscopically positive of which *P. vivax* cases were 5631 (67.06%) and *P. falciparum* cases were 2766 (32.94%) (Table 1).

Table 1: Year wise malaria cases from 2010- 2016.

Year	Pv (%)	Pf (%)	Total Pv+Pf	API
2010	1681 (67.67)	803 (32.32)	2484	5.16
2011	1311 (68.35)	607 (31.64)	1918	3.90
2012	843 (54.78)	696 (45.22)	1539	3.13
2013	671 (66.77)	334 (33.23)	1005	2.17
2014	448 (80.43)	109 (19.56)	557	1.19
2015	332 (81.17)	77 (18.82)	409	0.88
2016	345 (71.13)	140 (28.86)	485	1.04
Total	5631 (67.06)	2766 (32.94)	8397	

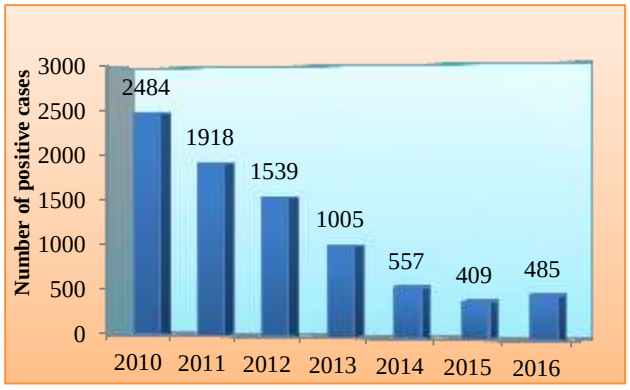

Figure 1: Year wise distribution of malaria.

Out of 2484 malaria cases diagnosed in 2010 *P. vivax* cases were 1681 (67.67%) and *P. falciparum* cases were 803 (32.32%). In 2011 total malaria cases were 1918 of which *P. vivax* cases were 1311 (68.35%) and *P. falciparum* cases were 607 (31.64%), in 2012 total number of malaria cases were 1539 of which *P. vivax* cases were 843 (54.78%) and *P. falciparum* cases were 696 (45.22%). In 2013 total malaria cases were 1005 of which *P. vivax* cases were 671 (66.77%) and *P. falciparum* cases were 334 (33.23%). In 2014 total malaria cases were 557 of which *P. vivax* cases were 448 (80.43%) and *P. falciparum* cases were 109 (19.56%), In 2015 total malaria cases were 409 of which *P. vivax* cases were 332 (81.17%) and *P. falciparum* cases were 77 (18.82%), In 2016 total malaria cases were 485 of which *P. vivax* cases were 345 (71.13%) and *P. falciparum* cases were 140 (28.86%) (Table 1) (Figure 1).

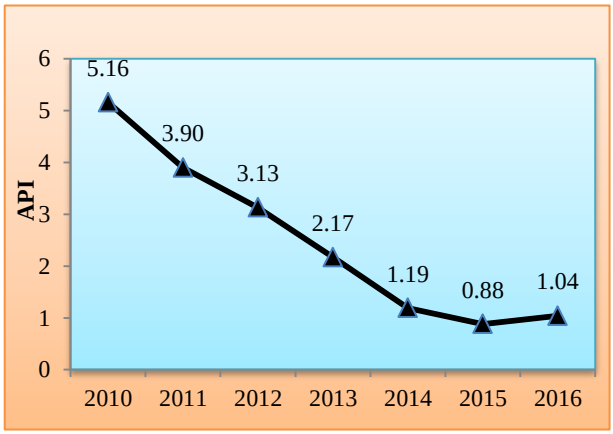

Figure 2: Year wise trend of API.

Annual parasite incidence in 2010 was 5.16 in 2011 API was 3.90, in 2012 it was 3.13, 2013 it was 2.17, in 2014 API was 1.19, in 2015 it was 0.88 and in 2016 API was 1.04 (Figure 2).

DISCUSSION

In India malaria is found to be a seasonal disease. The cases are usually observed to increase from July to October. The conditions which favour transmission of malaria are good rainfall, relative humidity of 60% and temperature between 20 and 30°C.[12] According to Park textbook of Preventive and Social Medicine, in India, about 70% of the infections are reported to be due to *P. vivax*, 25-30% due to *P. falciparum*, 4-8% due to mixed infection and 1% due to *P. malariae.*[10] As per our observation 67.06% of cases in Andaman and Nicobar Islands are due to *P. vivax* and 32.94% of total cases are due to *P. falciparum*, which correlated with Park textbook of preventive and social medicine.[10]

In a similar study done in a teaching hospital in Kerala *P. falciparum* cases were 46.04% and *P. vivax* were 27.33%.[13] Study done by Singh et al in a Tertiary Care Hospital in Navi Mumbai observed *P. vivax* infection (54.76%) and *P. falciparum* infection (17.80%).[14] In another study done in Arunachal Pradesh *P. vivax* caused 80.8% of infection and *P. falciparum* caused 17.7% of total malaria cases[15].

From 2010 - 2016 the API ranged from 5.16 to 0.88 in Andaman and Nicobar islands. Malaria is found to be endemic in Andaman and Nicobar Islands for many years and the vector responsible is Anopheles sundaicus in southern districts and Nicobar while Anopheles stephensi in north and middle districts.[16] Anopheles sundaicus has affinity for brackish water.[17] The salinity of water post Tsunami in Andaman and Nicobar Islands has favored breeding of *Anopheles sundaicus*.

Post tsunami it has been found that there is an upsurge of vector breeding and risk of malaria transmission due to the tsunami created breeding areas and these inundation becoming permanent due to constant flooding. Due to close locality of the houses and in close proximity to cattle rearing, chances of man-vector contact and threat of malaria outbreak in thickly populated area is high.[11]

Another important explanation for upsurge of cases in these islands are the migrant population which also bear an important risk factor.[18] In Nicobar group of islands, *A. sundaicus* is found to breed copiously in mouth of lagoons of perennial rivers and creeks resulting in increase of malaria cases here.[19]

It was observed form our study that the malaria cases have decreased from 2010 to 2016.The total cases in 2010 were about 2484 which declined in 2016 and the total malaria positive cases in 2016 were about 485. Reason for decline of malaria cases in these islands could be due to implementation of proper mosquito control measures and distribution of long lasting insecticide treated nets (LLIN) especially in high endemic areas and implementation of revised drug policy for treatment of falciparum malaria in 2009 comprising of artesunate combination therapy. In addition to all these measures in Car Nicobar the decline in cases were also due to large-scale release of larvivorous fish, Gambusia affinis, in the stagnated water bodies.[20] The climate of Andaman and Nicobar islands is hot and humid. Temperature varies between 24 to 30 degrees and humidity is about 78.5% which favours transmission of malaria.[11]

Similar study done by Alias et al over a period of 10 years in peninsular Malaysia observed that provinces Perlis, Kedah, Selangor, Kuala Lumpur and Melaka reported API values of <0.1/1000 population.[21]

There is decrease in API in the islands from 2010 to 2016 due to active efforts by the health department. At present regular seasonal spraying of DDT is done in the islands consisting of at least 2 rounds per year. In addition to this, indoor spraying of Pyrethrum is done wherever malaria positive cases are being diagnosed.

CONCLUSION

From this study conducted in Andaman & Nicobar Islands from 2010 to 2016 for malarial infection it can be concluded that there is high prevalence of *P. vivax* cases as compared to *P. falciparum* infections. With progresses in years there is gradual decline in number of positive malarial cases as well as decrease in API which concludes that there is definitely awareness among general public towards malaria. For further decrease in malaria cases there should be regular surveillance and stringent steps should be taken by the government and health department before monsoon season. Other measures which can be adopted are readily availability of anti-malarial drugs in all the health centres of the islands. Community based action programmes emphasising on integrated vector control like source reduction and spraying to arrest mosquito breeding sites, personal protective measures to prevent mosquito bites and adoption of biological control measures on a massive scale is required. Ultimately to thwart any malaria outbreak there is need for untimely detection and instant treatment.

Limitations of the study

We have not taken gender and age group in consideration.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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