



Study of Smear Positive Malaria Cases, its Determinants and Malariometric Indicators of A City In Southern Maharashtra.

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ABSTRACT

Objectives: The present study was carried out in an urban community to study the incidence of Malaria, its determinants and Malariometric Indicators.

Methods: Community based descriptive longitudinal study in an urban area under national vector born disease control office of the city for a period of 12 months from 1st of January to 31st December 2015. All cases of Malaria in the city that were tested positive by peripheral smear examination at National Vector Born Disease Control office of city were included in the study. After obtaining verbal consent, the patients were interviewed using a predesigned and pretested proforma. The data were analysed considering the level of significance at 95%.

Results: API of city (0.04) is less as compared to that of state Maharashtra (0.2) in 2014. 27(57.45%) were in age group 20-60 years which is statistically highly significant ($p < 0.001$). Males (59.60%) outnumbered the females (40.40%). Male to female ratio is 1.47. Significant proportion (65.96%) of patients was living in an urban slum area. Numbers of cases declined as the educational level is increased. (46.80%) of the patients were belonging to Socio-Economic Status Class IV according to modified B G Prasad classification followed by class V (27.70%) .

Conclusions: API is much less than one per thousand populations. This may be due to better entomological control than the past. Significant proportion of patients was living in an urban slum area. Education, Socio-Economic Status, presence of plenty of Mosquitoes and water collection in/around house are major determinants.

Keywords: Malaria, API, Slum, Determinants.

INTRODUCTION

Malaria or a disease resembling malaria has been noted for more than 4,000 years. From the Italian word for "bad air," malaria has probably influenced to a great extent human populations and human history¹. Malaria remains the world's most important tropical parasite disease and kills more people than any other communicable disease except tuberculosis. Malaria has an estimated mortality of 1 million per year². Malaria is a major public health problem in India though it is both a preventable and treatable disease. India contributes to 61 per cent of malaria cases and 41 per cent of malaria deaths in SEAR countries³. Total number of cases malaria in India in Oct 2014 were 0.85 million, Plasmodium falciparum cases were 0.54 million and deaths due to Malaria were 316 with Annual Parasite Incidence of 0.70. Maharashtra contributes with 32,071 cases and 35 deaths with API of 0.28 till November 2014⁴.

The epidemiological situation of malaria has shown a gradual deterioration in India. There has also been a quantum jump in the incidence of falciparum cases of malaria. It has also become apparent that chloroquine resistance of malaria has become a global problem, is perhaps one of the important causes of malarial resurgence, and needs update studies in all the states of India⁵.

AIMS AND OBJECTIVES

1. To find out annual incidence of Malaria patients in an urban community.
2. To study the Malariometric indicators and determinants of Malaria.

MATERIAL & METHODS

Study Type & study design:

Community based descriptive longitudinal study in an urban area for one year.

Study area:

This study was conducted in an urban area under National vector born disease control office of the city.

Study Population:

All positive cases of Malaria in the city.

Duration of study:

This study period was of 12 months from 1st of January to 31st December 2015.

Definition of case:

A patient tested positive by peripheral smear examination at National Vector Born Disease Control office of city.

METHODOLOGY

All positive cases of Malaria in the city that were tested positive by peripheral smear examination at National Vector Borne Disease Control office of city were included in the study. Positive cases of malaria were collected from National Vector Borne Disease Control office of the city. Total number of positive cases was 47. All positive cases were visited at their house immediately after the reports are available with the help of Multi-purpose workers and Health assistants.

The socio-demographic profile, information regarding patient's knowledge about malaria and environmental determinants mentioned in proforma was collected by interviewing the patients/guardians of the patient using a preformed and pretested proforma. The standard case definitions were used to classify the diseases under National Vector Borne Disease Control Programme.

Inclusion criteria:

All positive cases of Malaria in an urban community.

Exclusion criteria:

Patient not giving consent. Patient not willing for examination.

Consent and Confidentiality and Risk Factors:

Permission of respected Joint Director of Malaria-Filaria section, Health services office, Pune is taken. Verbal consent of each patient was taken before the interview and nature and purpose of study was explained to them. No risk factor was involved as only interview and examination of patient was carried out. Privacy, confidentiality and anonymity were maintained throughout the study.

Data analysis & processing:

The detailed data was entered into the Statistical Package for Social Sciences (SPSS) version 15, presented in the form of tables and figures and subsequently analyzed using percentages, Chi-square tests and Z test. For all the statistical tests, a "p value of < 0.05" was considered as statistically significant and p value of <0.01 was considered as statistically highly significant.

OBSERVATIONS AND RESULTS

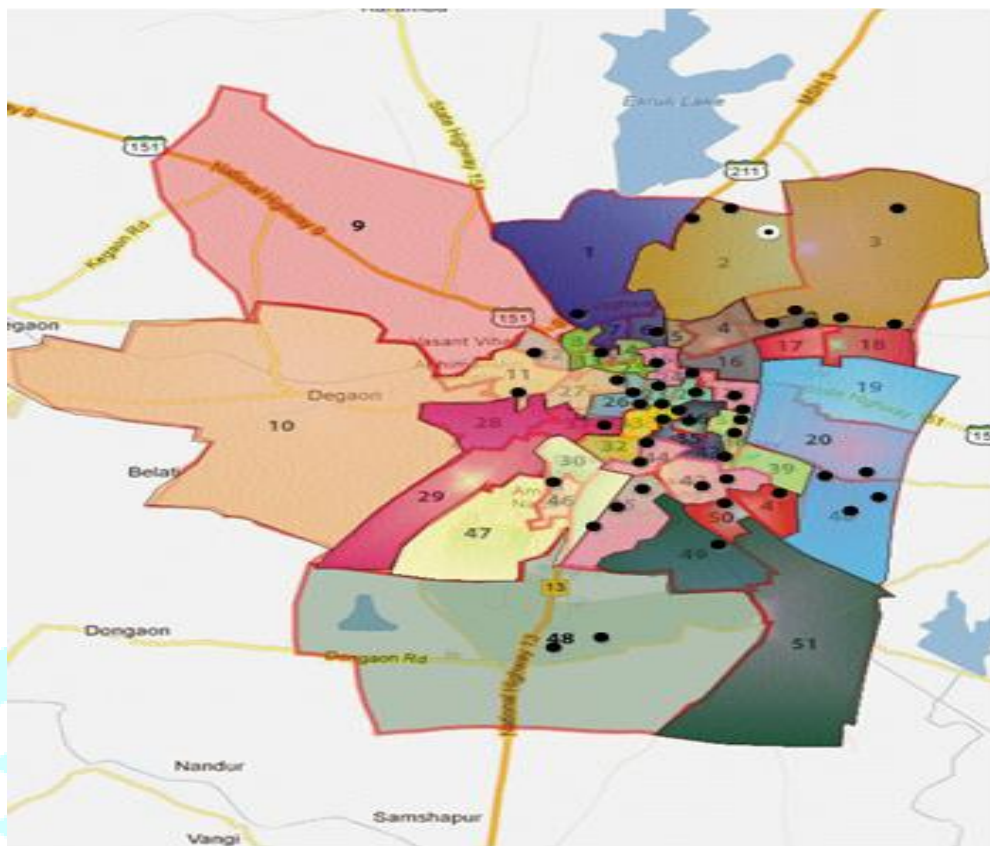
Table no.1: Age & Sex wise distribution of Patients

Variables		Number	Percentage (%)	Statistical values
	< 1 yrs#	00	0	
Age	1-5 yrs#	03	6.4	$X^2=15.484,$ d.f=2 * p<0.001
	6-10 yrs#	02	4.3	
	11-15 yrs#	04	8.5	
	16-19 yrs#	06	21.92	
	20-60 yrs	27	57.45	
	> 60 yrs	05	10.64	
Total		47	100	
SEX	Male	28	59.60	Z=1.31 p>0.05
	Female	19	40.40	
Total		47	100	

Age group less than 20 yrs are clubbed. * Test applied is Chi-square.

Chi-square value(X^2) =15.484, degrees of freedom (d.f) = 2

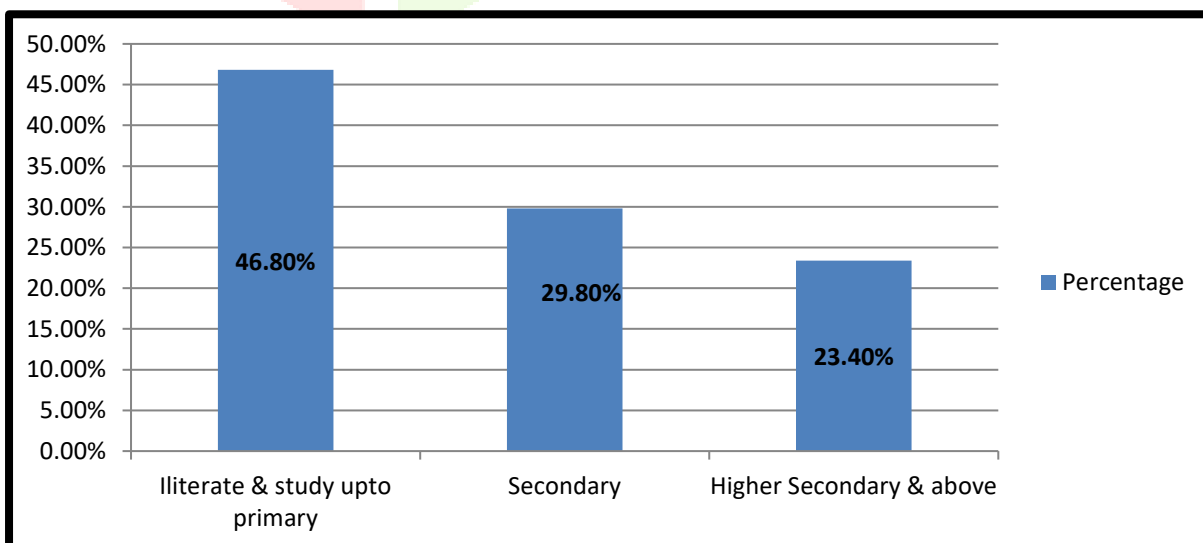
Fig. 01: Spot Map of Malaria cases in an Urban Community



Each dot represents single case. Source⁶.

Maximum cases i.e. four were seen in ward no.45 and three cases each were seen in ward no.2, 17, 18 and 35,38,40,50 with clustering of cases in central part of the city. More surveillance activities should be carried out in these areas.

Fig 02: Bar Diagram No.1: Education wise distribution of Patients



Number of cases declined as the educational level is increased.

Table no.02: Socio-Economic status wise distribution of Patients.

Socio-Economic Status (SES)	Number	Percentage (%)	Statistical values
#I	03	6.40	X²=15.38, d.f=3 *P<0.01
# II	02	4.30	
III	07	14.90	
IV	22	46.80	
V	13	27.70	
Total	47	100	

Patients with SES I & II are clubbed together for statistical calculation.

* Test applied is Chi-Square, Chi-Square value=15.38, d. f=3.

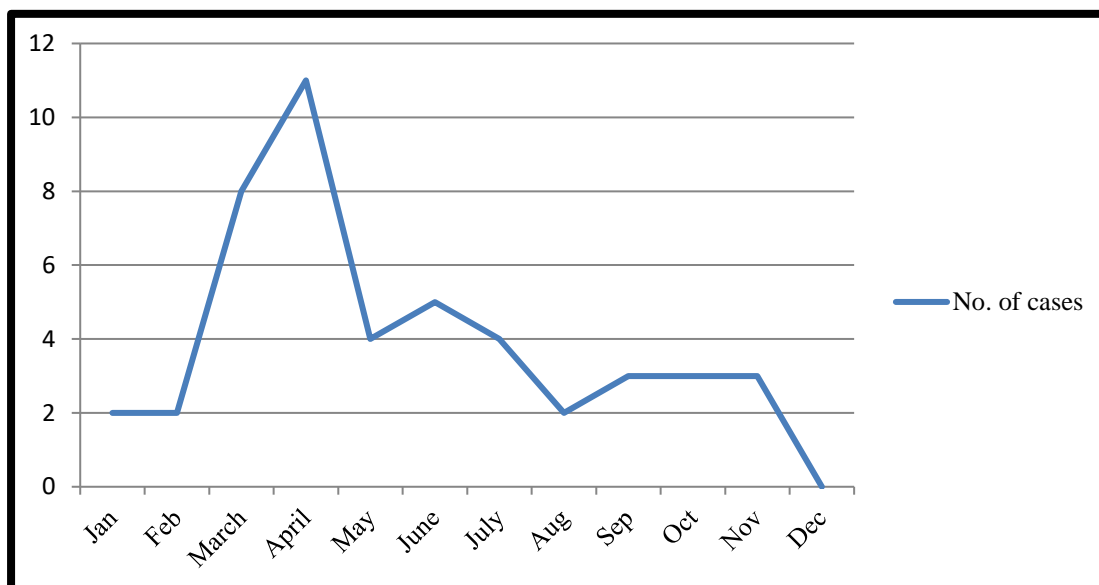
(46.80%) of the patients were belonging to Socio-Economic Status Class IV according to modified B G Prasad classification followed by class V (27.70%) . Five (10.7%) were above from SES II and I. There was highly significant association (**p<0.01**) between the number of patients and socio-economic status by Chi-Square Test.

Table no.03: Environmental determinants for Malaria.

Determinants		Number (N=47)	Percentage (%)	Statistical values
Presence of plenty of Mosquito	Yes	33	70.20	Z=2.17 P<0.01
	No	14	29.80	
Water collection in/around house	Yes	35	74.50	Z=3.35 P<0.01
	No	12	24.50	

Significant proportion of patients was having presence plenty of mosquitoes and water Collection in/around house which is statistically significant by Z test of proportion.

Fig 03: Line Diagram No.2: Month wise distribution of patients.



Maximum number of cases i.e. one-fourth 11(23.40%) cases were found in April, with no case in December. We found more number of cases 30(63.83%) from February to June which is a summer season. Peak in April may be because of outdoor sleeping practices are increased but adverse summer temperature for mosquito is not reached as in May where we see some drop in number of cases. Some increase in number of cases five (10.64%) is again in June where onset of monsoon is usual.

Some Malarimetric Indicators of the city.

1. The Annual Parasite Incidence (API) is given by the formula According to Census 2011, the population of the city is 9, 51,118 which is obtained from city Malaria office⁶.

$$\begin{aligned}
 \text{API} &= \frac{\text{Confirmed cases during one year}}{\text{Population under Surveillance}} \times 1000 \\
 &= \frac{47}{9,51,118} \times 1000
 \end{aligned}$$

API=0.04941

API of city (0.04) is less as compared to that of state Maharashtra (0.2) in 2014. API is much less than one per thousand populations. This may be due to better entomological control than the past. Better treatment seeking behaviour leading to less transmission to mosquitoes.

2. Annual Blood examination (ABER) is given by the formula,

$$\text{ABER} = \frac{\text{Number of slides examined}}{\text{Population}} \times 100$$

Under NVBDCP screening of fever cases for malaria is done in 10% of population

$$= \frac{1293}{95,111} \times 100$$

$$\text{ABER} = 1.35\%$$

ABER of the city (1.35%) is much less as compared to that of state Maharashtra (13.96%) in 2011.

3. Slide Positivity Rate (SPR) is the percentage of slides found positive for malarial parasite

$$\text{SPR} = \frac{47}{1293} \times 100$$

$$\text{SPR} = 3.63\%$$

SPR of the city (3.63%) is much more as compared to that of state Maharashtra (0.60%) in 2011.

4. Slide Falciparum Rate (SfR) is the percentage of slides found positive for P. Falciparum parasite

$$\text{SfR} = \frac{33}{1293} \times 100$$

$$\text{SfR} = 2.55\%$$

SfR of the city (2.55%) is much more as compared to that of state Maharashtra (0.60%) in 2011.

DISCUSSION

❖ Age & Sex wise distribution of Patients (Table no.1)

In the present study most of the patients 27 (57.45%) were in the age group 20-60 years and two (4.3%) were in the age group of 6-10 years, there was no any case of infant age group. Males 28(59.60%) outnumbered the females 19 (40.40%). Male to female ratio is 1.47. Similar findings were obtained in.

A study conducted by **Jitendra M Patel, et al (2007)** found that maximum patients Were between 15 – 54 years constituting 354 (70.8%), 122 (22.54 %) of total patients during study period were of 0-15 years of paediatric age group and Gender wise analysis of the data reveals male to female ratio is 1.34:1⁷.

A study conducted by **Kumaraswamy USB et al (2015)** found that maximum patients were between 21 – 40 years constituting 186 (62%) followed by age group greater than 40 years 80 (26.7%) and females were more 170 (56.7%)⁸.

❖ Education wise distribution of Patients. (Fig 02: Line Diagram No.1)

In the present study more than one third 16(34%) patients were with primary education followed by patients with secondary education 14(29.80%) and there is a considerable percentage of patients who were illiterate six (12.80%). Number of cases is declined as the educational level is increased. Similar findings are seen in.

A study conducted by **Kumaraswamy USB et al (2015)** found that majority of patients 123(41%) were with higher secondary school certificate followed by middle school 90(30%) , 71 (23.7%) with post high school and above, 15 (5%) with primary school and only one patient was illiterate⁸.

❖ Socio-Economic status wise distribution of Patients. (Table no.02)

In the present study near about half 22(46.80%) of the patients were belonging to Socio-Economic Status Class IV according to modified B G Prasad classification followed by class V (27.70%), Seven (14.9%) were belonging to SES class III and five (10.7%) were above from SES II and I. Similar findings are seen in.

A study conducted by **Taviad P P et al (2006)** found that majority of cases belongs to socio-economic class V 56(56.0%) and IV 34(34.0%). The other classes have shown lower incidence class III (8%) and Class II (2%)⁹.

❖ Environmental determinants for Malaria. (Table no.03)

In the present study significant proportion of patients was having presence of plenty of mosquitoes 33(70.20%) and water collection in/around house 35(74.5%). Similar findings are seen in.

A study conducted by **Shivalli et al (2012)** found that almost three fourths of study subjects (n = 89, 74.8 %) were residing at the construction site i.e water collection around the site¹⁰.

❖ Month wise distribution of patients. (Fig 03: Line Diagram No.2)

In the present study maximum number of cases i.e. one-fourth 11(23.40%) cases were found in April, with no case in December. We found more number of cases 30(63.83%) from February to June which is a summer season. Peak in April may be because of outdoor sleeping practices are increased but adverse summer temperature for mosquito is not reached as in May where we see some drop in number of cases. Some increase in number of cases five (10.64%) is again in June where onset of monsoon is usual.

Findings in similar studies are as follows: A study conducted by **Agravat et al (2011)** found that the geometric means of malaria infection exhibited major peaks in September, October & November, which corresponds with the pattern of equatorial rainfall seasons in the months of September to November¹¹.

REFERNCES

- 1) Global Health - Division of Parasitic Diseases and Malaria. The History of Malaria, an Ancient Disease. www.cdc.gov/malaria/about/history/. Accessed on September 21, 2014.
- 2) WHO world malaria report 2015. Geneva Switzerland world malaria report 2015. www.who.int/malaria/publications/world-malaria-report-2015/report/en/. Accessed on March 14, 2016.
- 3) WHO, World malaria report 2011. Geneva: World Health Organization. Available from: http://www.who.int/malaria/world_malari_report_2011/9789241564403_eng.pdf, Accessed on September 16, 2014.
- 4) NVBDCP Annual Report 2014-15. nvbdcp.gov.in/Doc/Annual-report-NVBDCP-2014-15.pdf. Accessed on September 16, 2015.
- 5) Potkar CN, Kshirsagar NA, Kathuria R. Resurgence of malaria and drug resistance in Plasmodium falciparum and plasmodium vivax species in Mumbai. JAPI 1995;43(5): 336-8.
- 6) City Malaria Office, Department of Health & Family Welfare, Municipal Corporation Office of the city Annual reports.
- 7) Patel JM, Godara N. Clinico-epidemiological profile of patients with febrile illness attending malaria clinic at medical college hospital of Surat, Gujarat, India. Int J Med Sci Public Health 2014;3:686-688.
- 8) Kumaraswamy USB, Manohar M, Muthukrishnan G, Jebamony K, Radhakrishnan S. Awareness and treatment seeking behaviour of malaria in selected endemic and non-endemic rural areas of Kanyakumari district, Tamilnadu, India. Int J Community Med Public Health 2016; 3:2313-8.
- 9) Taviad P P, Javadekar T B. Socio demographic and clinical features of the malaria cases. Nat. Jour. of Comm. Med. March 2012; 3(1):94-96.
- 10) Shivalli, Sudarshan Pai. Construction site workers' malaria knowledge and treatment-seeking pattern in a highly endemic urban area of India. Malar J (2016) 15:168.
- 11) Agravat A H, Dhruva G A. Clinico-Hematological Pattern of Malaria in Rajkot City (Gujarat, India). IJBAR (2012):03(11):847-52.
- 12) Park's Textbook of PREVENTIVE AND SOCIAL MEDICINE, 23rd edition, Jabalpur, Banarsidas Bhanot Publishers;5:256-270,11:682-84,2015.