

**Original Article****A STUDY OF MALARIA – RELATED PAEDIATRIC MORBIDITY AND MORTALITY IN AHMEDABAD, GUJARAT STATE, INDIA**Talsania N J<sup>1</sup>, Vani SN<sup>2</sup><sup>1</sup>Professor, Department of Community Medicine, <sup>2</sup>Ex. Professor and Head Pediatric Dept, B.J. Medical College, Ahmedabad**Correspondence:** nitibenok@hotmail.com.**ABSTRACT**

**Background:** Malaria is one of the foremost public health problems in India. **Aims:** To assess the syndromic diagnosis of fever in pediatrics patients. **Method:** The longitudinal hospital – based study was conducted in Pediatric ward of New Civil Hospital, Ahmedabad .Information was collected on a pretested semi structured schedule. After collection, the whole data was compiled; analyzed and appropriate statistical tests like simple proportions and chi-square ( $\chi^2$ ) test were applied. **Result:** A total of 4,515 children were admitted to the three Paediatric wards in New Civil Hospital from August 2009 to July 2010, of whom 584 (12.94 %) had three clinical symptoms. males were 2.5 times more brought than females, but the malaria rate was almost same in both sexes. Of the 584 clinical malaria admission, 15 died (C.F.R.: 2.6 %). The case fatality rate of males 9 (3 %) did not differ significantly from that of females (2.11 %). **Conclusion** the children presenting with a sequence of the symptoms of malaria, have been given radical treatment at home, 84-100% would have been correctly treated, 0-16% may have been false positive and unnecessarily treated

**Key words:** Malaria, Malaria mortality, Syndromic diagnosis**INTRODUCTION**

Malaria is one of the foremost public health problems in India. There were 3.04 million total cases reported including 1.18 million cases due to P.Falciparum, 1010 deaths and API 3.48, causing thousands of child deaths and many more case of child malnutrition in the year 2006.[1]

During 1994-96, WHO-SEARO estimated that there were 15 million malaria cases and 19,500 deaths due to malaria in India, and these figures were 6-7 times more than those reported. In endemic areas, the W.H.O case definition of malaria is the presence or a history of fever without other obvious cause.

Recently a study has been taken up by Malaria Research Centre on the “Impact of climate change on malaria in India” under National Communication Project of Ministry of Environment & Forests for studying vulnerability, assessment and adaptation measures in various sectors due to climatic change. Taking into account the present malaria situation in different paradigms in the country the study envisages identifying: (1) areas vulnerable to climate change in India and (2) the future scenario of malaria with global warming in 2050 and 2100.

**AIMS & OBJECTIVES**

- To assess the syndromic diagnosis of fever in pediatrics patients
- To detect infant and child morbidity and mortality in hospital admission

- To determine temporal trend in the number of cases

**MATERIALS & METHODS**

- a) Study area & Study population: The study was conducted in Pediatric ward of New Civil Hospital, Ahmedabad with over 3000 beds capacity
- b) Data sources ‘one-year survey’:
  - Paediatric ward records - from August 2009 to July 2010, all children admitted to the hospital with elevated temperature (>37.60C), a history of fever, or a history of “chilly Rigors” during the week, were initially evaluated in Paediatric/Emergency wards, are recorded. The total numbers of Paediatric admission, deaths from all causes and from malaria were noted and Case-fatality rates (CFR) for hospitalized malaria patients were computed.
  - Laboratory examinations –The whole structure of malaria control is based on accurate and prompt microscopic diagnosis of blood smears of fever cases. It is possible to diagnose a case of malaria microscopically; when the parasitaemia reaches 10-20 parasites / cubic mm in case of thick blood smear examination. In order to detect the parasite in thin smear, there should be 100 parasites / cmm.
  - Statistical Methods –  $\chi^2$  test was applied where necessary

## RESULTS

A total of 4,515 children were admitted to the three Paediatric wards in New Civil Hospital from August 2009 to July 2010, of whom 584 (12.94 %) had three clinical symptoms in combinations or sequence (Fever, Chills and/or Sweating) and 300 (51.37 %) were male. one important finding from the present study was the sex-difference observed in the admission rate. Males were 2.5 times more brought than females, but the malaria rate was almost same in both sexes. India in male-dominant societies ,it is the females who do all household chores .Incapacitation of females therefore has a relatively large impact.( Table 1)

Age-wise distribution of infection and disease (Fever, Parasitaemia and Splenomegaly) are given in Table 2.

**Table 1:** Total number of paediatric admission and of Paediatric malaria in New Civil Hospital, Ahmedabad August 1999 to July 2000

Sex	Total admission (%)	No. of malaria Admission (%)
Male	3049 (67.53)	300 (51.37)
Female	1466 (32.47)	284 (48.63)
Total	4515 (100)	584 (100)

$X^2 = 79.9$ ;  $df = 1$ ;  $P < 0.01$

.Out of total 584 malaria Patients, when separate characteristics were identified and recorded it was found that an elevated temperature ( $>37.6^{\circ}\text{C}$ ) constituted 122 (49.8 %) of malaria infection for children below 5 years, 94 (38.37 %) for 5-9 years of age, and 29 (11.83 %) for the group aged 10-12 years of age.

**Table 2:** Age specific incidences of infection and disease (Fever, Parasitaemia and Splenomegaly) in study population.

Particular	Age group (years)				Total (%)
	< 1(%)	1-4(%)	5-9(%)	10-12(%)	
No. Of malaria Admission	57 (9.76)	179 (30.65)	196 (33.56)	152 (26.03)	584 (12.94)
Temperature ( $>37.6$ )	22 (8.98)	100 (40.8)	94 (38.4)	29 (11.8)	245 (41.95)
Parasitaemia	10 (7.79)	48 (34.0)	61 (43.26)	22 (15.6)	141(24.14)
Splenomegaly	24 (7.79)	96 (31.2)	139 (45.13)	49 (15.9)	308 (52.72)

The slide positivity rate was significantly high 58(41.13 %) for children below 5 years and 61(43.26 %) in 5-9 years compared with 22(15.61 %) in the group 10-12 years of age. The children of 5-9 years of age group suffered maximum from malaria. The infection in children was found

associated with splenomegaly also. Corresponding figures for Splenomegaly were 120 (38.96 %) in under 5 years, 139 (45.13 %) for 5-9 years and 49 (15.91 %) he group 10-12 years of age. Thus, all the three characters in same individuals were not found.

**Table 3:** Month wise distribution of total admissions and malaria admissions & deaths in Paediatric wards.

Month	Total Admission	Malaria Admission (a)	Malaria Admission Rate (%)	Total Deaths	Malaria Deaths (b)	Malaria Mortality Rate (%)
Aug 09	639	58	9.08	81	1	1.23
Sep 09	479	68	14.20	46	2	4.35
Oct 09	387	66	17.05	56	2	3.57
Nov 09	305	49	16.07	51	1	1.97
Dec 09	213	32	15.02	41	2	4.87
Jan 10	192	32	16.67	44	-	-
Feb 10	251	19	7.57	40	-	-
Mar 10	365	36	9.86	54	-	-
Apr 10	383	33	8.62	55	-	-
May 10	403	34	8.44	62	2	3.23
June 10	415	73	17.59	65	3	4.62
July 10	483	94	17.40	75	2	2.67
Total	4515	584	12.93	670	15	2.24

$N = 584$  June to November = 398 December to May = 186  
(a)  $X^2 = 71.18$ ,  $df = 11$ ,  $P < 0.01$  (b)  $X^2 = 9.5$ ,  $df = 11$ ,  $P > 0.05$

Table 3 Shows the month- wise distribution of total admissions and Malaria admissions and

advance clinical malaria deaths in Pediatric wards. Malaria cases were 2.11 times more reported

during Monsoon season (June to October but it varies every year due to climatic variation) as compared to winter season, with no discernible seasons for malaria deaths. Malaria cases were maximum during the period of May to August 249

(42.64 %) by 215 (36.82 %) in September to December and 120 (20.55 %) in January to April. Results of the one-year survey of Malaria admissions and deaths at New Civil Hospital from August 2009 to July 2010 are shown in Table 4.

**Table 4:** Age-specific deaths at New Civil Hospital, Ahmedabad.

Particular	Age group (years) (%)				Total
	< 1	1-4	5-9	10-12	
No. of death From malaria	5 (33.3)	7 (46.7)	2 (13.3)	1 (6.7)	15 (100)
No of malaria Admission	57 (9.8)	179 (30.6)	196 (33.6)	152 (26.0)	584 (100)
Case Fatality Rate	8.77%	3.91%	1.02%	0.66%	2.57%

A total of 670 Paediatric deaths were registered at the hospital, of which 15 (2.24 %) were attributed to severe (*P.falciparum*) malaria. The proportion of Malaria deaths is significantly less than other hospital – based studies in India.[5,6] This may be due to patients received rapid and intensive clinical management soon after their arrival at one of the largest hospital of Asia. More than 80 % of the children with *Falciparum* malaria, who died were less than 5 years old. Most of the deaths were associated with anemia and malnutrition in children, anemia also result from inadequate nutrient intake especially when high level of childhood, protein-energy malnutrition where

found. The negative association between low PCV and clinical malaria was not detected in the study. Of the 584 clinical malaria admission, 15 died (C.F.R.: 2.6 %). The case fatality rate of males 9 (3 %) did not differ significantly from that of females (2.11 %). When stratified by age, the CFR was highest in children aged <1 year (8.8%) and decreased progressively with age. ( $X^2 = 14.19$ ;  $df = 3$ ;  $P < 0.01$ ). Since acquired immunity to Malaria is least developed among younger age groups, these findings were not unexpected; however, the data emphasize the importance of the prompt diagnosis & management of Malaria in young children.<sup>5</sup>

**Table 5:** Year wise trend of admission and deaths in new civil hospital, Ahmedabad

Particulars	1996	1997	1998	1999	2000
Total admissions	4,398	4,717	4,352	4,126	4,895
Malaria admissions	455	509	535	447	605
Proportion malaria admission rate (a)	10.35%	10.79%	12.29%	10.83%	12.35%
Total deaths	640	598	659	516	681
Malaria deaths	6	6	8	10	9
Proportional malaria mortality rate (b)	0.945	1.0%	1.2%	1.94%	1.32%

(a)  $X^2=21.72$   $df=4$ ;  $p<0.001$  (b)  $X^2=2.79$   $df=4$ ;  $P>0.05$

Table 5 revealed the temporal trends in malaria related morbidity / mortality in hospital from 1996 to 2000. While the number of Pediatrics admissions from all causes remained relatively constant (367 per month in 1996, 393 per month in 1997, 363 per month in 1998, 344 per month in 1999 and 408 per month in 2000), the proportional malaria admission rate increased significantly from 10.35% in 1996 to 12.35% in 2000 ( $X^2=21.72$   $df=4$ ;  $p<0.001$ )

#### INTERPRETATION & CONCLUSION

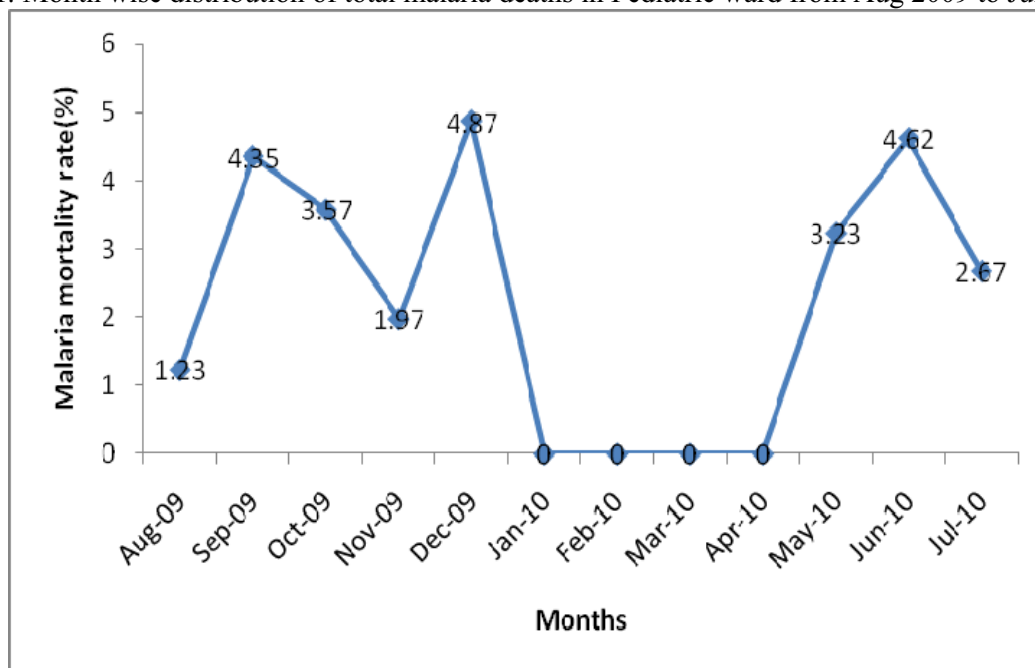
The environment of Gujarat, western region is conducive to mosquito proliferation, survival and longevity; all these prerequisites leads to active transmission of the malaria pathogen; undermining the health and welfare of women and families, endangering the survival of their children and

straining both countries and people's scarce resources.

Ahmedabad city is situated on the bank of river Sabarmati. In Gujarat state *An.culicifacies* is most abundant in the villages situated on the bank of rivers (46%) followed by hilly (23%), canal irrigated (22%), coastal (7%) and non-canal irrigated areas (2%). In general it was most abundant during the summer and monsoon months. [7] However, the rapid development and intensification of resistance in vectors to insecticides may be related to the observed increase in the number of cases of malaria in the city. Patients were treated on the basis of clinical symptoms of malaria (based on prescription of an Antimalarials drug and responded) were recorded. Oral Antimalarials for High and Low malaria risk areas, First-line antimalarial is Chloroquine; Second-line antimalarial is Sulphadoxine plus

Pyrimethamine; first line treatment in areas with High Resistance to Chloroquine.

**Figure 1:** Month wise distribution of total malaria deaths in Pediatric ward from Aug 2009 to July 2010



If the children presenting with a sequence of the symptoms of malaria, have been given radical treatment at home, 84-100% would have been correctly treated, 0-16% may have been false positive and unnecessarily treated (although it must be remembered that negative microscopic diagnosis does not necessarily mean absence of infection or clinical silence i.e. the absence of a symptom (or group of symptom) did not necessarily indicate absence of infection. Of the malaria deaths, 80% occurred among children aged <5 years, 33.33% among infants aged <1 year and 46.67% among children aged 1-4 years. The case-fatality rate among hospitalized malaria patients was highest for infants (8.77%) and young children (3.91%)

#### DISCUSSION

During 1998-99 the MRC field station at Nadiad undertook a major study to estimate malaria cases and deaths in Ahmedabad City by retrospective analysis of registered cases and reported deaths during the years 1991-98.

The impact of climate on malaria was studied by NAMP in Surat, Banaskantha, Ahmedabad, Kheda districts of Gujarat state revealed that the cases started increasing from late 2007 and reached to a peak in 2010. The seasonal peaks in March (paddy growing) and second peak in August-October (onset of monsoon).

Proportional malaria mortality rate has since gradually increase, from 0.94% in 1996 to 1.32%

in 2000. Our study compares well with the study of M.S. Choudhary in Bangladesh (2006).<sup>8</sup> Thus, chloroquine should remain the drug of choice for treatment of malaria infection in this region. For resistant and/or complicated cases, quinine or metakalfin (Sulfadoxine + Pyrimethamine) should be used depending upon the clinical presentation of the patients. *P. vivax* is highly susceptible to chloroquine in the northeastern states, and thus should always be the first line of treatment.

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