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MALARIA TRENDS AND CLINICAL OUTCOMES IN RURAL TRIBAL COMMUNITIES OF BAMNI, TAHSIL: SIRONCHA, DIST:GADCHIROLI(MS)

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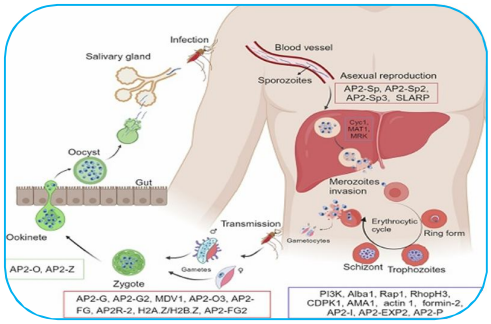
ABSTRACT:



Background:-*Malaria remains a major vector-borne parasitic disease and a significant public health challenge, particularly in endemic geographical regions. Seasonal fluctuations in transmission intensity contribute substantially to variations in disease incidence, morbidity and clinical outcomes. The epidemiological characteristics of malaria are influenced by multiple determinants, including climatic variability, vector ecology, host-related factors and the geographical distribution of different Plasmodium species. Systematic assessment of malaria epidemiology is essential for elucidating temporal transmission patterns, identifying vulnerable population groups and evaluating disease burden. Such epidemiological evidence provides an important scientific basis for strengthening surveillance systems and formulating effective prevention and control interventions. In this context, the present investigation was undertaken to characterize the epidemiological profile and temporal trends of malaria cases over a one-year period 2025).*

Objectives:- *To investigate the temporal and month-wise distribution of malaria cases, determine the species-specific prevalence of different Plasmodium species, assess age-stratified distribution and demographic characteristics, evaluate the frequency of severe and complicated malaria presentations, analyse therapeutic outcomes and treatment-related clinical endpoints, and examine interannual variations and longitudinal epidemiological trends in malaria incidence during 2025.*

Methods:- *A record-based descriptive study was undertaken to comprehensively analyse reported malaria cases over a one-year period (Jan 2025 To Dec 2025). The study focused on assessing temporal and seasonal variations in malaria incidence, species-wise distribution of Plasmodium, age-specific prevalence, disease severity. Year-wise trends and monthly patterns were systematically evaluated to identify variations in malaria occurrence. The collected data were analysed using appropriate descriptive statistical methods, including frequencies, percentages, means, and standard deviations.*

Results:- *A total of 299 malaria cases were reported during the study period. The highest number of cases occurred during the monsoon months, with a peak in July 2025 (46; 15.38%), followed by June (40; 13.37%) and August (32; 10.07%), indicating an outbreak during this period. Plasmodium falciparum was the predominant species, accounting for the majority of cases, followed by Plasmodium vivax and mixed infections. Most patients were discharged (250 cases), and no deaths were reported.*

Conclusion:- *The findings reveal a distinct seasonal trend in malaria transmission, with a marked increase in cases during the monsoon season. Plasmodium falciparum emerged as the predominant causative species, while adults constituted the most affected age group. Despite the prevalence of malaria cases, treatment outcomes were predominantly favorable. These findings underscore the critical importance of strengthening epidemiological surveillance, intensifying vector control measures, and implementing timely*

preventive interventions before the onset of the monsoon to minimize transmission, prevent outbreaks, and reduce the overall burden of malaria.

Key Words: *Malaria epidemiology, Seasonal distribution, Plasmodium falciparum, Species-specific distribution, Vector control, Tribal healthcare, Disease surveillance, Malaria prevention.*

INTRODUCTION:

Malaria remains a major vector-borne public health concern worldwide, with an estimated 263 million cases and 597,000 deaths reported globally in 2023. Although India has achieved a substantial reduction in malaria incidence over the past decade, it continues to contribute significantly to the malaria burden in the WHO South-East Asia Region.[1] Within India, malaria transmission is geographically heterogeneous, with a disproportionately high burden reported from forested, tribal, and geographically inaccessible districts. Tribal communities, despite representing a relatively small proportion of the national population, account for a disproportionately high share of malaria cases, *Plasmodium falciparum* infections, and malaria-related deaths.[2]

Gadchiroli district in eastern Maharashtra represents one such epidemiologically vulnerable region. Its extensive forest cover, scattered settlements, challenging geographical terrain, and limited access to timely diagnosis and treatment create favorable conditions for sustained malaria transmission and periodic outbreaks. Studies conducted in Gadchiroli and other tribal regions of India have consistently reported the predominance of *Plasmodium falciparum*, although *P. vivax* and mixed-species infections also contribute to the regional disease burden. Furthermore, hospital-based studies in India have documented a wide spectrum of malaria manifestations, ranging from uncomplicated febrile illness to severe and complicated presentations involving anaemia, altered sensorium, jaundice, renal dysfunction, circulatory shock, and mortality.

These parameters are essential for understanding seasonal transmission patterns, identifying vulnerable population groups, assessing disease severity, and evaluating healthcare delivery and treatment outcomes.

The study aims to generate evidence that may support effective disease surveillance, strengthen local healthcare interventions, and improve strategies for malaria prevention and control in tribal and resource-limited settings.

NEED OF THE STUDY:-

The rationale for the present study is based on the continued concentration of malaria burden in tribal, forested, and geographically remote regions, where routinely collected surveillance data are often insufficiently utilized for evidence-based local health planning. Despite substantial improvements in national and state-level malaria indicators, considerable geographical variations in disease transmission persist. Consequently, outbreak-prone areas require location-specific epidemiological evidence to identify high-risk populations, understand transmission patterns, and develop context-specific prevention and control strategies. Official malaria surveillance reports from India and Maharashtra indicate that malaria continues to pose a significant public health challenge in selected districts, including Gadchiroli, highlighting the importance of district-specific epidemiological investigations.[5]

Previous studies have further established the need for focused malaria research in tribal and underserved regions. Sharma *et al.* reported a disproportionately high malaria burden among tribal populations in India, emphasizing the need for targeted surveillance and control interventions.[2] Sundararajan *et al.* identified several structural and behavioural barriers to effective malaria control in Gadchiroli, including delays in healthcare-seeking behaviour and gaps in healthcare service utilization.[6] Bawankar *et al.*, through an analysis of years of malaria surveillance data from Maharashtra districts, including Gadchiroli, highlighted the importance of district-level epidemiological trend analysis for understanding species distribution and monitoring malaria control programmes.[7] Similarly, Sahu *et al.* documented persistent *Plasmodium falciparum* transmission foci among tribal populations, indicating

the continued risk of severe malaria and localized outbreak occurrence. Hospital-based investigations in India have also demonstrated the contribution of severe malaria to clinical morbidity and mortality, particularly in settings where timely diagnosis and appropriate referral are delayed.[3]

AIM OF THE STUDY:-

To evaluate the epidemiological profile, clinical spectrum, malaria outbreak cases.

Objectives:-

1.To determine the month-wise distribution and seasonal trends of malaria cases during the study period, with particular emphasis on outbreak periods.
2. To assess the species-specific distribution of malaria infections caused by *Plasmodium falciparum* (PF), *Plasmodium vivax* (PV), and mixed-species infections.
3. To evaluate demographic pattern of malaria cases.
4. To determine the frequency and proportion of severe and complicated malaria cases reported during the outbreak period.

Research Methodology Research Design:-

The present study adopts a retrospective, record-based, descriptive observational research design.

Research Setting:-

The study will be conducted at THO Office in Sironcha, District Gadchiroli, utilizing malaria surveillance data and inpatient records maintained under the Medical Officer.

Population:-

The study population includes all patients diagnosed with malaria and admitted to the rural hospital during the period from January 2025 to December 2025.

To determine the month-,vise distribution of malaria cases during the study period, including periods of malaria outbreaks

Table 1: Month-wise distribution of malaria cases (N=299)

Sr. No.	Month	Total Malaria Cases	Percentage (%)
I	January 2025	13	4.37
2	February 2025	18	6.02
3	March 2025	21	7.02
4	April 2025	19	6.35
5	May 2025	26	8.69
6	June 2025	40	13.37
7	July 2025	46	15.38
8	August 2025	32	10.07
9	September 2025	26	8.69
10	October 2025	21	7.02
11	November 2025	25	8.36
12	December 2025	12	4.01
	Total	299	

Table 1 Presents the month-wise distribution of malaria cases recorded during the study period, with a total of 299 cases. The findings show a clear seasonal variation in the occurrence of malaria cases across the year. The number of malaria cases remained comparatively low during the early months of the year, from January to May 2025.

DISCUSSION:-

The present study demonstrated a distinct seasonal pattern in malaria incidence, characterized by a relatively low number of cases during the early months of the year, followed by a marked increase during the monsoon season. The highest case burden was recorded in July 2025, indicating a strong seasonal association between malaria transmission and prevailing environmental and climatic conditions. Species-specific analysis revealed that *Plasmodium falciparum* (PF) was the predominant causative species, accounting for the majority of reported infections. Adults constituted the most affected age group.

Furthermore, the occurrence of severe and complicated malaria was relatively low, and no mortality was recorded during the study period, suggesting favorable treatment outcomes in the study population.

These findings are consistent with the outbreak investigation conducted by Ahmed *et al.* (2022) in Dolonibasti, Assam, which documented a substantial increase in malaria cases during the monsoon season, particularly in June and July. Their investigation identified high relative humidity, moderate rainfall, and inadequate utilization of personal malaria protection measures as potential contributing factors to outbreak occurrence.

The findings of the present investigation are further supported by the surveillance-based analysis conducted by Gahwai *et al.* (2025) in Chhattisgarh. Their study demonstrated that malaria incidence reached its seasonal peak in July, accompanied by an overall declining trend in annual case numbers between 2015 and 2023. The authors identified the monsoon period as a critical phase for malaria transmission and emphasized the importance of implementing timely preventive and vector-control interventions before the onset of seasonal transmission. These observations are consistent with the present study, in which July represented the peak transmission month, while year-wise analysis indicated fluctuations in case occurrence with a recent declining trend.

Overall, the findings of the present study are in agreement with those reported by Ahmed *et al.* (2022) and Kannambath *et al.* (2023), collectively highlighting the seasonal nature of malaria transmission, its increased occurrence during the monsoon period, and the substantial contribution of adult populations to the reported disease burden. The relatively low frequency of severe malaria cases and the absence of mortality observed in the present study may reflect favorable clinical management and treatment outcomes. However, these observations should be interpreted cautiously, as the hospital-based study design does not establish a direct causal relationship between healthcare interventions and clinical outcomes.

CONCLUSION:

Overall, the study emphasizes the importance of early detection, effective treatment, and strengthened surveillance systems in reducing malaria burden, particularly in rural and tribal areas.

Conflict of Interest: The authors certify that they have no involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this paper.
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