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FREQUENCY OF MALARIA IN YOUNG FEBRILE CHILDREN AT CIVIL HOSPITAL SUKKUR

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Abstract

Objective: *To determine the frequency of malaria in young febrile children at Civil Hospital Sukkur.*

Methods: *This study was conducted at the Department of Pediatric Medicine, Ghulam Muhammad Mahar Medical College (GMC), Sukkur, from April 1 to September 30, 2024, using non-probability consecutive sampling. Children aged 1–5 years with fever ≥48 hours and symptoms like chills, shivering, or headache were included. Excluded were those who had received antimalarial treatment in the prior 42 days or had begun therapy at peripheral hospitals. After CPSP and ethical approval, informed consent was obtained. Demographic and clinical data, including age, weight, height, BMI, drug history, and symptoms, were recorded. Weight and height were measured using a Camry analogue scale and stadiometer, respectively. Capillary blood was collected for thick and thin smears, stained with 10% Giemsa, and examined microscopically. Thick smears identified parasite presence; thin smears identified species. Two technologists analyzed slides, with a third rechecking all positives and 10% of negatives. Geographical and socioeconomic data were also documented.*

Results: *Out of 135 children with fever ≥ 48 hours and symptoms like chills, headache, and shivering, 70 were male (52%) and 65 were female (48%). The mean age was 3.03 ± 1.42 years, weight 13.59 ± 3.01 kg, height 89.80 ± 9.39 cm, and BMI 16.67 ± 1.20 kg/m². Most participants (81.5%) were from rural areas. Malaria parasites were detected in 41.5% (n = 56); Plasmodium vivax was most common (69.1%), followed by P. ovale (20%), P. falciparum (7.3%), and P. malariae (3.6%). Chill and shivering occurred in 90.4%, headache in 49.6%, and vomiting in 14.8%. Illness lasted an average of 4.11 ± 1.55 days. Most mothers had secondary (31.1%) or primary (25.9%) education. Malaria infection was significantly associated with rural residence (p = 0.049) and male gender (p = 0.037); 50 of 56 positive cases lived in rural areas, and more males (35/70) were infected than females (21/65). No significant links were found between malaria and clinical symptoms or maternal education (p = 0.221), though a trend toward lower malaria*

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with higher maternal education (p = 0.020) was noted. These findings suggest demographic rather than clinical predictors for malaria.

Conclusion: *This study highlights the influence of gender, rural residence, and environmental factors on malaria prevalence in children. The results underscore the need for targeted interventions in rural areas, especially among males, and effective treatment strategies for Plasmodium vivax. Further research is recommended to examine socio-economic influences and long-term outcomes, which could enhance and refine malaria control measures in endemic regions for improved pediatric health outcomes.*

INTRODUCTION

Malaria represents one of the most relevant public health problems worldwide. The burden is particularly high in low and middle-income countries, where environmental factors, poor access to healthcare, and social inequality lead to high transmission (1). Young children, particularly under-five children, are one of the most vulnerable populations that inherit an unfair share of the burden from malaria morbidity and mortality. Malaria remains a significant threat to the child health status in Pakistan, especially in rural and underserved areas with limited access to vector control, diagnostic facilities, and preventive strategies (2). It is estimated that nearly 2.7 million positive cases of malaria were recorded in 2023 across Pakistan. Among them, 65% (approximately 1.75 million cases) were due to Plasmodium vivax and the remaining to Plasmodium falciparum, evidencing the continued predominance of P. vivax in the region (3).

Under-five children are among the high number of cases of malaria in Pakistan. With immature immune systems, they are at high risk for severe forms of the disease, and repeated infection from an endemic setting leads to long-term health problems such as anemia, malnutrition, and developmental delays (4). A study done in Quetta, Balochistan, showed a minimum of 7.41% of pre-school children contributed to the pool of malaria confirmed cases, indicating the presence of infection in the low age groups (5). Same findings have also been reported in different regions of the country, including high-burden provinces- Sindh, Balochistan, and Khyber Pakhtunkhwa. Sindh accounted for 49.4% of the total national malaria cases in 2023, followed by Balochistan with 37.9%. Such alarming numbers illustrate the continued regional variations and suggest an immediate requirement for regional disease monitoring and targeted intervention (6).

The malaria peril in Pakistan is not confined to the prevalence of infection. It is the leading cause of high mortality in children. One estimate is that up to 50, 000 deaths are caused by malaria each year in Pakistan, many of them children. Although efforts to control malaria at the national level, including ITN and indoor residual spray (IRS) distribution and the adoption of artemisinin-based combination therapies, are ongoing, the disease is still endemic in some parts of the country, due to logistical, climatic, and social barriers (7). Unfortunately, that challenge is compounded by factors such as floods, poor drainage systems, ignorance within the community, and the growing resistance to anti-malarial drugs and insecticides. Additionally, early diagnosis at the primary healthcare facilities is quite low leading to a delay in diagnosis and management (8).

In Pakistan, febrile diseases are the leading reasons for childhood hospital admissions, and malaria is often considered the primary differential diagnosis in the endemic areas. Fever for over 48 hours associated with features such as chills, rigor and headache is highly suspicious of malarial infection in such settings (9). But in most public hospitals, the empiric treatment of febrile children without laboratory proof may cause misdiagnosis and under-reporting. It is, therefore, important to have hospital-based surveys that provide reliable estimates of the frequency and clinical spectrum of malaria among febrile pediatric patients, to inform evidence-based case management (10).

In addition, inequities in access to care and care-seeking practices between urban and rural areas are

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associated with the delay in malaria diagnosis and treatment. In some remote areas, traditional healer consultation or self-medication comes before a visit to formal care providers leaving already advanced stage at the time of medical consultation. This is exacerbated by a general lack of knowledge of malaria symptoms and the benefits of early detection. These facts emphasize the relevance of hospital-based estimates to provide better knowledge of the disease burden and to close surveillance system gaps (11).

Another significant factor that malaria species distribution contributes to is the pattern of distribution, which is essential in clinical findings and response to therapy. P vivax remained the predominant species in Pakistan, experiencing relapses because of dormant liver stages, and P falciparum, being infrequent, was known for more severe manifestations and greater mortality (12). Correct diagnosis of the infecting species is important for appropriate antimalarial therapy and shaping public health strategies to reduce transmission. Knowledge of the age distribution and meditation with species-specific prevalence in children will be useful in the improvement of the treatment strategy and lead to better patient management (13).

Methodology:

This study was conducted at the Department of Pediatric Medicine, Ghulam Muhammad Mahar Medical College (GMC), Sukkur, from 1st April to 30th September 2024, using a non-probability consecutive sampling technique. Children aged 1-5 years with fever lasting ≥48 hours along with clinical symptoms such as chills, shivering, and headache, were included, regardless of gender. Children who had received antimalarial chemotherapy within the previous 42 days or had started antimalarial therapy at peripheral hospitals prior to laboratory investigation were excluded to avoid bias. After approval from CPSP and the institutional ethical review committee, eligible children presenting with fever in the ER, ward, or OPD were enrolled following informed consent. Demographic details including age, weight, height, BMI (calculated as weight in kg/height in m^2), drug history, and clinical symptoms were documented. Weight was measured using a Camry analogue scale and height with a stadiometer. Capillary blood was collected aseptically using sterile lancets to prepare thick and thin smears. Slides were air dried, with thin films fixed in methanol and stained using 10% Giemsa for 15 minutes. Malaria parasite detection was done via thick smears, and species identification through thin smears. Two laboratory technologists examined slides; a third reviewed all positives and 10% of negatives. Geographical and socioeconomic data were also recorded in a pre-designed proforma, and exclusion criteria were strictly followed to minimize bias.

RESULTS

Out of 135 children with fever of ≥ 48 hours along with clinical symptoms like chills, headache, shivering, 70 were males and 65 were females, which constitutes about 52% and 48% respectively. The children had a mean age of 3.03 ± 1.42 years, with a mean weight of 13.59 ± 3.01 kg and a mean height of 89.80 ± 9.39 cm. The average BMI was 16.67 ± 1.20 kg/m^2. In addition to baseline anthropometric measurements, further demographic and clinical characteristics of the study population were assessed to provide a holistic understanding of the health profile of the children (Table 1).

A significant majority of the participants, 81.5% (n = 110), resided in rural areas, while only 18.5% (n = 25) were from urban settings, indicating a strong rural representation in the sample. About malaria prevalence, 41.5% (n = 56) of the children were found to have malaria parasites present in their blood, while 58.5% (n = 79) tested negative. Among those who tested positive for malaria (n = 55), the predominant species identified was Plasmodium vivax, accounting for 69.1%, followed by P. ovale (20.0%), P. falciparum (7.3%), and P. malariae (3.6%) (Figure-1). The remaining 80 children, representing 59.3% of the sample, did not present with any malarial parasite and were excluded from this sub-analysis. In terms of clinical manifestations, chill and shivering were the most frequently reported symptoms, present in 90.4% (n = 122) of the children. Other symptoms included headache, reported by 49.6% (n = 67), and vomiting, seen in 14.8% (n = 20) of the participants (Table 1).

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The mean duration of illness was found to be 4.11 ± 1.55 days. Additionally, the maternal level of education was documented. The majority of mothers had attained secondary education (31.1%), followed by primary education (25.9%), matriculation (17.0%), intermediate education (14.1%), and graduate-level education (11.9%) (Table 1).

Socio-Demographics	**N (%) / Mean ± SD Total=135**
Gender	
Male	70 (52%)
Female	65 (48%)
Anthropometric measurements	
Age (in years)	3.03 ± 1.42
Weight (in kg)	13.59 ± 3.01
Height (in cm)	89.80 ± 9.39
BMI (kg/m^2)	16.67 ± 1.20
Residential status	
Urban	25 (18.5%)
Rural	110 (81.5%)
Malaria Parasite	
Positive	56 (41.5%)
Negative	79 (58.5%)
Clinical Symptoms	
Chills/Shivering	122 (90.4%)
Headache	67 (49.6%)
Vomiting	20 (14.8%)
Parental Education Level	
Primary	35 (25.9%)
Secondary	42 (31.1%)
Matriculation	23 (17.0%)
Intermediate	19 (14.1%)
Graduate	16 (11.9%)

Table 1: Socio-demographic, clinical, and anthropometric characteristics of the children presenting with fever and malaria-like clinical symptoms (N = 135).

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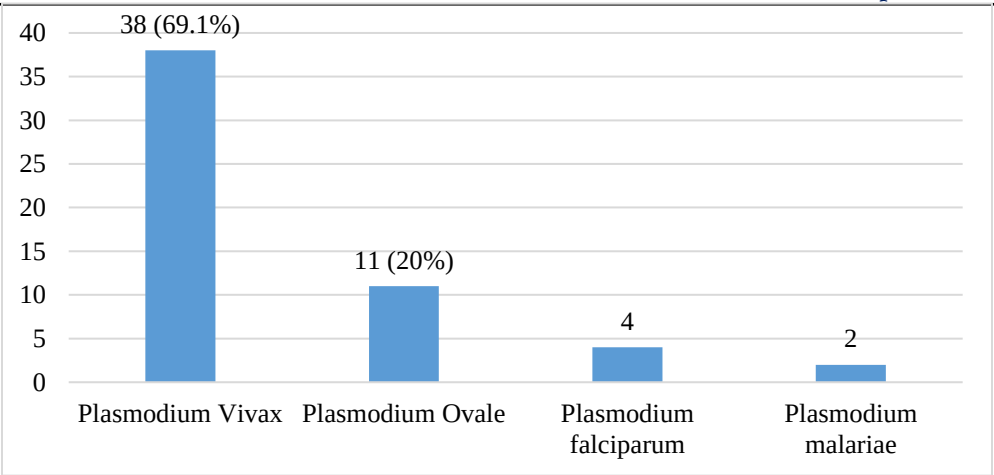


Figure 1: Types of malaria parasites

In our study, associations between malaria infection and key demographic and clinical factors were examined to identify potential determinants of parasite presence among the study population.

A significant association was found between place of residence and malaria parasite status (p = 0.049), indicating that children from rural areas were more likely to be infected compared to their urban counterparts. Specifically, 50 out of 56 malaria-positive cases resided in rural settings, underscoring the higher exposure risk in these environments (Table 2).

Likewise, gender was significantly associated with malaria prevalence (p = 0.037). Among the 70 male children, 35 tested positive for malaria, whereas only 21 of 65 females were infected, suggesting a higher burden among males in this sample (Table 2).

In contrast, no statistically significant associations were observed between malaria infection and clinical symptoms such as chill and shivering (p = 0.719), headache (p = 0.782), or vomiting (p = 0.259). These symptoms, while prevalent, did not differentiate between infected and non-infected children in this dataset (Table 2).

Regarding maternal level of education, no significant association was found with malaria infection status (p = 0.221) (Table 2). However, the test for linear-by-linear association approached significance (p = 0.020), indicating a possible trend where higher maternal education could be linked to lower malaria prevalence, though this requires further investigation.

Variables	Categories	Gender		P-value
		Malaria Present (n = 56)	Malaria Absent (n = 79)	
Gender	Male	35 (62.5%)	35 (44.3%)	0.037*
	Female	21 (37.5%)	44 (55.7%)	
Place of Residence	Urban	6 (10.7%)	19 (24.1%)	0.049*
	Rural	50 (89.3%)	60 (75.9%)	
Chill & Shivering	Yes	50 (89.3%)	72 (91.1%)	0.719
	No	6 (10.7%)	7 (8.9%)	
Headache	Yes	27 (48.2%)	40 (50.6%)	0.782
	No	29 (51.8%)	39 (49.4%)	
Vomiting	Yes	6 (10.7%)	14 (17.7%)	0.259
	No	50 (89.3%)	65 (82.3%)	

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Maternal Education	Primary	18 (32.1%)	17 (21.5%)	0.221
	Secondary	20 (35.7%)	22 (27.8%)	
	Matriculation	9 (16.1%)	14 (17.7%)	
	Intermediate	5 (8.9%)	14 (17.7%)	
	Graduate	4 (7.1%)	12 (15.2%)	

Table 2: Comparative analysis of demographic and clinical factors associated with malaria status in febrile children (N = 135).

DISCUSSION

This study aimed to assess the demographic, clinical, and anthropometric profiles of children with prolonged fever and malaria prevalence in rural and urban settings. Our results revealed some striking associations of malaria infection with sex, residence, and maternal education, which are described below in comparison with the literature.

Our findings revealed a pronounced gender gap in the prevalence of malaria, with male children (50%) having a significantly higher probability of testing positive compared to females (32.3%). This is consistent with the findings of earlier studies, like Okiring J et al study published in 2022 (14). Crompton PD et al (2014) indicate that men could be at higher risk of malaria given issues such as immune response variations and higher outdoor activity (15). The higher burden of malaria in males justifies focusing on this group through interventions.

Furthermore, place of residence was strongly associated with malaria infection (p = 0.049), with 50 out of 56 malaria-positive children coming from the rural areas. This is consistent with results from Larson PS et al. (2021), which emphasize that rural living conditions expose residents to a higher malaria risk, notably because of environmental conditions favoring mosquito breeding sites and the reduced access to care (16). Targeting rural areas would be the best approach to reducing Malaria transmission.

Among the malaria-positive children, Plasmodium vivax was the most predominant species (69.1%), which is typical for areas of low transmission intensity (17). The dominance of this species demonstrates that treatment protocols that address the complexities of P. vivax, requirements for radical cure, are warranted.

A high proportion of subjects reported chills (90.4%) and headache (49.6%), whilst 14.8% reported vomiting; however, none of these symptoms were significantly associated with malaria infection. This corresponds with evidence that both these signs are non-specific and widespread in malaria and other febrile diseases (18), thus the need for laboratory testing to accurately diagnose malaria.

Although maternal education was not significantly associated with malaria (p 0.221), a borderline significance (p 0.020) was found. Higher maternal education has also been reported to be associated with improved malaria preventative behaviors and treatment adherence (19). In the current context, however, the rural base and poor access to health may have reduced the influence of maternal education.

Conclusion

This study demonstrates a strong effect of gender, rural residence, and environmental factors on malaria prevalence in children. The findings highlight the importance of male-targeted malaria control programs in rural areas and for a comprehensive treatment strategy for P. vivax. Further investigations should investigate the impact of socio-economic status and long-term health effects in order to optimize malaria control strategies in endemic areas.

Conflict of interest: -

The authors declare no conflict of interest.

REFERENCES

1.Apeagyei AE, Patel NK, Cogswell I, O'Rourke K, Tsakalos G, Dieleman J. Examining geographical inequalities for malaria outcomes and spending on malaria in 40 malaria-endemic countries, 2010–2020. Malar J. 2024;23(1):206.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

2.Mbishi JV, Chombo S, Luoga P, Omary HJ, Paulo HA, Andrew J, et al. Malaria in under-five children: prevalence and multi-factor analysis of high-risk African countries. BMC Public Health. 2024;24(1):1687.

3.Khan MI, Qureshi H, Bae SJ, Khattak AA, Anwar MS, Ahmad S, et al. Malaria prevalence in Pakistan: a systematic review and meta-analysis (2006–2021). Heliyon. 2023;9(4):15373.

4.Ibrahim M, Khan A. Frequency of malaria in children with fever without localizing sign in age less than 36 months. Indus J Biosci Res. 2025;3(2):229-34.

5.Hussain K, Shafee M, Khan N, Jan S, Tareen A, Khan M. Seroprevalence of pediatric malaria in Quetta, Balochistan, Pakistan. Iran J Parasitol. 2013;8(2):342.

6.Sumbal A, Khan N, Naseem M, Yasinzai M, Ara T, Arif S, et al. Prevalence of pediatric malaria in Quetta (city) balochistan, Pakistan. Int J Ent Res. 2020;5(4):20-3.

7.Haq IU, Mehmood Z, Khan GA, Kainat B, Ahmed B, Shah J, et al. Modeling the effect of climatic conditions and topography on malaria incidence using Poisson regression: a retrospective study in Bannu, Khyber Pakhtunkhwa, Pakistan. Front Microbiol. 2024;14:1303087.

8.Acosta-España JD, Romero-Alvarez D, Luna C, Rodriguez-Morales AJ. Infectious disease outbreaks in the wake of natural flood disasters: Global patterns and local implications. Infez Med. 2024;32(4):451.

9.Ali N, Khan NU, Waheed S, Mustahsan S. Etiology of acute undifferentiated fever in patients presenting to the emergency department of a tertiary care center in Karachi, Pakistan. PaK J Med Sci. 2020;36(6):1285.

10.Koliopoulos P, Kayange N, Jensen C, Gröndahl B, Eichmann J, Daniel T, et al. Challenges in diagnosing and treating acutely febrile children with suspected malaria at health care facilities in the Lake Mwanza region of Tanzania. Am J Trop Med Hyg. 2023;110(2):202.

11.Diallo EM, Traore FB, Camara BS, Langlet A, Delamou A, Diallo OO, et al. Analysis of care-seeking pathways and factors influencing early and appropriate care-seeking for malaria patients in the Republic of Guinea: a cross-sectional study. Malar J. 2024;23(1):273.

12.Habtamu K, Petros B, Yan G. Plasmodium vivax: the potential obstacles it presents to malaria elimination and eradication. Trop Dis Travel Med Vaccines. 2022;8(1):27.

13.Cohen JL, Leslie HH, Saran I, Fink G. Quality of clinical management of children diagnosed with malaria: a cross-sectional assessment in 9 sub-Saharan African countries between 2007–2018. PLoS Med. 2020;17(9):1003254.

14.Okiring J, Epstein A, Namuganga JF, Kamya EV, Nabende I, Nassali M, et al. Gender difference in the incidence of malaria diagnosed at public health facilities in Uganda. Malar J. 2022;21(1):22.

15.Crompton PD, Moebius J, Portugal S, Waisberg M, Hart G, Garver LS, et al. Malaria immunity in man and mosquito: insights into unsolved mysteries of a deadly infectious disease. Annu Rev Immunol. 2014;32(1):157-87.

16.Larson PS, Eisenberg JN, Berrocal VJ, Mathanga DP, Wilson ML. An urban-to-rural continuum of malaria risk: new analytic approaches characterize patterns in Malawi. Malar J. 2021;20:1-14.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

17.Arévalo-Herrera M, Lopez-Perez M, Medina L, Moreno A, Gutierrez JB, Herrera S. Clinical profile of Plasmodium falciparum and Plasmodium vivax infections in low and unstable malaria transmission settings of Colombia. Malar J. 2015;14:1-11.

18.Bria YP, Yeh C-H, Bedingfield S. Significant symptoms and nonsymptom-related factors for malaria diagnosis in endemic regions of Indonesia. Int J Infect Dis. 2021;103:194-200.

19.Abu Bonsra E, Amankwah Osei P, Adjei Kyeremeh E, Adama S, Sekyi AG, King EF. Factors associated with malaria in pregnancy among women attending ANC clinics in selected districts of the Ashanti Region, Ghana. Malar J. 2025;24(1):8