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Original Article

Analysis of Clinical Manifestations of Malaria Fever among Pediatric and Adult Patients in the Out-Patient Department

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ABSTRACT

A significant variation exists between malaria's clinical presentations among adults versus pediatric populations. **Objectives:** To compare malaria fever's clinical manifestations amongst adult and pediatric patients presenting to the outpatient department of Al-Tibri Medical College and Hospital, Karachi. **Methods:** A cross-sectional analytical study was carried out at the Pediatric and Adult OPD, Al-Tibri Medical College and Hospital, Karachi, for six months after ethical approval. A total of 369 laboratory-confirmed malaria patients were selected through non-probability consecutive sampling. Patients under 15 years of age were classified as pediatric, and patients aged 15 years and above as adults. A structured proforma was used for data collection, and data were analyzed using IBM SPSS Statistics version 31.0. The chi-square test or Fisher's exact test was used for comparison, and crude odds ratios with 95% confidence intervals were calculated. A p-value below 0.05 was considered statistically significant. **Results:** Out of 369 patients, 162 (43.9%) were pediatric and 207 (56.1%) were adults. Males were 58%. All patients had fever, followed by chills (81.6%) and sweating (74.8%). Vomiting (58.0% vs 36.2%), diarrhea (38.9% vs 18.8%), anemia (48.1% vs 29.0%), convulsions (28.4% vs 5.8%), and altered consciousness (17.9% vs 5.8%) were more frequent in pediatric patients. Chills (88.4% vs 72.8%) and headache (76.8% vs 54.9%) were more frequent in adults. All these differences were statistically significant ($p<0.001$). **Conclusions:** Among patients with laboratory-confirmed malaria, clinical presentation differed between pediatric and adult age groups. Pediatric patients more often had gastrointestinal and neurological features, while adults more often had chills and headache.

INTRODUCTION

Malaria is a well-known life-threatening infection that is caused by the parasitic species of Plasmodium, which is transmitted via the bite of infected female Anopheles mosquitoes [1]. The majority of infections are caused by four of Plasmodium species, viz. falciparum, malariae, ovale, and vivax [2]. Even after medical advances throughout the years, malaria has remained a major health concern and problem for the public globally. According to the WHO (World Health Organization), malaria remains a substantial cause of mortality annually, amounting to millions of cases [3]. The most commonly encountered and vulnerable groups are pregnant females and children below the age of five years [4]. Malaria remains a major global public health problem, with a continuing burden of cases and deaths every year [5, 6]. Pakistan has a substantial malaria burden, and the level of transmission differs between provinces [7, 8]. In Pakistan, malaria is reported to be endemic, with a majority of the outbreaks occurring during monsoon season. The most commonly observed species in the local population is Plasmodium vivax, followed by Plasmodium falciparum [9]. A typical presentation of malaria includes fever with chills,

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headache, sweating, and malaise. In cases of severe malaria, frequently encountered conditions include cerebral malaria, anemia, metabolic complications, and organ dysfunction [10]. Clinically, malaria presents in a variety of factors such as on the basis of immunity, age and infecting species [11]. In children, malaria may present with symptoms such as diarrhea, vomiting, and convulsions, which can be mistaken for other illnesses [11, 12]. In adults, the more typical features are intermittent fever with rigors and chills. Age, immune status, and parasite genetic diversity may influence how malaria presents [11, 13]. A significant variation exists between the clinical presentations of malaria among adults and pediatric populations [14, 15].

Diagnosis and treatment of malaria can be difficult where trained health care staff, appropriate medicines, and laboratory facilities are limited. Recognizing age-specific manifestations early can improve both diagnosis and management. However, local data comparing the presentation of malaria between adults and children are scarce, especially in OPD settings. Such data can help clinicians to identify malaria early and start treatment on time. Such data may also help to reduce morbidity, prevent complications, and improve OPD-based diagnostic protocols. This study aimed to compare malaria fever's clinical manifestations amongst adult and pediatric patients presenting to the out-patient department, Al-Tibri Medical College and Hospital, Karachi.

METHODS

A cross-sectional analytical study was carried out at the Pediatric and Adult OPD, Al-Tibri Medical College and Hospital, Karachi, for a period of six months (August 2025 to January 2026). The study is reported according to the STROBE guidelines for observational studies. Patients were recruited consecutively through non-probability sampling from the OPD. Patients who were referred from the emergency department or admitted to the ward were also included. During the study period, patients with suspected malaria were screened, and 369 patients who met the eligibility criteria and had complete data were included in the final analysis. Patients of either gender who presented with fever and associated symptoms and had a clinically and laboratory confirmed diagnosis of malaria were included. Informed consent was obtained from adult patients. For data collection, after ethical approval from the Ethical Review Committee (ERC) of Al-Tibri Medical College and Hospital, Karachi, with ref. no. IERC/ATMC/16(01-2025)/08 dated 8 July 2025, a self-structured questionnaire (proforma) was used that included patient demographic data, clinical signs and symptoms of malaria, and laboratory and clinical findings. For patients under 15 years, consent was obtained from a parent or legal guardian, and assent was taken from children who were old enough to understand. Patients under 15 years of age were classified as pediatric, and patients aged 15 years and above were classified as adults. Patients with co-infection such as typhoid or dengue, those already on antimalarial treatment before presenting to the OPD, and those with incomplete data were excluded. This was a descriptive comparative study, and all eligible patients who presented consecutively during the study period were included. A sample size calculation for estimating malaria prevalence was therefore not applicable, because all participants had confirmed malaria. No formal sample size calculation was performed for comparing age groups, and the findings should therefore be regarded as descriptive. The proforma was pretested on a small sample of patients who were not part of the final sample, and unclear items were corrected before use. For young children, information on symptoms was obtained from the parent or guardian. Confirmation of malaria was done on the basis of laboratory testing of a 5 ml venous blood sample collected from each patient's brachial vein using aseptic measures, and tested by peripheral blood smear as well as Rapid Diagnostic Test (RDT). Throughout the data collection process and reporting of data, confidentiality of patients was maintained. Fever was defined as a history of fever or a recorded body temperature of 37.5 °C or above. Anemia was defined as pallor on clinical examination (conjunctival, palmar, or nail bed pallor); hemoglobin was not measured, so anemia was assessed clinically only. Altered consciousness was defined as a level of consciousness other than "Alert" on the AVPU scale (Alert, responds to Voice, responds to Pain, Unresponsive), that is, not fully alert and responsive. Convulsions were defined as a witnessed seizure or a history of seizure during the present illness reported by the caregiver. Splenomegaly was defined as a spleen palpable below the left costal margin. Severe malaria was not classified separately in this study, and each clinical manifestation was compared individually between the age groups.

IBM SPSS Statistics version 31.0 was used for analysis of the collected data. Grouping by age (pediatric versus adults) was the independent variable, while the clinical manifestations of malaria were the dependent variables. After testing for normality using the Shapiro-Wilk test for continuous variables, the mean and standard deviation were reported. If data were skewed, median and interquartile range (IQR) were reported. For categorical variables, frequencies and percentages were tabulated. The chi-square test was used for comparison of categorical variables, and Fisher's exact test was used when any expected cell count was below 5. Crude odds ratios (pediatric versus adult) with 95% confidence

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intervals were calculated for each manifestation. Because seven manifestations were compared, a Bonferroni-corrected significance level of p<0.007 was also applied to account for multiple comparisons. Multivariable logistic regression was not performed because data on relevant confounders such as malaria species, parasite density, illness duration, and nutritional status were not recorded, and the study was designed to describe and compare clinical presentation. Patients with incomplete data were excluded, so there was no missing data in the analyzed variables. A p-value below 0.05 was taken as statistically significant.

RESULTS

369 patients were included in the analysis. Out of these, 162 (43.9%) patients were of the pediatric age group (under 15 years of age), while 207 (56.1%) were adults (15 years of age and above). Gender distribution showed 214 (58%) males and 155 (42%) females. The overall mean age of patients was 23.2 ± 11.67 years (Table 1).

Table 1: Age and Gender Distribution of Patients Included in the Study (n=369)

Variables	Category	n (%)
Age Group	Pediatric (under 15 years)	162 (43.9 %)
	Adult (15 years and above)	207 (56.1 %)
Gender	Male	214 (58 %)
	Female	155 (42 %)
Mean Age	Mean ± SD	23.2 ± 11.67 years

Since the inclusion criteria included patients with fever, all patients included in the study had a presenting complaint of fever (100 %), followed by chills in 301 (81.6 %) of patients and sweating in 276 (74.8 %) of patients. Among other complaints, headache was reported in 248 (67.2 %) patients, vomiting in 169 (45.8 %) patients, and diarrhea in 102 (27.6 %) patients. Among the clinical manifestations, anemia was recorded in 138 (37.4 %) patients, splenomegaly in 121 (32.8 %) patients, convulsions in 58 (15.7 %) patients, while altered consciousness was observed in 41 (11.1 %) patients (Table 2).

Table 2: Frequency Distribution of Clinical Manifestations in Patients with Malaria (n=369)

Clinical Manifestation	n (%)
Fever	369 (100 %)
Chills	301 (81.6 %)
Sweating	276 (74.8 %)
Headache	248 (67.2 %)
Vomiting	169 (45.8 %)
Diarrhea	102 (27.6 %)
Anemia	138 (37.4 %)
Splenomegaly	121 (32.8 %)
Convulsions	58 (15.7 %)
Altered Consciousness	41 (11.1 %)

The findings show the percentage of pediatric and adult patients with vomiting, diarrhea, convulsions and headache. Vomiting, diarrhea, and convulsions were more frequent in pediatric patients, while headache was more frequent in adults (Figure 1).

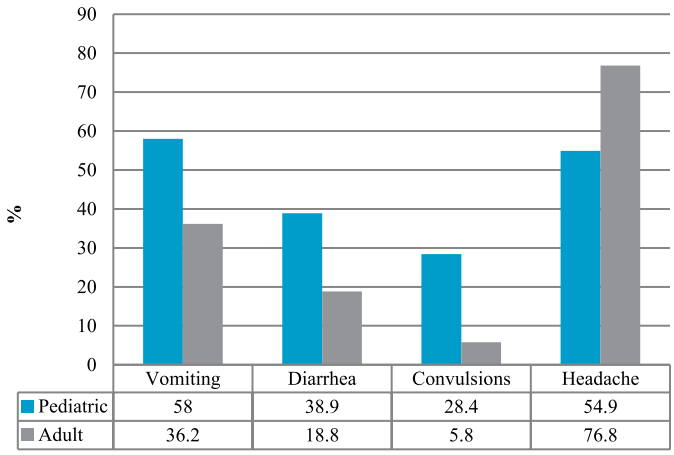


Figure 1: Graphical Representation of Key Symptoms of Malaria Between Pediatric and Adult Patients (n=369)

Chills, vomiting, diarrhea, anemia, convulsions, altered consciousness, and headache all differed significantly between pediatric and adult malaria patients (all p<0.001). Vomiting, diarrhea, anemia, convulsions and altered consciousness were more frequent in pediatric patients, while chills and headache were more frequent in adults. The crude odds of convulsions (OR 6.44, 95% CI 3.28 to 12.66), altered consciousness (OR 3.54, 95% CI 1.75 to 7.19), diarrhea (OR 2.74, 95% CI 1.71 to 4.39), vomiting (OR 2.43, 95% CI 1.60 to 3.71) and anemia (OR 2.27, 95% CI 1.48 to 3.50) were higher in pediatric patients, while the odds of chills (OR 0.35, 95% CI 0.20 to 0.61) and headache (OR 0.37, 95% CI 0.24 to 0.58) were lower. All associations remained significant after Bonferroni correction (p<0.007).

Table 3: Comparison of Clinical Manifestations Between Pediatric and Adult Malaria Patients (n=369)

Clinical Features	Pediatric (n= 162), n (%)	Adults (n= 207), n (%)	Crude OR (95% CI)	p-value
Fever	162 (100%)	207 (100%)	–	–
Chills	118 (72.8%)	183 (88.4%)	0.35 (0.20 to 0.61)	<0.001
Vomiting	94 (58.0%)	75 (36.2%)	2.43 (1.60 to 3.71)	<0.001
Diarrhea	63 (38.9%)	39 (18.8%)	2.74 (1.71 to 4.39)	<0.001
Anemia	78 (48.1%)	60 (29.0%)	2.27 (1.48 to 3.50)	<0.001
Convulsions	46 (28.4%)	12 (5.8%)	6.44 (3.28 to 12.66)	<0.001
Altered Consciousness	29 (17.9%)	12 (5.8%)	3.54 (1.75 to 7.19)	<0.001
Headache	89 (54.9%)	159 (76.8%)	0.37 (0.24 to 0.58)	<0.001

Chi-square test was applied, as all expected cell counts were 5 or more. OR = odds ratio (pediatric versus adult, adults as reference group); CI = confidence interval. A p-value below 0.05 was considered significant, and below 0.007 after Bonferroni correction

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Species of Plasmodium, parasite density, hemoglobin value, and fever pattern were not recorded in the study proforma and could not be compared between the age groups. Sweating (276 patients, 74.8%) and splenomegaly (121 patients, 32.8%) were recorded for the whole sample only and could not be compared between the age groups, because they were not available separately by age group. These items are acknowledged as limitations.

DISCUSSION

In this study, the clinical presentation of malaria differed significantly between pediatric and adult patients with laboratory confirmed disease. Fever was present in all patients because it was an inclusion criterion. Chills and headache were more frequent in adults, while vomiting, diarrhea, anemia, convulsions, and altered consciousness were more frequent in pediatric patients. Sweating was common overall (74.8%) but was not compared between the age groups. Since only confirmed malaria cases were studied, these findings compare presentation between age groups. They do not show that any age group is more susceptible to malaria or to severe disease. The current research analyzed and compared malaria's clinical features in pediatric and adult patients in an OPD setting. In line with our research, chills, headache, and sweating were among the most frequently reported symptoms in studies by Bria *et al.* [16]. Wang *et al.* showed that malaria incidence is influenced by climate factors such as rising temperatures, which supports the need for local clinical data [17]. Workineh et al. reported malaria among children attending health institutions, which shows that malaria is an important cause of illness in this age group [18]. Convulsions and altered consciousness were significantly more frequent in pediatric patients in our study. Neurological complications are an important feature of severe malaria [19]. In our sample, 28.4% of pediatric patients had convulsions and 17.9% had altered consciousness. These proportions are high for an OPD population and may reflect referral of sicker patients to a tertiary care hospital. Convulsions in a febrile child may also be caused by fever itself, which was not investigated further. Adults more often reported chills and headache, which agrees with the classical description of malaria as fever with rigors and chills [10]. Adults can describe symptoms such as headache and chills themselves, whereas very young children cannot. The lower frequency of these symptoms in children may therefore partly reflect underreporting. Vomiting and diarrhea were more frequent in pediatric patients. Gastrointestinal symptoms in a febrile child may delay recognition of malaria, and higher rates of misdiagnosis have been reported in pediatric patients compared with adults with malaria [20]. In the current study, hemoglobin values were not available for comparison, so this finding should be interpreted with caution. Guidelines on malaria in children also stress careful clinical assessment of febrile children [21]. Gender differences in pediatric hospital attendance have also been described locally [22].

This study included both pediatric and adult patients and compared their clinical presentation in a real-world OPD setting using the same proforma for both groups. Laboratory confirmation by blood smear and RDT is a strength. However, the study has several limitations. It was a single-center cross-sectional study, so generalizability is limited and causal relationships cannot be established. Only patients with confirmed malaria were included, so the risk of malaria by age could not be assessed. The high frequency of convulsions and altered consciousness suggests that sicker patients may have been referred to this hospital, so selection bias is possible. Age was divided into two groups only, and symptoms such as headache and chills may not be reliably reported by very young children. Data on malaria species, parasite density, hemoglobin, fever pattern, illness duration, and nutritional status were not available, and these factors may influence clinical presentation. Prior antimalarial treatment was an exclusion criterion. Only unadjusted comparisons and crude odds ratios were reported, and residual confounding is possible. No formal sample size calculation was performed because all eligible consecutive patients were included, so the study was not powered for comparisons between age groups and the findings are descriptive. Sweating and splenomegaly were recorded for the whole sample only and could not be compared by age group. Anemia was assessed clinically without hemoglobin confirmation, so misclassification is possible. Future multicenter studies with adjusted analysis, species-specific data, and follow-up of outcomes are recommended.

CONCLUSIONS

This study found significant differences in the clinical manifestations of malaria between pediatric and adult patients with laboratory confirmed disease. Pediatric patients more often presented with vomiting, diarrhea, anemia, convulsions, and altered consciousness, while adults more often presented with chills and headache. These findings describe differences in clinical presentation only. They do not show differences in susceptibility or disease severity between age groups. Larger studies with adjusted analysis are needed to confirm these findings.

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Authors' Contribution

Conceptualization: HZ
Methodology: HZ, NS
Formal analysis: ES, AI, NQ, HK
Writing and Drafting: HZ, NS, HA, ES, AI, NQ, HK
Review and Editing: HZ, NS, HA, ES, AI, NQ, HK

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflict of Interest

All the authors declare no conflict of interest.

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