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Prevalence of Anemia with Malaria in Children of age Group 1-12 Years Admitted at Khairpur Medical College Hospital

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Abstract:
Malaria is a major cause of anemia in children with a complex, bidirectional relationship caused by the parasite plasmodium leading to hemolysis and anemia. The aim of this study to investigate the prevalence of malaria with anemia in children admitted at Khairpur Medical College Civil Hospital District Khairpur. **Methodology:** Study was conducted on 260 patients of malaria with anemia, and 150 individuals were used as control group. Demographic result showed socioeconomics, residential locations, literacy and detailed history about malaria and anemia. The finding from survey questionnaire, we concluded that socioeconomic conditions, residential locations and literacy rate are significant risk factors of the disease. **Result:** The incidence of correlation of malaria with anemia is determined to be higher in male than female children with school going child above the 5 years of age. The study population consisted of 55% males and 45% females. There were 150 control patients and/160 case patients (infected youngsters). According to demographic data, 24% of children lived in urban areas and 76% of children lived in rural areas. Socioeconomic status of anemia with malaria children`s guardians were categorized into three different classes on the bases of their monthly income, Upper class 0% middle class 15%, lower class 85%. The literacy status of parents/ guardians showed that 8% parents were literate whereas 92% parents were illiterate. Significant majority (92%) of guardians were unaware of anemia. 58% children reported experiencing malaria more than twice. The 208 children were plasmodium vivax positive, 42 children were plasmodium falciparum positive, and 10 patients have mixed picture. **Conclusion:** This study emphasizes the prevalence of malaria with anemia play a very important role in population of Kahirpur Pakistan. Demographic findings revealed that boys were more affected with malaria than girls, 36% were preschool age children were affected with malaria 14% were infants, Majority of study population were belonged to the lower class, due to the lack of education majority of parents were showed no any knowledge about sever anemic condition of their children, 80% Plasmodium vivax positive patients whereas 16% of plasmodium falciparum positive patients.

Key words: Demographic, Plasmodium vivax. Anemia, plasmodium falciparum

Introduction

Malaria, a life-threatening disease caused by the Plasmodium parasite, remains a significant public health concern globally, particularly in tropical and subtropical regions. According to the World Health Organization (WHO), there were 241 million cases of malaria reported in 2020, resulting in 627,000 deaths, with the majority of these cases occurring in Africa. Anemia, a condition characterized by a decrease in the number of red blood cells or the amount of hemoglobin in the blood, is a common complication of malaria, particularly in children under the age of 12. The main vector of the disease is the female Anopheles mosquito, which carries the parasite Plasmodium malaria (Sato, 2021). There are five types of Plasmodia known to infect humans which include; Plasmodium, falciparum Plasmodium vivax, Plasmodium malaria, Plasmodium ovale, and Plasmodium knowlesi. Symptoms of malaria include fever, chills, headaches, aches in the muscles, exhaustion, nausea, and vomiting. Severe malaria episodes can lead to anemia, organ failure, and even death (Bria et al., 2021). To ensure interaction between the malaria pathogen and its human host, understanding the effects of the parasite on host cells and immune responses in addition to its survival and reproduction is critical. Scientists can also investigate genetic factors influencing susceptibility to malaria and the disease's severity. (Penczykowski et al., 2016). Anemia and malaria have found together in the majority of children living in endemic areas due to interactions between the complex factors socioeconomic, clinical, and epidemiological factors. Epidemiological studies (Korenromp et al.,2016) demonstrated that children infected with malaria develop anemia more often than healthy children. Prevalence rates of risk differ depending on the intensity of spreading malaria in endemic areas. (Kaur et al., 2014).Basic mechanisms leading to this connection include hemolysis of parasitized red blood cells, disruption of erythropoiesis, and higher death rate of infected as well as non-infected erythrocytes Besides, socio-economic factors like poverty, restricted access to health care and poor sanitation contribute to the disproportionately high prevalence of anemia and malaria among children aged one to twelve years (White NJ et al., 2018). Early detection and prompt treatment of anemia are crucial for decreasing morbidity and mortality rates in the context of malaria infection (WHO, 2019). The correlation between anemia and malaria in children aged 1 to 12 years indicates the need for a holistic public health strategy based on nutritional supplementation, malaria control, and improving the health system (WHO, 2021). An integrated approach that combines nutritional interventions such as iron supplementation and dietary diversity with vector control, chemoprophylaxis, and early diagnosis and treatment is needed to reduce the combined burden of anemia and malaria, as stated by the World Health Organization in 2018. Additionally, there is the need to address socioeconomic determinants by reducing poverty and access to healthcare services in efforts to sustain improvements in child health outcomes (WHO, 2016). Both of these conditions continue to seriously threaten public health, in many areas where they co-occur and affect already vulnerable populations, such as one to twelve years old children. Malaria and anemia are two infectious diseases, more significantly affecting children in the third world. According to (Vignier, 2019), malaria is one of the significant global health issues that afflict people in every corner of the globe (Avery, Weldon et al., 2016). Malaria is a major cause of morbidity and mortality globally (Na-Bangchang & Congpuong, 2007). It is estimated that there are approximately 300-500 million cases of malarial disease worldwide (Campbell, 1997) and 1-2 million malaria-related deaths annually. Malaria exacerbates anemia, a significant health issue (Ekvall, 2003). In 14 villages of northeastern Tanzania, the anemia prevalence caused by malaria in newborns was 4.6 percent, 4.1 percent in children under one-year-old, 1.7 percent in children under two years old, and 3.3 percent in women of reproductive age (Brabin, 1992). Early childhood anemia is substantially predicted by malaria in early children, according to observational epidemiologic research (Mc Cuskee, et

al., 2014). All these results indicate the involvement of malaria in anemia.

Materials and Methods

This study comprised 260 case (infected children) and 150 control patients. This study was conducted on the patients admitted at Khairpur Medical College Civil Hospital District Khairpur, having malaria belonging to Khairpur and periphery. Prevalence of malaria was calculated using simple proportion. The studies were conducted on venous blood samples that were taken into EDTA tubes The plasmodium parasites species were checked used ICT kit. Calculating the percentage of people in the sample that tested positive for malaria is the most basic approach, known as the simple proportion. The population's prevalence can then be calculated by projecting this percentage to the full population. Patients with age group between 1 to 12 years, admitted at Khairpur Medical College Civil Hospital District Khairpur, having malaria positive were included in this study. The Patient attendant (mother/grandmother) was sign an informed consent form. Patients having malaria & typhoid (enteric fever) and pneumonia were excluded. To collect and analyze the data from survey on the incidence of malaria and anemia in children admitted at Khairpur Medical College Civil Hospital District Khairpur. Demographic information such as home location, age, gender, and socioeconomic status is gathered using structured questionnaires that are presented to parents or legal guardians. Clinical data, including past medical history, symptoms of malaria, and history of treatment, were gathered by the questionnaire.

Results

Assessment of demographic data and estimation of traditional biochemical parameters. This chapter presents the results and discussion on the topic “Correlation of anemia with malaria in children of age group 1-12 years admitted at Khairpur Medical College Hospital”. Overall Distribution, Total control patients: 150, Total case patients (infected youngsters): 260 Total study population: 410 (150 control + 260 case patients).

Gender-Wise Breakdown

Male: (226/410), Control patients: (83/150), Case patients: (143/260).
Female: (184/410), Control patients: (67/150), Case patients: (117/260).
Key Trends and Observations: The study population consisted of 55% males and 45% females. There were 150 control patients and/160 case patients (infected youngsters) in this study; out of these, 45% were girls and 55% were males.

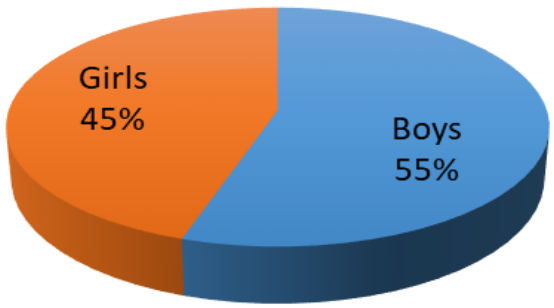

Figure 1: Gender Distribution of malaria with anemia patients

Figure 2, presented the age distribution of the children by gender; There were 100 preschool-age youngsters, of which 40 were boys and 60 were girls. There were 152 school-age youngsters in all, 94 of them were boys and 58 were girls. Infants, 8 were recorded, comprising 4 males and 4 females. The gender distribution in this age group is equal, with a male-to-female ratio of 1:1. Preschool-age Children (2-5 years), this age group consists of 100 children, with 40 males and 60 females. Females outnumber males by 20, accounting for 60% of the preschool-age population. The male-to-female ratio in this age group is approximately 1:1.5. School-age Children (6-12 years), 152 school-age children were recorded, comprising 94 males and 58 females. Males dominate this age group, accounting for 62% of the school-age population. The male-to-female ratio in this age group is approximately 1.6:1.

Key Trends and Observations:

The infant age group exhibits a balanced gender distribution.

Females outnumber males in the preschool-age group.

Males predominate in the school-age group.

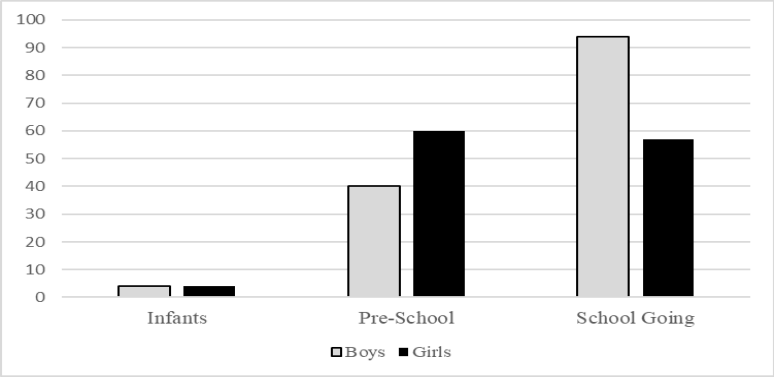

Figure 2: Age distribution of malaria with anemia patients

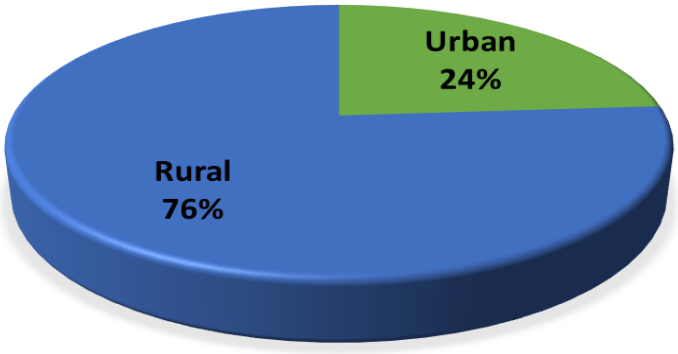

Figure 3: Residence Distribution of the patients

Residential Distribution: Urban Areas: 24% (almost a quarter) of children resided in urban areas. Rural Areas: A significant majority, 76% (more than three-quarters) of children, lived in rural areas. According to demographic data, 24% of children lived in urban areas and 76% of children lived in rural areas.

Rural Dominance: The data reveals a strong rural-urban divide, with a substantial majority of children living in rural areas.

Urban Minority: A smaller proportion of children reside in urban areas, indicating potential differences in lifestyle, access to resources, and socioeconomic status.
Implications for Resource Allocation: The demographic distribution has significant implications for resource allocation, healthcare access, and education in rural area.

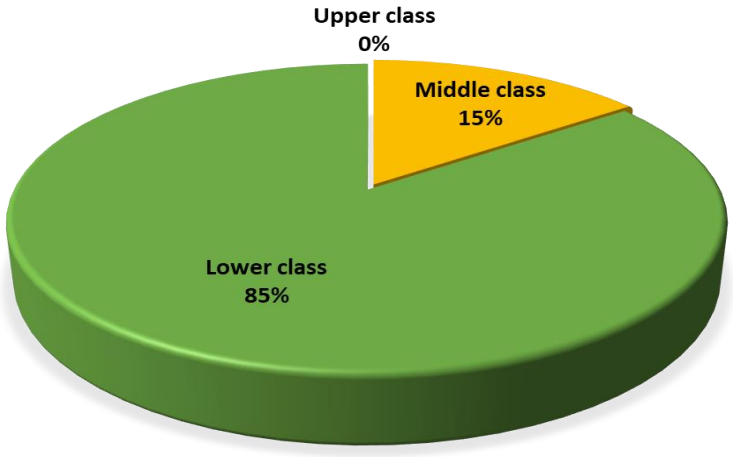

Figure 4: Income Status of the patient`s parents (Distribution according to World Bank Organization report WHO: 2022)

The Socioeconomic status of anemia with malaria children`s guardians were categorized into three different classes on the bases of their monthly income, Upper class 0% middle class 15%, lower class 85% as showed in figure no 4.

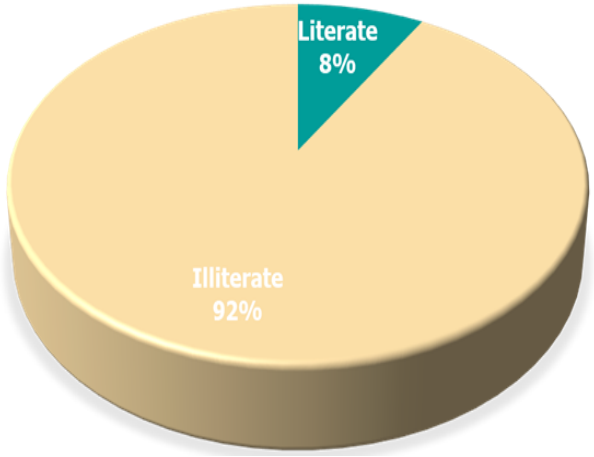

Figure 5: Literacy rate of the patient`s parents

The literacy status of parents/ guardians of anemia with malaria children`s shown in figure no 5, its showed that 8% parents were literate whereas 92% parents were illiterate.

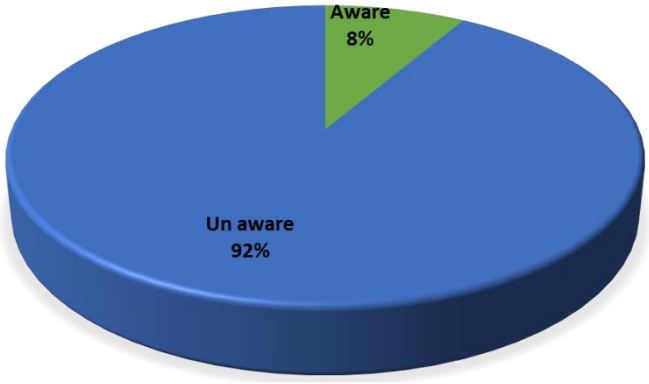

Figure 6: Guardians' Awareness about Anemia

The results are presented in a pie chart, highlighting the proportion of guardians who are aware and unaware of the condition shown in the figure. Unawareness: A significant majority (92%) of guardians were unaware of anemia. This suggests a substantial knowledge gap among guardians regarding the condition. Awareness Only a small proportion (8%) of guardians demonstrated awareness about anemia. This indicates that a limited number of guardians have knowledge about the condition.

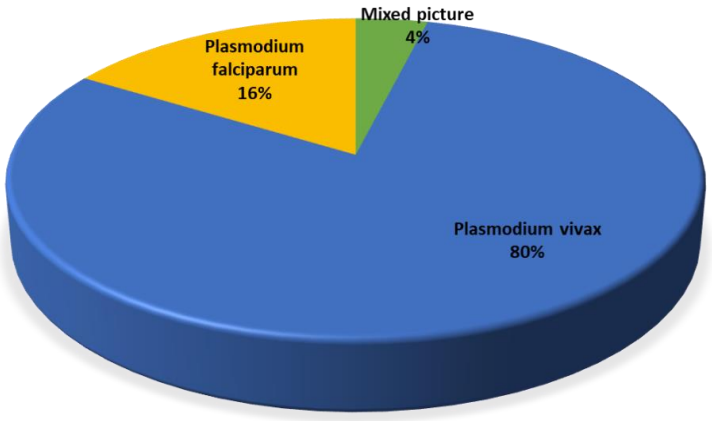

Figure 7: Species-Wise Distribution of Malaria Cases.

260 cases of malaria-infected children were enrolled in the study. The species-wise distribution of these cases is presented below. Distribution of Malaria Species

Plasmodium vivax: 80% (208/260) of cases were infected with Plasmodium vivax. Plasmodium falciparum: 16% (42/260) of cases were infected with Plasmodium falciparum. Mixed Infection: 4% (10/260) of cases had concurrent infections with both Plasmodium vivax and Plasmodium falciparum.

Key Trends and Observations: Dominance of Plasmodium vivax: Plasmodium vivax was the most common species detected, accounting for 80% of cases. Significant Presence of Plasmodium falciparum: Plasmodium falciparum was detected in 16% of cases, indicating a notable presence of this species.

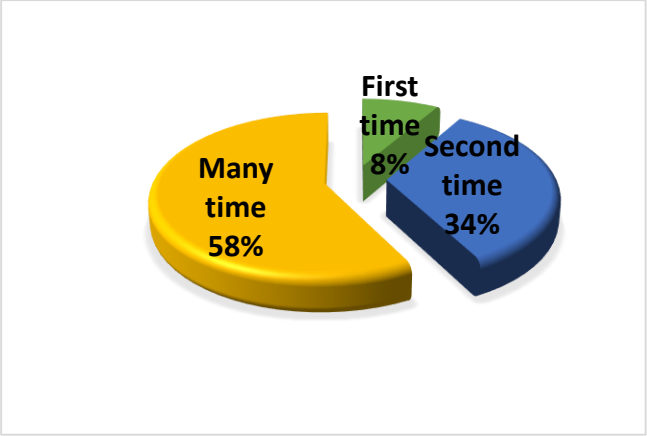

Figure 8: Time Wise Positive Status of Malaria among Children.

A survey was conducted to assess the frequency of malaria episodes among children. The results provide insight into the timely wise positive status of malaria shown in figure. Distribution of Malaria Episodes: Multiple Episodes, The majority of children (58%) reported experiencing malaria more than twice. This suggests a high recurrence rate of malaria among children. Second-Time Episodes, A significant proportion of children (34%) reported experiencing malaria for the second time. First-Time Episodes, A small percentage of children (8%) reported experiencing malaria for the first time.

Conclusion:

The present study intends to find out whether there was a correlation between anemia and malaria in children admitted to Khairpur Medical College Hospital between the ages of 1 to 12 years. The inferences of the study are important new information regarding the prevalence and consequences of malaria-induced anemia in the area. In this study, the prevalence of anemia among children with malaria was significantly higher than those without malaria. A total of 410 patients (260 case + 150 control) were included in this study. Demographic findings revealed that 55.0% children were males and 45.0% were females. 14% were infants, 36% were preschool age children, and 50% were school age children. The 85% belonged to the lower class, 15% to the middle class, and none to the higher class. Of those 76.0%, the 24.0% had originated from urban areas; whereas, 92%, had uneducated guardians as against 8% which had formal educated. From the 80% Plasmodium vivax positive patients; 16% of plasmodium falciparum positive patients had shown the criticality of anemia caused due to plasmodium falciparum.

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