STUDY OF RENAL FUNCTION TEST IN CHILDREN WITH MALARIA

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Abstract

Background: Malaria is a disease of global importance having effect on more than ninety countries and territories in the tropical and subtropical region of earth. Objectives: This study was undertaken to assess the renal functions in children with malaria.

Methods: Sixty children with smear positive malaria were included in this study. Detailed history regarding main renal manifestations was obtained. Renal function was assessed by gfr, blood urea and serum creatinine. It is compared with 25 age and sex matched healthy controls.

Results: proteinuria was documented in 42% of cases and it was common with falciparum infection. blood urea and serum creatinine were significantly high in malaria cases compare to controls.

Conclusion: The evaluation of renal functions in malaria infected children should form an important part of assessment because of variety of acute onset renal dysfunction. In addition it may facilitate safer use of fluids and drugs study also showed that renal dysfunction found in human malaria.

Keywords: Acute renal failure, acute respiratory distress syndrome, glomerular filtration rate.

Introduction:

Anaemia Malaria is a disease of global importance and affects population of more than ninety countries and territories of the tropical and subtropical areas. According to the World malaria report 2011, there were about 216 million cases of malaria (with an uncertainty range of 149 million to 274 million) and an estimated 655000 deaths in 2010 (with an uncertainty range of 537000 to 907000). Mortality rates due to malaria have fallen by more than 25% globally since 2000, and by 33% in the WHO African Region. Most deaths occur among children living in Africa where every minute a child dies from malaria. (1)

Malaria is one of oldest recorded disease known to human. The term "Malaria" came into use in the 18th century from Italy. Malaria is an Italian word composed of "mala" and "aria," derived from malus (bad), and aeris (air). The term was first used to describe a fever (miasma), which was wrongly attributed to exposure to poisonous air rising from marshes. (2)

Malaria is caused by four species of Plasmodium these are Plasmodium vivax, P. falciparum, P. malariae and P. ovale. Common clinical symptoms of infection with all above Plasmodia species are periodic paroxysm, chills, rigors, sweating, body aches, headache, nausea, generalised weakness and prostration. Severe life-threatening complications like cerebral malaria, severe anemia, respiratory distress, jaundice, acidosis, acute renal failure (ARF), acute respiratory distress syndrome (ARDS), etc occur mostly due to P. falciparum infection.

Renal involvement in malaria cases vary from mild proteinuria to severe renal failure. Clinically significant renal and related disorders are most commonly seen in infection with plasmodium falciparum and recently due to P. vivax infections. The knowledge of renal function is important for clinical management of patients with malaria, including monitoring of drug dosage and fluid balance.

Material and methods

The present study was done from January 2014 to July 2014 in department of Paediatrics at Military Hospital Jaipur. Sixty children admitted at Military

Hospital Jaipur with smear positive malaria cases were included in the study using purposive sampling technique.

Inclusion criteria: All Children less than 15 yrs of age diagnosed as malaria patients were included in our study. **Exclusion criteria:** Children with pre-existing renal disease, Children taking any medication which known to cause renal impairment and Children with past history of renal disease that could interfere in our study.

The purpose of the study and details of protocol were discussed with the parents and an informed written consent was obtained. Detailed history regarding various clinical manifestations was elicited. Detailed clinical examination was done. After obtaining history and physical examination, blood and urine samples were obtained for investigation.

Renal function was assessed by blood urea, serum creatinine and GFR. GFR was calculated by using Schwartz formula. This method avoids need for a collection of urine and is more accurate than creatinine clearance. These parameters were compared with 25 age and sex matched healthy people.

Statistical analysis:

Collected data was analysed by frequencies, percentages, Mean, standard deviation, Chi-square test and Anova test. P value ≤ 0.05 was considered significant.

Results

All the patients in this study were diagnosed to be cases of malaria by Peripheral smear examination. These investigations were ordered before the antimalarial treatment was started. 25 age sex matched healthy children were taken as controls.

Table no. 1 and 2 shows blood urea and creatinine level in patients suffering from malaria were significantly increased ($p < 0.001$).

Table no. 4 shows GFR value is significantly decreased in malarial patients as compared to healthy controls.

Table 1: blood urea level in cases and control

Blood urea(mg/dl)	Cases	Control
< 20	16	16
20-40	33	09
>40	11	00

Table 2: serum creatinine level in cases and control

Serum Creatinine(mg/dl)	Cases	Control
<1	52	25
1-2	08	00
>2	00	00

Table 3: GFR level in cases and control

GFR (ml/min.)	Cases	Control
<90	32	01
90-120	18	18
> 120	10	06

Table 4: comparison of mean levels of blood urea, serum creatinine and GFR levels between cases and control

Group	Number	Mean+sd	p value
Blood urea			
Case	60	31.15±8.87	P<0.001
Control	25	18.32±3.39	
Serum creatinine			
Case	60	0.77±0.24	P<0.001
Control	25	0.58±0.1	
GFR			
Case	60	91.43±27	P<0.001
Control	25	114.28±15	

P value – highly significant

Discussion

Malaria is the most common serious parasitic disease of human beings, transmitted by mosquitoes. It is caused by plasmodium species found all over the world and is endemic in many tropical countries. 300-500 million cases of malaria occur annually all over the world with an estimated 1.1-2.7 million deaths each year, killing one-person every 30 seconds.(3) Malaria is third disease among the major infectious diseases in the world which causes death of people after pneumococcal acute respiratory infections and tuberculosis. It carry about 2.6 percent of the total disease burden of the world. It is responsible for the loss of more than 35 million disability-adjusted life-years each year. Every year around 30000 visitors to endemic areas develop malaria and 1% of them may die. (4, 5)

Malaria is a major health problem in India. Approximately 2.48 million cases are reported annually from South-east Asia, of which 75% cases are contributed by India alone. WHO has reported malaria mortality rate 15000 per year in India; however, A study done by “million death collaborators” suggest that there is much higher annual malarial mortality from malaria in India (205,000 overall and 55,000 in children <14 y age). (6, 7)

In present study mean blood urea, mean serum creatinine was significantly high in malaria cases compared to control. Similar results were reported by Ekeanyanwu RC et al(8), Ogbadoyi EO et al (9) and

Idonije BO et al(10) in their studies with respect to serum urea, but Ogbadoyi EO et al (9) in their study failed to show any significant difference between the serum creatinine levels in malaria patients when compare to healthy controls.

Studies by Ogbadoyi EO et al (9) and Idonije BO et al (11) had also reported that serum urea changes seen commonly with female patients who had malaria. This observation was not seen in our study.

Study done by Umboh A et al (12) had reported that blood urea increases with severity of infection, but not creatinine. However our study showed mean Blood urea and mean serum creatinine increases as severity of malaria increases. In contrary, study done by Adenosun OG et al (13) showed that there was no significant correlation between blood urea with severity of infection.

In our study 53% of cases had renal impairment during acute illness. This is

contrary to study done at Aligarh (India) by Ahmad SH (14), where 83% of cases had impairment of renal function during acute illness. However the study conducted by Sowunmi A (15) revealed that impairment of renal function was seen in 45% of cases. Our study has not showed any significant relationship between low GFR (<90ml/kg/1.73m²) level and malaria species or severity of infection. This is just similar with findings of Umboh A et al (12).

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