Original Research Article

Study of Serum total protein, albumin and globulin Level in Children with Malarial Infection in Civil Hospital, Ahmedabad

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Received: 28-11-2021 / Revised: 26-12-2021 / Accepted: 06-01-2022

Abstract

Introduction: Malaria is a major protozoal disease in many developing countries that is main cause of for 20-30 lakhs deaths per year. This study will give us a proper view for monitoring and management of these patients. **Material and Method:** Fifty children with Malaria are included in the study as cases and equal number of age and sex matched healthy children formed the control group. Study is conducted during the period of August 2014 to October 2016. **Result:** there is significant difference in serum Total protein levels in cases and controls (p value is 0.0393**)**. And in serum albumin levels in cases and controls (p value is less than 0.0001) and in serum globulin levels in cases and controls (p value is 0.0114). **Conclusion:** Children having malaria has low serum total protein, albumin and globulin as compare to healthy individuals. Impairment of hepatic function associated with severe malaria may be responsible for the hypoproteinemia and hypoalbuminemia reported in this study. Moreover, plasma albumin is a negative acute phase protein, the level of which falls as a result of malaria infection probably due to an increase in its trans-capillary escape rate

Keywords: Albumin, Children, Malaria, Total protein.

Introduction

Malaria is a widespread disease in country like india, Africa etc. which accounts for 2-3 million deaths every year. Malaria, protozoan disease, transmitted by bites female Anopheles mosquitoes. It is caused by different plasmodium parasite families consist of P. falciparum, P. vivax, P. ovale, P. malariae and P. knowlesi. P. falciparum and P. Vivax cause the most severe forms of the disease[1-2].

Objectives

We want to determine the serum total protein, albumin and globulin levels of these children, to ascertain the effect of malaria on albumin since it's a negative acute phase protein

Materials and Methods

The present study is having children of age group 0 - 12 years selected from civil hospital and B.J Medical College, Ahmedabad, Gujarat. Study is done during the August 2014 to October 2016.
Diagnosis is first suggested by clinical features but for its confirmation laboratory test is done for malaria.

Sample size

50 children with **Malaria** are included in the study as cases and 50 number of age and sex matched healthy children formed the control group.

Inclusion criteria

Children with malaria whose smear positive for plasmodium malarial infection are included as cases and those smear negative and apparently healthy are included as control. Blood samples passing acceptable criteria were included in the study.

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Exclusion criteria

Children with:-

a) Chronic infection
b) Malabsorption syndrome, protein losing nephropathy
c) Typhoid fever, dengue fever and meningitis and other inflammatory conditions

Sample Collection

For above mentioned parameters, 5.0 ml of blood is collected in plain red vaccute and samples are sent to the lab at 2-8°C immediately in ice box. after the complete clot formation centrifugation is done. Serum is removed from the clot within 2 hours of drawing the sample. If testing was delayed for more than 24 hours, serum specimens are stored at 2-8°C and test done next day as per criteria (Ueland PM 1993)[3].

Sample Analysis

All samples are immediately analysed for Serum total protein and Serum albumin after thawing at 37°C. The measurement of Serum total protein and Serum albumin levels are analysed on an Erba XL 640 Fully Automated Analyzer by kit of crest biosystems, a division of coral clinical systems. serum globulin level estimation is done by abstracting albumin level from serum total protein level.

Data quality control

Pre-analytical quality assurance

Blood samples were collected by well trained and experienced phlebotomist according to the Standard Operating Procedures (SOPs). All reagents were stored properly and reagents that were beyond expiry date were avoided. Samples were checked whether they are in the acceptable criteria like; hemolysis, clotting, volume and collection time. All blood samples collected were labeled properly. Prior to analysis, samples were homogenized and inverted 10-15 times. Cold box was used for transportation of the blood samples that were collected.

Analytical quality assurance

Daily Internal Quality control for the automated hematology analyzer was done by quality control reagents to keep reliability of the data collected from the machine.

Post-analytical quality assurance
All data recording was checked for completeness.
The results were recorded with the patients' identification number.

Serum Total Protein Estimation
Proteins, in an alkaline medium, bind with the cupric ions present in the biuret reagent to form blue- violet colored complex. The intensity of the color formed is directly proportional to the amount of Proteins present in the sample.
Proteins + cupric ions → Blue Violet Colored Complex

Serum Total Protein Estimation
Albumin binds with the dye Bromocresol Green in a buffered medium to form a green colored complex. The intensity of the color formed is directly proportional to the amount of albumin present in the sample.
Albumin + Bromocresol Green → Albumin BCG Green Complex

Serum Albumin Estimation
It is done by abstracting albumin from total protein
Serum albumin = serum total protein – serum albumin

Data Analysis
Data was analyzed by unpaired t- test using graphpad prism version 3.03 statistical software which evaluated the differences of various parameters in both group cases and control on the basis of p value.
Interpretation was done by p-value
{P < 0.05 - Significant, P < 0.001 - Highly significant, P ≥ 0.05 – Not significant}

Result

Table 1:Age distribution of cases and control

Age groups (Years)	Cases (N= 50)	Controls (N= 50)
Mean age (years) ± SD	6.16 ± 3.31	6.46 ± 3.27
P value is 0.6495		

Here for age distribution p value is greater than 0.05 so case and controls are age matched

Table 2:Sex distribution of cases and control

Gender	Cases(N=50)		Control (N=50)	
	No.	%	No.	%
Male	26	53	27	54
Female	24	48	23	46
Total	50	100	50	100

Results showed that there was no the gender distribution bias in cases and controls

Table 3:Comparisons of Serum Total Protein levels in case and controls

Group	S. Total Protein (case)	S. Total Protein (control)
Mean	6.08	6.4
Standard Deviation	0.95	0.52
Sample Size	50	50
Std. error of Mean	0.1344	0.0735
Minimum	2.46	4.6
Maximum	8.95	7.68
Significance	t = 2.0893, df = 98, p =0.0393	

As shown above there is significant difference in serum Total protein levels in cases and controls (p value is 0.0393)

Table 4:Comparisons of Serum Albumin levels in case and controls

Group	S. Albumin (case)	S. Albumin (control)
Mean	3.12	3.77
Standard Deviation (SD)	0.59	0.45
Sample Size	50	50
Std. error of Mean	0.834	0.0636
Minimum	1.01	2.54
Maximum	4.5	4.65
Significance	t = 6.1941, df = 98, p <0.0001	

As shown above there is highly significant difference in serum albumin levels in cases and controls (p value is less than 0.0001)

Table 5:Comparisons of Serum Globulin levels in case and controls

Group	S.Globulin (case)	S.Globulin (control)
Mean	2.95	2.63
Standard Deviation (SD)	0.61	0.63
Sample Size	50	50
Std. error of Mean (SEM)	0.0863	0.0891
Minimum	1.45	0.8
Maximum	4.45	4.61
Significance	t = 2.5803, df = 98, p =0.0114	

As shown above there is significant difference in serum globulin levels in cases and controls (p value is 0.0114)

Discussion

Present study is done to know the status of serum total protein, albumin and globulin levels in children with malaria. In the present study 50 children of age group of 0-12 years with malaria positive are enrolled as cases, equal number number of healthy children formed the control wing. Both cases and control group were age and sex matched. Higher morbidity and mortality in this age group required greater precaution from malaria.

The mean age of these patients was 6.17 years and the highest proportion of cases (40%; 20 cases) was seen in the 5-8 years age group. It has been reported in some study that the incidence of malaria in endemic areas falls as people grow older, suggesting that advancing age contributes to immunity[4].

In the present study mean albumin levels is significantly lower in cases as compared to controls (p value <0.001).In the present study mean total protein levels was significantly lower in cases as compared to controls (p value =0.0393).

Results of the present study correlate with studies conducted by Adebisi S.A. et al[5] and Kwena *et al[6]*

According to study conducted by Fleck et al and Kwena *et al* ,This is because plasma albumin is a negative acute phase protein the level of which falls as a result of malaria infection, probably because of an increase in its trans-capillary escape rate[6,7].

According to study conducted by Adebisi S.A. et al , anorexia often occur in majority of malaria this might lead to rapid gluconeogenesis so protein store suffer[5].

Thus our findings are well correlates well with the previous studies.

Conclusion

Children having malaria has low serum total protein, albumin and globulin as compare to healthy individuals. Impairment of hepatic function associated with severe malaria may be responsible for the hypoproteinemia and hypoalbuminemia reported in this study. Moreover, plasma albumin is a negative acute phase protein, the level of which falls as a result of malaria infection probably due to an increase in its trans-capillary escape rate. This study will give us a proper view for monitoring and management of these patients.

Limitations

As this study having small sample size further study is required for the proper justification

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Conflict of Interest: Nil Source of support: Nil