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Pathology

KEY WORDS:
CSF,Malaria,Plasmodium falciparum,Children

AUDITING THE FINDINGS OF CEREBROSPINAL FLUID ANALYSIS IN CHILDREN WITH PLASMODIUM FALCIPARUM MALARIA IN EASTERN ODISHA

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ABSTRACT

Aim and objective of the study- To study the findings and evaluating the clinical usefulness of cerebrospinal fluid analysis in cases of falciparum malaria infection in children.

Background-
The most severe complication of Plasmodium falciparum infection is Cerebral malaria (CM) and is associated with significant mortality and morbidity in the form of neurological sequelae in surviving patients. The pathogenesis of brain involvement remains unclear. Examination of cerebrospinal fluid can be used to
verify the various changes(both biochemical and cytological)that occurred in falciparum infection and to find out predictive value if any with respect to diagnosis and prognosis.

Methods: This study was conducted in the period from April 2016 to October 2016 in sardar vallabhabhai patel post graduate institute of paediatrics(SVPPGIP),Cuttack,which is an extension of SCB Medical College,cuttack,Odisha.A total of 58 participants who were children with age group 1 year to 14 years and were confirmed cases of falciparum malaria infection first screened by rapid diagnostic test and subsequently Pf malaria parasits were demonstrated by examination of both thick and thin blood smears.All these patients were admitted ,CSF was collected by Lumbar puncture
CSF pressure measured in mm of water and biochemical and cytological analysis carried out as early as possible following standard operating procedures.

Results: Total 58 patients were found who participated in the study.Out of which 42(72.4%) were males and 16(27.6%) were females.Age group of 1 to 7 years constituted 37(63.8%) cases where as > 7 years upto 14 years consisted of 21(36.2)cases.Increased CSF pressure were found in 38 (65.5%)patients.On
biochemical examination increased CSF protein found in 31(53.4%) ,normal CSF glucose found in 52(90%) cases where as decreased CSF glucose was noted in 6 (10%) cases.On cytological examination 47 (81%)patients had normal CSF cytology
whereas increased CSF cell count detected in11(18.9%)cases consisting predominantly polymorphs in 4(6.9%)and mononuclear cells mostly lymphocytes in 7(12.1%) cases.

Conclusion: This study highlighted that CSF analysis is not an alternative diagnostic tool for plasmodium falciparum infection including cerebral malaria and abnormal findings demonstrated in CSF were not specific for Pl. falciparum infection.However changes in CSF such as increased pressure,increased protein and normal CSF glucose were frequent findings in Pl. falciparum infection and decreased CSF glucose though less common,was especially associated with incrased mortality.

Introduction

Malaria is one of the worlds major health problem and india leads the South East Asia region in terms of malaria infections[1].The state of Odisha contributes about 25% of total annual malaria cases and about 40% of plasmodium falciparum infections in India.Generally human infection of malaria is caused by four species of malaria parasites out of which Plasmodium falciparum and Pl.vivax are common in India. Pl.falciparum infection is most frequent in Odisha and is associated with high morbidity and mortality especially in children[2].A major manifestation and usual complication of Pl.falciparum infection in children is Cerebral malaria which is defined as coma and pyrexia with a positive thick film for asexual P. falciparum blood stages and no other identified cause of an encephalopathy(WHO definition).The pathogenesis of childhood cerebral malaria is not wellunderstood[3,4].Though there are two suggested hypotheses explaining etiology of cerebral malaria in pl.falciparum infection,one is mechanical and another humoral hypotheses[4].Activation of microglia and astrocytes in brain might cause the cerebral symptoms by excitotoxic mechanisms[5]and might be responsible for abnormal findings in cerebro spinal fluid(CSF).Therefore,we conducted this study of analysis on cerebro spinal fluid auditing the findings detected in cerebrospinal fluid in children with plasmodium falciparum infections including cerebral malaria.

Materials and Methods:

This study was conducted in the period from April 2016 to October 2016 in sardar vallabhabhai patel post graduate institute of paediatrics(SVPPGIP),Cuttack, which is an extension of SCB Medical College,cuttack, Odisha.Children of age group more than 1year and less than 14 years were included.Plasmodium falciparum infection and cerebral malaria was considered when in a child one or more symptoms of fever,headache,vomiting,history of convulsion,irritability ,some degree of CNS involvement or coma found which were not attributable to any other cause.In all such patients demographic data were collected,detailed clinical history recorded and physical examination both general and systemic were carried out.All the patients were tested for malaria and species detection by(1) Rapid diagnostic test kits and(2) by microscopic blood smear examinations.

Sample collection,preparation,staining and associated work were performed by trained and experienced technicians working in the institution following standard operating procedure. Rapid diagnostic test(RDT) for malaria was performed on about 5 micro liter of blood using SD Bioline Malaria Antigen P.f/P.v Rapid test kit ,which is an one step,rapid,qualitative and differential test for the detection of HRP-II(Histidine-rich protein II) specific to Plasmodium falciparum and pLDH(Plasmodium lactate dehydrogenase) specific to Plasmodium vivax in human blood sample.

The test was conducted following the detailed procedure of the test and result interpretation was done as Negative,Positive (P.f./P.v/Mixed) or Invalid according to instruction and information given by the manufacturer of the kit. A drop of blood was used for preparing a thick and a thin smear which was dried and stained with leishman's stain for 10 minutes,washed with distilled water ,dried and examined carefully under oil-immersion lens of microscope and atleast 200 fields were examined before reporting a smear as negative Because of the fixed monolayer of RBC available in thin smear the morphological identification of the parasite to the species level was much easier and provided greater specificity than the thick-smear examination. Thus thin blood film was preferred for exaimation of the parasite because the organisms were easier to detect and could be differentiated in to their species. Confirmation of malaria infection was made by demonstration of plasmodium falciparum parasites in peripheral blood by examination of both thick and thin stained smears .Thus we recruited 58 children in whom plasmodium falciparum malaria infection was confirmed which constituted our study group.They were admitted to the hospital a lumber puncture(LP) was done by the treating physician following standard operating procedure

with 22 gauge needle.CSF pressure was recorded during LP.The number of drops were counted in 21 seconds and this was considered as pressure of CSF in cm of water.The CSF collected were analysed biochemically for protein and sugar and examined microscopically for total cell count and types of cell count.

Results

Total 58 patients were found who participated in the study.Out of which 42(72.4%) were males and 16(27.6%) were females.Age group of 1 to 7 years constituted 37(63.8%) cases where as > 7 years upto 14 years consisted of 21(36.2)cases.

Table-1:Age and sex distribution of patients

Age	No.of cases	Percentage	Sex	No.of cases	Percentage
1year-upto 7 years	37	63.8	Male	42	72.4
7- 14 years	21	36.2	Female	16	27.6
Total	58			58	

Increased CSF pressure were found in 38 (65.5%)patients.On biochemical examination increased CSF protein found in 31(53.4%) ,normal CSF glucose found in 52(90%) cases where as decreased CSF glucose was noted in 6 (10%) cases.On cytological examination 47 (81%)patients had normal CSF cytology whereas increased CSF cell count detected in11(18.9%)cases consisting predominantly polymorphs in 4(6.9%)and mononuclear cells mostly lymphocytes in 7(12.1%)cases.

Table-2: showing CSF findings in our study:

CSF parameters/Indices	No.of Patients (n=58)	Percentage(%)
Increased pressure Ř 180 mm of H2O	38	65.5
Increased Protein	31	53.4
Normal glucose(45-80mg/dl)	52	89.7
Decreased glucose(<45mg/dl)	6	10.3
Pleocytosis(wbc > 10/mm3)	11	18.9
Predominantly polymorphs	4	6.9
Predominantly mononuclear cells/Lymphocytes	7	12.1

Discussion

In the present study 58 patients were enrolled(72.45 % male and 27.6% females).Sixty four percent of patients were under the age of 7 years.Fever with rigor and chill,vomiting and altered sensorium were most common presenting symptoms and signs.Similar observation were found in other studies[6,7].In this study we observed increased CSF pressure in 65.5% of cases which was similar to the study by Bag S et al[7].Increased CSF pressure was associated with plasmodium falciparum infection causing cerebral malaria and was associated with increased mortality as also reported by other studies[8,9,10].In the present study we found CSF protein was increased in 53.4%cases which was in accordance with observation made in other studies [11,12,13].In the present study increased CSF protein were common in plasmodium falciparum malaria infection and associated with increased mortality similar to the findings of Das BS etal [14].CSF glucose was found to be within normal range(45-80mg/dl) in most of cases a finding which was contrary to the observation made by Suresh Goyal et al who reported increased CSF glucose in about64% of cases[15].In our present study 10% cases were found to have low glucose in their CSF and those caes showed increased mortality ,the similar observation was also reported by Jakka et al[16].In our present study we observed about 19% of cases of falciparum infection had pleocytosis in their CSF which finding was contrary to findings reported by Mturi N et al[17].However few studies in india reported no change in CSF even in cerebral malaria which was a common complication of pl.falciparum infection[18,19].

Conclusion

This study highlighted that CSF analysis is not an alternative diagnostic tool for plasmodium falciparum infection including cerebral malaria and abnormal findings demonstrated in CSF were not specific for Pl. falciparum infection.However changes in CSF such as increased pressure,increased protein and normal CSF glucose were frequent findings in Pl. falciparum infection and decreased CSF glucose though less common,was especially associated with incrased mortality.CSF examination findings though not specific and inconsistent still provide valuable diagnostic and prognostic information about the disease process and help to rule out or corroborate the other causes of fever and altered sensorium in children.

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