Recent Advances in Management of Dengue in Children: Correlation of Clinico-Patho-Radiological parameters, with the severity of illness and outcome.

Abstract:
For the children who are admitted with dengue or dengue like illness, the progression of the diseases is very rapid. In this illness, the progressive capillary leak, bleeding manifestation, shock, ARDS warrants early hospitalization and specialized Pediatrics ICU care. Reported case fatality rates for the world are approximately 1%, but in India, the focal outbreaks have reported case-fatality rates of 3-5 %. Thus, we require some laboratory or radiological parameteres which will predict the severity of Dengue.

Here we tried to compare and correlate the severity of dengue patients in endemic region of Andhra Pradesh with PRISM III and also correlating other clinico-patho-radiological parameters.

In this study of children with VHF, the correlation between the severity of illness, PRISM III score, and morbidity as PICU stay with radiological parameter (USG/X ray Chest) and aminotransferases was evaluated and analyzed. During the period of this study, 94 children were evaluated and they were subjected to PRISM III scoring. Higher PRISM III score on admission to level III Pediatric intensive care unit correlated with the poorer the outcome. In viral hemorrhagic fever, the radiological intervention like X ray chest showing pleural effusion and USG abdomen showing ascitis and elevated serum transaminoferas levels are associated with high PRISM III score and predictive of the severity of viral hemorrhagic fever.

Keywords: Dengue, Severe Dengue, Dengue Hemorrhagic Fever

STUDY DESIGN: The study was a Prospective Observational study done over a period of 1 year. All children admitted to PICU during the study period with probable viral hemorrhagic fever were evaluated for severity of illness using PRISM Score III on admission, radiological parameter, serum aminotransferases levels in relation to duration of PICU stay and the mortality and morbidity.

INCLUSION CRITERIA: All children between 1 month and 18 years admitted to Paediatric Intensive Care Unit and satisfying the case definition criteria of Viral/Dengue fever by WHO were included in the study.

EXCLUSION CRITERIA: Children with associated sepsis and other comorbidity or preexisting illness (congenital heart disease, renal abnormalities, liver disease and hematological disorders)

RESULTS: A total of 102 cases were enrolled in the study out of which 7 cases were discharge against medical advice before 8 hours of PICU stay and 1 case died before 8 hours of PICU stay. Total 94 cases were followed and analysed during this study period.
**Age Distribution of study population:** Out of 94 children, majority of children were between age of 6-12 years (38.2%), 27.5% of children were infants and 30.8% were between 1-5 years. Mean age of the study population was 4.80 years. The youngest patient was 3 month old.

Table 1: Age and Sex distribution of study population

<table>
<thead>
<tr>
<th>SEX\AGE</th>
<th>1 mo - 1 year</th>
<th>1- 5 years</th>
<th>6- 12 years</th>
<th>13-18 years</th>
<th>Total (n=94)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>12</td>
<td>17</td>
<td>23</td>
<td>2</td>
<td>54 (57%)</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>12</td>
<td>13</td>
<td>1</td>
<td>40 (43%)</td>
</tr>
<tr>
<td>Total</td>
<td>26 (27.5%)</td>
<td>29 (30.8%)</td>
<td>36 (38.2%)</td>
<td>3 (3.5%)</td>
<td></td>
</tr>
</tbody>
</table>

**Radiological abnormality on admission:** Among the Radiological investigations, pleural effusion on chest x ray was found in 51 (53%) children and on USG study ascitis was seen in 66 (70%) children and gallbladder wall oedema in 26(28%) children.

**Distribution of PRISM III score in the study population:** Out of total 94, 34 (36%) had PRISM III score between 0-10, 50 (53%) children had PRISM III score between 11-20 and 10 (11%) had PRISM III score between 21-30.

**Correlation of PRISM III score & effusion on the x-ray:** The children with PRISM III score between 0 to 10, pleural effusion on x ray was found in 5(15%) of population, while PRISM III score between11-20 showed effusion in 38(76%). All cases 10(100%) with PRISM III score in between 21-30 had pleural effusion. The correlation between PRISM scores of the two groups is statistically significant (p < 0.01).

**Correlation of PRISM III score & Ascitis on the USG:** Among children with PRISM III score between 0 to 10, ascitis on the USG was found in 8(24%) of population, while PRISM III score between11-20 showed ascitis in 48(96%). All cases i.e. 10(100%) with PRISM III score in between 21-30 had ascitis. The correlation between PRISM scores of the two groups is statistically significant (p < 0.01).

**Correlation of PRISM III score & Gall Bladder wall edema on the USG:** Among children with PRISM score 0 to 10 GB wall edema on the USG was found in 6(18%) children, while PRISM score 11-20 showed GB wall edema in 13(26%). 7(70%) cases with PRISM score 21-30 had GB wall edema. The correlation between the PRISM III scores of the two groups is statistically significant (p < 0.01).

**Correlation of PRISM III score with elevated Aminotransferases:** Among children with PRISM III score between 0 to 10 elevated aminotransferases was found only in 9(26%) of population, while PRISM III score between11-20 42(84%) showed elevation. All cases 10(100%) with PRISM III score in between
21-30 had elevated Aminotransferases. The correlation between the PRISM III scores of the two groups is statistically significant (p < 0.01).

**Correlation of PRISM III score with mortality in children with VHF:** Among the children within the study (n= 94), 85 (90%) children were discharged, 9(10 %) have expired. Out of total number of deaths (n=9) in the children, 7(78%) children expired with PRISM III score more than 20 as compared to 2 (22%) children with PRISM III score less than 20. (p < 0.01).

**Correlation of PRISM III scores and length of stay in PICU:** The children with PRISM III score with 0-10 on arrival to PICU had majority (24 out of 34) 71% of 1 day stay in PICU. 2-3 days of stay was found maximum (29 out of 50) 58% in 11-20 PRISM III score and in children with PRISM III score between 20-30 score 90% (9 out of 10) had more than 4 days of PICU stay (p < 0.01).

**DISCUSSION**

In this study of children with VHF, the correlation between the severity of illness, PRISM III score, and morbidity as PICU stay with radiological parameter (USG/X ray Chest) and aminotransferases was evaluated and analyzed. During the period of this study, 94 children were evaluated and they were subjected to PRISM III scoring.

**Correlation of PRISM III scores with effusion on the x-ray:** In this study, higher PRISM III score correlated well with presence of pleural effusion on chest x-ray which was statistically significant.

**Correlation of PRISM III score with Ascitis and gall bladder wall edema on the USG:** The correlation is more for ascitis as compared to the GB wall edema, the correlation with the PRISM III score with individual two parameters are statistically significant (p < 0.01).

**Correlation of PRISM III score with elevated Aminotransferases:** This study concluded that elevated serum aminotransferase is correlating with the high PRISM III score and predictive of severity of probable viral haemorrhagic fever.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Correlation Coefficient</th>
<th>p-value at &lt;0.01</th>
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<tbody>
<tr>
<td>PICU Stay (days)</td>
<td>0.889</td>
<td>0.0000001</td>
</tr>
<tr>
<td>X ray</td>
<td>0.691</td>
<td>0.0000001</td>
</tr>
<tr>
<td>USG ascitis</td>
<td>0.727</td>
<td>0.0000001</td>
</tr>
<tr>
<td>GB WALL EDEMA</td>
<td>0.343</td>
<td>0.000708</td>
</tr>
</tbody>
</table>
Among the variables studied, though all are significant as \((p < 0.01)\) GB wall edema has poor correlation coefficient and maximum for Ascities in USG examination.

**PRISM III score with mortality in children:** Out of total number of deaths \((n=9)\) in the children, 7\((78\%)\) children expired with PRISM score more than 20 as compared to 2\((22\%)\) children with PRISM score less than 20 \((p \text{ value} < 0.01)\). The higher the PRISM III score on arrival to the PICU the worst/poorer the outcome.

**PRISM III scores and length of stay in PICU:** The duration of stay in PICU was more in children with increase in PRISM score on arrival. This difference in duration of PICU stay is attributed to increased mortality in children with high PRISM score. \((p < 0.01)\).

**CONCLUSION:**

1. To conclude, the higher PRISM III score on admission to level III Pediatric intensive care unit correlates with the poorer the outcome.
2. In viral hemorrhagic fever, the radiological intervention like X ray chest showing pleural effusion and USG abdomen showing ascitis and elevated serum transaminofereses levels are associated with high PRISM III score and predictive of the severity of viral hemorrhagic fever.

**BIBLIOGRAPHY**


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