A Prospective Study in Scrub Typhus Patients with Cardiac Manifestations - A Tertiary Care Center

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Introduction
Scrub typhus, a rickettsial infection caused by Orientia Tsutsugamushi
Typhus remains a substantially under-recognized disease entity, particularly in Asia, where up to 28% of malaria negative fevers can be attributed to rickettsial infections.
The clinical manifestations of this disease range from sub-clinical disease to organ failure and death. Jaundice, renal failure, pneumonitis, ARDS, septic shock, myocarditis and meningoencephalitis are various known complications of this disease.
In south East Asia alone, an estimated 1 million cases of scrub typhus occur yearly with approximately 50000-80000 deaths per year.
Scrub typhus contributing to myocardial disease and death is not well established. Myocarditis occurs due to disseminated endothelial infection of the small vessels or by secondary immune mediated mononuclear inflammation.

Materials & Methods
Source of Data
The study was conducted on 81 patients admitted in Great Eastern Medical School & Hospital, Ragolu, Srikakulam, Andhra Pradesh, with scrub IgM ELISA positive
Study Period: August 2019 to November 2020
Study Design: Prospective cohort study

Inclusion Criteria
1) Age more than 16 years
2) Acute febrile illness (AFI) with criteria fulfilled for the diagnosis of scrub typhus
3) Absence of any obvious focus of infection after initial clinical evaluation

Criteria For Diagnosis: Positive for Scrub IgM ELISA or having eschar on body and negative for other serology like Dengue, Malaria etc

Exclusion Criteria
1) Alternative diagnosis other than scrub typhus
2) Patients diagnosed with autoimmune disorders
3) Seropositive for both Scrub & Dengue

Statistical Analysis
Categorical and continuous variables were compared for outcome by using the fisher’s exact test and student t test respectively
p value of < 0.05 was considered statistically significant for all analysis

### Result

#### GENDER DISTRIBUTION (n - 81)

- Female: 57%
- Male: 43%

#### SYMPTOMS

- Fever: 100%
- Cough: 35.86%
- Dyspnea: 70.52%
- Headache: 18.50%
- Myalgia: 67%
- Vomiting: 17.20%

#### PRESENCE OF ESCHAR

- Non-eschar: 23%
- Eschar: 77%

#### PERCENTAGE OF DIFFERENT ORGAN INVOLVEMENT IN SCRUB TYPHUS (n - 81)

- Respiratory: 96.10%
- Cardiovascular: 62.50%
- Liver: 54.30%
- Hematological: 38.50%
- Central nervous system: 18.50%
- Skin: 18.50%
- Renal: 10%

### CARDIOVASCULAR MANIFESTATIONS IN SCRUB TYPHUS (n - 81)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number</th>
<th>mean</th>
<th>SD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cardiac biomarkers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CKMB</td>
<td>81</td>
<td>6.69</td>
<td>9.4</td>
<td>4.88-9.07</td>
</tr>
<tr>
<td>Troponin T</td>
<td>81</td>
<td>83.1</td>
<td>212.2</td>
<td>36.21-130.04</td>
</tr>
<tr>
<td>b. Echocardiography findings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVEF</td>
<td>81</td>
<td>57.59</td>
<td>14.16</td>
<td>54.46-60.72</td>
</tr>
<tr>
<td>Cardiac output</td>
<td>63</td>
<td>4.37</td>
<td>1.38</td>
<td>4.02-4.71</td>
</tr>
</tbody>
</table>

### ELECTROCARDIOGRAPHIC FINDINGS IN SCRUB TYPHUS

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinus Tachycardia</td>
<td>30</td>
<td>36.6%</td>
</tr>
<tr>
<td>ST-T changes</td>
<td>10</td>
<td>12.3%</td>
</tr>
<tr>
<td>T wave inversion</td>
<td>8</td>
<td>9.9%</td>
</tr>
<tr>
<td>QRS morphology changes</td>
<td>11</td>
<td>13.6%</td>
</tr>
<tr>
<td>Supraventricular tachycardia</td>
<td>1</td>
<td>1.2%</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>3</td>
<td>3.7%</td>
</tr>
<tr>
<td>Wide QRS tachycardia</td>
<td>1</td>
<td>1.2%</td>
</tr>
<tr>
<td>Sinus bradyarrhythmia</td>
<td>5</td>
<td>6.2%</td>
</tr>
</tbody>
</table>

### PERICARDIAL EFFUSION

- No effusion: 49%
- Effusion: 51%

### OUTCOME VARIABLES IN PATIENTS WITH SCRUB TYPHUS (n - 81)

<table>
<thead>
<tr>
<th>Primary outcomes</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocarditis</td>
<td>17 (21)</td>
</tr>
<tr>
<td>Myocardial dysfunction</td>
<td>25 (30.9)</td>
</tr>
<tr>
<td>Myocardial injury</td>
<td>50 (61.7)</td>
</tr>
</tbody>
</table>
The cardiovascular manifestations were assessed with the help of cardiac biomarkers, electrocardiogram and echocardiogram. The mean (SD) CKMB and troponin T values were 6.69 ± 9.4 ng/ml and 83.1 ± 212.2 pg/ml. Echocardiography was done in all patients. The mean ± SD of LVEF was 57.59 ± 14.16%. The mean CO was 4.37 ± 1.38 liters.

In this cohort 38 patients (46.9%) had sinus tachycardia.

In our cohort we found pericardial effusion in 41 patients (51%).

Regional wall motion abnormality was seen in 12 patients, in which 7 patients had myocarditis.

The mean ± SD duration of ICU and hospital days was 4.2 ± 4.4 and 9.2 ± 4.7 respectively. The patients requiring invasive and non invasive ventilation were 63.8% and 17.2% respectively.

The crude mortality in our cohort was 9.9%.

**Conclusion**

In our cohort of scrub typhus patients from GEMS hospital the prevalence of myocarditis was 21%.

Myocardial injury was seen in 61.7% and myocardial dysfunction was observed in 30.9% participants.

ECG changes were no specific; sinus tachycardia was the predominant ECG finding.

The development of myocarditis increased the need for ventilation, prolonged the duration of ICU and hospital stay.

Myocarditis was not associated with worse mortality in our cohort.

**References**