INTRODUCTION

Acute Flaccid Paralysis (AFP) is defined as “Any child <15 years of age with acute (rapid progression), flaccid paralysis including Guillain Barre Syndrome (GBS) or any flaccid paralysis illness at any age when polio is suspected”. Since the launch of Global Polio Eradication Initiative in 1998 by World Health Organization, the number of cases of polio has decreased all over the world. In 2012, only three countries in the world namely Pakistan, Afghanistan and Nigeria remain polio-endemic.

GBS is an immune mediated acute polyradiculoneuropathy and one of common causes of AFP in pediatric population after poliomyelitis. GBS leads to a wide variety of deficits but the most common presentations are sudden onset of ascending paralysis, muscle pain and areflexia. Sensory, autonomic, and brainstem abnormalities may also be seen. It affects both genders and the annual incidence is reported to be ranging from 0.34 to 2.1/100,000. The various antibodies that have been implicated in the pathogenesis of GBS are antibodies to GM1, GM1b, GD1a, GalNac-GD1a and GQ1b. Several infections e.g., Epstein-Barr virus, cytomegalovirus, hepatitis, varicella, other herpes viruses, Mycoplasma pneumoniae, Clostridium jejuni as well as immunizations have been known to precede or to be associated with the illness. C jejuni seems to be the most commonly described pathogen associated with GBS. There are various variants of GBS like acute inflammatory demyelinating polyneuropathy (AIDP), acute motor axonal neuropathy (AMAN), acute motor sensory axonal neuropathy (AMSAN) and the Miller Fisher syndrome (MFS).

The prognosis of GBS is generally favorable with a mortality ranging from 10% to 20%. Results of trials have shown equivalent efficacy of both plasma exchange and intravenous immunoglobulin (IVIG) in hastening recovery from Guillain Barre syndrome. Although use of IVIG before loss of unaided walking has shown faster recovery in one of the trial. Respiratory failure is one of the most important complication of GBS resulting in need for mechanical ventilation and leading to mortality. There is limited data on the factors causing mortality in pediatric cases of GBS in Pakistan; therefore the aims of this study...
were to ascertain the causes of AFP cases and to review the clinical course and identify various factors causing mortality in patients with Guillain Barre Syndrome admitted to a tertiary care hospital.

MATERIAL AND METHOD
A retrospective study was carried out in the Pediatric department of Liaquat National Hospital, which is a 750 bedded, tertiary care hospital. Data of all the cases of AFP who were admitted from August 2000 to August 2008 in the pediatric department was analyzed. A case of AFP was defined as “a child aged less than 15 years of age with acute onset of flaccid paralysis in one or more limb or acute onset of bulbar paralysis”. Records of all of the AFP cases were evaluated regarding history, clinical examination, cerebrospinal fluid (CSF) exam and Nerve conduction velocity (NCV). Stool sample analysis for polio virus was also recorded. The diagnostic criteria of GBS included motor weakness, progression of weakness, relative symmetry, sensory signs and symptoms and laboratory criteria such as increased protein in CSF and electro diagnostic features such as nerve conduction slowing or blockage. A structured questionnaire was designed which documented variables like diagnosis of the case, age, sex of the child, symptoms and their duration before coming to hospital, history of fever, pattern of weakness, involvement of cranial nerves, respiratory muscle and swallowing muscle were noted. Only IVIG was given as specific treatment to all of the cases of GBS along with other supporting measures such as Intake/output charting, vitals monitoring and intravenous fluid therapy. Data was also analyzed for the requirement of mechanical ventilator and its outcome. Analysis was done using the Statistical package for social science (SPSS 15.0). The results were expressed as percentage.

RESULTS
Total number of cases of acute flaccid paralysis reported from August 2000 to August 2008 were 53, out of which 27 (51%) were male and 26 (49%) were female. Majority i.e. 39 cases (73.6%) were diagnosed as Guillain Barre Syndrome, 4 as Transverse Myelitis while only one case was confirmed as case of Poliomyelitis. Frequencies of other diseases presenting as AFP are given in (Table-I). 49 out of 53 cases of AFP were discharged home while 4 patients of GBS expired during treatment in the hospital. Examination at 60th day after the illness showed that 11 (20.8%) patients still had residual paralysis whereas it was absent in 31 (58.5%) patients and 7 patients were lost to follow up.

<table>
<thead>
<tr>
<th>Clinical Diagnosis (N-53)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guillain Barre Syndrome</td>
<td>39</td>
<td>73.6</td>
</tr>
<tr>
<td>Transverse Myelitis</td>
<td>4</td>
<td>7.5</td>
</tr>
<tr>
<td>Traumatic Neuritis</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td>Myositis</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td>Poliomyelitis</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Septic Arthritis</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Hemiplegia of Childhood</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Familial periodic paralysis</td>
<td>1</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Table-I. Cases presenting as AFP

Out of 39 patients of GBS, 18 were male and 21 were female with a male/female ratio of 0.8:1. Majority of the patient were of age 10 or below i.e. 31 (79.4%) and only 08 patients were of age 11 or above. 29 patients (74%) were admitted in the hospital within 6 days of development of symptoms whereas 7 patients had symptom duration ranging between 7 to 14 days and 3 patients had duration lasting for more than 2 weeks before coming to the hospital. History of fever was present in 17 patients (43.5%), Flu in 4 and diarrhea in only 1 patient. Majority (71.7%) had rapid onset of weakness. Most common neuromuscular problem at the time of admission was muscle weakness and inability to walk followed by muscle pain. Three
patients had facial nerve palsy. Respiratory and swallowing muscles were involved in 4 patients who later required mechanical ventilation also. (Table II)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5 years</td>
<td>16</td>
<td>41</td>
</tr>
<tr>
<td>6-10 years</td>
<td>15</td>
<td>38.4</td>
</tr>
<tr>
<td>&gt; 11 years</td>
<td>08</td>
<td>20.5</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18</td>
<td>46</td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>53.8</td>
</tr>
<tr>
<td><strong>Duration of symptoms before coming to hospital</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6 days</td>
<td>29</td>
<td>74.3</td>
</tr>
<tr>
<td>7-14 days</td>
<td>07</td>
<td>17.9</td>
</tr>
<tr>
<td>&gt; 2 wks</td>
<td>03</td>
<td>7.69</td>
</tr>
<tr>
<td><strong>Preceding history of fever</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>17</td>
<td>43.5</td>
</tr>
<tr>
<td>Not present</td>
<td>22</td>
<td>56.4</td>
</tr>
<tr>
<td><strong>Presenting symptom</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscle weakness/Inability to walk</td>
<td>16</td>
<td>41</td>
</tr>
<tr>
<td>Muscle Pain</td>
<td>12</td>
<td>30.7</td>
</tr>
<tr>
<td>Cranial nerve abnormality</td>
<td>03</td>
<td>7.69</td>
</tr>
<tr>
<td>Difficulty in breathing</td>
<td>04</td>
<td>10.25</td>
</tr>
<tr>
<td>Difficulty in swallowing</td>
<td>04</td>
<td>10.25</td>
</tr>
<tr>
<td><strong>Onset of Weakness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid</td>
<td>28</td>
<td>71.7</td>
</tr>
<tr>
<td>Gradual</td>
<td>11</td>
<td>28.2</td>
</tr>
</tbody>
</table>

**Table-II. Clinical features of GBS patients**

Review of the data shows that mortality was high among males (11.1%) as compared to females (9.5%) and in children between ages 6-10 yrs (20%) compared to children with age less than 6 years (6.25%) and none of the patient above 10 years of age expired. Mortality was 100% in the patients who required mechanical ventilation and in patients with respiratory and swallowing muscle involvement. Higher mortality rate was seen in patients who were admitted in the hospital in the 2nd week after development of symptoms in comparison to the

patients who were admitted within a week or who were admitted > 2 week after the onset of the symptoms. None of the patient with cranial nerve abnormality expired. Similarly patients with history of fever before admission and rapid onset of the muscle weakness also had higher mortality rates as shown in Table-III.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Discharge</th>
<th>Expired(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5 years (N-16)</td>
<td>15</td>
<td>1 (6.25)</td>
</tr>
<tr>
<td>6-10 years (N-15)</td>
<td>12</td>
<td>3 (20)</td>
</tr>
<tr>
<td>&gt; 11 years (N-08)</td>
<td>08</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Sex:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (N-18)</td>
<td>16</td>
<td>02 (11.1)</td>
</tr>
<tr>
<td>Female (N-21)</td>
<td>19</td>
<td>02 (9.5)</td>
</tr>
<tr>
<td><strong>Duration of symptoms before coming to hospital:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6 day (N-29)</td>
<td>26</td>
<td>03 (10.3)</td>
</tr>
<tr>
<td>7-14 day (N-07)</td>
<td>06</td>
<td>01 (14.2)</td>
</tr>
<tr>
<td>&gt; 2 wks (N-03)</td>
<td>03</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Preceding history of fever:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present (N-17)</td>
<td>15</td>
<td>2 (11.76)</td>
</tr>
<tr>
<td>Not present (N-22)</td>
<td>20</td>
<td>02 (9.09)</td>
</tr>
<tr>
<td><strong>Onset of weakness:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid (N-28)</td>
<td>24</td>
<td>03 (11.1)</td>
</tr>
<tr>
<td>Gradual (N-11)</td>
<td>10</td>
<td>01 (9.09)</td>
</tr>
<tr>
<td><strong>Cranial never:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal (N-36)</td>
<td>0</td>
<td>04 (100)</td>
</tr>
<tr>
<td>Involved (N-03)</td>
<td>3</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Respiratory muscle:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved (N-04)</td>
<td>0</td>
<td>04 (100)</td>
</tr>
<tr>
<td>Not involved (N-35)</td>
<td>35</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Swallowing muscle:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved (N-04)</td>
<td>0</td>
<td>04 (100)</td>
</tr>
<tr>
<td>Not involved (N-35)</td>
<td>35</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Ventilator:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required (N-04)</td>
<td>0</td>
<td>04 (100)</td>
</tr>
<tr>
<td>Not required (N-35)</td>
<td>35</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

**Table-III. Outcome of GBS patients**

**DISCUSSION**

With the marked decline in incidence of Poliomyelitis in other parts of the world, GBS is now considered as one
of the important and common cause of AFP. Its incidence varies from one region to another. In our study it accounted for 73.6% of all AFP cases which is comparatively high when compared to previous Pakistani and Bangladesh studies which showed frequency of 47.29% and 47.1% respectively but in accordance with a western study where it was present in 72.2% of cases. It has been reported in both of the genders but predominance was seen in females in our study and in a previous local data which is different from male predominance reported in the German and American studies. Its incidence was found to be high in younger children (<6 years) which is in accordance with the earlier studies.

GBS is an immune mediated polyradiculopathy presenting in various forms. Risk of GBS after vaccination may be slightly higher than general population. Prior infection is well established as a precipitating event in the development of GBS. It is frequently associated with history of 1-4 weeks preceding illness such as upper respiratory tract infection or acute enterocolitis. The most common neuromuscular symptoms present at the time of presentation to hospital are muscle weakness, inability to walk and myalgias which were also present in our patients. In our study, cranial nerve involvement was present in only 7.69% of cases whereas Kou and Korinthenberg found involvement in about 50% of the cases in their respective studies. Facial weakness is most common followed by abducens palsy which causes ophthalmoparesis. Respiratory muscle involvement often in association with cardiac arrhythmias and dysautonomia has been found to be associated with mortality in GBS. Therefore meticulous respiratory care and early recognition of bulbar weakness can reduce the mortality. Respiratory dysfunction due to diaphragmatic weakness is common in patients with severe quadriplegia.

Patients with weakness of neck muscles, tongue and palate often have concomitant diaphragmatic and respiratory muscle involvement. We found respiratory muscle impairment leading to mechanical ventilation in only 4 patients (10.25%) which is low as compared to other western studies and Asian studies which had involvement ranging from 15 to 17%.

GBS has an unpredictable course and optimal management and treatment of GBS is important as the chances of full recovery are high if the patient overcomes the acute stage. Generally the outcome of GBS is more favorable in children than in adults. Deaths are relatively rare, especially if the disorder is diagnosed and treated early. However, the recovery period is long, often weeks to months. Mortality rate in our study was 10.25% which is high as compared to 2.85% and 5% reported by other researchers. There is paucity of local pediatric data regarding various prognostic factors of GBS although few combined pediatric and adult studies have been done in this regard. The factors associated with 100% mortality in our study were respiratory muscle impairment and mechanical ventilation which is similar to the adult studies by Gohar and Sundar.

We would recommend to do more pediatric studies with larger sample size regarding the prognostic factors of GBS and also to include other variables like relation to different treatment modalities, types of GBS etc to its mortality.

CONCLUSIONS
GBS is a leading cause of AFP commonly presenting as muscular weakness and inability to walk. Involvement of respiratory and swallowing muscles in GBS is associated with requirement for mechanical ventilation and can result in high mortality rate.

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REFERENCES


GUILLAIN BARRE SYNDROME

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