ORIGINAL ARTICLE

Risk factors for poor outcomes in Indonesian children with Guillain-Barré syndrome

PRASTIYA INDRA GUNAWAN[1,2], RIZA NOVIANDI[1,2], SUNNY MARIANA SAMOSIR[1,2]

[1]Division of Neurology, Department of Child Health, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia; [2]Division of Neurology, Department of Child Health, Dr. Soetomo General Academic Hospital, Surabaya, Indonesia

ABSTRACT

Background and aim: Guillain-Barré syndrome (GBS) is a rare disease in which the immune system strikes the peripheral nervous system. Lack of observation may lead to respiratory failure or even death. This study aims to analyse risk factors for poor outcomes in children with GBS especially in limited resource settings.
Methods: This was a retrospective study using medical records conducted on children with GBS. Data obtained included age, sex, clinical symptoms, infection history, laboratory examination, Medical Research Council (MRC) scale, treatment, GBS type, the use of mechanical ventilation, GBS disability score, and outcome recorded in the medical history. The outcomes obtained during treatment in this study were categorised as recovery or mild disability and poor outcome based on GBS disability level. Statistical analysis used a chi-squared, multivariate logistic regression test with a significance score of $p < 0.05$.
Results: There were 61 children with GBS fulfilling inclusion criteria during the study. The frequency of male children was 54.1% and respiratory infection was the most antecedent event in 45 cases (73.8%). The mean age 8.4 years old (± 3.79), and the most common type of GBS was acute inflammatory demyelinating polyneuropathy (AIDP) in 89.1% cases. The most common GBS treatment was a combination of intravenous immunoglobulin (IVIg) and steroids, and a poor outcome was observed in 80.3% of children with GBS. Age, sex, clinical manifestation, laboratory examination, antecedent event, MRC scale, and GBS type were not risk factors of poor outcomes in GBS.
Conclusions: Mechanical ventilation was related to poor outcomes in children with GBS (OR = 0.112, 95% CI = 0.013-0.932, $p < 0.05$), making it a risk factor. (www.actabiomedica.it)

Key words: child, disease, Guillain-Barré syndrome, mechanical ventilation, poor outcome

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Correspondence: Prastiya Indra Gunawan / Division of Neurology, Department of Child Health, Faculty of Medicine, Universitas Airlangga, Dr. Soetomo General Academic Hospital Surabaya, Indonesia, Mayjen. Prof. Dr. Moestopo No. 6-8, 60286, Surabaya, Indonesia / E-mail: prastiya-i-g@fk.unair.ac.id
ORCID ID: 0000-0003-3199-2826

Introduction

Guillain-Barré syndrome (GBS) is an acute inflammatory polyneuropathy disease in which the body's immune system targets the peripheral nervous system, such as the motor, sensory, autonomic, or cranial nerves (1). The first symptom that appears is tingling in the feet or hands, sometimes accompanied by pain that starts in the legs or back. Another symptom is body weakness, which is characterised by difficulty walking. In most cases, weakness starts in the legs then spreads upward (ascending), but it can also start in the eyes. In the advanced phase, weakness can attack the respiratory muscles, which can be fatal. In most people, symptoms reach their maximum severity two weeks after they first appear. The diagnosis of GBS in children is often delayed, especially in those less than six years of age, as it has similar symptoms to that of a viral infection or other neuromuscular diseases. This can lead to a delay of diagnosis of more than 2 weeks. Inadequate monitoring during this period can result in respiratory failure and even death (1–3). The incidence of GBS in Europe and North America ranges from 0.81 to 1.8 cases per 100,000 people each year. The incidence of GBS is lower in children, with 0.34 to 1.34 cases per 100,000 people each year (1,4). In previous research in west Java Indonesia, there were 40 cases reported in a 4-year period from 2011 to 2015 (5). Although the incidence of GBS cases is rare, it has been reported that in recent years the number of cases continues to increase. The prognosis of GBS in children is generally good. The percentage of GBS patients who experience complete recovery is 75%–90%, compared to those who recover but still suffer sequelae in the form of drop foot or postural tremors (25%–36%). Recovery may take several weeks to several years (4,6). The mortality rate in Europe and North America varies from around 3%–7% during the acute phase due to respiratory failure, pulmonary complications, or autonomic disorders, including arrhythmias (1–6). Suarez and Ginsberg stated that advanced age, history of abdominal infection, acute-phase disease severity, antiganglioside antibodies, cranial nerve involvement, electrophysiological parameters which show axonal degeneration, and the need for mechanical ventilation are risk factors associated with poor outcomes in GBS patients (4,6). The use of mechanical ventilation prolongs the length and cost of hospitalisation, leading to higher morbidity and mortality rates. The most effective method in treating GBS is the use of intravenous immunoglobulin (IVIg) or plasma exchange (PE), both leading to quicker clinical improvement, less usage of mechanical ventilation, and shorter treatment periods (1,6–8). Understanding the risk factors of severe GBS will provide better treatment strategies and improve the outcomes, since there is no significant statistical data at the national level that might explain the prognosis of the disease. The aim of this study is to evaluate the risk factors for poor outcomes in Indonesian children with GBS.

Materials and Methods

Design

This was a retrospective analytical study using medical records of children with GBS admitted to the paediatric intensive care unit (PICU) and the paediatric ward of Dr. Soetomo General Academic Hospital in the period of January 2017–July 2020.

Patients

All patients aged 1 month to 18 years old with a diagnosis of GBS, confirmed by a paediatric neurologist with a complete neurological examination, were included. The diagnosis of GBS was based on Asbury (9) criteria determined from clinical, laboratory, and electrodiagnostic procedures. Progressive ascending motor weakness with areflexia were features required for diagnosis. Patients were not eligible if there was a history of inadequate information details or the presence of chronic inflammatory demyelinating polyradiculoneuropathy or other critical illness neuropathy. Although this was a retrospective study, all patients had undergone neurological assessments conducted according to institutional protocols documented in the medical records. Data retrieved included age, sex, clinical manifestation, history of preceding triggering event, laboratory examination, complications, GBS type, use of mechanical ventilation, treatment, and outcome. All

patients underwent standardised neurological assessment by a paediatric neurologist to obtain information on muscular weakness, physiological reflexes, sensory problems, patterns of motor involvement, pathological reflexes, and pain pattern. Medical Research Council (MRC) scale measures muscle strength (arm abduction, forearm flexion, wrist extension, leg flexion, knee extension, foot dorsal flexion) from 0 (no visible contraction) to 5 (normal) in 4 muscles (proximal and distal) in both the upper and lower limbs, with a scale ranging from 0 (quadriplegic) to 40 (normal). The MRC scale was measured during admittance and following 1 week of treatment. The GBS disability score was used to assess the functional status of patients with GBS; the scale description was as follows: 0 - a healthy state; 1 - minor symptoms and capable running; 2 - able to walk 10 m or more without assistance but unable to run; 3 - able to walk 10 m across an open space with help; 4 - bedridden or chairbound; 5 - requiring assisted ventilation for at least part of the day; and 6 - death. The GBS disability score was measured during admittance, following 1 week of treatment, and when discharged from the hospital. Outcome was categorised based on GBS disability score when discharged. Good outcome was based on GBS disability score 0 to 2 otherwise poor outcome categorised as GBS disability score 3 to 6. The GBS electrophysiological subtype (acute inflammatory demyelinating polyneuropathy [AIDP], acute motor axonal neuropathy [AMAN], acute motor-sensory axonal polyneuropathy [AMSAN], or Miller-Fisher syndrome [MFS]) was determined from a nerve conduction study (NCS). Lumbar puncture procedures were performed to collect cerebrospinal fluid (CSF). The CSF was then analysed for cell count and protein and glucose concentrations to assess cytoalbuminologic dissociation. However, lumbar puncture was not performed in all patients. Some parents did not provide consent for the invasive procedure, and several patients required mechanical ventilation or were clinically unstable at the time of admission, making the procedure unsafe to perform.

Ethics

Ethics approval was obtained from the Ethic and Medico-legal Committee at Dr. Soetomo General Hospital Surabaya with approval number 0215/KEPK/IV/2018. The study was conducted after obtaining ethical clearance and complied with the Declaration of Helsinki.

Statistics

All data was analysed using IBM SPSS Statistics 21 software. Descriptive and analytical statistics were done as applicable. Patients' sociodemographic characteristics and GBS-related variables were summarised using frequency distribution tables. A chi-squared test was performed to determine the relationship of each risk factor. Risk factors that have a significant significance value ($p < 0.05$) were further analysed using logistic regression to determine the risk factors for poor outcomes of children with GBS.

Results

Seventy children with GBS were treated in the paediatric neurology inpatient room and PICU of Dr. Soetomo General Academic Hospital during the study period, and 61 patients met the inclusion criteria (Figure 1). The basic characteristics of children with GBS are presented in Table 1. The most common symptom that preceded the onset of weakness was respiratory infection in 45 (73.8%) cases. Tetraparesis was observed in 51 (83.6%) patients.

Patients admitted to the hospital presented with varying degrees of motor abnormalities, as detailed in Table 2. Classification according to the GBS disability scale was completed upon admission, with 11.5% of patients maintaining the ability to walk (scores 2 and 3), and the remaining 88.5% showed a severe degree of disability (scores 4 and 5). The majority of GBS patients who received treatment for at least one week showed an improvement of one or more scores on the GBS disability scale. This includes one (1.6%) patient with no or minor deficits, six (9.8%) patients could walk at least 10 m without assistance. Of the six patients whose good outcome was defined, two of them were hospitalised for only 5 days. The rest of patients were scored according to the GBS disability scale, namely 19 (31.1%) patients required assistance to walk any distance, 15 (24.6%) bedridden patients, 19

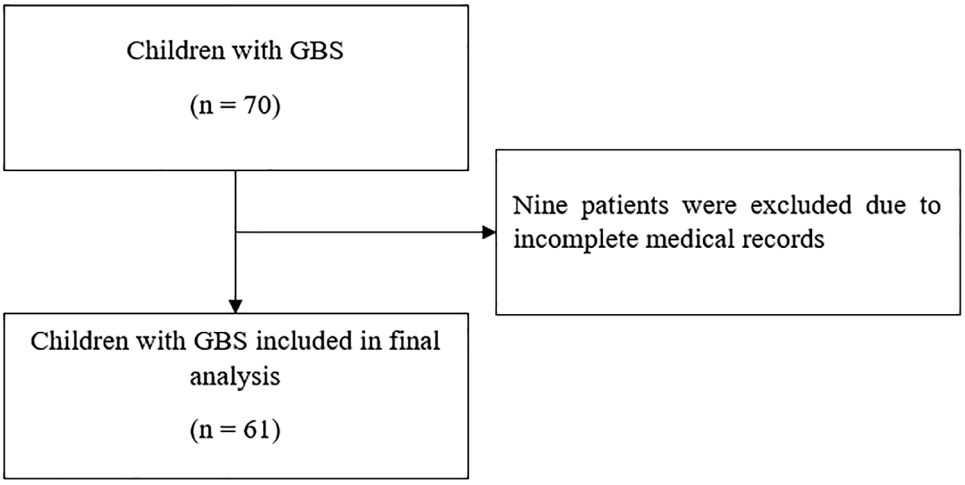

Figure 1. Flow diagram of patient selection.

Table 1. Baseline characteristics of children with Guillain-Barré syndrome (GBS).

Characteristic	Number
Mean age (year) (± SD)	8.4 (± 3.79)
Gender, n (%)	
Boys	33 (54.10)
Girls	28 (45.90)
Onset of disease (days), mean (± SD)	6.5 (± 5.60)
Paresis type, n (%)	
Paraparesis	10 (16.40)
Tetraparesis	51 (83.60)
Duration of disease, mean (± SD)	26.4 (± 19.40)
History of antecedent event, n (%)	
Upper respiratory infection	45 (73.77)
Diarrhoea	3 (4.91)
Trauma	3 (4.91)
Vaccination	1 (1.63)
Unclassified fever	8 (13.11)
Surgery	1 (1.63)
Clinical manifestation, n (%)	
Weakness	51 (83.60)
Pain	2 (3.30)
Paraesthesia	2 (3.30)
Ophthalmoplegia	6 (9.80)
Autonomic dysfunction	7 (11.50)
Electrodiagnostic findings	
Demyelinating	9 (19.50)
Axonal	3 (6.50)
Mixed	34 (73.90)
GBS type	
AIDP	41 (89.10)
AMSAN	2 (4.30)
AMAN	1 (2.20)
MFS	2 (4.30)
Lumbar puncture, n (%)	
Albuminocytologic dissociation	3 (75.0)
Normal	1 (25.0)
Laboratory, n (%)	
Normal	15 (24.60)
Anaemia	4 (6.60)
Leucocytosis	40 (65.60)
Acute kidney injury	3 (4.90)
Hypokalaemia	3 (4.90)
Acidosis/alkalosis	26 (42.60)
Treatment, n (%)	
IVIg	18 (29.50)
Steroids	20 (32.80)
IVIg and steroids	21 (34.40)
Plasmapheresis	2 (3.30)
Outcome, n (%)	
Good	12 (19.70)
Poor	49 (80.30)

Abbreviations: SD: standard deviation; AIDP: acute inflammatory demyelinating polyradiculoneuropathy; AMAN: acute motor axonal neuropathy; AMSAN: acute motor sensory axonal neuropathy; MFS: Miller-Fisher syndrome.

(31.1%) patients requiring ventilator breathing devices, and one (1.6%) patient who died after three days of treatment due to complications of respiratory failure. At discharge, 12 patients (19.7%) demonstrated good outcomes, defined as a GBS disability score of 0–2. They included no or minor deficit symptoms observed in 2 (3.3%) patients, 10 (16.4%) were able to walk 10 m without assistance. The rest of 49 patients categorised as having poor outcomes. They included 26 (42.6%) needed assistance to walk, 12 (19.60%) bedridden or chairbound, 8 (13,10%) requiring assisted ventilation for at least part of the day and 3 (4.90%) deaths (Table 2). The most common GBS treatment was a combination of intravenous immunoglobulin (IVIg) and steroids (Table 1), which were delivered to 21 patients (34.45%). Only two patients (3.3%) received plasmapheresis. A total of 46 (75.4%) patients suffered from severe disability and three (4.9%) patients died due to pneumonia as a complication of mechanical ventilation. There were 50 (81.9%) patients who were able to be discharged requiring no respiratory support and were to follow up at the outpatient clinic. Meanwhile, eight (13.1%) patients who returned home from the hospital required respiratory support in the form of a tracheostomy. The remaining three (4.9%) patients were deceased.

Table 2. GBS disability scale and Medical Research Council (MRC) scale of the patients.

Characteristic	n (%)
GBS disability scale during admittance	
5	20 (32.80)
4	34 (55.70)
3	5 (8.20)
2	2 (3.30)
GBS disability scale after 1 week of treatment	
6	1 (1.60)
5	19 (31.10)
4	15 (24.60)
3	19 (31.10)
2	6 (9.80)
1	1 (1.60)
GBS disability scale when patient is discharged	
6	3 (4.90)
5	8 (13.10)
4	12 (19.60)
3	26 (42.60)
2	10 (16.40)
1	2 (3.30)
MRC scale during admittance	
Mild (31–40)	0
Moderate (11–30)	5 (8.20)
Severe (0–10)	56 (91.80)
MRC scale after 1 week of treatment	
Mild (31–40)	0
Moderate (11–30)	19 (31.10)
Severe (0–10)	42 (68.90)

The impact of treatment on GBS patient outcomes can be seen in Table 3. Those treatment had varies impact on outcome when the patients discharge. Among the 61 children included in this study, 20 patients (32.8%) with a GBS disability score of 5, indicating the need for assisted ventilation for at least part of the day, were admitted to the Paediatric Intensive Care Unit (PICU). The remaining 41 patients (67.2%) with GBS disability scores ranging from 2 to 4 were treated in the general paediatric ward. All of the patients who died were among those requiring ventilation (4.9% overall; 1 of 20 patients on steroid therapy alone, 1 of 18 patients on IVIg therapy, and 1 of 21 patients on combination IVIg and steroid therapy). The statistical analysis indicated a $p = 0.054$, meaning that the treatment had no correlation with death outcomes.

Some risk factors of severe disability in GBS patients that were previously explained were analysed using bivariate analysis and presented in Table 4. The MRC scale and the use of mechanical ventilation when admitted to the hospital had a significant correlation with poor outcomes in paediatric patients with GBS ($p < 0.05$). After further analysis with multivariate logistic regression, it was determined that mechanical ventilation was statistically significant as a risk factor for poor outcomes in children with GBS (Table 5).

Discussion

In our study, the average age of GBS patients was 8.5 years old (SD 3.79). Our result is in accordance

Table 3. Analysis of treatment on GBS patient outcomes.

Characteristic, n (%)	IVIg	Steroids	IVIg & Steroids	Plasmapheresis	P
GBS disability scale during discharge					
6	1 (1.60)	1 (1.60)	1 (1.60)	0	0.258
5	0	0	0	0	
4	7 (11.50)	2 (3.30)	10 (16.4)	1 (1.60)	
3	8 (13.10)	12 (19.70)	5 (8.20)	1 (1.60)	
2	2 (3.30)	4 (6.50)	4 (6.50)	0	
1	0	1 (1.60)	1 (1.60)	0	
Death	1 (1.60)	1 (1.60)	1 (1.60)	0	0.054

Abbreviation: IVIg: intravenous immunoglobulin.

Table 4. Bivariate analysis of risk factors of poor outcomes in GBS.

	Outcome during discharge			
Characteristics	**Good**	**Poor**	**Total**	**P**
Sex				
Male	9	24	33	0.194
Female	3	25	28	
Weakness type				
Paraparesis	4	6	10	0.096
Tetraparesis	8	43	51	
History antecedent event				
Acute respiratory tract infection	10	35	45	0.962
Diarrhoea	1	2	3	
Trauma	0	3	3	
Vaccination	0	1	1	
Fever	1	7	8	
Surgery	0	1	1	
MRC scale during admittance				
Moderate (11–30)	5	0	5	0.000*
Severe (0–10)	7	49	56	
GBS type				
AIDP	2	39	41	0.488
AMSAN	0	2	2	
AMAN	0	1	1	
MFS	0	2	2	
Mechanical ventilation				
Yes	1	22	23	0.022*
No	11	27	38	
Laboratory results				
Anaemia	0	4	4	1.000
Leucocytosis	5	35	40	0.086
Acute kidney injury	0	3	3	1.000
Hypokalaemia	1	2	3	0.374
Acidosis/alkalosis	3	23	26	0.329
Clinical symptoms				
Weakness	8	43	51	0.235
Pain	1	1	2	
Paraesthesia	2	4	6	
Ophthalmoplegia	1	1	2	

* $p < 0.05$ is considered significant.

Table 5. Multivariate analysis of risk factors of severe outcome in GBS.

Variable	Exp (B)	Cl 95%	P
Sex	0.320	0.077–1.326	0.116
Age	0.813	0.210–3.141	0.956
Weakness type	0.279	0.064–1.218	0.089
Mechanical ventilation	0.112	0.013–0.932	0.043*
MRC scale	0.000	0.000	0.999
GBS type	2.136	0.177–25.731	0.550
Treatment	0.938	0.225–3.901	0.729
Clinical symptoms	5.125	0.290–90.703	0.570
Anaemia	0.000	0.000	0.999
Leucocytosis	0.286	0.078–1.053	0.060
Acute kidney injury	0.000	0.000	0.999
Hypokalaemia	0.468	0.039–5.638	0.550
Acidosis/alkalosis	0.377	0.091–1.562	0.179
Constant	0.112		

* $p < 0.05$ is considered significant. *Abbreviation:* CI: confidence interval.

with prior studies that stated most of the GBS incidence is in the 3–9-year-old age group (7). A study from Mexico also stated that the most commonly affected children with GBS were school children (5–11 years) with an average of 45.8% (8). This study shows no significant correlation between age and poor outcomes in children with GBS; however, other studies demonstrated that age was associated with bad outcomes in GBS patients (6). Long term functional recovery in children is better compared to adults due to better nerve regeneration in children. Younger patients, however, tend to have worse outcomes in walking ability within 2 months. This is mostly likely due to the immaturity of nerve fibres in children; having less myelin fibres makes children more susceptible to nerve injury in GBS (10). Most of the patients in this study were male. Cheng et al. (11) also found a predominance of male patients in their GBS patient population; however, another study stated that they found no difference in gender (6). According to Sipilä (12), for every 10-year increment of age, the estimated incidence rate of GBS increased by 28% (23%–33%) among males and 14% (10%–19%) among women. In the older age groups, males were progressively more susceptible to GBS with age compared to females (12). Sex is not a risk factor for poor outcomes in children with GBS and has not been shown to affect GBS patients' short-term outcomes (6,13). An antecedent event, which was summarised as an infection or another immune stimulator that might induce an aberrant autoimmune response against peripheral nerves, usually precedes the onset of GBS. In this study, an upper respiratory infection proceeded GBS (14). Although it is suspected that sanitary and hygiene problems still dominate in developing countries, which can increase the risk of infection with gastrointestinal pathogens that might increase triggers of GBS-related gastroenteritis, upper respiratory tract infections were still more common in this study. Several studies have shown that most cases of GBS were preceded by respiratory tract infections, with Campylobacter jejuni being the most frequent infectious agent, especially in axonal types (6,11,12,14,15). The test to determine the specific pathogen causing the infection was not carried out at our centre. GBS clinical manifestations in children are different than in adults. Preschool children usually present with nonspecific complaints or atypical clinical presentations, such as pain that is difficult to localise, unwilling to walk, or gait that is not balanced, which often lead to a misdiagnosis (14). We found that the most frequent clinical symptoms were early weakness in both lower limbs, followed by pain,

paraesthesia, ophthalmoplegia, and autonomic dysfunction. Suarez et al. (6) also stated that weakness and hyporeflexia or areflexia are the most common symptoms. According to Wu et al. (16), the most common GBS clinical manifestations in children are pain and bulbar dysfunction. This study showed that a few patients suffered from pneumonia related to mechanical ventilation. This is due to weakness in the respiratory muscles, which causes hypoventilation, coughing disorders, retention of secretions, and atelectasis. The risk of pneumonia is increased, most commonly in patients who are using mechanical ventilation. Orlikowski et al. (17) explained that a prolonged stay in the ICU after admission to the hospital and the usage of mechanical ventilation are factors associated with the early onset of pneumonia. This study shows the most frequent cause of patient death is pneumonia due to prolonged use of mechanical ventilation. Kalita et al. (7) explained that the risk of death is increased by 6.9 times due to pneumonia. Weakness is the most common symptom among GBS patients, and the MRC scale is designed to evaluate the disease severity based on strength deficits. Univariate analysis in the current study showed a significant relationship between the MRC scale and poor outcomes in paediatric patients. This result is consistent with a 3-month follow up study in Egypt, where the MRC sum score on the 10th day of treatment was a predictor of poor outcomes (18). A longer investigation conducted by Park et al. (19) stated that a low MRC score is the main predictor of GBS patients not being able to walk independently at 6 months or 1 year. Whilst the MRC scale is an easy clinical tool for evaluating muscle weakness in GBS, it is more challenging for children, especially young children, to interpret (20). With this consideration, clinicians should proactively conduct further neurological evaluation when parents complain about weakness in their child. Rapid muscle weakness in patients with GBS, especially childhood-onset, poses a higher risk of requiring artificial respiration management (16). The current study's results showed mechanical ventilation was required in about one-third of the children. A similar proportion of patients requiring mechanical ventilation, about 10%–30%, was reported by Barzegar et al. (9) and Roodbol et al. (18). GBS patients who are admitted to the hospital using mechanical ventilation are found to be around 9.6% of the population, with a mortality rate of 1.5%. The study of Varkal (21) stated that paediatric patients that require respiratory support was found in 12.5% cases. Some patients had speech impairment and bulbar-involvement dysfunction that can lead to severe respiratory problems. This analysis confirms that clinical findings have an important value in predicting the progression of the disease. Ventilators are ubiquitously used to sustain life in patients with acute respiratory failure due to respiratory paralysis in GBS. The goal is to achieve sufficient oxygenation and ventilation to ensure tissue viability until recovery of the muscle weakness while minimising the complications (22). All of the patient with mechanical ventilation were intubated in this study. If the patient required a longer length of stay, a tracheostomy was performed to sustain the airway. Prolonged mechanical ventilation can cause severe diffuse neuropathy, which affects both the respiratory and limb muscles. Some of our patients required a tracheostomy in this study, indicating the long duration of mechanical ventilation needed, which also related with poorer outcomes (23). Although numerous studies reported the high use of ventilators (22,23), a study in Australia showed that some centres did not require mechanical ventilation for their GBS patients. This can be due to differences in IVIg accessibility in regional and rural areas in high income countries (24). The use of mechanical ventilation is a significant risk factor for poor outcomes in paediatric patients with GBS. Similarly, previous research explained that the severity of motor weakness (MRC score < 2) is related to the use of mechanical ventilation. Tiwari et al. (25) stated the need for mechanical ventilation can be independently predicted by the presence of older age, a history of preceding infection, lower MRC sum score at presentation, and bulbar palsy. Autonomic dysfunction (e.g., tachyarrhythmia, bradyarrhythmia, and abnormal sweating) was significantly higher and also served as predictor factor in mechanically-ventilated children with GBS. Patients who experienced respiratory failure requiring mechanical ventilation had higher mortality or morbidity rates than those without mechanical ventilation (7). According to the previous studies in India and China, a lower MRC sum at presentation is also one of the predicting factors of respiratory failure

in GBS children. Even in adults, a low MRC score has been shown to significantly predict the need for ventilatory support (16,25). Both MRC value and mechanical ventilation pose a risk for poor outcomes. The study showed that the most frequent type of GBS was AIDP in 41 (89.1%) patients, which is in line with a previous study conducted by Barzegar. On the other hand, patients with AMAN had a higher risk of requiring mechanical ventilation than the AIDP group. The incidence of disability was higher in the AMAN group than in the AIDP group, although it was not statistically significant (7). Children with AMAN experience longer improvement than those with AIDP. The proportion of children discharged from the hospital who could walk was significantly higher in the AIDP group than in the AMAN group (7). Nagasawa et al. (26) reported that the total cure was obtained in 100% of the AIDP group and in 86% of the AMAN group. The incidence rates of AIDP and AMAN forms of GBS vary in different regions, which may be due to genetic background and inciting pathogens (10). This study explained that the administration of IVIg alone, the combination of IVIg and steroids, or PE alone have been shown to produce various results. Steroids alone also provides benefits; however, the overall treatment was not significantly different in improving the GBS disability scale and the MRC scale. This can be due to the heterogeneous population of GBS patients, resulting in statistical therapy tests that are not significant for determining the effect of therapy on individuals. Other studies suggest that giving plasma exchange combined with IVIg does not provide better results than giving plasma exchange alone or IVIg alone. The combination of IVIg and methylprednisolone is no more effective than IVIg alone, but the two drugs can work synergistically. The mechanism by which steroids act on the pathophysiology of GBS is unknown. One theory is that steroids, as an anti-inflammatory and immunosuppressant, can reduce inflammation and lead to decreased endoneurial pressure and oedema, leading to nerve ischemia; however, overall, the benefits of intravenous corticosteroids as adjunct therapy are controversial (1,27–29). Although IVIG is the recommended first-line therapy for GBS, it was not always readily available in our centre due to its high cost and limited supply. Consequently, some patients initially received corticosteroids while awaiting IVIG availability or administrative approval, which often required additional diagnostic confirmation. These factors may have influenced treatment consistency and patient outcomes. The high proportion of poor outcomes observed in our study may be influenced by several factors. The short follow-up period, limited to the time of discharged, may not fully capture the longer course of neurological recovery typical in GBS. Furthermore, as a tertiary referral hospital, our centre tends to receive more severe and complicated cases, which may account for the higher rate of poor outcomes. Diagnostic challenges and potential delays in initiating specific therapy, commonly encountered in middle-income settings, could also contribute to these findings. The weakness of this study is that we could not carry out a long-term evaluation considering the very low level of patient adherence to post-hospitalisation controls. The number of GBS patients is also very small, so we can only do a retrospective study that relies solely on data retrieved from an administrative registry. More studies with durations of observation of over a year with larger sample sizes from multi-centres are needed to know the exact prognosis of the disease.The present work was carried out with the purpose of describing risk factors of poor outcome paediatric patients with GBS, since there are no studies at the national level that give us adequate statistics for the prognosis of this disease.

Conclusion

A higher incidence of GBS in male patients and school children were reported. They mostly had clinical symptoms of weakness in both lower limbs. The use of mechanical ventilation is associated with poor outcomes in Indonesian children with GBS. Understanding the risk factors of poor outcomes of GBS will provide better management strategies, as well as improve the outcomes.

Ethic Approval: The study was registered and approved by Ethic and Medico-legal Committee at Dr. Soetomo General Academic Hospital Surabaya with approval number 0215/KEPK/IV/2018, issued on April 20, 2018.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g., consultancies, stock ownership, equity interests, patent/licensing, arrangement etc-) that might pose a conflict of interest in connection with the submitted article.

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