

# SPECTRUM OF NEUROLOGICAL ILLNESSES IN PEDIATRIC WARD OF NORTHWEST GENERAL HOSPITAL, PESHAWAR

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## ABSTRACT

**Background:** Neurological disorders affect a large percentage of population worldwide, both in low-income and high-income countries. It also has socio-economic consequences and the treatment is comparatively more expensive than other diseases in pediatric age group.

**Objective:** To find out the spectrum and burden of neurological illnesses and its associated mortality in pediatric ward.

**Methods:** A retrospective cross-sectional study was done on the medical records of children with primary diagnosis of acute neurological illness in pediatric ward and intensive care unit from patient age 1 month to 16 years in a time frame from January 2014 to June 2015 in Northwest General Hospital, Peshawar. Basic demographic data, primary diagnosis, investigations performed, Glasgow coma scale and outcomes were documented on a structured datasheet. Descriptive analysis was carried out.

**Results:** Over a span of 18 months 1150 patients were admitted in Pediatric ward out of which 135(11.7%) were diagnosed with neurological illnesses with mean age of  $45.7 \pm 44.5$  months. Out of 135 diagnosed cases 80.7% (n=109) had neurological diagnosis and 19.3% (n=26) had neurosurgical diagnosis. Patient with neurological diagnosis 71.9% (n=97) were Non-traumatic cases and 8.9% (n=12) were neuromuscular disorders. In cases of Non-traumatic, 60.7% (n=82) were structural cases in which majority of patients were diagnosed with infectious illnesses 47.7% (n=64). Metabolic group of NTC had 11.1 % (n=15) cases with ischemic encephalopathy, 5.9%(n=8), being the most common diagnosis. In neuromuscular illnesses, GBS were 6.7% (n=9) and myasthenia gravis cases were 2.2% (n=3). In all neurological illnesses most common primary diagnoses were meningitis (18.5%), encephalitis (11.1%) and seizure disorders (7.4%). In majority of the patients neuro-radiological tests were performed, CT scan was done on 65.9% (n=89) and MRI on 52.6% (n=71), LP was performed on 38.5% (n=52) and EEG on 14.1% (n=19) of cases. . Mean age of patients who died was  $41.4 \pm 32.5$  months. Mortality in PICU of patients with neurological diagnosis was 32.7%. Mortality rate in Pediatric ward was 12.6% (n=17) in which 35.3% (n=6) died of vascular causes.

**Conclusion:** Overwhelming amount of patients from Afghanistan was admitted with acute neurological illnesses. Infections were the most common presentation in pediatric ward with Stroke most common cause of death. A very high mortality rate was associated with patients admitted in PICU.

**Key Words:** Neurological illness, Non-traumatic cases, Neuromuscular disorders, Metabolic disorders, Neuro-radiological tests, Mortality.

## INTRODUCTION

Major contributor to children morbidity and mortality are neurological illnesses. Traumatic injury to brain accounts for significantly higher mortality rate than neoplasias in children. With improvement in diagnostics and therapeutics in diseases related to heart, kidney, and lungs, there is considerable decrease in their death rate in Pediatric Intensive care unit (PICU), which is why contribution of neurological diseases to death rate has comparatively increased.

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Comorbidities can result from neurological affliction such as seizure disorders, central nervous system infections and other brain encephalopathy's which halt mental growth and progress. And cause depression, dyslexia, Attention deficit-hyperkinetic disorders and eventually effecting standard of living in children. Any kind of brain injury has much worse prognosis in children compared to adults.

Neurological disorders effects substantial percentage of population. It also has socio-economic consequences. According to a study in Europe, neurological disorders present as a financial ordeal and are more expensive than previously anticipated.

Researches in developed countries have shown reducing prevalence due to advancement in perinatal care, better vaccination programs and decreased brain traumatic injury.<sup>1</sup>

There are only two related articles been published nationally, and no previous study found in Peshawar.

Aim of this study was to know the prevalence and spectrum of neurological disease in pediatric ward in North West general hospital Peshawar.

## METHODS

A retrospective study was done on the medical records of children with primary diagnosis of acute neurological illness in pediatric ward and intensive care unit from patient age 1 month to 16 years in a time frame from January 2014 to June 2015 in Northwest General Hospital, Peshawar. The Northwest General Hospital is a Tertiary care Hospital with several pediatric sub-specialties in the department of pediatric including pediatric surgery and pediatric critical care medicine. The Ethical Review Board of Northwest General Hospital in Peshawar, Pakistan approved the study.

The Pediatric Intensive Care Unit (PICU) of this hospital is multidisciplinary- pediatric surgery closed ICU having an average of 500 admissions annually. Only those patients were labeled with neurological illness which was presented with signs and symptoms that involved the nervous system at the time of admission. We divided our diagnosis in to two main categories Neurological diagnosis and Neurosurgical diagnosis based on ICD-9 coding system. The Neurological diagnoses were further classified in to Non-traumatic and Neuromuscular disorders (NMD). The Non-traumatic was divided into category of structural or intrinsic disorders that includes CNS infections (mainly meningitis, encephalitis), vascular (mainly stroke) and space occupying lesion (mainly tumors and cysts). The other category for Non-traumatic was a metabolic or toxic disorder that includes poisoning, encephalopathy due to hypoxia, metabolic diseases like inborn error of metabolism, hepatic encephalopathy and diabetic coma. Neuromuscular disorders were broadly classified into Guillain-Barre syndrome (GBS), Botulism and Myasthenia Gravis. The Neurosurgical disorders were classified into traumatic brain injury and post operative care after any neurosurgical procedures. Diagnosis of was based on history, physical examination, laboratory tests and Neuro-diagnostic tests like computed tomography(CT), Magnetic resonance imaging (MRI), lumbar puncture(LP) and electroencephalogram (EEG). Structured Performa was used for the collection of data which included basic demographic details (age, gender and nationality), primary diagnosis, and PICU admission. The Neuro-diagnostic tests like CT/MRI/LP/EEG were also documented in the Performa. And Glasgow coma scale at the time of admission was also part of our data collecting tool.

Statistical analysis were performed using the Statistical Package for Social Science (SPSS) version 22. The data was displayed as mean + standard deviation. Frequencies and percentages were used for the presentation of categorical and nominal data.

## RESULT

Over a span of 18 months 1150 patients were admitted in Paediatric ward out of which 135(11.7%) were diagnosed with neurological illnesses with mean age of  $45.7 \pm 44.5$  months. Patient below one year of age were 34.1% (n=46), between 1 and 5 year they were 37.0% (n=50) and above the age of 5 were 28.9% (n=39). 68.1% (n=92) were male and 31.9% were female, with male to female ratio of 2.1:1. Majority of patients were Pakistani that is 64.4% (n=87) and 35.6% (n=48) were from Afghanistan.

Out of 135 diagnosed cases 80.7% (n=109) had neurological diagnosis and 19.3% (n=26) had neurosurgical diagnosis. Patient with neurological diagnosis 71.9% (n=97) were Non-traumatic cases

**Table 1: showing spectrum of neurological illnesses**

	Cases % (N)	Mortality % (N)
Neurological cases	72.6%(109)	10.1%(11)
Non-traumatic	71.8%(97)	10.3%(10)
Structural	60.7%(82)	11.0%(9)
Infections	47.4%(64)	3.1%(2)
Vascular	6.7%(9)	66.7%(6)
Tumors	3.0%(4)	0%(0)
Others	3.7%(5)	20%(1)
Metabolic	11.1%(15)	6.7%(1)
Status epilepticus	5.2%(7)	0%(0)
Hypoxic ischemia	5.9%(8)	12.5%(1)
Neuromuscular	8.9%(12)	8.3%(1)
GBS	6.7%(9)	0%(0)
MG	2.2%(3)	33.3%(1)
Neurosurgical cases	19.3%(26)	23.1%(6)
Traumatic brain injury	5.2%(7)	57.1%(4)
Post operative care after surgery	14.1%(19)	10.5%(2)

**Table 2: Show GCS at time of admission and mortality**

GCS	Cases % (N)	Mortality % (N)
3-8	8.9%(12)	75%(9)
9-12	35.6%(48)	14.6%(7)
13-15	55.6%(75)	1.3%(1)
total	100%(135)	12.6%(17)

and 8.9% (n=12) were neuromuscular disorders. In cases of Non-traumatic, 60.7% (n=82) were structural cases in which majority of patients were diagnosed with infectious illnesses 47.7% (n=64). Metabolic group of NTC had 11.1%(n=15) cases with ischemic encephalopathy, 5.9%(n=8), being the most common diagnosis. In neuromuscular illnesses, GBS were 6.7% (n=9) and myasthenia gravis cases were 2.2% (n=3). As shown in table 1. In all neurological illnesses most common primary diagnoses were meningitis (18.5%), encephalitis (11.1%) and seizure disorders (7.4%).

In majority of the patients neuro-radiological tests were performed, CT scan was done on 65.9% (n=89) and MRI on 52.6% (n=71), LP was performed on 38.5% (n=52) and EEG on 14.1% (n=19) of cases. 36.3% (n=49) of total neurological cases were admitted in PICU. All patients with GCS of 3-8 at time of admission were admitted in PICU. Mean age of patients who died was 41.4± 32.5 months. Mortality in PICU of patients with neurological diagnosis was 32.7%. Mortality rate in Paediatric ward was 12.6% (n=17) in which 35.3% (n=6) died of vascular causes. Mortality rate was considerably high in patient with low GCS, as shown in Table 2.

## DISCUSSION

The spectrum of neurological disease has very wide range. The burden of neurological illnesses among the seriously acutely sick children is very high in developing countries like Pakistan.<sup>9,11</sup> A study We had a male to female ratio of 2.1:1 and although there is no difference in relative population of the two genders within Pakistan, especially in paediatric group, it has been previously noted that in studies reported from Pakistan that of the patients coming to the hospital, a greater proportion tends to belong to the male gender.

As in our research CNS infections are major cause of paediatric hospital admission. The global incidence of pneumococcal meningitis in children under 5 years, irrespective of HIV status, was 17 cases per 100 000, with an estimated 103 000 pneumococcal meningitis cases in 2000. The incidence of meningitis in children was lowest in Europe (6/100000) and highest in Africa (38/100000). The mortality rate due to acute bacterial meningitis remains significantly high (16–32%) in India and other developing countries. Universal immunization has led to a dramatic decrease in the rates of Hib and pneumococcal meningitis in developed countries. Unfortunately, because of limited economic resources and poor living conditions, many developing countries are still affected by the devastating consequences of this life-threatening systemic infection.

There is increasing recognition of stroke as an important contributor to childhood morbidity and mortality. A research shows that in 2013, globally, there were 97,792 prevalent cases of childhood ischemic stroke and 67,621 prevalent cases of childhood hemorrhagic stroke, reflecting an increase of approximately

35% in the absolute numbers of prevalent childhood strokes since 1990. According to a study in Australia, Ten percent of children suffering from stroke will die, and at least 50% of survivors are left with significant neurological disabilities, learning difficulties or seizures. Different studies linked Ateropathies, cardiac diseases and Iron-deficiency anemia as common risk factors for stroke.

Our study shows that mortality is considerably high in PICU in acutely ill child with neurological diagnosis. 18.2% mortality was reported in a study in Karachi and 5.2% in America in PICU patients with neurological illnesses.<sup>12</sup> Higher mortality in our study can be possibly because of late presentation of patients, as around 35.6% of the patients are from Afghanistan. A survival rate of 26% was observed in children with non-traumatic coma who presented 48 hours after the onset of symptoms.<sup>11</sup> Study on emergency management displays higher mortality in children with neurological illnesses as a result of late presentation in less developed countries. Introduction of paediatric neuro-critical care in developed countries has reported better survival with early diagnosis and appropriate management.

Limitation to this study are small sample size and collection of data from single hospital. So it cannot be generalized to other hospitals in Pakistan. But it provides a first ever study in Khyber- Pukhtoonkhwa which attempt to present spectrum of neurological cases in Paediatric ward.

## CONCLUSION

Overwhelming amount of patients from Afghanistan are admitted with acute neurological illnesses. Infection were the most common presentation in paediatric ward with Stroke most common cause of death. A very high mortality rate was associated with patients admitted in PICU.

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