

Evaluation of Sociodemographic Characteristics and Effects of Sensory Stimulation for Management of Acute Stroke Syndrome in Children

Mohammad Abdul Hye^{*1}, Md. Shamsur Rahman², Md. Iqbal Hossain³,
Shuperna Ahmed⁴

Abstract:

Introduction with Objective: In this study our main goal is to assess the sociodemographic characteristics of acute stroke syndrome in children and effect of sensory stimulation for management of acute stroke. **Materials and Methods:** This randomized control trial study conducted at Magura Medical College Hospital, Magura from January 2021 to December 2023. During experiment, in study group was 43 patients & 42 patients in control group. Children in study group were given sensory stimulation therapy while those in control group received no sensory stimulation. **Result:** during the study, highest number of the patients in study and control group belong to 2 months to 1 year's age group, (n=24) and (n=27). 57% patients from urban and 43% from rural. 76% patients had ischemic stroke and 24% had hemorrhagic stroke. Also, GCS score improved significantly after two weeks of sensory stimulation in study group. **Conclusion:** From our study we can conclude that, early sensory stimulation has been shown to have significant effects, both beneficial and detrimental, on stroke size and functional outcome. Further study is needed for better outcome.

Keyword: Acute ischemic stroke, sensory stimulation, GCS score.

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*1. Corresponding Author:

Dr. Mohammad Abdul Hye

Associate Professor

Department of Pediatrics

Magura Medical College & Hospital

Magura, Bangladesh.

Email: dr.mahye@yahoo.com

Mobile: 01815245012

2. Dr. Md. Shamsur Rahman

Assistant Professor

Department of Pediatrics

Satkhira Medical College & Hospital.

Satkhira, Bangladesh.

3. Dr. Md. Iqbal Hossain

Assistant Professor

Department of Pediatrics

Jessore Medical College & Hospital

Jessore, Bangladesh.

4. Dr. Shuperna Ahmed

Associate Professor

Department of Pharmacology

Magura Medical College

Magura, Bangladesh.

Introduction:

Acute ischemic stroke (AIS) is a common disorder with almost 700 000 new or recurrent events per year in the United States. The risk of AIS varies by region, with the highest incidence occurring in the so-called stroke belt in the southern part of the country^{1,2}. The risk of AIS varies among African Americans, Latinos, and Caucasians, with the highest risk in African Americans. The risk of AIS increases with age, and the ageing of the US population portends an increase in AIS incidence and prevalence over the next several decades, despite increasingly effective efforts to treat stroke risk factors and the use of other preventive strategies. The incidence of AIS is also increasing in many other countries, largely related to potentially modifiable risk factors, especially in the developing world. The incidence of AIS is also greater among women beginning with an increased risk in the perimenopausal period and continuing into older age groups³. The role of sensory stimulation during the acute phase of ischemic stroke is fundamentally different from its putative role for long-term recovery. The latter evokes a complex process of neuroplasticity and finally aims to improve functional recovery but not primarily to protect brain tissue from ischemia. In contrast, sensory stimulation within the time window for acute stroke therapy

might change critical parameters for stroke size and neuronal survival including regional cerebral blood flow or regional oxygen demand^{4,5}. In this study our main goal is to evaluate the sociodemographic characteristics of acute stroke syndrome in children and effect of sensory stimulation for management of stroke.

Objective

General objective are to assess the sociodemographic characteristics of acute stroke syndrome in children and effect of sensory stimulation for management of stroke. Specific objective are to detect clinical characteristics of the patients and to identify GCS trend in Acute stroke syndrome.

Materials and Methods:

This randomized control trial study conducted at Magura Medical College Hospital, Magura from January 2021 to December 2023. Study population was a total 85 (eighty-five) children aged 02 months to 12 years having coma due to acute stroke syndrome was selected randomly and Sampling technique was purposive. Following inclusion criteria, 85 (eighty-five) comatose children were enrolled by purposive sampling technique. Then selected patients were randomized into study and control group by simple random sampling. The study group received standard care plus sensory stimulation & control group received no stimulation. In study group was 43 patients & 42 patients in control group. Children in study group were given sensory stimulation therapy while those in control group received no sensory stimulation. Tactile, Visual, auditory stimulation were given by specific coma kits.

Statistical Analysis: First data were edited to the validity and consistency of the data. After proper verification data were coded and entered into computer by using SPSS software programs. Descriptive analysis was done by percentage, mean and standard deviation. Association was observed by appropriate statistical test at 95% confidence interval e.g., odds ratio, Chi-square, t-test .

Result:

In figure-1 shows gender distribution of the patients where for both control and study group male patients were higher than female. The following figure is given below in detail:

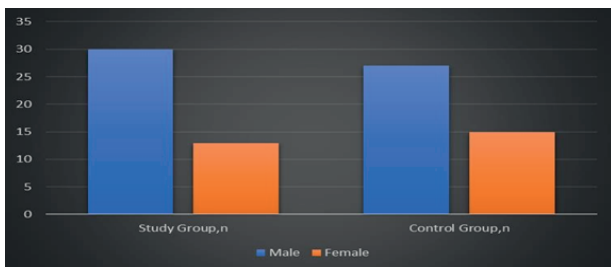


Figure-1: Gender distribution of the patients.

In table-I shows age distribution of the patients where most of the patients in study and control group belong to 2 months to 1 year’s age group, (n=24) and (n=27). The following table is given below in detail:

Age group	Study group	Control group
2 months to 1 years	24	27
1 to 5 years	12	9
5 to 12 years	7	6

Table- I: Distribution of baseline characteristics of both study & control groups (N=85).

In figure-2 shows distribution of the patients according to residential area where in study & control group, 57% patients from urban and 43% from rural. The following figure is given below in detail:

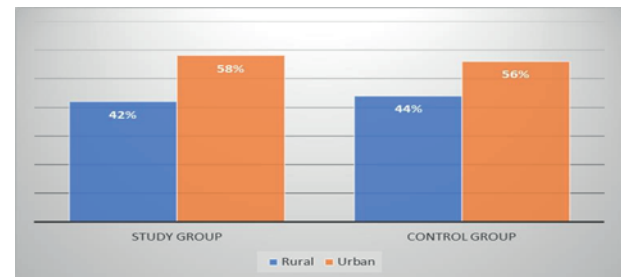


Figure-2: Distribution of the patients according to residential area.

In table-II shows distribution of the patients according to sociodemographic factors where only 25% parents were completed their graduation and most of them belong to poor economic condition. The following table is given below in detail:

Table-II: Distribution of the patients according to sociodemographic factors

Variable	Both Study & Control Group (%)
Economic condition of parents (taka):	
• Poor	60%
• Middle class	25%
• Upper class	15%
Occupation of patient’s parents:	
• Housewife	25%
• Teacher	25%
• Service holder.	10%
• Businessman	35%
• others	5%
Education of patient’s parents:	
• Illiterate	2%
• Primary	9%
• Secondary	23%
• Higher-secondary	41%
• Graduation or more	25%

In table-III shows clinical characteristics of the patients where

56% patients had ischemic stroke and 44% had hemorrhagic stroke. The following table is given below in detail:

Table-III: Clinical characteristics of the patients

Clinical characteristics	Both Study & Control Group (%)
Symptom:	
Seizures	32%
Sudden headaches	22%
Difficulty speaking	10%
Hemiparesis	20%
Sudden loss of vision	10%
Trouble walking	6%
Types of strokes: Ischemic stroke	76%
Hemorrhagic stroke	24%

In figure-3 shows GCS trend in Acute stroke syndrome where GCS score improved significantly after two weeks of sensory stimulation in acute stroke syndrome Cases. The following figure is given below in detail:

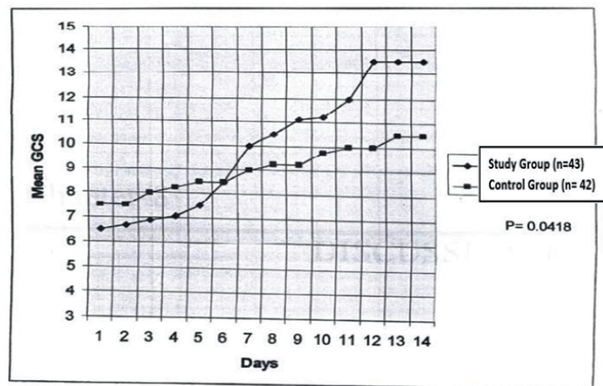


Figure-3: The GCS trend in Acute stroke syndrome.

Discussion:

The beneficial effects of cortical activation for functional recovery after ischemic stroke have been well described. However, little is known about the role of early sensory stimulation, i.e., stimulation during first 6 h after stroke onset even during acute treatment. In recent years, various preclinical studies reported significant effects of acute sensory stimulation that range from entire neuroprotection to increased infarct volumes by 30-50%. Systematic knowledge about the effect of acute sensory stimulation on stroke outcome is highly relevant as stroke patients are subject to uncontrolled sensory stimulation during transport, acute treatment, and critical care. One study reported that when they collected the clinical history, the physician should consider risk factors for pediatric stroke, investigating ethnic origin, familial history and in particular a positive family history for coagulopathies, and cerebrovascular, metabolic or immunologic diseases. Particular attention should be given in

the personal history to the presence of sickle cell disease or congenital heart disease, to a history of head or neck trauma, to unexplained fever and recent infections (especially chickenpox), vasculitis, drug ingestion and blood disorders. Another study reported that, the current treatment options for acute ischemic stroke are substantial but still limited. Thrombolysis therapy and more recently thrombectomy have demonstrated their potential to improve stroke outcome via early revascularization of occluded artery segments⁷.

Conclusions:

From our study we can say that, early sensory stimulation has been shown to have significant effects, both beneficial and detrimental, on stroke size and functional outcome. Further study is needed for better outcome.

References:

- Dimyan MA and Cohen LG. Neuroplasticity in the context of motor rehabilitation after stroke. *Nat Rev Neurol*. 2011; 7: 76-85.
<https://doi.org/10.1038/nrneurol.2010.200>
PMid:21243015 PMCID:PMC4886719
- Von Bornsta dt D, Houben T, Seidel JL, et al. Supply-demand mismatch transients in susceptible peri-infarct zones explain the origins of spreading injury depolarizations. *Neuron*. 2015; 85: 1117-1131.
<https://doi.org/10.1016/j.neuron.2015.02.007>
PMid:25741731 PMCID:PMC4351476
- Frostig RD, Lay CC and Davis MF. A rat's whiskers point the way toward a novel stimulus-dependent, protective stroke therapy. *Neuroscientist*. 2013; 19: 313-328.
<https://doi.org/10.1177/1073858412462607>
PMid:23047156 PMCID:PMC3710106
- Iadecola C. Neurovascular regulation in the normal brain and in Alzheimer's disease. *Nat Rev Neurosci*. 2004; 5:347-360.
<https://doi.org/10.1038/nrn1387>
PMid:15100718
- Chen-Bee CH, Agoncillo T, Xiong Y, et al. The triphasic intrinsic signal: implications for functional imaging. *J Neurosci*. 2007; 27: 4572-4586.
<https://doi.org/10.1523/JNEUROSCI.0326-07.2007>
PMid:17460070 PMCID:PMC6673004
- Baker WB, Sun Z, Hiraki T, et al. Neurovascular coupling varies with level of global cerebral ischemia in a rat model. *J Cereb Blood Flow Metab*. 2013; 33: 97-105.
<https://doi.org/10.1038/jcbfm.2012.137>
PMid:23032485 PMCID:PMC3597370
- Heiss WD, Hayakawa T and Waltz AG. Cortical neuronal function during ischemia. Effects of occlusion of one middle cerebral artery on single-unit activity in cats. *Arch Neurol*. 1976; 33: 813-820.
<https://doi.org/10.1001/archneur.1976.00500120017003>
PMid:999544