Original Article

Effectiveness of Magnesium Sulfate for the Treatment of Severe Traumatic Brain Injury

MgSo4 for Treatment of Brain Injury

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ABSTRACT

Objective: The aim of this study is to determine the effectiveness of magnesium sulfate for the treatment of severe traumatic brain injury.

Study Design: Prospective study

Place and Duration of Study: This study was conducted at the Neurosurgery Unit Mardan Medical Complex, Mardan for duration of one year from 1st November 2019 to 31st October, 2020.

Materials and Methods: Total 70 patients of both genders were included in this study. Enrolled patients were aged between 20-65 years. Patients detailed demographics age, sex and body mass index were recorded after taking written consent. Glasgow coma score (GCS) were recorded in this research at first day of admission in hospital and at the 5th day. Complete data was analyzed by SPSS 24.0 version.

Results: Out of 70 patients 50 (71.43%) patients were males and 20 (28.67%) patients were females. Mean age of the patients were 41.38 ± 7.87 years with mean BMI 27.12 ± 8.25 kg/m^2 . Mean duration of the post traumatic brain injury was 7.68 ± 4.32 hours. Mean GCS without magnesium sulfate at first day was 7.46 ± 2.32 but at the 5th day GCS was 11.41 ± 1.56. Significantly difference was observed with p value < 0.0126. But significantly difference was not observed in GCS with respect to gender and duration of disease.

Conclusion: We concluded in this study that use of magnesium sulfate was effective for the treatment of traumatic brain injury among patients. GCS among patients were improved by using magnesium sulfate at the 5th day.

Key Words: Magnesium Sulfate, traumatic brain injury, Glasgow Coma Score (GCS)

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INTRODUCTION

A sudden effect is causing damage to the brain, and traumatic brain injury (TBI) occurs. TBI affects people of all ages and is extremely morbid and lethal. The following TBI events in morbid patients lead to lifelong financial, medical, emotional, family and social disabilities. In animal brains and in human blood, after brain injury, magnesium deficiency has been reported. Magnesium administration attenuated neurobehavioral and pathological changes in brain damage animal models. However, in TBI patients two forward-looking clinical studies have shown conflicting results with magnesium as a neuroprotective agent.[1,2] The findings of the clinical research on the therapeutic effectiveness of magnesium in TBI patients have been adversely affected by secondary brain insults and other parameters and may be adversely affected by these results. Tests in normal rats have shown that magnesium has been able to reach the brain after systemic administration, however[3,4] pharmacokinetic studies have shown that the parenteral administration of magnesium in humans does not lead to a simultaneous rise in CSF magnesium. [5–7] Blood – brain barrier (BBB) permit for magnesium peripherally administered could be restricted by control of the brain and the CSF by a central nervous system that may be an effective factor in TBI patients.

In the brain degeneration stage following TBI, several biochemical pathways are involved. Treatment with one single agent can result in an insufficient effective dosage or a reliable adverse effect on a therapeutic dose or on repeated administration. The treatment of these pathways with multiple agents must be guided towards clinically effective neuroprotective therapy for a synergistic effect. Apart from magnesium, a variety of pharmaceutical agents [8,9] and physiological therapies are being studied for the treatment of TBi such as hyperoxia and hypothermia (seen elsewhere in this issue). Dexanabinol and progesterone were studied in clinical trials among the pharmaceutical macological agents. Dexanabinol was healthy but ineffective in a Phase III study. [10]

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We conclude that increased brain biologic availability of mannitol magnesium together with cotherapy with pharmacologic agents and safe and lowest-cost physiological treatments may contribute to a clinically effective neuroprotective treatment regime for TBI**.**

MATERIALS AND METHODS

This prospective study was conducted at Neurosurgery Unit Mardan Medical Complex, Mardan for duration of one year from 1st November 2019 to 31st October, 2020 and comprised of 70 patients. Patients detailed demographics age, sex, body mass index, was recorded after taking written consent. Patients with ay metabolic diseases, pregnant women and patients less than 20 years of age were excluded from this study.

Enrolled patients were aged between 20-65 years. The CT scantest were performed on each patients. The periodic mode of therapy for TBI was the implementation of a typical predictor treatment (reinforced brain trauma directives, the transition of nighttime percussion, intravenous fluids, Individual, treatment, food, depression, operation when presented, required surgery) and the ingestion of patients addition to the therapy treatments contain magnesium sulfate. The starting loading doses after the trauma resulted in 50 mg/kg magnesium sulfate, then 15 mg/kg TDSS after a threatened duration for care directives. Glasgow coma score (GCS) were recorded in this research at first day of admission in hospital and at the 5th day. T-test was used to compare the results significantly. Complete data was analyzed by SPSS 24.0 version.

RESULTS

Table No. 1: Baseline detailed demographics of traumatic patients

Variables	Frequency	% age
Gender		
Male	50	71.43
Female	20	28.67
Mean age	41.38 ± 7.87	
Mean BMI	27.12 ± 8.25	
Mean post traumatic injury (hours)	7.68 ± 4.32	

Table No. 2: Distribution of GCS pre and post using of magnesium sulfate

Variables	Frequency	P value
GCS		
At first day	7.46 ± 2.32	0.0126
At 5th day (Magnesium sulfate)	11.41 ± 1.56	
GCS with respect to Age		
<40 years	9.69±2. 56	0.56
> 40years	11.98±3.57	
GCS with respect to Sex		
Male	9.98±3. 65	0.92
Female	8.69±5.48	
GCS with respectro duration of disease		
At 5hours	8.88±5.89	0.92
>5hours	6.97±5.67	

Out of 70 patients 50 (71.43%) patients were males and 20 (28.67%) patients were females. Mean age of the patients were 41.38 ± 7.87 years with mean BMI 27.12 ± 8.25 kg/m^2 . Mean duration of the post traumatic brain injury was 7.68 ± 4.32 hours. (Table 1)**.**

Mean GCS without magnesium sulfate at first day was 7.46 ± 2.32 but at the 5th day GCS was 10.14 ± 1.65. Significantly difference was observed with p value < 0.0126. Glasgow coma score was 9.69±2. 56 at age <40 years and it was 11.98±3.57 in age > then 40 years. But significantly difference was not observed in GCS with respect to gender and duration of disease. (Table 2)

DISCUSSION

This research presents data on the effectiveness of magnesium sulphate therapy in disorderly headache patients. This research has contrasted GCS with related GCS sulphate feedback on 5th before and after magnesium sulphate at the start of day management. Tests will substantially monitor an increase in GCS magnesium sulphate treatment. The effectiveness and safety models in the CSF for magnesium concentrations have to be monitored by human studies.[11] One randomised, controlled trial provided magnesium therapy efficacy evidence for patient GCS and GOS evaluations. They analysed the test results with a team not caused by magnesium. The result was not enough from usual brain injury care. [12]

In this study, a total of 70 patients enrolled and males were 71.43% of the patients. Patients' average age was 41.38 ± 7.87 years, mean BMI 27.12 ± 8.25kg/m2 The mean post-traumatic brain injury length was 7.68 ± 4.32hours. Our findings were close to those of Wen Li et al.[13] The enrolled patients were aged in our sample between 20-65 years. The mean GCS for the first day was 7.46 ± 2.32but the mean GCS for the fifth day was 11.41 ± 1.56. There was a substantial difference of p < 0.0126. More evidence about the outcome of combination therapy in patients with magnesium and hypothermia were discovered. This demonstrated that magnesium sulphate was beneficial for traumatic injury. Further analysis of the success of combination therapies using magnesium and hypothermia . [14]

An I/V infusion study of magnesium sulphate resulted in a merely insignificant rise in magnesium sulphate CSF levels.[15,16] Significant improvement in this evaluation has been indicated by the threshold results for therapies for patients with standardised TBI. [17] No combination effects in people with TBI with magnesium and hyperoxia have been reported. Through his study, Kazim Ali et al. also provided the very results of the more effective use of magnesium sulphate for

traumatic patients.[12] GCS has improved significantly in patients whose disease has a positive effect, following treatment with magnesium sulphate. Patients with TBI should have a better outcome. Further study must therefore be carried out to generalise the findings**.**

CONCLUSION

We concluded in this study that use of magnesium sulfate was effective for the treatment of traumatic brain injury among patients. GCS among patients were improved by using magnesium sulfate at the 5th day**.**

Author's Contribution:

Concept & Design of Study:	Naeem ul Haq
Drafting:	Muhammad Ishaq
Data Analysis:	Musawer Khan, Adnan Ahmed
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Final Approval of version:	Naeem ul Haq

Conflict of Interest: The study has no conflict of interest to declare by any author.

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