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Original Research Article

The effect of acetazolamide on intracerebral hemorrhage in stoke patients

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ABSTRACT

Background: 10-20% of all strokes are caused by intracerebral haemorrhage which is the world's leading cause of neural tube defects and the second cause of mortality in the world. The aim of this study was to assessment the effect of acetazolamide in the symptom improvement, decreasing rankin scale and mortality rate in patients with intracerebral haemorrhage.
Methods: This is a clinical trial study that has been done on 120 stroke patients which divided randomly in two groups each with 60 patients. Patients in intervention group take acetazolamide 750 mg/day and in control group take placebo. The status of patients investigated by Rankin scale in three times baseline, 72 hours and 3 weeks after Cerebral haemorrhage.
Results: Of all patients, 49 (40.8%) were male and 71 (59.1%) were female. Putamen haemorrhage is the most location for cerebral haemorrhage (n = 43, 35.8%). According to the Rankin scale, 53 (44.2%) of patients were in the status 4 “moderately severe disability. Unable to attend to own bodily needs without assistance and unable to walk unassisted” in baseline. In the intervention group based on Rankin scale after 72 hour and three week the recovery rate was significantly more than control group.
Conclusions: Acetazolamide can be effective in treatment haemorrhagic stroke, decreasing Rankin scale and mortality rate in patients with cerebral haemorrhage.

Keywords: Acetazolamide, Cerebral haemorrhage, Rankin scale

INTRODUCTION

Stroke is the second leading cause of death worldwide which is considered as the third one in the United States and other industrialized countries.[1] Each year, 55 million deaths occur in the world that 10% of them are caused by stroke. In the United States, about 780,000 strokes occur each year.[2-4]

The deaths occurring within 28 days after the stroke in the Middle East and North Africa vary from 10% in Kuwait to 31.5% in Iran. Two-thirds of all strokes occur in the developing countries which, in spite of their preventable nature, are increasingly becoming a major health problem. It is expected that the deaths resulting from stroke will nearly double in the Middle East and North Africa by 2030.[4]

Stroke is the second cause of death in the world that causing the death of 6 million people yearly. In Iran daily 250-300 persons suffering to strike and other person with mild stroke symptoms not referred to hospital.[5]

Statistics showed that 30 - 40% of persons which live after stroke suffering to severe disabilities. Severity and type of disorders related to location, extent and type of

caught artery which from them Hemiparesis is common.[6,7] Studies showed that various factors and diseases deal to hemorrhagic stroke.[8,9] Hemorrhagic strokes include 10 - 20% of strokes that its incidence rate in world was 24.6 per 1000.[10,11]

After hemorrhagic stroke about third of patients dead in the first month and 40% of them have ICH (intracerebral hemorrhage) and 30% have SAH (subarachnoid hemorrhage).[12-14]

Treatment of patients in the golden time is important and several studies have been studied the chemical and herbal treatments in this context.[15]

Aacetazolamide is one of the drugs used for carbonic anhydrase inhibitors and can be reduced brain edema and death of neurons. Also this drug causing a significant increase in cerebral blood flow (CBF) and thereby increase the oxygen supply in the first minutes after use.[16-17]

The aim of this study was to assessment the effect of acetazolamide on the signs recovery rate, decreasing Rankin scale and mortality rate in patients with intracerebral hemorrhage.

METHODS

This is a double blind clinical trial (patients and samplers not informed the type of drug) that has been done on 120 stroke patients with intracerebral hemorrhage in 2014-2015. Study has been done after confirmed study design by ethical committee of university.

Patients with inclusion criteria such as age > 40, non-history of stroke and heart and liver and digestive diseases after confirmation there stroke by neurologist and doing CT-Scan divided randomly in two groups each with 60 patients. Patients in intervention group take acetazolamide 750 mg/day and in control group take placebo.

The drug and placebo administration for two groups repeated each 8 hour. The status of patients investigated by Rankin scale in three times in baseline, 72 hours and 3 weeks after intracerebral hemorrhage. Data collected by a checklist and analyzed by statistical methods in SPSS.19.

RESULTS

Of all patients, 49 (40.8%) were male and 71 (59.1%) were female and the difference was statistically significant between two groups. Putamen hemorrhage is the most location for intracerebral hemorrhage (n = 43, 35.8%).

The prevalence rate of disease in age group 70 - 80 years was the most (n = 53, 44.1%) and from them 52.8% were male (Table 1).

According to the Rankin scale, 53 (44.2%) of patients were in the status 5 “moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted” in baseline. In the intervention group after 72 hour and three week, the recovery rate significantly more than control group based on Rankin scale (Table 2).

Table 1: Prevalence of intracereberal hemorrhage in patients by age and sex.

Age group	Female		Male		Total	
	n	%	n	%	n	%
40-50	7	9.9	4	8.2	11	9.2
50-60	8	11.3	6	12.2	14	11.7
60-70	15	21.1	7	14.3	22	18.4
70-80	28	39.4	25	51	53	44.2
80-90	13	18.3	7	14.3	20	16.7
Total	71	59.2	49	40.8	120	100

Table 2. Status of stroke patients referred with intracerebral hemorhhage symptoms in baseline by rankin scale.

Scale score	Definition	n	%
0	No symptoms.	0	0
1	No significant disability. Able to carry out all usual activities, despite some symptoms.	1	0.83
2	Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities.	6	5
3	Moderate disability. Requires some help, but able to walk unassisted.	14	11.7
4	Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted.	53	44.2
5	Severe disability. Requires constant nursing care and attention, bedridden, incontinent.	43	35.8
6	Dead	3	2.5

Of all patients, 4 (3.33%) have complications midline shift and 1 (0.83%) patients have intracranial and abdominal bleeding (IVH).

According Rankin scale, after 72 hour in intervention group the rate of one unit recovery with 56.7% significantly more than control group with 35% (Table 3).

According Rankin scale, after three weeks in intervention group the rate of two unit recovery with 45% significantly more than control group with 8.3% (Table 4).

Table 3: Recovery rate (change in rankin scale to better status) of patients after entry to study by groups and location of intracerebral hemorrhage.

Rankin scale	Without change		1 unit recovery		Total	
Location	Intervention	Control	Intervention	Control	n	%
Thalamus	3	8	7	0	18	15
Putamen	14	11	12	6	43	35.8
Pons	0	1	1	3	5	4.2
Cerebellum	1	9	1	2	13	10.8
Lobar	4	6	13	8	31	25.8
Gaudate	1	3	0	2	6	5
IVH	23	1	0	0	4	3.3
Total	**26**	**39**	**34**	**21**	**120**	**100**

P = 0.039

Table 4: Recovery rate (change in Rankin scale to better status) of patients three weeks after study by groups and location of intracerebral hemorrhage.

Rankin scale	Without change		One unit recovery		Two unit recovery	
location	Intervention	Control	Intervention	Control	Intervention	Control
Thalamus	0	0	5	8	5	0
Putamen	0	0	14	13	12	4
Pons	0	1	0	3	1	0
Cerebellum	0	0	1	11	1	0
Lobar	0	0	9	13	8	1
Coditis	0	1	1	4	0	0
IVH	2	0	1	1	0	0
Total	2	2	31	53	27	5

P=0.001

DISCUSSION

In the study the significant effect of acetazolamide compared with placebo on stroke, due to lack of similar research in the field of acetazolamide effect on intracerebral hemorrhage compare the results of this study with other studies may not make sense. But according the obtained results from this study, we can resulted that acetazolamide is a better drug for stroke and our study results consist with Sharafadinzadeh and et al study.[18] In this study most of stroke patients similar to other studies were female (59.1%).[19,20] In terms of conflict the result of this study in line with rahman and et al study and in two study the most of conflict was in Putamen and the least was in Sia and also in all age groups the results was similar.[19]

In this study the rate of mortality significantly decreased by using acetazolamid and our study in line with Fuyou and et al study.[21] In this study the rate of mortality in using acetazolamid in increasing blood flow and better performance of brain was confirmed and our study results in line with Bothun and et al study.[22]

CONCLUSION

Acetazolamide can be effective in treatment hemorrhagic stroke, decreasing Rankin scale and mortality rate in patients with cerebral hemorrhage. It was recommended that in future studies this drug used on big sample of patients for reach to better positive results in using acetazolamide.

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