

# Evaluation on Drug Utilization and Pharmacoeconomic Status of Citicoline in Stroke Patients

Thogaru Mounika<sup>1</sup>, Hajera Fatima<sup>2</sup>, Sahrash Fatima<sup>3</sup>

<sup>1,2,3</sup>Student, Dept. of Pharmacy Practice, St. Peter's Institute of Pharmaceutical Sciences, Warangal, India

**Abstract:** The aim of present study is to evaluate the utilization of citicoline in stroke patients and its pharmacoeconomic studies.

**Main Objective** is to interpret, evaluate and improve the prescribing administration and use of medication. To identify, measure, value and establish a link between stroke and citicoline. **Methodology** used prospective observational study was carried out from November 2018 to April 2019 at Rohini Super Speciality Hospital, Sri Sri Neuro Clinic Hospital, hnk, Warangal, Telangana. The data was collected from 300 patients for their demographic details and was documented and analysed.

**Keywords:** Citicoline, Drug utilization evaluation, NIHSS-National institute of health stroke scale, Pharmaco economics, Stroke.

## 1. Introduction

DUR is a system of ongoing, systematic, criteria-based evaluation of drug use that will help ensure that medicines are used appropriately (at the individual patient level). If therapy is deemed to be inappropriate, interventions with providers or patients will be necessary to optimize drug therapy. A DUE is drug - or disease - specific and can be structured so that it will assess the actual process of prescribing, dispensing or administering, dispensing or administering a drug (indications, dose, drug interactions, etc.). DUE is the same as Drug Utilization Review (DUR) and terms are used synonymously.

Pharmacoeconomics is the field study that evaluates the behavior of individual, firm and markets relevant to the use of pharmaceutical products, services and programs and which frequently focuses on the cost (inputs) and consequences (outcomes) of that use.

The aim of this approach is to identify, measure, value and establish a link between both resource consumption and outcomes so that the relative worth of selected pharmaceutical products, programs or services to the next best alternatives from selected perspectives.

Citicoline is a complex organic molecule that function as an intermediate in the biosynthesis of cell membrane phospholipid citicoline is also known as CDP – choline belongs to the group of biomolecules in living systems known as nucleotides that play an important role in cellular metabolism.

- Citicoline is also known as CDP – choline and cytidine

diphosphate choline.

- Citicoline is water soluble compound with greater than 90 percent bioavailability oral doses of citicoline are rapidly absorbed.
- Citicoline elimination occurs in two phases mainly via respiratory CO<sub>2</sub> and urinary excretion.

Stroke sometimes also known as “brain attack”, CVA (cerebrovascular accident), occurs when blood flow to an area in the brain is cut off. The brain cells; deprived of the oxygen and glucose needed to survive or die.

## 2. Objectives

- To study the demographic data of stroke patients.
- To evaluate the utilization of citicoline in stroke pts.
- To evaluate the overall cost of citicoline use.
- To assess the relation between cost of treatment and outcome.
- In assessment of economic consequences of drug utilization.

### A. Priorities of populace

- Drug price control
- Lack of specific product patents and the relatively limited spread of the concept of health insurance.
- It evaluates the affordability of the right medication to the right pt at the right time, comparing two drugs in the same therapeutic class or drugs with a similar mechanism of action.
- Creating guidelines (criteria) for appropriate drug utilization.
- Evaluating the effectiveness of medication therapy.
- Enhancing responsibility/accountability in the medicine use process.
- Preventing medication related problems, for example adverse drug reactions, treatment failures, over-use, under-use, incorrect doses and non-formulary medicine use.

Table 1  
Gender, Stroke and Confidence Interval

Gender	Stroke	Confidence Interval
Male	216	5.08
Female	84	5.08

Table 1 shows that out of 300 prescriptions, 72% of stroke patients were males and 28% of them were females.

Table 2  
Age, Stroke and Confidence Interval

Age	Stroke	Confidence Interval
30-65	196	5.44
Greater Than 65	104	5.38

Table 2 shows that out of 300 prescriptions, 36.3% of patients were between 30-65, and 34.6% were above 65 years.

Table 3  
Comorbidities, Stroke, Confidence Interval

Comorbidities	Stroke	Confidence Interval
HTN	224	4.93
DM	106	5.41
CAD	28	3.29
OLD CVA	6	1.58
OTHER	18	2.69

Table 3 shows that out of 300 prescriptions 74.6% of stroke patients were having hypertension, 35.3% DM, 9.3% CAD, 2% old CVA and others 6%.

Table 4  
Type, Stroke and Confidence Interval

Type	Stroke	Confidence Interval
Hemorrhagic Stroke	55	±4.38
Ischemic Stroke	245	±4.38

Table 4 shows that out of 300 patients 18.33% were admitted with hemorrhagic stroke and 81.66% with ischemic stroke.

Table 5  
Etiology, Stroke, Confidence Interval

Etiology	Stroke	Confidence Interval
Smoking	102	± 5.38
Alcoholic	138	± 5.64
Tobacco Chewing	10	±2.02
Age	104	±5.38

Table 5 shows that out of 300 patients 34.6% of them were smokers, 46% alcoholic, 3.3% tobacco chewing and 34.6% having age related etiology.

Table 6  
Gender, Cost of Citicoline and Standard deviation

Gender	Cost of Citicoline	Standard Deviation
Male	466,020	± 424.71
Female	184,680	±400.13

Table 6 shows the cost of citicoline is 466,020 at standard deviation of ±424.71 and is females the cost is 184,680 at standard deviation of ±400.13.

Table 7  
Type of stroke and Cost of Citicoline

Type of Stroke	Cost of Citicoline
Hemorrhagic Stroke	127,980
Ischemic Stroke	522,720

Table 8  
Days and Cost

Days	No. of Days	Cost
D2	4	4,320
D3	75	121,500
D4	133	287,280
D5	88	237,600
Total		650,700

Table 7 shows that cost for patients with ischemic stroke is

more compared to hemorrhagic stroke.

Table 8 shows total cost of Citicoline

Table 9  
Strokes before and after

Before		After	
Moderate To Severe	Severe Stroke	Moderate Stroke	Minor Stroke
104	196	64	236

Table 9 shows that out of 300 prescriptions, in accordance with NIHSS before admission 104 patients was with moderate to severe stroke and 196 patients was admitted with severe stroke. And while discharge 64 patients were having moderate stroke and 236 were having minor stroke.

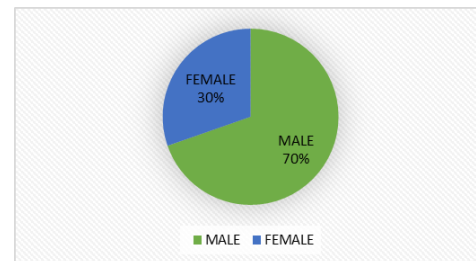


Fig. 1. Gender wise distribution of stroke patients

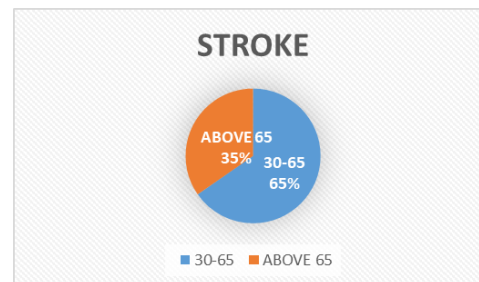


Fig. 2. Distribution of stroke patient's among different age group's

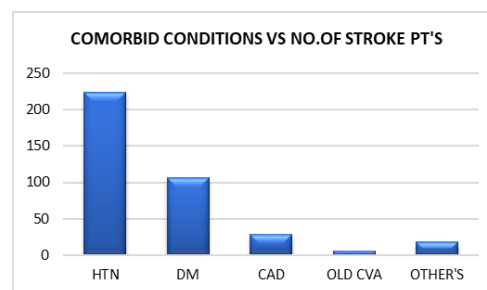


Fig. 3. Comorbid conditions vs. No. of stroke patient's

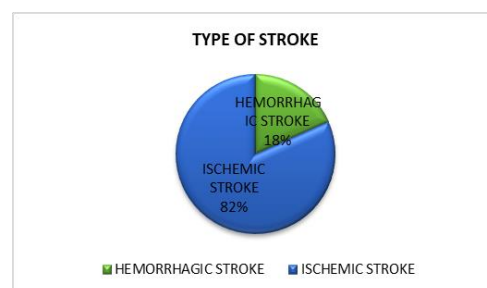


Fig. 4. Type wise classification of stroke patient's

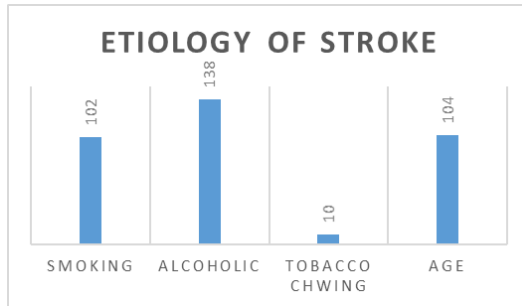


Fig. 5. Etiology of stroke

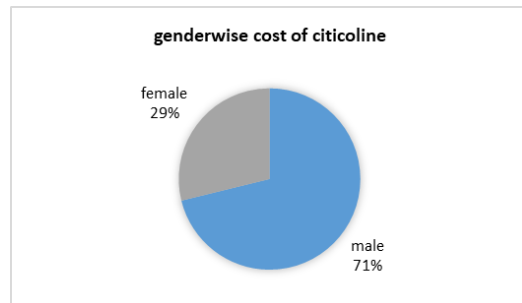


Fig. 6. Gender wise cost of Citicolone

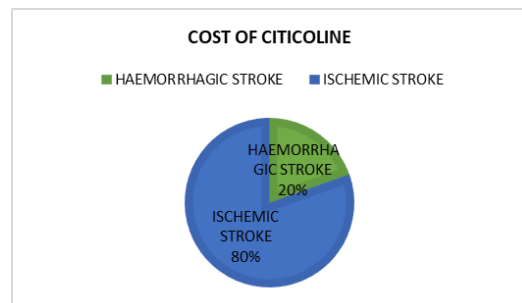


Fig. 7. Cost of citicolone based upon type of stroke

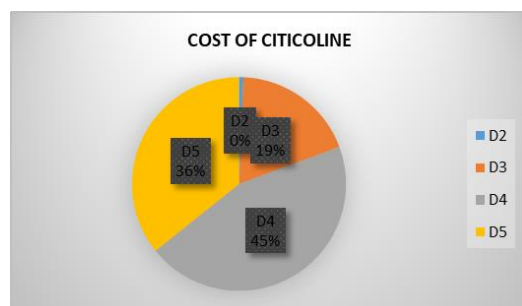


Fig. 8. Total cost of citicolone

### 3. Conclusion

A total of 300 patients were reviewed in inpatients in Rohini Superspeciality hospital during a study period of 6 months.

In the study 81.66% of patients are reported with ischemic stroke and 18.33% with hemorrhagic stroke which is similar to study conducted by Kenneth s.yew and Eric cheng-2009 ‘Acute Stroke Diagnosis’.

In the study of 300 patients 216(72%) patients were male and 84(28%) were females admitted with stroke, which is similar to study done by Appelros et al. ‘Sex differences in stroke

epidemiology’.

In this study it shows that 102(34.5%) of patients were having habit of smoking, 138 patients (46%) were alcoholic 10 patients (3.3%) having habit of tobacco chewing which is similar to the study conducted by markidan et al. ‘Risk of ischemic stroke in young men’.

Based on past medical history 224(74.6%) of patients are with hypertension, 106 (35.33%) patients are with diabetes, 28 (9.3%) of patients are with CAD, 6 (2%) are with old CVA and 18 (6%) are with other co morbidities like asthma, seizures, which is similar to study conducted by parth dhruv et al. a systemic literature review of patients with carotid web and acute ischemic stroke.

Based on severity 196 patients were admitted with severe stroke and 104 with moderate to severe stroke after the treatment with citicolone 64 patients were with minor symptoms of stroke and 236 with moderate stroke symptoms which is similar to the study conducted by Wayne M. clark, Benjamin J, Williams, Kenneth, Richard. M: A randomized efficacy trail of citicolone in stroke patients.

Average cost of citicolone in females is 184,680, at a standard deviation of 424.71 and in males the average cost is 466,020, at a standard deviation of 400.13 which is similar to study conducted by Bart M De maerschark, Ha-mill Hwang, Grace Leung: US Cost burden of ischemic stroke.

Citicoline side effects were minimally identified, with less problematic side effects like headache, diarrhea, nausea, blurred vision, high or low blood pressure, tachycardia; which is studied by CH0, H-J; KIM J ‘Conducted by study on efficacy and safety of citicolone in stroke’.

### References

- [1] Kumar SV, Damodar G, Ravikanth S, Vijayakumar G. Drug utilization pattern of stroke patients in a tertiary care hospital. *Int J Curr Pharm Clin Res.* 2012, 2:3-7.
- [2] Sathvik, B S. Drug utilisation Review/Evaluation. In: A Textbook of clinical Pharmacy Practice. G. Parthasarathi, Karin Nyfort-Hansen, Milap C Nahata eds. *Orient Longman.* India, 2004:362-375.
- [3] Fagan SC, Morgenstern LB, Petitta A, et al. Cost-effectiveness of tissue plasminogen activator for acute ischemic stroke. NINDS re-PA stroke study group. *Neurology Journal.* 1998;50:883-90.
- [4] Demaerschalk B M, Hwang HM, Leung G. Cost analysis review of stroke centers, telestroke, and rt-PA. *Am J Manag Care* 2010;16:537-44.
- [5] Weiss GB1. Metabolism and actions of CDP-choline as an endogenous compound and administered exogenously as citicolone. *life sci.* 1995; 5(94).
- [6] Dempsey R. J. & Raghavendra Rao VL. Cytidinediphosphocholine treatment to decrease traumatic brain injury-induced hippocampal neuronal death, cortical contusion volume, and neurological dysfunction in rats. *J Neurosurg.* (2003), 98(4):867-73.
- [7] C.S. Anderson, E. Heeley, Y. Huang, et al., INTERACT2 Investigators Rapid blood-pressure lowering in patients with acute intra cerebral hemorrhage. *N Engl J Med,* 2013, 2355-2365.
- [8] Jauch EC, Saver JL, Adams HP, et al. *American Heart Association Stroke Council, Council on Cardiovascular Disease, Council on Clinical Cardiology.* Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American heart association/American stroke association. *Stroke* 2013;44:870-947.
- [9] Giralt D, Garcia-Bonilla L, Campos M, Sosti V, Rosell A, Montaner J. Selecting the optimal dose of citicolone treatment in animal’s models of

focal cerebral ischemia through a meta-analysis. *Cerebrovasc Dis.* 2010;29:165.

- [10] European stroke organisation executive C, committee ESOW. Guidelines for management of ischemic stroke and ansient ischaemic attack 2008;5:457-507.
- [11] National Stroke Foundation. Clinical guidelines for stroke management. Melbourne Australia, 2010.