

ASSESSMENT OF RISK FACTORS AND DRUG RELATED PROBLEMS IN STROKE PATIENTS

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ABSTRACT:

AIM: The study aims to investigate the risk factors associated with stroke and to evaluate the occurrence, nature and frequency of Drug Related Problems (DRPs) among stroke patients using multiple drugs during hospital stay.

METHODS: This is a Prospective observational study performed for a period of 12 months. Patients visiting inpatient department of Neurology at Rohini hospital were enrolled into the study. All the cases were reviewed and those who met the study criteria were followed after the drug therapy. Details were recorded in a data collection form. Patients were monitored and DRPs were evaluated through interviewing patients or their care givers. The identified DRPs were recorded and reported.

RESULTS: The study included 930 stroke patients. Among them, the mean age of individuals was 55.30 ± 15.18 years (Mean \pm S.D). The study revealed that most of the DRPs were identified in the age group range of 61-70 (34.4%) years. Most common risk factors associated with the stroke are Hypertension 307 (30.7%) followed by alcohol 245 (24.5%), smoking 153 (15.3%), diabetes 147 (14.7%), coronary heart diseases 60 (6.0%) and dyslipidaemia 40 (4.0%). Out of 670 patients identified with drug related problems, number of patients with single co-morbid condition (380), with two co-morbidities (240), with three co-morbidities (50)

CONCLUSIONS: The present study helped to identify the Risk factors in Stroke patient's in respect to different variables. The findings in our study focused on the need for early and appropriate management of stroke to prevent further complications of stroke.

Keywords: Stroke, Risk factors, Drug related problems.

Introduction:

Stroke is a medical emergency, which occurs when blood flow to brain stops leading to death of brain cells within minutes. Stroke is caused by the interruption of the blood supply to the brain, usually because of bursting of blood vessel or blockage caused by a clot causing break of supply

of oxygen & nutrients, leading to damage to the brain tissue(necrosis)¹. According to Thomas Truelsen, Stroke patients are at highest risk of death in the first weeks after the event, and between 20% to 50% die within the first month depending on type, severity, age, comorbidity and effectiveness of treatment of complications²

Drug related problem is an event or circumstance involving drug therapy that actually or potentially interferes with the patient while achieving an optimum outcome of medical care³. According to Ruths S, Viktil KK, Blix HSDrug-related problems (DRPs) lead to substantial morbidity and mortality, as well as increased health care expenditure , which in turn affect both patients and society⁴.Drug related problems may arise at all stages of the medication process starting from prescribing to follow-up of treatment. Lack of proper follow-up and reassessment of medical treatment by the physician is a major cause. Also problem usually occurs during administration, dispensing or use of a medicinal product by the patient. Increased number of medications, complexity of drug regimens and availability of new drug therapies potentially increase the risk of patient for iatrogenic adverse drug events in hospitals. This can lead to prolonged stay in hospital and increased health care cost. So the injury or death that may occur as a result of drug related problems has to be evaluated in order to reduce the occurrence of similar events in future. Drug related problems (DRPs) are of major concern in view of the physical, psychological and economic burden to the patients and to society as a whole. DRPs are prevalent and cause considerable patient morbidity and in some cases death, as well as increased health care expenditures⁴.Thus, optimizing drug therapy by preventing drug-related problems may influence the health costs and potentially save lives and enhance patient's quality of life. DRPs are classified into six main categories: drug choice, dosage, adverse drug reaction, interaction, drug use and other miscellaneous.

AIMS AND OBJECTIVES

Aims:

To investigate the risk factors associated with stroke and to evaluate the occurrence, nature and frequency of Drug Related Problems (DRPs) among stroke patients using multiple drugs during hospital stay.

Objectives:

1. To assess the risk factors in Stroke patients
2. To study the rate, types, pattern, and clinical significance of DRPs in Stroke patients.
3. To capture the pharmaceutical interventions used to address the DRPS observed in patients with Stroke from hospital admission to discharge.

METHODOLOGY

Study site: The proposed study was carried out in inpatients of Neurology department of Rohini Super Speciality Hospital, which is a Tertiary Care Hospital set up in Hanmakonda, Telangana. It is a 300 bedded hospital with different department for neurology. It provides all the facilities along with adequate laboratory needs (if is equipped with facilities for ECG,CBC,CTscan and emergency requirements).During the study period a total number of 1000 patients were taken and among them 930 patients were enrolled into the study. Among the enrolled 510 males and 420 females were considered.

Study design: Prospective observational study deals with exposure of risk factors and drug related problems. The study period was 12 months (1 year). Patients visiting inpatient

department of Neurology were enrolled into the study based on the following inclusion and exclusion criteria.

Inclusion criteria:

- Stroke patients admitted to in-patient wards of Neurology department.
- Patients with stroke (ischemic and hemorrhagic).
- Stroke patients with other associated co-morbid conditions were also eligible.
- Patients of either sex.
- Patients of all age groups (in case of children information is collected from parents).

Exclusion criteria:

- Patients already sensitive to the stroke or hypertensive drugs so that the results will not be accurate.
- Patients with only risk factors of stroke but not prone to stroke.
- Stroke patients having any form of mental illness were excluded.

All the cases were reviewed and those who met the study criteria were followed after receiving the drug therapy. Details were then recorded in the suitable designed data collection form including the drug history, laboratory parameters, and treatment chart as per the need of the study. Monitoring of patients drug therapy for any Drug Related Problems interview was done with aid of patients or their care givers when necessary. The identified DRPs were recorded and reported.

RESULTS AND DISCUSSION

During the study period of 12months out of 1000 patients 930 patients were enrolled according to inclusion criteria and exclusion criteria. According to the Celin A.T, Seuma J, Ramesh A* study, drug related problems were identified to occur at a frequency of 1.4 per patient.⁵

Table 1. Distribution of patients according to gender:

Gender	Number of patients (n)	Percentage (%)
Males	510	54.8
Females	420	45.2

Among the 930 patients enrolled in study, the occurrence of stroke was seen more in males when compared to females.

Among 930 patients, the mean age of individuals was 55.30 ± 15.18 yrs (Mean \pm S.D). The study revealed that most of the DRPs were identified in the age group range of 61-70(34.4%) yrs followed by 51-60(25.8%) yrs and 41-50(19.3%) yrs ranges. In a study conducted by Janet K Sluggett ,the mean average age group patients with ischemic stroke were 86 years.

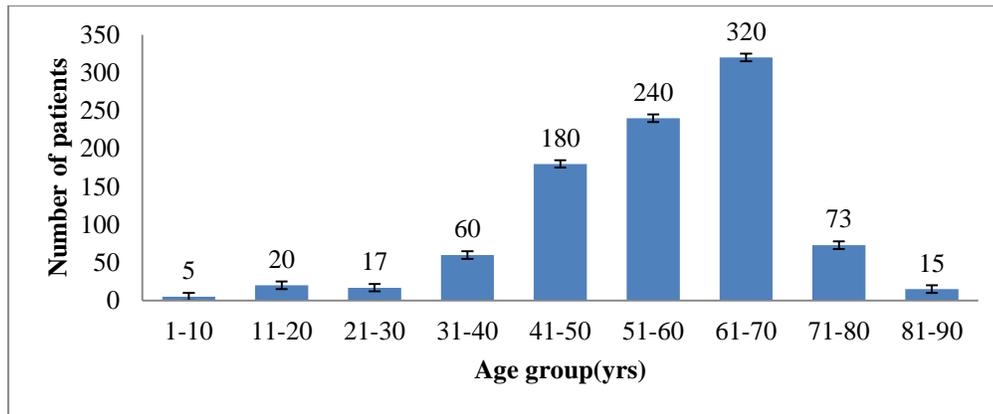


Figure: 1 Distribution of patients according to age group

Table: 2 Distribution of patients based on type of stroke:

Type of stroke	Number of patients (n)	Percentage (%)
Ischemic stroke	617	66.3
Hemorrhagic stroke	313	33.6

Out of 930 patients, most of them were diagnosed with Ischemic stroke 617 (66.3%) than Hemorrhagic stroke 313 (33.6%). In Ischemic stroke, males were 67.2% (415) and females were 32.7% (202). In Hemorrhagic stroke, males were 63.8% (200) and females were 36.1% (113).

Distribution of patients based on risk factors:

1. Non-modifiable: Age, gender, race, family history

2. Modifiable risk factors: Hypertension, Diabetes mellitus, Dyslipidemia, Alcohol, Smoking and Coronary heart diseases

According to Z Mirghani, T Zein, there is more evidence that the ratio of total cholesterol to HDL-cholesterol is more informative to determine the risk to ischemic stroke than total and LDL cholesterol levels.⁶

Among 930 patients, the most common risk factors associated with the diseases are Hypertension 307(30.7%) followed by alcohol 245 (24.5%), smoking 153 (15.3%), diabetes 147 (14.7%), coronary heart diseases 60 (6.0%) and dyslipidemia 40 (4.0%).

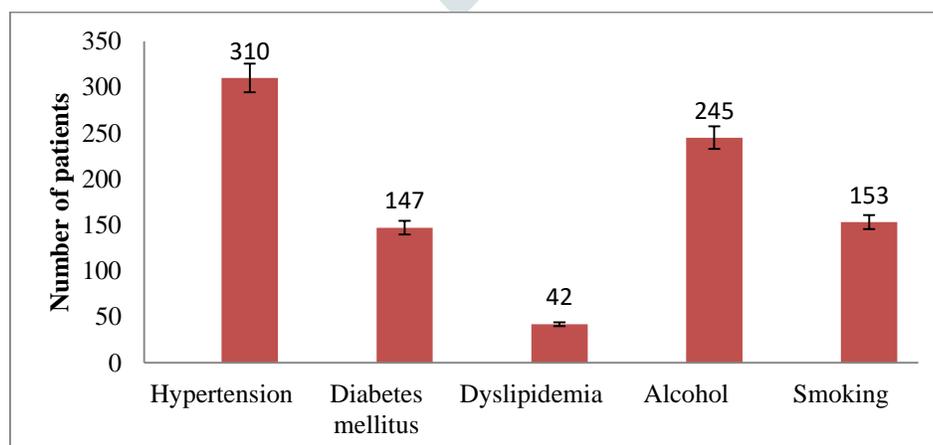


Figure: 2 Distribution of patients based on modifiable risk factors

1. Lipid profile observed in Stroke patients:

Number of Patients with abnormal HDL,LDL, Triglycerides, serum cholesterol were evaluated.

Normal values : High density lipoproteins: >45 mg/dL
 low density lipoproteins :<134.45mg/dL
 Triglycerides <150mg/dL

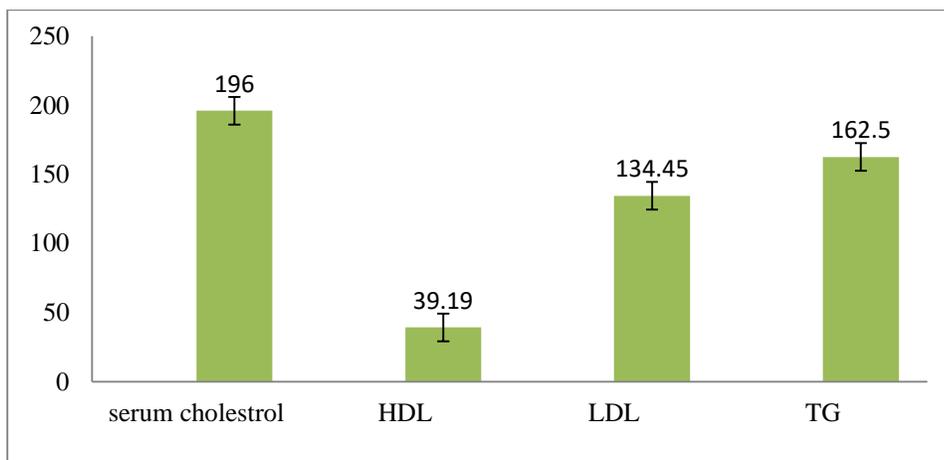


Figure : 3 Lipid Profile of Stroke Patient

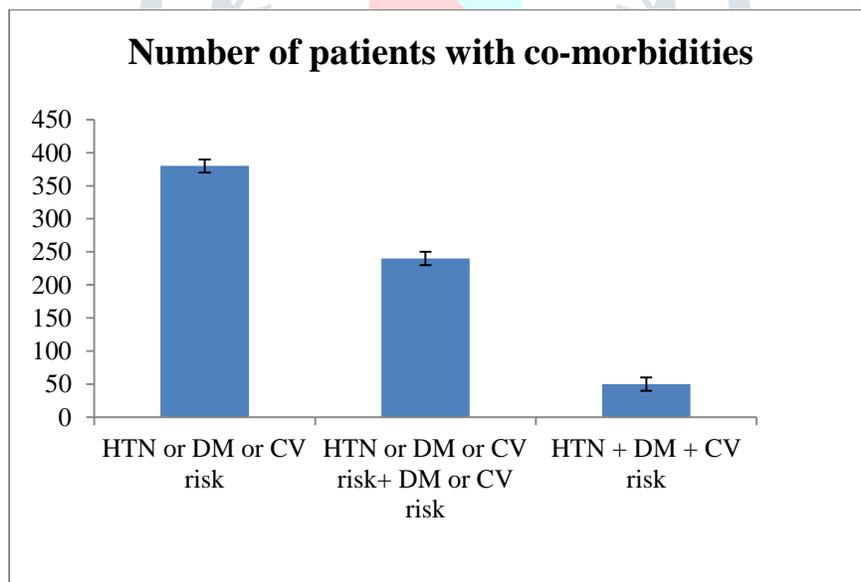


Figure: 4 Distribution of patients with co-morbidities

Out of 670 patients, number of patients with single co-morbid condition (380),with two co-morbidities (240),with three co-morbidities(50).

*HTN-Hypertension, DM-Diabetes mellitus, CV risk-cardiovascular risk

Table: 3 Distribution on type of identified drug related problems

Drug related problem	Number(n)	Percentage (%)
Drug-drug interaction	390	39.0
Indication without drug	278	28.0
Incorrect drug choice	156	16
Adverse effects	93	9.3
Unnecessary long duration	69	7.0
Double medication	60	6.0
Drugs without indication	31	3.1
Contraindications	36	3.6

The total number of Drug-Drug Interactions were 390 , Indication without drug were 278, Incorrect drug choice were 156 , Adverse effects were 93 , unnecessary long duration were 69 , double medication were 60 , drugs without indications were 31 and contraindications were 36 .

The highly reported drug related problems are drug-drug interactions (39.0%) and least reported were drugs without indication(3.1%).

Table : 4 Drug –drug interactions and their severity

S.no	Drug A	Drug B	Severity	Reaction
1	Atorvastatin	Clopidogrel	Moderate	Concurrent use of clopidogrel and CYP3A4 metabolised statin may result in decreased formation of clopidogrel active metabolite resulting in high on treatment platelet reactivity.
2	Aspirin	Naproxen	Major	Concurrent use of aspirin and NSAIDs may result in increased risk of bleeding
3	Nifedipine	Clobazam	Major	Concurrent use of nifedipine and CYP3A4 inducers may result in decreased nifedipine exposure
4	Aspirin	Clopidogrel	Major	Concurrent use of aspirin and clopidogrel may result in an increased risk of bleeding
5	Clonidine	Insulin	Moderate	May result in hypoglycemia or hyperglycemia
6	Aspirin	Insulin	Moderate	Increase risk of hypoglycemia
7	Heparin	Ibuprofen	Major	May result in increased risk of

				bleeding
8	Aspirin	Spiranolactone	Major	Result in reduced diuretic effectiveness
9	Piracetam	Heparin	Major	May result in increased bleeding
10	Aspirin	Ranitidine	Minor	May result in reduced salicylate plasma levels and decreased antiplatelet effect on aspirin

The total number of drug interactions were classified as Moderate (260), Major (90), Minor (40).

Table : 5 Adverse drug reactions and naranjo's grading

S.no	Drug	Adverse effect	Number	Naranjo's scale
1	Citicoline	Giddiness	7	Probable
2	Nifedipine	Headache	4	Probable
3	Aspirin	Gastric irritation	1	Probable
4	Insulin	Hypokalemia	1	Probable
5	Mannitol	Blurred vision	1	Probable
6	Acenocoumorol	Headache	1	Probable
7	Buprenorphine	Rash	1	Probable
8	Clobazam , valproate, midazolam	Headache	1	Probable
9	Torasemide , Spironolactone	Giddiness	1	Probable
10	Nifedipine	Pedal edema	12	Possible
11	Aspirin	Headache	1	Probable

The adverse effects identified and severity of adverse effect in stroke patients enrolled using Adverse Drug Reaction Probability Scale (Naranjo).

Indication without drug:

Out of 930 patients 278 indication without drugs were identified most commonly

Unnecessary long duration of therapy:

Most commonly found long duration of medications were in case baclofen for the treatment of hiccups, Anti-pyretic (Paracetmaol) drug usage even after fever was cured,

Painkillers (Tramadol) even after pain was relieved, Antiepileptics for seizures even when they are controlled and Loperamide for treatment of diarrhea.

Double medication:

Most of the drug classes include antihypertensives, antiepileptics, antipyretics and NSAIDs

Table: 6 Drug without indication:

Drugs	Indications
Antiepileptics	No indication of seizures
Antipyretic	No fever conditions
Painkillers	No pain
Antiulcer	No acid production
Antibiotics	No infections

The presence of stroke was higher in patients with a negative family history than the patients with a positive family history of stroke.

Acceptance rate of recommendations

Assessment of DRPs by the pharmacist can significantly improve appropriate prescribing in elderly patients with poly pharmacy. In this study the role of the pharmacist is to focus on identification of potential DRPs and discuss with the physician.

Among 375 (40%) prescriptions were discussed with the physician and in them about 280(30%) were accepted. All the drug related problems were reviewed and discussed with the physician. Few of them were accepted but the change in therapy did not take place.

CONCLUSION: The present study helped to identify the Risk factors in Stroke patients. The findings in our study stress the need for early and appropriate management of stroke to prevent further complications of stroke. Predominance of stroke was found to be more in males than females and predominant age group was between 61-70 followed by 51-60. Most patients were found to have Ischemic stroke compared with Hemorrhagic stroke. Out of the total 617 Ischemic stroke patients, 415 were males and 202 were females. Similarly out of 313 Hemorrhagic stroke patients, 200 were males and 113 were females. A total of 1113 DRPs were identified in 930 patients during the study period, in which prevalence of DRPs was found to be more in males than females and prevalence of DRPs was found to be more in Ischemic cases than Hemorrhagic cases. Majorly identified drug related problem was Drug-Drug Interaction followed by Indication without drug, incorrect drug choice, Side effects, unnecessary long duration, Double medication, Drug without indication and Contraindications. Developing and adopting policies regarding the drug administration, dispensing and prescribing would minimize the drug related problems in stroke patients. Poly pharmacy was found to be a potential risk factor for developing drug related problems.

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References:

1. Joseph T.Dipiro, Darbara G.Wells, Terry L, Schwinghammer, Cecily V.Dipiro Pharmacotherapy, A pathophysiology approach, 8th edition : 415-424.
2. Thomas R.Brown, Hand book of Institutional Pharmacy Practice, Available at: [http:// books.google.com.in/books? Id=6m6Gs Oii](http://books.google.com.in/books?Id=6m6GsOii).
3. Javedh Shareef,Sandeep B, C S Shastry, Assessment of Drug Related Problems in Patients with Cardiovascular Diseases in a Tertiary Care Teaching Hospital, Journal of Pharmaceutical care, 2014; 2(2): 70-76.
4. Ruths S,Viktil KK, Blix HS, Classification of Drug Related Problems,The Journal of the Norwegian Medical Association,Tidsskr Nor L aegeforen 2007; 127: 3073-6.
5. Celin A.T, Seuma J, Ramesh A, Assessment of Drug Related Problems in Stroke Patients Admitted to a South Indian Tertiary Care Teaching Hospital, Indian Journal of Pharmacy Practice, 2012;5(4):456-466.
6. Z Mirghani, T Zein, Total and LDL cholesterol as risk factors of ischemic stroke in emirates patients, the international journal of neurology , 2013.