A review on medication adherence in stroke patients

[1] Kavitha P*, [1] Prakash A, [2] Jayaprakash S, [1] Linus T, [1] Roby R and [1] Sambathkumar R.

[1]JKK Nattraja College of Pharmacy, Komarapalayam, Tamilnadu, India.

[2] MNR College of Pharmacy, Sangareddy, Telagana, India.

* **Corresponding Author:** E-Mail: apcology@gmail.com

ABSTRACT

Stroke is a major cause of death and disability worldwide that affects 16 million persons annually. The burden is especially high in low and middle income countries which account for more than 85 % of all stroke related mortality. It is one of the leading causes of adult physical disability. The risk of a recurrent stroke is 30–43%within 5 years. Medical treatment is needed for the management of stroke and the risk reduction of recurrent stroke. The success of a medical treatment is determined largely by adherence. Adherence to therapy is a primary determinant of treatment success. Poor adherence reduces the overall effectiveness of health care interventions, yet it is estimated that in developed countries only 50% of patients who suffer from chronic diseases adhere to treatment recommendations. Large randomized controlled trials and meta-analysis have identified several drugs which significantly reduce the risk of future vascular events after stroke. Guidelines for secondary prevention after stroke now recommend antiplatelet therapy and reduction of both blood pressure and cholesterol level. Non-adherence to stroke prevention medications is a risk factor for first-ever and recurrent stroke. As of yet, there are no guidelines for processes to recognize and address medication non-adherence in stroke patients. This study investigates determinants of medication adherence in the secondary prevention of stroke.

Keywords: Stroke, Adherence, Lipid lowering agents.

1. INTRODUCTION

Stroke is a worldwide health problem and leading cause of adult disability. Annually, 15 million people worldwide suffer from stroke. Of this total, 5 million die and another 5 million are left permanently disabled. Stroke is a major cause of death and disability worldwide that affects 16 million persons annually. [1] The risk factors for stroke are well recognized, and risk-stratification according to the presence of diabetes, hyperlipidemia, atrial fibrillation, current tobacco smoking, and hypertension occurs primarily during the hospitalization for acute stroke. Adherence to therapy is a primary determinant of treatment success. Poor adherence reduces the overall effectiveness of health care interventions.[2] It is estimated that in developed countries only 50% of patients who suffer from chronic diseases adhere to treatment recommendations. High priority should be given to fundamental and applied research in which innovations are concerned to follow only medication prescriptions in case of stroke. Research and clinical guidance support the use of medicine for the treatment of all types of stroke and the reoccurring of stroke can be reduced. The adherence to medical therapy also reduces further damage and it improves patient outcomes.

1. 1. Adherence

The extent to which a person's behavior of taking medication, following a diet, or making healthy lifestyle changes as per the recommendations from a health-care provider is known as medication adherence. It is a cluster of behaviors which are governed by different factors. Adherence determines that how well a person is behaving to the agreed recommendations of a healthcare professional. [3]

1. 1. 1. Medication Adherence

The patient's conformance with the provider's recommendation with respect to *timing*, *dosage*, and *frequency* of medication-taking during the prescribed length of time Adherence to

a medical regimen is defined as the extent to which a person's behavior corresponds with agreed recommendations from a health professional is known as medication adherence. [4] It is the duration of time patient takes medication, from initiation to discontinuation of therapy. It is the extent to which a person behaves to the agreed recommendations from a healthcare professional. Medication adherence is necessary for patients suffering from stroke to obtain specific and better outcomes. The success of the treatment is based on good and effective medication adherence. Over the past few decades, medical and technological advances have transformed our understandings in the treatment of stroke, which has created opportunities for saving lives and reducing disabilities. [5] After the occurrence of stroke there are options for medical treatments to restore the blood flow and to enhance brain function in case of any damage is been caused to brain. Medication adherence is therefore more necessary to reduce further stroke damage and to reduce the risks from stroke. [6]

1. 2. Non-Adherence

Non-adherence can be unintentional and intentional.

1.2.1. Unintentional non-adherence

Occurs when someone intends to take the medication but something prevents them from doing so (for example, forgetting or a physical disability). It is often a consequence of cognitive impairment. Very mild cognitive impairment, even in healthy elderly patients, is associated with poor medication adherence. [7] After a stroke, the impact of cerebro-vascular disease on cognitive functioning, particularly memory may mitigate against adherence, particularly if the patient is elderly and the drug regime complicated. [8]

1.2.2. Intentional non-adherences

Occurs when someone actually decides not to take the medication, or takes it in a way that is different from the recommended way due to their beliefs or illness perceptions. [9] It occurs when a patient adopts a deliberate strategy of taking medication in a manner that differs from medical advice. This is likely to depend on the patient's beliefs concerning their condition (illness perceptions) and their medication, *i.e.* the perceived benefits versus the perceived risks (or side effects) of the medication. For example, someone may not like the side-effects of a medication and intentionally not take it. The negative consequences of non-adherence to medication are considerable and can include poor health outcomes, increased morbidity and substantial costs. Around half of patients from

developed countries that have one or more chronic conditions do not adhere to their medication as recommended. [10]

Non-adherence causes ~30% to 50% of treatment failures and 125,000 deaths annually. Non-adherence to cardio-protective medications increased risk of cardiovascular hospitalizations (10% to 40%) and mortality (50% to 80%). Poor adherence to heart failure medications increased the number of cardiovascular-related emergency department (ED) visits.

1.3. Methods for assessment of medication adherence

A database of the selected patients who underwent the treatment for the stroke events are created in the hospital outpatient clinics. The data's are collected by means of interview with patients by using a questionnaire of known reliability and validity to assess treatment adherence.11 The different methods of assessment of medication adherence are listed below:

The Morisky Medication adherence scale

This scale consists of four items with a scoring scheme of Yes = 0 and No = 1. The items are summed to give a range of scores from 0 to 4. If the patients are poor adhering they score 1. The four questions in the scale are:

> * *Do you ever forget to take the medicine?*
> * *Do you have any problems remembering to take your medications?*
> * *When you feel better, do you sometimes stop taking your medications?*
> * *If you sometimes feel worse, did you stop taking your medications?*

Assumptions about the medicine questionnaire

This questionaire was developed in the UK and published by Horne and Weinman. It comprises of two parts. The subjects are asked for the extent to which they agree or disagree with the statement on a five point like scale in which 1 = Strongly disagree , 2 = Disagree , 3 = uncertain and 5 = strongly agree. This is to investigate the opinion of the participant for each items.

Data management and statistical analysis

The data management and the statistical analysis is done by using different computer soft wares. eg: GraphPad Instat version 6.00. It is used to analyze the data obtained by the questionnaire. The frequency and percentage were calculated for qualitative variables while the mean and standard deviation values are used for quantitative analysis. Student *t* test is used to compare two groups.

Other statistical methods such as *Chi Square test* and *Pearsons Correlation tests* are also used.

1.4. Medication non-adherence: under-recognized risk factors

Non-adherence to medications in patients at risk for stroke is an important risk factor in and of itself. For example, the heart and soul study showed that in patients with coronary artery disease, if patients only took 75% or less of their medications as prescribed, the risk for stroke was found higher than patients who were 100% adherent.[12] A study of Tennessee's Medicaid program from 1994 to 2000 showed that antihypertensive medication adherence by one pill per week for a once-a-day regimen reduced the risk of stroke by 8-9% and death by 7% .A separate analysis of stroke patients in a Medicaid program showed that stroke recurrence was 57% less likely if patients consistently took medications over time (i.e. persistent), even after adjusting for confounders. Medication-taking behavior can be categorized as persistence or adherence. The results from other studies of medication-taking among stroke patients have reported considerable variability. [13] Analysis of a Medicaid managed care database from Maryland reported the persistence in stroke patients was about 80% after maximum follow-up of 2 years.

1.4.1. Strategies to improve adherence to stroke prevention medications

The preventing recurrence of thromboembolic events through coordinated treatment program was a quality improvement program designed to increase adherence with medications and behavioral changes after stroke and acute coronary artery syndrome. [14] Patients admitted to a single center were discharged with materials related to appointments, and at 2-4weeks, a nurse contacted patients by telephone to reinforce medication/behavior regimens. To relieve from this non-adherence, we designed a medication coaching intervention that would focus on these factors as well as providing non-medication help for patients or families that needed it. The theme of the questions asked by patients and caregivers focused on how to prevent another stroke, and how to take medications to avoid interactions. [15] We learned that although many of the questions and concerns about medications and stroke were similar, there were other system failures, such as difficulties obtaining appointments, and social issues, such as lack of transportation to appointments for providers and physical, occupational, speech therapy. Medication adherence is obviously critically important, but as we learned in our coaching intervention, it was actually the tip of the iceberg. An effective prevention model would require recognition of medication non-adherence and also readiness by the team to provide individualized assistance and education during the transition from hospital to home. [16]

1.5. A new model of stroke prevention

Tracs programme development

A new model is used for the prevention of stroke by giving positive effects to improve the medication adherence. The medication coaching pilot study informed the development of the transitional coaching for stroke (TRACS) program, a hospital-supported quality improvement program to reduce 30-day readmissions, maximize stroke prevention, and improve outcomes. The TRACS program provides one-on-one transition coaching to patients admitted with an ischemic or hemorrhagic stroke or TIA. The TRACS coach meets individually with patients prior to discharge and provides a take-home packet with a personalized review of the patient's risk factors, medication information, instructions for stroke awareness, action with new symptoms, and post-hospital follow-up care. [17] After discharge, the TRACS coach (initially an educator, now an RN) calls the patient within 2weeks to assess medications, any new problems after arriving home, and confirm appointments with the patient or caregiver if patient is unable or unavailable to speak to the coach. This includes screening for new stroke symptoms, depression, and fall risk, assessing progress with rehabilitation, providing referrals to home health if needed, con- firming access to primary care, and discussion of diagnostic test results from the stroke hospitalization. Importantly, self-reported medication use and reconciliation is obtained at this visit, with follow-up questions related to why a medication is not taken and why, as well as steps to help with access to cheaper alternatives if cost is an issue, or to address side effects by adjusting medications or doses.

2. Study settings and randomization

In this study to prevent the patients from stroke we are taking the randomized and the controlled group. In which we are getting the primary end point and the secondary end point gives the recurrent rate and the mortality rate. The program objectives were helping the subject to acquire skills for self-management and the control of ischemic stroke risk factors. [18] The intervention supported for self-management and drug therapy to control subject's risk factors using 14 types of education booklets created by the researchers as well as a self-management record notebook in which the subject recorded daily blood pressure, body weight, and lifestyle

improvement goals. Abnormalities in self-monitored values or data or the development or exacerbation of subjective symptoms were reported immediately to the primary care physician. Appropriate treatment and therapeutic activities were assessed collaboratively by the nurses and primary care physicians and were based on the clinical practice guidelines. [19]

2.1. Education for the usual care group

At the initial interview, the subjects were given instructions using a leaflet that consisted of material extracted from the educational booklets. They also received a self-management record notebook, as described previously. Otherwise, the patients were given routine medical consultations as per standard practice. Quality Assurance each of the 14 types of booklets used in the present study covered the contents of the patient's education, according to the self-management and lifestyle recommendations of each of the clinical practice guidelines for stroke and the risk factors. [20] The content was created based on discussions with neurologists, chronic disease nurse specialists, and registered dieticians.

2.2. Quality assessment

Quality assessment was done to highlight any bias that may have occurred. A quality assessment tool was designed for this systematic review and based on some of the criteria of the Quality Assessment Tool for Quantitative Studies. [21] The designed quality assessment tool used seven criteria. These included:

➢ Sample size

➢ Appropriateness of the population and description of stroke

➢ Drop-out rate

➢ Follow-up length

➢ Length of intervention

➢ Appropriate person delivering intervention

➢ Measurement of the appropriateness of the outcome of medication adherence

Criteria were scored from 1 to 5 for quality, with 1 being low and 5 being high. The studies were independently assessed by two reviewers with the tool. The total score was the average score of the two reviewers. Discrepancies in the scores were resolved by meeting if there was more than a two-point difference.

2.3. Outcome measures

They are various tools mainly used for measure the therapeutic outcome. The MARS was used as the primary outcome measure. The MARS is a brief self-report instrument, assessing five separate non-adherent behaviors, and provides a sensitive assessment of drug adherence behaviors.[22] It is specifically worded so as to reduce social desirability effects. This five-item scale asks respondents to rate the frequency with which they engage in five aspects of non-adherent behavior. Demographic factors of age, sex and Car stairs social deprivation index , low social class, lack of car ownership, overcrowding and male unemployment are certainly used.

The Mini-Mental State Examination (MMSE) is a brief, valid and reliable assessment of various components of cognitive function, widely used in stroke research. Patient's perceptions and beliefs about their illness and medication were explored using several measures. [23] The Illness Perception Questionnaire (IPQ) was developed to provide quantitative measurement of the main components of illness representations in Leventhal's self regulation model. The revised version of the measure, the IPQ-R, provides a comprehensive and psychometrically robust measure of the major components. The Beliefs about Medicines Questionnaire (BMQ) was designed to assess cognitive representations regarding medication and measures four domains: specific necessity, specific concerns, general harm and general overuse. For this study, it was hypothesized that adherence would be predominantly related to patients specific concerns regarding their secondary preventative stroke medication, and their views as to the specific necessity of that medication. The questionnaire is one of the most solutions used for the medication adherence. [24] The primary outcome of interest will be a change in medication adherence after some months. The findings will be compared to its corresponding findings from the control group which has been taken. Medication adherence will be taken by various methods in which various scales are mainly used to find the adherence. The Morisky adherence scale is mainly used to find the medication adherence of the patients.

3. CONCLUSION

Optimal medication adherence amongst stroke survivors is vital in the prevention of recurrent strokes and other cardiovascular events. Our results suggest that targeting younger stroke patients may be important. For all patients, the interventions which elicit and challenge patients' specific concerns regarding the negative consequences versus the benefits of taking medication may be helpful in improving rates of medication adherence and are worthy of controlled evaluation. Patient enrollment is closed, and follow-up studies are in progress. The

results derived from this study could establish the potential usefulness of DMPs for the secondary prevention of ischemic stroke in a primary care setting. So through adherence specific and useful outcomes can be achieved in patients suffering from Stroke.

4. REFERENCE

1. Merican JS, Piaw CS and Basri H. Malaysia Ministry of Health. In: MOH Clinical Practice Guidelines: Management of Ischaemic Stroke. 1st ed. **Malaysia: Malaysia Ministry of Health,** 2006:1.

2. Strong K, Mathers C and Bonita R. Preventing stroke: saving lives around the world. **Lancet Neurol.** 2007; 6(2):182-7.

3. Horne R. Adherence to treatment. In: Ayers S, Baum A, McManus C *et al.* (eds) **Cambridge Handbook of Psychology, Health and Medicine.** 2007; 2nd ed. Cambridge University Press, Cambridge.

4. Barlow J, Wright C, Sheasby J, Turner A and Hainsworth J. Selfmanagement approaches for people with chronic conditions: a review. *Patient Educ Couns.* 2002; 48(2): 177–87.

5. Newman S, Steed L, Mulligan K. Self-management interventions for chronic illness. **Lancet.** 2004; 364(9444): 1523-37

6. Mahoney FI and Barthel DW. Functional evaluation: the Barthel index. **Md State Med J.** 1965; 14: 61-65.

7. Haynes R, McKibbon A and Kanani R. Systematic review of randomised trials of interventions to assist patients to follow prescriptions for medications. **Lancet.** 1996; 348(9024): 383-6.

8. Newman S, Steed L and Mulligan K. *Chronic Physical Illness: Self- Management and Behavioural Interventions.* **Open University Press, Berkshire,** 2009.

9. O'Carroll R, Whittaker J and Hamilton. Predictors of adherence to secondary preventive medication in stroke patients. *Ann Behav Med.* 2011; 41(3): 383-90.

10. Horne R. Compliance, adherence, and concordance - implications for asthma treatment. *Chest.* 2006; 130(1): 65S-72S.

11. Morisky DE, Ang A, Krousel-Wood M and Ward H. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens.* 2008; 10(5): 348-54.

12. O Carroll RE, McGregor LM, Swanson V, Masterton G and Hayes PC. Adherence to medication after liver transplantation in Scotland: a pilot study. **Liver Transpl.** 2006; 12(12): 1862-1868.

13. Rodgers H, Bond S and Curless R. Inadequacies in the provision of information to stroke patients and their families. **Age Ageing.** 2001; 30(2): 129-33.

14. Ovbiagele B, Saver JL, Fredieu A, Suzuki S, Selco S and Rajajee V. In-hospital initiation of secondary stroke prevention therapies yields high rates of adherence at follow up. **Stroke.** 2004; 35: 2879-83.

15. Ovbiagele B, Kidwell C, Selco S, Razinia T, Saver J. Treatment adherence rates one year after initiation of a systematic hospital-based stroke prevention program. **Cerebrovasc Dis.** 2005; 20: 280-2.

16. Sides E, Zimmer L, Wilson L, Pan W, Olson D and Peterson ED. Medication coaching program for patients with minor stroke or TIA: a pilot study. **BMC Public Health.** 2012; 12: 549.

17. Duncan PW, Wallace D, Lai SM, Johnson D, Embretson S and Laster LJ. The Stroke Impact Scale version 2.0 evaluation of reliability, validity, and sensitivity to change. **Stroke.** 1999; 30: 2131-40.

18. Hata J, Tanizaki Y and Kiyohara Y. Ten year recurrences after first ever stroke in a Japanese community: the Hisayama study. **J Neurol Neurosurg Psychiatry.** 2005; 76: 368-372.

19. Ogihara T, Kikuchi K, Matsuoka H, *et al.* The Japanese Society of Hypertension Guidelines for the Management of Hypertension. **Hypertens Res.** 2009; 32: 3-107.

20. Wilson B, Cockburn J and Baddeley AD. Rivermead Behavioural Memory Test, Titchfield, Fareham: Thames Valley Test Co; 1985.

21. Jackson N and Waters E. Criteria for the systematic review of health promotion and public health interventions. **Health Promotion International.** 2005; 20(4): 367-74.

22. Horne R. Measuring adherence: the case for self-report. **Intl J Behavioral Med.** 2004; 11:75.

23. Baxter GJ, Lawrence JR, Graham AB, Wiles D, Paterson JR. Identification and determination of salicylic acid and salicyluric acid in urine of people not taking salicylate drugs. **Ann Clin Biochem.** 2002; 39(1): 50-55.

24. Trewby PN, Reddy AV, Trewby CS, Ashton VJ, Brennan G and Inglis J. Are preventive drugs

preventive enough? A study of patients'
expectation of benefit from preventive drugs.
Clin Med. 2002; 2 (6): 527-533.