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A STUDY ON IMPACT OF CLINICAL PHARMACIST INTERVENTION ON HEALTH OUTCOMES AMONG ACUTE ISCHEMIC STROKE PATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Acute Ischemic Stroke (AIS) poses significant challenges globally due to its impact on mortality and disability. Effective interventions are crucial to mitigate these effects, particularly by preventing secondary complications such as recurrent strokes. Medication adherence and patient education play pivotal roles in enhancing outcomes for AIS patients. Clinical Pharmacist intervention has emerged as a promising approach to improve medication adherence and patient knowledge, thereby potentially reducing the risk of secondary strokes. This study aims to evaluate the impact of Clinical Pharmacist intervention on Knowledge, Medication Adherence, and Quality of Life among AIS patients, offering valuable insights for optimizing stroke care protocols.

Methods: A six-month prospective observational study was conducted at the Department of Neurology, Pushpagiri Medical College Hospital, involving 76 AIS patients selected based on predefined criteria. Data on patient demographics, knowledge, attitudes, practices, medication adherence, and quality of life were collected using a structured proforma. Statistical analysis was performed using SPSS.

Results: Among the 76 participants, predominantly male and aged 71-80 years, significant improvements were observed post-intervention. Knowledge scores increased from 1.09 to 4.54,

attitudes improved from 2.67 to 4.20, and practices enhanced from 3.46 to 4.51. Medication adherence scores notably rose from 3.58 to 6.67, reflecting better adherence following Clinical Pharmacist intervention. Quality of life assessments also showed marked improvement, increasing from 3.86 to 7.79.

Conclusion: This study underscores the critical role of Clinical Pharmacists in enhancing Medication Adherence and Quality of Life among AIS patients through tailored interventions. By addressing both technical and psychosocial aspects of care, pharmacists contribute significantly to holistic stroke management strategies. Integrating pharmacist expertise into healthcare frameworks can lead to improved outcomes and well-being for stroke survivors, emphasizing the importance of collaborative interdisciplinary approaches in stroke care.

Keywords: Acute Ischemic Stroke; Knowledge; Attitude; Practice; Medication Adherence; Quality of Life; Clinical Pharmacist

INTRODUCTION

Stroke is among the most prevalent causes of disability and is the second leading cause of death worldwide in Western countries **[1]**. Stroke is defined by the World Health Organization as a clinical syndrome consisting of rapidly developing clinical signs of focal (or global in case of coma) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin **[2]**. The prevalence of stroke has increased by 50 percent over the last 17 years, and at present, 1 in 4 people are at risk of getting a stroke in their lifetime **[3, 4]**. Acute Ischemic Stroke (AIS) is one of the main causes of death and the major cause of disability globally. After a first stroke, it is estimated that 11% of individuals will have a recurrence within a year and 26% within 5 years **[5]**. Evidence suggests that secondary prevention through the management of risk factors, such as hypertension, dyslipidemia and the use of antiplatelet treatment can reduce the risk of stroke recurrence by up to 30% **[6, 7, 8]**. There are numerous risk factors for stroke, including both modifiable (eg: diet and comorbid conditions) and nonmodifiable risk factors (eg: age, race). Seizures, deep vein thrombosis, pulmonary embolism, urinary infection, are among the most common short-term poststroke complications.

In addition, long-term sequelae include pain syndromes, pseudobulbar affect, depression and anxiety, cognitive impairment and dementia, epilepsy, gait instability and motor impairment, and fractures followed by repeated falls and osteoporosis **[9]**. With an aging global population, the importance of effective interventions by healthcare professionals to reduce stroke risk and improve treatment outcomes is well recognised **[10]**. While primary prevention

interventions have the potential to reduce the risk of stroke in asymptomatic people, secondary prevention interventions potentially reduce the risk of recurrence **[11]**. In general, one of the main goals in stroke reduction is to control vascular risk factors such as hypertension, diabetes, dyslipidemia, and smoking cessation **[12]**. Adequate general knowledge about stroke could result in a quick and correct identification of stroke thus good management within the estimated time **[13]**. A good knowledge regarding Stroke can also improve the Medication Adherence of patients. Adherence can be summarized as "The extent to which a person's behaviour taking medication, following a diet, and/or executing lifestyle changes-corresponds with agreed recommendations from a healthcare provider" **[14]**. Stroke events were almost twice as high in non-adherent study participants and remained independently predictive of adverse events after adjusting for baseline disease severity and known risk factors **[15-21]**.

Health Related Quality of Life (HRQoL) related to stroke and life satisfaction after stroke are important healthcare outcomes that have not received sufficient attention in the literature. HRQoL assessment includes at least 4 dimensions: physical, functional, psychological, and social health **[22, 23]**.

The Clinical Pharmacist is recognized for acting together with other health team professionals and patients, and for performing Pharmacotherapy Interventions (PIs) that enhance drug therapy's effectiveness and safety **[24, 25]**. Pharmacists as an integral part of the health care team can play a significant role in improving patient's awareness and knowledge and are in a key position to track adherence to drug therapy. Pharmacist involvement can improve disease and disability prevention, decrease the need for medical treatment, lower heath care costs and most important, improve patient's quality of life.

MATERIALS AND METHODS

A single centered, hospital based, prospective observational study was conducted in the Department of Neurology, Pushpagiri Medical College Hospital, Thiruvalla, Kerala, India for a duration of 6 months including a total of 76 patients.

Inclusion criteria

- Patients diagnosed with Acute Ischemic Stroke admitted to the Department of Neurology, Pushpagiri Medical College Hospital, Thiruvalla, Kerala, India.
- Both male and female inpatients.
- Age group: 45 years and above.
- Those who give consent to participate in the study.

Exclusion criteria

- Patient who are not willing to give consent.
- Patient who lost the follow up.

The sample size obtained was n=76 using the formula;

Sample size, n = 2

$$\frac{[Z\alpha] \times PQ}{d^2}$$

STUDY PROCEDURE

The study involved Acute Ischemic Stroke patients, identified through specific inclusion and exclusion criteria, who provided written informed consent. Data collection included demographic details, medical history, current drug treatment, and other relevant information using data collection performa. The study assessed Knowledge, Attitude, and Practice (KAP) regarding stroke and its treatment, Medication Adherence, Quality of Life, and functional outcomes using self structured questionnaires. The Modified Rankin Scale (mRS) was used to evaluate stroke severity. KAP was initially assessed during the first visit, followed by patient counseling and distribution of educational leaflets. KAP were reassessed in the first week and Medication Adherence and Quality of Life were assessed during that period and reassessed again after one month during a follow-up visit. Counselling focused on the importance of Medication Adherence, Rehabilitation, and Quality of Life. Pre and post-test scores were compared and analyzed.

STATISTICAL ANALYSIS

Pre and post test scores of KAP, Medication Adherence, Quality of Life were compared using Paired T test. Data were organised, tabulated, analysed and described with the help of tables and graphs using Statistical Package for Social Sciences (SPSS). P value of <0.05 was considered statistically significant.

RESULTS AND DISCUSSION

The present study evaluated the impact of Clinical Pharmacist intervention on health outcomes in 76 Acute Ischemic Stroke patients.

1. Prevalence of risk factors for stroke among the study population

The study's demographic profile predominantly featured an older population, with most participants aged 71-80, aligning with the known increased stroke risk with age. 59.2% were male participants, consistent with higher stroke risk factors in males such as smoking, alcohol consumption, and occupational stress. 48.68% of the patients did not have a social history of smoking or drinking, emphasizing the importance of cessation interventions. 86.84% had a family history of Acute Ischemic Stroke, highlighting the need for family history awareness to identify higher-risk individuals. 46% of the patients had education only up to SSLC, resulting in poor stroke knowledge due to limited social networking and access to education. Hypertension was the most prevalent

comorbidity accounting for 67.10%, followed by Diabetes mellitus (56.60%) and Previous Stroke (23.40%), contributing to stroke risk. Most patients (35.52%) had two comorbidities, increasing stroke recurrence risk and complicating treatment. The study found that older participants experienced moderate to severe stroke (36.80%) due to prevalent risk factors. Recurrent stroke occurred mostly within one year and within 6 months both accounting for about 36.36%, underscoring the necessity for effective secondary prevention strategies.

2. Knowledge, Attitude, Practice

The study revealed that baseline knowledge among participants regarding stroke, its complications, and medications was low, as assessed by the KAP questionnaire. This knowledge significantly improved after educational sessions and follow-up, with highly significant differences from 1.09 to 4.54 ($P \leq 0.001$). The present study showed that Attitude scores increased from 2.67 to 4.20 ($P \leq 0.001$). Improved attitudes led to better engagement in stroke management and positively influenced practice scores which increased from 3.46 to 4.51 ($P \leq 0.001$).

3. Medication Adherence among stroke patients

The study found that patients initially had low Medication Adherence scores due to a lack of awareness about indications, side effects, and the consequences of missed or double doses. Post-intervention counseling, aided by a leaflet, significantly improved adherence with scores increasing from 3.58 to 6.67 ($P \leq 0.001$). Improved adherence is crucial for preventing recurrent strokes and enhancing patient outcomes.

4. Quality of life and Functional Outcome

The study demonstrated significant improvements in patients' Quality of Life (QoL) and Functional Outcome across multiple domains post-intervention ($P \leq 0.001$), as assessed by the Quality of Life questionnaire. This improvement was attributed to adherence to medications and physiotherapy, emphasized during counseling sessions. Notable improvements were seen in Energy, Language, Mobility, Mood, Social Role, Personality, Self-Care, Upper Extremity function, and Work Productivity. However, no significant changes were observed in the Thinking and Vision domains ($P > 0.001$) due to the limited role of Clinical Pharmacists in these areas.

Table 1: Prevalence of risk factors for Stroke among the study population

Demographics		Frequency (N=76)	P-Value
Age (Years)	<50	7 (9.2%)	<0.001*
	51-60	15 (19.8%)	
	61-70	20 (26.3%)	
	71-80	26 (34.2%)	
	>80	8 (10.5%)	
	Total	76 (100%)	
Gender	Male	45 (59.2%)	<0.001*
	Female	31 (40.8%)	
	Total	76 (100%)	
Social History	Smoking	15 (19.74%)	<0.001*
	Alcohol	4 (5.26%)	
	Both	20 (26.32%)	
	None	37 (48.68%)	
	Total	76 (100%)	
Family History	Yes	10 (13.16%)	<0.001*
	No	66 (86.84%)	
	Total	76 (100%)	
Educational Level	Primary [Upper+ Lower]	30 (39.5%)	<0.001*
	SSLC	35 (46%)	
	Degree	11 (14.5%)	
	Total	76 (100%)	
Comorbidities	Hypertension	51 (67.10%)	<0.001*
	Diabetes Mellitus	43 (56.60%)	
	Previous Stroke	22 (23.40%)	
	Hyperlipidemia	8 (10.50)	
	CKD	5 (6.60%)	
	CAD	4 (5.30%)	
	Others	14 (18.40%)	
	Total	76 (100%)	
Number of Comorbidities	No comorbidity	7 (9.21%)	<0.001*
	One comorbidity	20 (26.32%)	
	Two comorbidities	27 (35.52%)	
	Three comorbidities	15 (19.74%)	
	More than 3 comorbidities	7 (9.21%)	
	Total	76 (100%)	
Stroke Severity	No stroke symptoms	5 (6.58%)	<0.001*
	Minor Stroke	13 (17.10%)	
	Moderate Stroke	15 (19.76%)	
	Moderate to Severe Stroke	28 (36.80%)	
	Severe Stroke	15 (19.76%)	
	Total	76 (100%)	
Recurrence of Stroke	Within 1 year	8 (36.36%)	<0.001*
	Within 6 months	8(36.36%)	
	Within more than 1 year	6 (27.28%)	
	Total	22 (100%)	

Table 2: Knowledge, Attitude, Practice among Stroke patients

Domain	Time	Mean score	SD	st statistic# & P value
Knowledge	Pre intervention	1.09	0.882	t= 27.621 p<0.001*
	Post intervention	4.54	0.701	
Attitude	Pre intervention	2.67	0.999	t= 10.393 p<0.001*
	Post intervention	4.20	0.783	
Practice	Pre intervention	3.46	1.113	t= 7.585 p<0.001*
	Post intervention	4.51	0.683	
Overall	Pre intervention	7.22	1.823	t= 22.471 p<0.001*
	Post intervention	13.25	1.443	

*Paired t test, * Statistically significant at p <0.05*

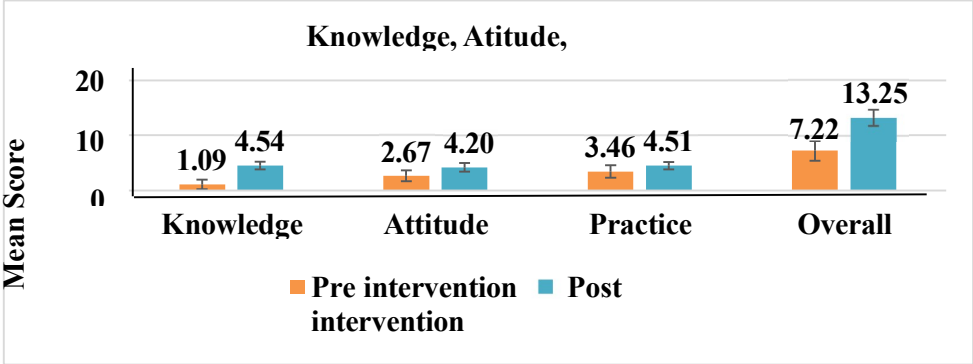

Figure 2: Knowledge, Attitude, Practice among Stroke patients

Table 3: Medication Adherence towards Stroke treatment

Parameter	Time	Mean score	SD	Test statistic# & P value
Medication adherence score	Pre intervention	3.58	1.214	t= 18.210 p<0.001*
	Post intervention	6.67	1.171	

*Paired t test, * Statistically significant at p <0.05*

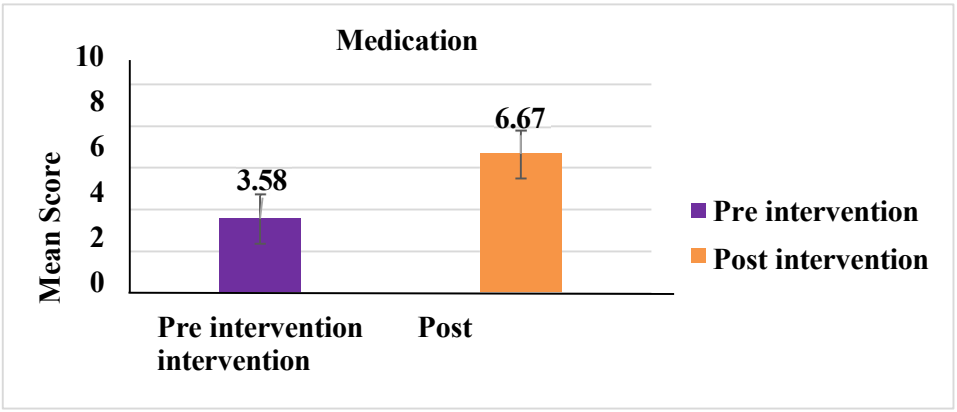

Figure 3: Medication Adherence towards Stroke treatment

Table 3: Quality of Life and Functional Outcomes among post Ischemic Stroke patients

Parameter	Time	Mean score	SD	Test statistic# & P value
Quality of life	Pre intervention	3.86	2.102	t= 21.740 p<0.001*
	Post intervention	7.79	1.948	

*Paired t test, * Statistically significant at p <0.05*

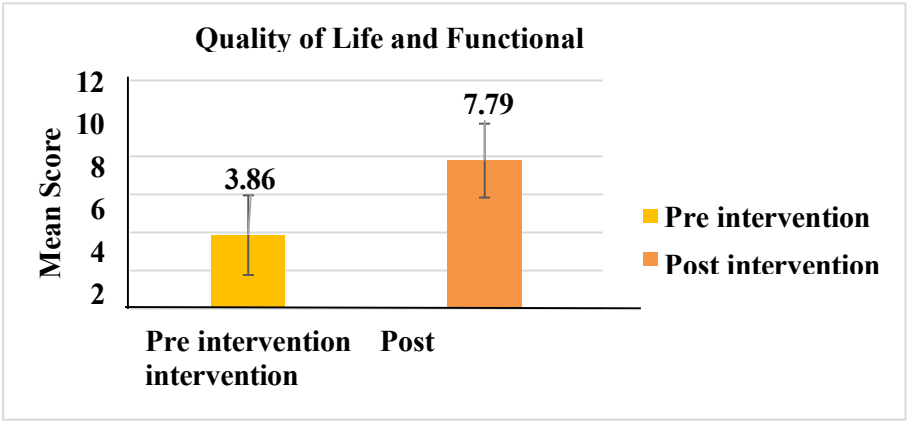

Figure 4: Quality of Life and Functional

Table 4: Comparison of change in various QOL domains following intervention.

QOL Domain	Good QOL Score		Test Statistic[#] & P value
	Pre intervention N (%)	Post intervention N (%)	
Energy	11(19.6%)	45(80.4%)	$\chi2$ =32.685, P<0.001*
Family Roles	17(37%)	29(63%)	$\chi2$ =4.489, P=0.034*
Language	20(29%)	49(71%)	$\chi2$ =22.321, P<0.001*
Mobility	14(20.3%)	55(79.7%)	$\chi2$ =44.615, P<0.001*
Mood	33(34.7%)	62(65.3%)	$\chi2$ =23.607, P<0.001*
Personality	35(40.2%)	52(59.8%)	$\chi2$ =7.768, P=0.005*
Self-Care	16(21.9%)	57(78.1%)	$\chi2$ =44.306, P<0.001*
Social Roles	14(27.5%)	37(72.5%)	$\chi2$ =15.610, P<0.001*
Thinking	42(46.7%)	48(53.3%)	$\chi2$ =0.981, P<0.322
Upper Extremity Function	28(32.6%)	58(67.4%)	$\chi2$ =24.101, P<0.001*
Vision	50(48.5%)	53(51.5%)	$\chi2$ =0.271, P=0.603
Work Productivity	13(21.7%)	47(78.3%)	$\chi2$ =31.832, P<0.001*

[#] *Chi-square test, * Statistically significant at p <0.05*

CONCLUSION

The KAP study highlights the crucial involvement of clinical pharmacists in stroke care, focusing on their influence on medication adherence, quality of life, and patient education. It recommends integrating pharmacists into multidisciplinary stroke teams to optimize treatment, minimize errors, and empower patients. Future directions include strengthening interdisciplinary collaboration, expanding pharmacist roles in medication management, and exploring innovative approaches such as telehealth and specialized clinics to enhance stroke care outcomes. Implementing these strategies promises to elevate the overall quality of stroke care and positively impact patient lives.

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Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/ publication of this article.

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Ethical consideration

Institutional Research/ Human Ethics Committee approval was obtained.

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