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Research article

Effectiveness of sensory stimulation program on neurological status of patients with stroke

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Abstract

The government is focusing on early diagnosis, management, infrastructure, public awareness and capacity building at different levels of health care for all the non-communicable diseases including stroke. **Aim:** The aim of this quasi experimental study is to assess the Effectiveness of Sensory Stimulation Program on neurological status of Patients with stroke. **Methods:** A quantitative approach with quasi-experimental non-equivalent pretest posttest design was adopted for the present study. **Results:** For hemispheric stroke scale two sample t-test for comparison of experimental and control group is used. P-values for this comparison were 0.027, 0.001, 0.000, 0.000 and 0.000 on days 7, 21, 42, 63, and 84. The neurological status of experimental and control group patients was found to be significantly different on day 7, day 21, day 42, day 63 and day 84. For Barthel Index scale of activities of daily living also two sample t-test for comparison of experimental and control group. P-values for this comparison were 0.322, 0.001, 0.002, 0.000 and 0.000 on days 7, 21, 42, 63, and 84. The neurological status of experimental and control group patients was not significantly different on week 7 and it was found to be significantly different on day 21, day 42, day 63 and day 84. SSP was found to be significantly effective in improving the neurological status of patients with stroke. **Conclusion:** No problem was faced during the pilot study. The findings of the pilot study revealed that it is feasible to conduct the study.

Keywords: Barthel Index, Hemispheric stroke scale, Neurological status, Sensory stimulation program, Stroke.

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1. Introduction

Stroke is one of the leading causes of mortality and morbidity worldwide. Approximately 20 million people each year will suffer from stroke and of these 5 million will not survive [1]. Developing countries account for 85% of global deaths from stroke [2-4]. Stroke is also a leading cause of functional impairments, with 20% of survivors requiring institutional care after 3 months and 15% - 30% being permanently disabled [5]. Stroke is a life-changing event that affects not only the person who may be disabled, but their family and caregivers. Utility analyses show that a major stroke is viewed by more than half of those at risk as being worse than death [6]. Effective screening, evaluation, and management strategies for stroke are well established in high-income countries but these strategies have not been fully implemented in India [7-10].

Developing countries like India are facing a double burden of communicable and non-communicable diseases. Stroke is one of the leading causes of death and disability in India [11]. The estimated adjusted prevalence rate of stroke range, 84-262/100,000 in rural and 334-424/100,000 in urban areas. The incidence rate is 119-145/100,000 based on the recent population based studies. There is also a wide variation in case fatality rates with the highest being 42% in Kolkata [12]. Stroke units are predominantly available in urban areas that too in private hospitals. Intravenous (IV) and intra-arterial thrombolysis (IA) are commonly used in India. In the on-going Indo USA National stroke registry the rate of IV thrombolysis is 11%. Stroke rehabilitation is not well

developed in India due to lack of personnel [13-17]. Organized rehabilitation services are available in the country but they are mainly in private hospitals of the cities. Even though India is a leading generic drugs producer still many people can't afford the commonly used secondary prevention drugs. As a first step the Government of India has started the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS) [18]. The government is focusing on early diagnosis, management, infrastructure, public awareness and capacity building at different levels of health care for all the non-communicable diseases including stroke. An organised effort from both the government and the private sector is needed to tackle the stroke epidemic in India [19-20].

The aim of the study was based on quasi experimental study to assess the Effectiveness of Sensory Stimulation Program on neurological status of Patients with stroke. The objective of the study was to assess the neurological status in experimental and control group before the implementation of SSP, Assess the neurological status in experimental group after the implementation of SSP, Assess the effectiveness of SSP on neurological status, and to associate the findings with selected demographic variables.

A conceptual framework is prepared based on Sr. Callista Roy's Adaptation Model

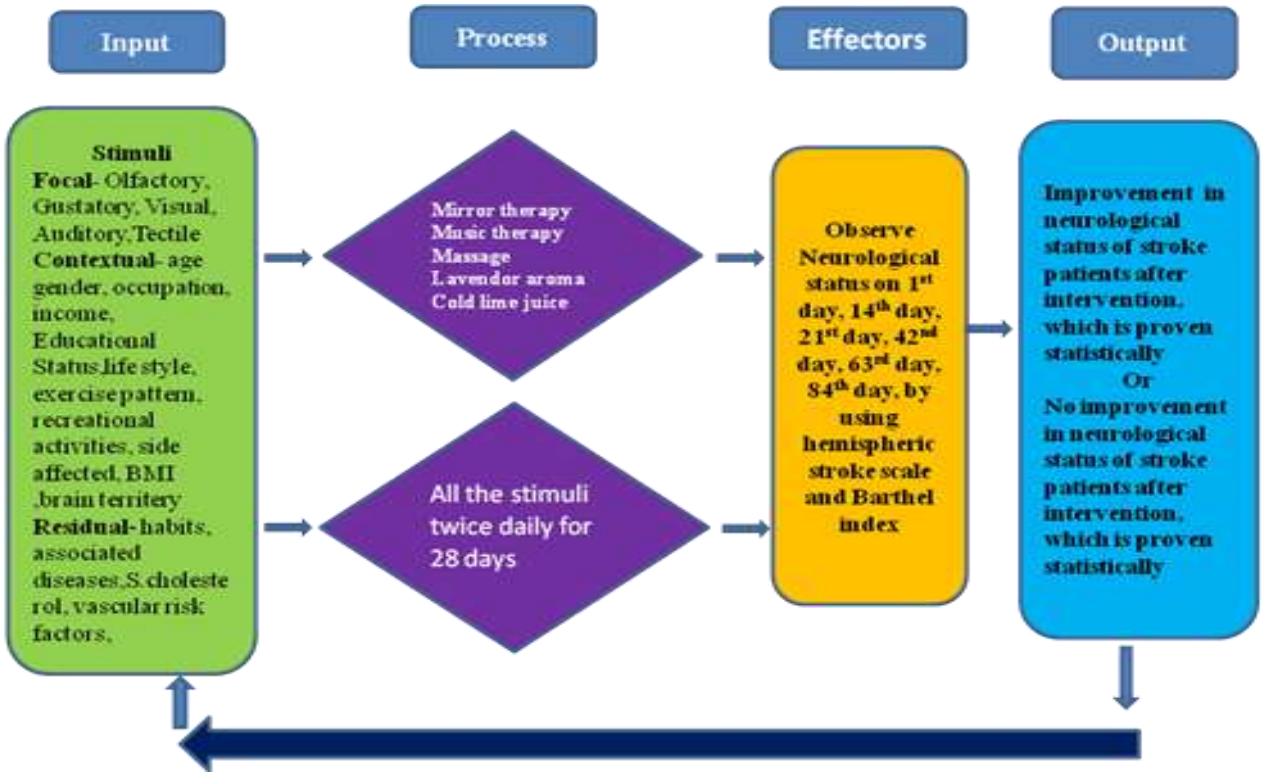

Figure 1: Conceptual framework to show the effectiveness of sensory stimulation programme on Neurological Status of patients with stroke based on Sr. Callista Roy's Adaptation Model.

2. Methods

Quantitative quasi experimental approach pre test-post test control group design had been adopted for the present study. The dependent and independent variables in the study were neurological status and sensory stimulation programme respectively. Pilot study was conducted at Bharati Hospital and Research Centre Pune. Total 16 patients, 8 patients in experimental and 8 in control group were selected by using non probability purposive sampling technique according to the inclusion criteria of the sample i.e Had stable vital signs at least for last 24 hours, Patients with ischemic and hemorrhagic stroke, MMSE score between 10-25 i.e. mild to moderate degree of impairment, and GCS score 9-15. Persons with psychological and cognitive disorder, Chronic and secondary stroke, past history of brain injury or any other cerebral pathology, seizure, blindness, hearing loss, or color blindness. (or h/o any neurological deficit), Had Cardiac arrest, Patients with TIA, Patients with stroke due to any other reason, Patients with craniotomy for stroke, Patients with H/O neuropathy, PVD, Alzheimer, leprosy were excluded for the study. Modified Hemispheric Stroke Scale and Barthel Index Scale are selected for data collection.

Reliability was assessed using inter-rater method. Samples for reliability: 20. Cohen's Kappa was found to be 0.98. Tool is validated by experts from related fields. Sensory Stimulation Program covers all five sensory

modalities, namely, Tactile, Gustatory, Olfactory, Auditory, and Visual senses. The stimulus is selected keeping in mind all age group people and is harmless to human beings but provokes the sensory organs effectively. Protocol is prepared for the administration of ssp. The SSP is given to samples when they are admitted in wards and after discharge in home.

Data collection (experimental group)

Obtained administrative approval. Selection of the sample according to inclusion criteria. 1st day assessed the neurological status by using hemispheric stroke scale and Barthel Index. SSP is given. Continued giving SSP for 28 days. Neurological status is assessed on 7th, 21st, 42nd, 63rd and 84th days.

Data collection (control group)

Selection of the sample according to inclusion criteria. 1st day: Assessed the neurological status by using hemispheric stroke scale And Barthel Index. No interventions are done. Neurological status is assessed on 7th, 21st, 42nd, 63rd, and 84th days.

3. Result

Table 1: Demographic data analysis

Demographic variable	Control group		Experimental group	
	Freq	%	Freq	%
Age				
31-50 years	1	12.5	1	12.5
51-70 years	6	75.0	6	75.0
>70 years	1	12.5	1	12.5
Gender				
Male	5	62.5	5	62.5
Female	3	37.5	3	37.5
Occupation				
Self employed	2	25.0	2	25.0
Unemployed	6	75.0	6	75.0
Monthly family income				
Rs. 5000-15000	5	62.5	4	50.0
Rs. 15001-25000	3	37.5	4	50.0
Educational status				
Literate	7	87.5	4	50.0
Illiterate	1	12.5	4	50.0
Family Type				
Nuclear	2	25.0	3	37.5
Joint	6	75.0	5	62.5
Habits				
No habits	2	25.0		0.0
Smoking, Using tobacco	0	0.0	1	12.5
Smoking	0	0.0	2	25.0
Smoking, Alcohol	1	12.5	1	12.5
Using tobacco	3	37.5	4	50.0
Using tobacco, Alcohol	1	12.5	0	0.0
Alcohol	1	12.5	0	0.0
Food				
Non-vegetarian	8	100.0	8	100.0
Physical activities				
Sedentary	5	62.5	3	37.5
Moderate	3	37.5	5	62.5
Exercise				
<1hour	2	25.0	2	25.0
1 to 3 hours	3	37.5	5	62.5
> 3 hours	3	37.5	1	12.5

Table 1 show that the demographic variables data, in this divide into control group and experimental group, the age between 51-70 years shows more frequency as well as percentage as compared to other age group i.e. frequency 6 times and percentage is 75%. When compared with gender, Male has high percentage than female in control as well as experimental group i.e. 62.5%. While comparing with occupational between the ratio employed and unemployed in this the ratio of unemployed occupation is high as compared to employed occupation viz. 75%. Demographic analysis showed that the surviving condition going on the person to person.

Table No 2: Clinical variables analysis

Demographic variable	Control group		Experimental group	
	Freq	%	Freq	%
Side affected				
Right	3	37.5	4	50.0
Left	5	62.5	4	50.0
Weight				
Obese	7	87.5	5	62.5
Over weight	1	12.5	1	12.5
Normal	0	0.0	2	25.0
Cholesterol level				
<200mg/dl	1	12.5	1	12.5
200mg/dl -250 mg/dl	5	62.5	6	75.0
251mg/dl -300 mg/dl	2	25.0	1	12.5
Vascular risk factors				
Hypertension, Diabetes mellitus	1	12.5		0.0
Hypertension, Diabetes mellitus, Hypercholesterolemia	3	37.5	1	12.5
Hypertension, Diabetes mellitus, Hypercholesterolemia, Coronary artery disease	1	12.5	2	25.0
Hypertension, Diabetes mellitus, Coronary artery disease	0	0.0	1	12.5
Hypertension, Hypercholesterolemia, Coronary artery disease	1	12.5	4	50.0
Diabetes mellitus, Hypercholesterolemia	1	12.5	0	0.0
Hypercholesterolemia	1	12.5	0	0.0
Cerebral arterial territory				
Anterior cerebral artery-right	1	12.5	0	0.0
Middle cerebral artery-left	0	0.0	6	75.0
Middle cerebral artery-right	4	50.0	2	25.0
Any other cerebral artery	3	37.5	0	0.0
Stroke Type				
Ischemic	5	62.5	4	50.0
Hemorrhagic	3	37.5	4	50.0

Table 2 shows that the clinical variable analysis, in control group the obese weight is high as compared to experimental group i.e. 87.5%. Cholesterol level is high in both control and experimental group 62.5% and 75% respectively. Ischemic Stroke type is most dangerous compared to other while comparing control group and experimental group

Table No 3: The neurological status of the patients with stroke based on Barthel Index score in experimental and control group before the implementation of SSP

Day	Dependence	Experimental		Control	
		Freq	%	Freq	%
1st day	Total dependence	8	100.0	8	100.0
	Severe dependence	0	0.0	0	0.0
	Moderate dependence	0	0.0	0	0.0
	Slight dependence	0	0.0	0	0.0
	Independence	0	0.0	0	0.0

Table 3 shows that on day 1st, all of them from experimental and control group had total dependence. Frequency of total dependence is 8 times as compared to others.

Table No 4: The neurological status of the patients with stroke based on Hemispheric Stroke Scale in experimental and control group before the implementation of SSP

Day	Neurological status	Experimental		Control	
		Freq	%	Freq	%
1st day	Good	0	0.0	0	0.0
	Satisfactory	0	0.0	1	12.5
	Bad	8	100.0	7	87.5

Table 4 shows that, on day 1st, all of the stroke patients had bad neurological status. In control group, 87.5% of them had bad neurological status and 12.5% of them had satisfactory neurological status.

To assess the neurological status of the patients with stroke in experimental and control group after the implementation of SSP only to experimental group.

The neurological status based on Barthel Index score of the patients with stroke in experimental and control group after the implementation of SSP only to experimental group.

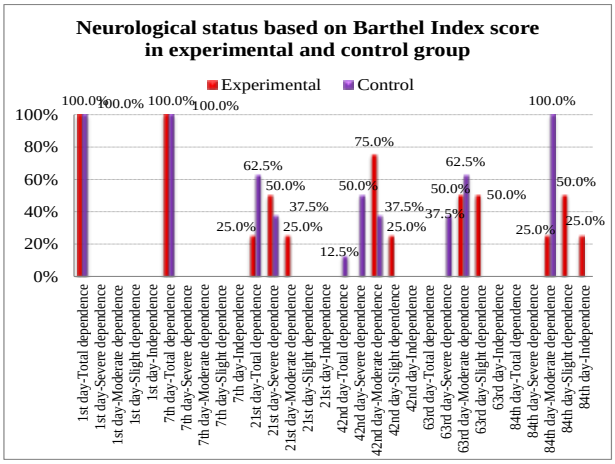

Figure 2: The neurological status based on Barthel index score in experimental and control group

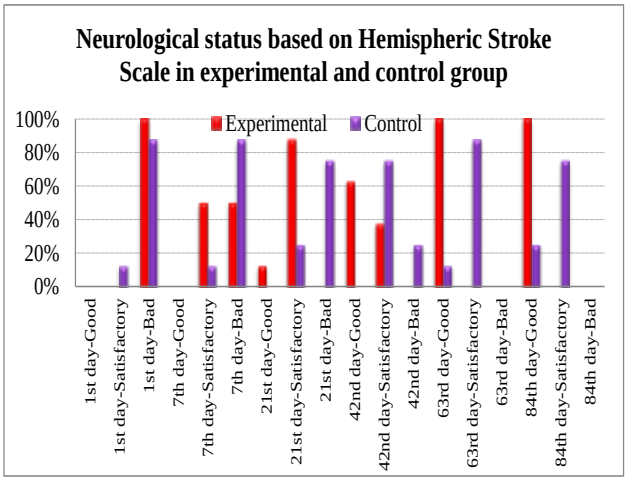

Figure 3: The neurological status based on Hemispheres stroke scale in experimental and control group

Table No 5: Two sample t-test for comparison of experimental and control group based on Barthel Index score

Day	Experimental group		Control group		T	df	p-value
	Mean	SD	Mean	SD			
7th day	5.6	5.0	4.4	5.6	0.5	14	0.322
21st day	36.9	11.0	18.8	7.4	3.9	14	0.001
42nd day	55.0	8.9	36.3	11.9	3.6	14	0.002
63rd day	63.8	7.4	43.8	5.2	6.2	14	0.000
84th day	74.4	12.4	52.5	4.6	4.7	14	0.000

Table 5 shows that the two sample t-test for comparison of experimental and control group based on Barthel Index score. Mean value of experimental group is high in 84th day i.e.74.4 and control group is 52.5.

Table No 6: Two sample t-test for comparison of experimental and control group based on Hemispheric Stroke Scale

Day	Experimental group		Control group		T	df	p-value
	Mean	SD	Mean	SD			
7th day	12.1	3.7	7.6	4.8	2.1	14	0.027
21st day	25.9	5.3	16.4	4.5	3.9	14	0.001
42nd day	36.9	7.4	21.3	4.5	5.1	14	0.000
63rd day	48.9	7.6	29.5	5.5	5.8	14	0.000
84th day	56.6	5.8	35.6	7.4	6.3	14	0.000

Table 6 shows that the two sample t-test for comparison of experimental and control group based on Hemispheric Stroke Scale. In Hemispheric stroke scale the experimental group of 84th day shows the highest mean value i.e. 56.6 and control group is 35.6.

Table No 7: To assess the effectiveness of SSP on neurological status of the patients with stroke based on Barthel Index score.

Day	Mean	SD	T	df	p-value
1st day	0.0	0.0			
7th day	5.6	5.0	3.2	7	0.007
21st day	36.9	11.0	9.5	7	0.000
42nd Day	55.0	8.9	17.5	7	0.000
63rd day	63.8	7.4	24.2	7	0.000
84th day	74.4	12.4	17.0	7	0.000

Table 7 shows that assess the effectiveness of SSP on neurological status of the patients with stroke based on Barthel Index score. The neurological status of patient shows the mean value is 74.4 in 84th day based on Barthel index score.

Table No 8: To assess the effectiveness of SSP on neurological status of the patients with stroke based on Hemispheric Stroke Scale.

Day	Mean	SD	T	df	p-value
1st day	74.9	3.8			
7th day	62.8	4.7	9.3	7	0.000
21st day	49.0	5.4	13.8	7	0.000
42nd day	38.0	7.5	14.1	7	0.000
63rd day	26.0	7.1	18.2	7	0.000
84th day	18.3	5.5	27.7	7	0.000

Table 8 shows that assess the effectiveness of SSP on neurological status of the patients with stroke based on Hemispheric Stroke Scale. In this 74.9 mean in 1st day i.e. compared to 84th day is very high.

4. Discussion

The findings of the study revealed that occurrence of stroke frequency is more in non vegetarian, male with the age group of people between 51-70 years, using tobacco frequently and leading sedentary life [21]. Data also shows that obesity and high cholesterol is commonly seen in stroke patients. Statistical analysis is done based on the assessment of both the tool separately. For hemispheric stroke scale two sample t-test for comparison of experimental and control group is used. P-values for this comparison were 0.027, 0.001, 0.000, 0.000 and 0.000 on day 7, day 21, day 42, day 63 and day 84 [22]. The neurological status of experimental and control group patients was found to be significantly different on day 7, day 21, day 42, day 63 and day 84. SSP was found to be significantly effective in improving the neurological status of patients with stroke [23].

For Barthel Index scale of activities of daily living also two sample t-test for comparison of experimental and control group. P-values for this comparison were 0.322, 0.001, 0.002, 0.000 and 0.000 on day 7, day 21, day 42, day 63 and day 84. The neurological status of experimental and control group patients was not significantly different on week 7 and it was found to be significantly different on day 21, day 42, day 63 and day 84. SSP was found to be significantly effective in improving the neurological status of patients with stroke [24].

Conclusion

No problem was faced during the pilot study. There was full co-operation from the staff and administration. The findings of the pilot study revealed that it is feasible to conduct the study.

Conflict of interest:

This study has no conflict of interest between the authors.

Ethical approval:

Ethical committee approval is obtained from the Ethical committee of the institution.

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