"If you take the game of life seriously, if you take your nervous system seriously, if you take your sense organs seriously, if you take the energy process seriously, you must turn on, tune in, and drop out”

**Timothy Leary (American Psychologist)**

Human body is structured in a bony framework called skeleton. Skeleton not only gives a shape to human body, but also protects all vital organs of our various systems. Brain which is a part of nervous system and a very important vital organ is protected in the skull as it is very delicate in nature. Nerves cells, fibers, and neurons which are part of nervous system linked with brain cells and maintain body functions like sensations, movements, thoughts, etc. Damage and infection of any part of nervous system may lead to temporary or permanent disability, psychiatric disorders or even death.¹

Stroke or brain attack is the effect of lack of blood circulation to the brain. Deficient blood delivery to brain results in lack of oxygen and nutrients. Brain cells are very sensitive to hypoxia. They stop working within 3-5 minutes if they are not getting oxygen and nutrients. This cell death results in stroke. Stroke is a medical emergency. Immediate treatment can reduce injury to brain and possible complications. There may be stroke due to lack of blood supply from blockage of cerebral arteries or may be due to cerebral haemorrhage.

According to World Health Organization, stroke is defined as ‘sudden dysfunction of a part of nervous system or whole nervous system itself’. Signs and symptoms will be seen abruptly without any prior signal. If the symptoms are very severe and lasting for longer time, may lead to permanent disability or death². Out of 100% cases about 85% cases are with lesions to any part of brain, 10% cases are with intracerebral haemorrhage and 5% cases are due to subarachnoid haemorrhage.

Stroke is the main reason of disability in adults which lasts for a prolonged period. Long-term weakness of motor activity, synergetic movements, and spasticity make patients with stroke to be the victims of a sedentary lifestyle. This adds to the limitation in Activities of Daily Living, diminished cardiac functions, distorted way of walking, and imbalance during walk etc. Improving functional outcome after brain attack has become a challenge for the physiotherapist.
The first three months after stroke are very important for recovery. Early recovery in the first month will boost the functional outcome in chronic phase. So providing an intensive physiotherapy at the earliest may lead to better & quicker progress in doing ADL. A number of optimistic physiotherapy methods have been now in practice for improving motor activities and balance in stroke patients such as virtual reality, treadmill training with body support mental imagery, neuromuscular stimulation and robotic intensive therapy etc.

Stroke is considered as one of the most important causes of mortality and morbidity worldwide. About 20 million people suffer brain attack, out of which five million people die due to brain attack\(^5\). In the developing countries about 85% of worldwide deaths occur from stroke\(^6\). Stroke attack not only makes the person disabled but also makes the family members to suffer. Currently in the developed countries screening and evaluation of health conditions to prevent stroke is well developed. The stroke management strategies are improved and well established, but the conditions still need to be improved in developing countries like India. \(^8\)

A study on stroke Global senses on Stroke Morbidity and Mortality reveal that out of 1, 00,000 population 400 -800 people suffer from stroke. Globally 5.7 million deaths occur due to stroke every year. Every year 15 million people suffer with acute stroke, 0.63 million deaths, 28,500,000 DALYs (disability-adjusted life-year) and 12% of strokes occur in the population aged above 40 years of age.

In India there isn’t much data available regarding stroke morbidity and mortality as the people are not keen to certify death and the reason for death\(^9\). In 1998 even after introduction of a system for recording cause of death, merely 14% of deaths are ever classified. This gives data of death from CVDs of which CVA is a division consist of 24% of all deaths between 1998 and 1999. Since the prevalence of stroke in India is higher in urban as compared with rural areas, this data seems doesn’t seems to be relevent and may be an underestimation\(^10\). In India National Time Trend Estimates are not easily obtainable for CVA. ICMR predict that death due to strokes is greater than before by 8% between 1998 and 2004 (2010). \(^11\)

Certain modifiable risk factors like demographic shift, increased life expectancy, change in lifestyle, food habits, lack physical activity, smoking, hypertension, high cholesterol and a rise in living standards resulted in increased incidents of CVA. Age, sex, low birth weight, ethnicity and hereditary factors are non modifiable risk factors for stroke.
Few studies estimate the risk factors for stroke among the Indian populations, comparison with US population and found that heart disease and smoking appear to be greater risk factors for the Indian compared with the US population. Tobacco plays a major role for non communicable diseases. 37% of population in Maharashtra use tobacco in the form of smoking or chewing. This prevalence is 40% among urban males and 55% among rural males. But the prevalence is very low among women compared to men. But 24% women use tobacco orally in the form of pan or mishri. This type of use of tobacco is high in rural area than urban areas. They usually start eating tobacco at the age of 18-20 years (2009).

It was predicted in a study (2014) that by the year 2015 in India there will be 1.6 millions of CVA cases every year and one among three cases will face disability. According to the estimation by ICMR in 2004 there will be 9.3 lakh stroke cases & 6.4 lakhs deaths due to CVA in India. According to expert’s opinion if death and disability are counted jointly, then India lost 63 lakhs of disability adjusted life years in 2004. According to the estimation by WHO by the year 2050 80% CVA cases found in low socioeconomic group and middle income countries, that too mainly in India and China. This is the reason why India has now come out with ‘National Guidelines for Stroke Management’ prepared by Dr. Kameshwar Prasad Director AIIMS’ Clinical Epidemiology Unit along with some famous doctors from various places from India, to prevent stroke in India. According to Dr. Kameshwar Prasad rising life expectancy, increasing urbanization, changing lifestyles and Stress Levels are the key reasons for increase in stroke cases (2014).

Mr. Suresh Kumar stated in his article ‘stroke fact sheet’ (2012) the prevalence of stroke in Maharashtra state is 220 per one million populations. Men are more likely to suffer from stroke than women, the ratio for 7:1. About ten thousand people suffer from stroke attack every year in Pune.1 According to Asian Indian Advisory Panel (2013), enough information is not available in India regarding stroke prevention or management. Data related to stroke occurrence, management and practice in all three levels i.e. primary, secondary and tertiary is rarely available. There is need of standardization of stroke related information like registration of cases, characteristics of stroke, management of stroke and its outcome, at global level.

An article in DNA (2010) reveals that every day an estimated 20 People in Pune suffer from cerebral strokes. According to the famous neurologist Dr. Sudhir Kothari, good
way of life is the best antidote to prevent stroke prevalence. Dr. Kothari opines that CVA is a second major cause for mortality in India after fist being the cancer. In same article Wing Commander Salil Gupta famous neurologist AFMC stated that in future one in six people may have CVA in his or her life time and rising rate can be because of speedy urbanization and lifestyle changes. According to Chief Managing Director of Sahyadri Hospitals Dr. Charudatta Apte excessive alcohol intake is an additional point to rise in occurrence of blood clots in blood vessels and increase stroke incidence.  

Thrift AG et al (2014) stated that despite its impact on public health in most of the countries, stroke prevention and management is least bothered than other diseases. Unavailability of actual stroke related data is a main hindrance for making national stroke strategies.
BACKGROUND OF THE STUDY

Brain attack or stroke or CVA is considered as 3rd most common cause for mortality and disability in the United States and also all around the world, after cancer and CADs. Studies on epidemiology provide data regarding occurrence, spread and the factors which increase the prevalence of these conditions. An urgent need is there to make more efficient health services for prevention & management of this problem. Stroke is now considered as a main cause for premature deaths and disability in low and middle income countries like India. This is the reason why now India is suffering from double burden of both communicable and non communicable diseases. If a family member suffers a stroke then the family or care givers are affected economically, socially and also psychologically. Mainstream of stroke survivors continue their living with residual effects of stroke like physical disability emotional impairments. The cost required for rehabilitation and prolonged care needs to be borne by family members, leads to deprive them in many aspects of daily living.

According to Dr. Ichaporia Dept. of Neurology Jahangir Hospital Pune Maharashtra, stroke which was thought to be a disease of the elderly is now a problem with younger age group also. (Umesh 2015).\textsuperscript{1}

Govt. of India has started the National Programme for prevention and control of cancer, DM, CVDs & CVA. Early diagnosis, treatment, good hospital setup, creating awareness in people, improving management in all levels is now the main motto of government regarding non communicable diseases including brain attack. Even private sector needs to take interest in this matter and needs to help government to enhance the programme (2008).\textsuperscript{18} Emotional and behavioural changes are very common in stroke patients. Post stroke effects like forgetfulness, carelessness, irritability, anxiety anger, depression and confusion are commonly faced by all stroke victims. These effects are due to altered brain function. Post stroke dependency makes the victims to think that they were failures in life and are burden on others and on society. Elderly Stroke victims suffer more as the body is not able to cope with available treatment and rehabilitation programme. Frequently impairments are interrelated to motor and cognitive performance, language, and temper. Research studies and practices had given more importance to the problems causing difficulties in ADL and communication problems (2013).\textsuperscript{3}

Human sense organs i.e. eyes, ears, nose etc have capacity to convert light and sound waves into sensory impressions. The nerves in oral cavity and in nose convert certain
molecules into taste and smell. The nerves in the skin which cover almost whole body convert force & heat into the sensations that we feel. But behind all these sensory functions not only nerves are in action but also it is the brain that converts all stimuli into a sensation. So if we stimulate any sensory organ means we are stimulating our brain (2011)\(^3\).

All sense organs contain receptor cells that are specifically sensitive to one class of stimulus energies, usually within a restricted range of intensity. Such selectivity means that each receptor has its own ‘adequate’ or proper or normal stimulus, as for example, light is the adequate stimulus for vision (2017).\(^4\)

The brain has the capacity to recover after injury during the first few weeks and months which can be further improved by providing environmental or manual stimulation. This is called brain spasticity\(^4\). Providing stimulation with various methods like providing virtual environment, electrical and cortical and peripheral stimulation have shown good recovery in stroke patients\(^4\). Providing multimodal stimulation like auditory, visual, olfactory together had shown better recovery in motor and cognitive aspects than providing a single environmental stimulation (2008).\(^20\)

A study by Blackwell W et al (2015) on brain stimulation summaries that providing simple non invasive Transcranial Magnetic Stimulation can help stroke patients to improve motor function significantly. According to the researchers stimulation needs to be provided early to have better effect. Delay in stroke treatment made no difference to the results.\(^21\)

An article by Pornnipa et al (2009) in neuroscience journal defines Sensory Stimulation as a type of treatment that may augment the client’s awareness. SSP can be systematically to stimulate sensory organs. SSP should be with good intensity so that it should reach damaged reticular nerve cells to activate cortical activity. SSP given periodically can facilitate dendritic growth, organization of neurons, reinnervation of synaptic part of nerve, and improve coma status .\(^22\)

Several studies on SSP had proven that, SSP is useful in improving post stroke effects. Studies have shown that many senses have some capacity to recover, which is known as plastic nature of neurons. Hearing and thinking capacities have shown improvement after stroke attack. A study recently conducted by Sarkamo et al (2008) has revealed that hearing music and audio books in early recovery stage of stroke can improve cognition.\(^23\)

Recent findings regarding plasticity of brain have motivated many, to apply newer interventions to stroke rehabilitation. Hospitals treating patients with CVA are providing
better medical and nursing care with task oriented meticulous teaching in a favourable surroundings improve the condition considerably. Brain plasticity takes place at several stages from starting with molecules to cortical reorganization. The outcome is influenced by the location of the lesion, post stroke time, cortical and subcortical connections (2011)^24.
NEED FOR THE STUDY

Father of medicine Hippocrates documented and illustrated about stroke 2400 years back. Since that period till now there is least knowledge and control on this disease, but now the situation is changing, every day new therapies and medicines are coming in practice in clinical areas. In recent days the patients admitted with stroke are back to home with minimal disabilities after getting a prompt treatment. Physicians have identified the main risk factors of stroke, and all newer techniques of treatment and for prevention of stroke (2006). 25

Studies on animals have revealed that the brain injury starts immediately after ischemia and can become irreversible within an hour. In the human beings brain damage starts immediately after stroke and frequently prolong for days later on. There is at least some opportunity now to treat most common forms of strokes. This has given an opportunity to CVA patients to get treated in hospitals with well advanced techniques and a chance of survival. 25

In an article by Sethi et al (2007) on Stroke it is stated that stroke is a neglected epidemic. An Indian perspective authors mentioned that if the prevalence of stroke occurrence in India is same as worldwide (500-800/100000) then India has stroke epidemic. Unfortunately, we are not having adequate statistical data to approximate the burden of brain attack in India. Study of Indian epidemiology revealed that the people in India are from different ethnic groups, religions, different cultures, different food habits and different life styles. Some are pure vegetarians and some compulsory need meat in their diet. Some people use excessive ghee in daily diet which is rich in saturated fat. People from Mizoram till now do not use salt in their diet. Many people eat tobacco and some smoke tobacco.

In stroke rehabilitation and care, nursing plays a very important role. Nursing care is important in all type of care settings like critical care centre, rehabilitation centre, community and home care divisions. Care from a skilled nurse is most important in stroke treatment. Canada is equipped with a well trained stroke nursing force. They are invited from all over the world for various nursing forums related to stroke nursing. 26

In the recent years, nurses are taking interest to conduct researches related to stroke nursing care. They are conducting some researches from pure nursing field and some collaboration studies with other disciplines. But the numbers of studies are very few and are considered as of poor quality. Nursing researches are mainly focused on finding correlations between knowledge and attitudes or on outcome measures. Nurses face problem in
conducting studies because they don’t have power of decision making even in patient care aspects. We need to find out funding sources for nursing studies and collaborative researches (2009). 27

According to Susan F (2000) an American neuroscience nurse there is big gap between neuroscience and Nursing Research related to Neuroscience Nursing since about forty years. There is strong need to conduct studies on planned nursing interventions and patient outcomes. Existence of Health discrepancy in many conditions related to health including neuroscience. There is an utmost need to develop effective tools to measure certain phenomena related to neuronursing by nurses. The gap could be filled by conducting researches in collaboration with the nurses working in clinical areas. 28

A research report from the field of neurology state that dissolving clots by injecting thrombolytic agents is a best option in acute stroke treatment. But it is not practised often because of lack of knowledge regarding recognition of stroke symptoms and inadequate knowledge of treatment of stroke in acute conditions. It is necessary to educate people having high risk factors for stroke with a well prepared stroke education and prevention programme. Stroke symptoms like unable to put their thoughts in to words, loss of vision, tingling and numbness in various body parts were not recognized by the people as stroke symptoms. They express that only paralysis of one side of the body parts is considered as stroke. 29

An article by M. Maureen (2011) in advanced nursing journal state that rehabilitation of patients with neurological disorders needs special nursing skill and now it is considered as a special branch of nursing. Neuro nurses feel that in order to provide best care to patients with neurological disorders they need to improve their knowledge of that discipline. Neurology nurses need to know the current status of nursing research in their field so that they can conduct more researches to achieve high levels of capability. M.Maureen et al in this review study want to validate the existing researches, their quality, weaknesses and gaps that may be filled by future researches. They incorporated a portion of nursing related to rehabilitation of patients with neurological disorders. This study scrutinized the areas like role of nurse in rehabilitation programme, problems faced by patients coming for rehabilitation, few nursing care points like nursing practice, nursing care delivery and interventions related to rehabilitation, and team working. They opine that many studies under review were lacking firmness and generalizability as they were conducted in a single place. 24
Rural areas in India are still not getting enough quality health care facilities. Many rural areas are not having updated data of birth and death. There are no enough medical facilities, physicians, health workers available. In this condition it is difficult to conduct studies related to neuroepidemiology of CVD. If proper data are not available it is not possible to know the burden of various diseases, distribution of resources and also to providing services. (2010).

Researcher has worked in clinical area for a long time. Since then she was rendering nursing care to stroke patients. She was using auditory stimulation often to patients with brain injury and to comatose patients. It was observed that music listening was bringing change in facial expression of patients even though they were not conscious. Since then it was in researcher’s mind to conduct study with multiple stimulation to see the effectiveness on patients with brain injuries.

It is the nursing care which helps the stroke patients once they are out of critical condition. An accurate rehabilitation plan is required to overcome the disability of stroke. Nurses already dealing with stroke patients to give maximum care to a new technique and rehabilitation processes. Still, there are very few studies to prove the effect of aromatherapy and gustatory stimulation therapy in the outcome of stroke patients. Sensory stimulation is cost effective and easy to perform in-home set up by the caregivers also. Keeping these points in mind the Investigator has decided to do a study on this topic.

**STATEMENT OF THE PROBLEM**

A study to assess the effectiveness of Sensory Stimulation Program (SSP) on neurological status of patients with stroke in selected Hospitals of Pune City.

**AIM OF THE STUDY**

To assess the effectiveness of Sensory Stimulation Program on neurological status of patients with stroke.

**OBJECTIVES OF THE STUDY**

1. To assess the neurological status of the patients with stroke in experimental and control group before implementation of the SSP.
2. To assess the neurological status of the patients with stroke in experimental group after the implementation of SSP; and control group.
3. To assess the effectiveness of SSP on neurological status of patients with stroke.
4. To associate the findings with selected demographic variables.
OPERATIONAL DEFINITION OF TERMS

Assess
In this study- ‘Assess’ means to judge the effectiveness of Sensory Stimulation Programme on neurological status of patients with stroke.

Effectiveness
In this study- ‘Effectiveness’ means change in the neurological status of patients with stroke after implementation of sensory stimulation program.

Sensory Stimulation Program (SSP): In this study, ‘Sensory Stimulation Program’ means an experimental therapy that aims to utilize neural plasticity mechanisms to aid in the recovery of somato sensory function after brain function impairment due to traumatic brain injury, brain haemorrhage or cerebral stroke. Neuroplasticity is brain's ability to reorganize itself by forming new neural connections throughout life. Neuroplasticity allows the neurons (nerve cells) in the brain to compensate for injury and disease and to adjust their activities in response to new situations or to changes in their environment. Traumatic brain injury, brain haemorrhage or cerebral stroke are well known sources of cognitive loss, ether by neuronal death, or by weakening of neural connections. Sensory Stimulation Programme is stimulating a patient with desired stimulation of five senses in a predetermined fashion at a known frequency.

Olfactory Stimulation: Means stimulation used to enhance brain activity by providing some fragrance. In this study researcher applied a drop of lavender oil on the pillow and on patient’s dress using a cotton swab at morning and at evening for 28 days. The researcher also applied talcum powder with the lavender aroma on the body.

Auditory stimulation: Means stimulation used to enhance brain activity by providing some music. In this study Auditory stimulation was given by providing Shehanoi music with 50% volume and 50-60 decibel for 30 minutes twice daily at morning and evening. In addition to this researcher was verbalizing with patients regarding their favourite subjects.

Visual stimulation: Visual stimulation was given by providing Mirror Therapy to patients. Mirror therapy stimulates ocular attention and it make the eyes to captures optical signals. In mirror therapy the client’s paralysed hand was placed behind the mirror in such a way that the reflection of the other limb appears as affected limb which was placed behind the mirror box. During the movement or exercise of normal limb, clients observe its reflection in mirror which makes him to feel that his paralysed limb is moving. Observing the reflective image enhance excitability of the ipsilateral motor cortex. MT depicts the use of motor copy
strategy which involves bimanual movements followed by forced use of the paralysed limb. Mirror therapy is given twice daily at morning and evening for 10 minutes for 28 days.

**Tactile Stimulation:** Retrograde massage applied to the affected limbs using coconut oil for lubrication scented with lavender oil daily for 28 days. Massage was given using effleurage and petrissage type strokes.

Steps:

1. **Effleurage:** Effleurage was given using full palmer and flat finger surface of the in a gliding manner.
2. **Petrissage:** Petrissage massage was given by placing the hand in C shape on the areas of massage and then pushed down in to the muscle, grasp it and pull it directly up off the bone. And release in a backward half circle motion. Along with massage ROM Exercise of the affected area for 28 days was given.

**Gustatory Stimulation:** Sour and cold 50% lemon juice was given for drinking twice daily for 28 days

**Neurological Status:** Neurological status was the findings of neurological examination performed by the researcher using hemispheric stroke scale and assessment of dependence status of the samples using The Barthel Index before and after implementation of SSP.

**Patients:** In this study: ‘Patients’ means people admitted to hospitals with ischemic and hemorrhagic stroke having stable vital signs at least for last 24 hours, with, having MMSE score between 10-25 i.e. mild to moderate degree of impairment and GCS score 9-15

**Stroke:** ‘Stroke’ is the the sudden death of brain cells in a localized area of brain due to lack of blood supply which will lead to ischemia to brain cells and cause altered neurological status.  

**HYPOTHESES**

\( H_01 \) – There is no difference in neurological status of patients with stroke after implementation of Sensory Stimulation Program as measured by Hemispheric Stroke Scale at 0.05 level of significance.

\( H_02 \) – There is no difference in dependence level of the patients with stroke after the implementation of Sensory Stimulation Program as measured by Barthel Index scale at 0.05 level of significance.

\( H_03 \) – There is no association between demographic variables with the neurological status of patients with stroke as measured by fisher’s exact test at 0.05 level of significance.
DELIMITATIONS

This study is delimited to stroke patients who are admitted in study settings with

- MMSE score between 10-25 i.e. mild to moderate degree of impairment
- GCS score 9-15

ETHICAL ASPECTS

The study plan was thoroughly scrutinized by the college ethical committee. The ethical principles followed in this research study were as follows:-

Privacy: - No revelation of any information identifying the participant or the study setting was mentioned in the name. Their names were represented as codes in the compiled data sheet. All documents, where the names of the participants were mentioned were kept under the locked cabinet of the Investigator. It was destroyed on completion of the research.

Consent: - Consent was taken from the responsible family member after explaining about the study in Marathi/English. As all sensory stimulations are non invasive and simple it was sure it was not causing any harm to the simples.

Rewards/Promises: - There were no rewards or promises offered to the participants or their relatives. However, the Investigator extended her informational and technical assistance to all the participants to be of any assistance/ support during their period of association with the hospital.

Protection: - The subjects were not exposed to any kind of physical or psychological harm. After discharge the Researcher, went to their house for an intervention. The information gathered also was not misused in any way to exploit the participants.

Information: - The participants were given beneficial information based on recent and evidence based practices of SSP to improve the neurological status of patients with stroke.

Debriefing: - Though complete research design was not explained to the participants since it was difficult but the brief information about the research and its purposes were explained.

Approval: - The study proposal was scrutinized thoroughly by the subject experts to exclude violation of human rights and was agreed upon by the ethical committee board of institution and university.

Permission: - The Investigator had obtained permission to conduct research study from the administrative authorities of the hospitals mentioned in the study.
CONCEPTUAL FRAMEWORK

A conceptual framework is a schematic representation. It provides:

- A theoretical approach to the study of the problem that are scientifically based and which lay emphasis on the selection, arrangement, and clarification of its concepts.
- A certain frame of reference for clinical practice, research and education.
- A direction to research for relevant questions on the phenomenon and points out a solution to practical problems.

The conceptual framework formalizes the thinking process, so that others may read and know the forms of reference basis to the research problem. It deals with elements that are assembled by virtue of their relevance to a common theme. The conceptual framework helps to think, observe, and interpret and to adopt strategies for research.

According to Treece et al. (1996) conceptualization is the outlining of ideas, designs, and plans. It is the process of moving from an abstract idea to a actual proposal. Theoretical framework refers to the interconnected opinions of abstract that are bringing together in some sensible system by the virtue of their significance to a general idea. Conceptual framework as quoted in Polit and Beck give perceptive regarding interrelated phenomena, presenting an understanding of the phenomenon of interest and reflects the assumptions and philosophic views of the model’s design. The purpose of the theoretical and conceptual framework is to make study finding significant and generalizable.

This study adopted Sr. Callista Roy’s Adaptation Model. According to this the human beings are in constant interaction with changing environments. To adjust to this change a human being uses both innate and acquired mechanisms which are biological, psychological and social in origin.

When a person suffers a stroke, there is a complete or partial blockage in blood circulation in the affected area of the brain. Brain plasticity starts immediately after stroke. This helps the brain cells to regain the function to some extent. This happens because of the body’s internal stimulation. Researchers have shown that if the person is provided with multiple external stimuli at the same time the brain plasticity can occur in better speed. In this study, the Researcher is giving sensory stimulation to the patients with stroke to improve their neurological status. Sensory stimulation is an input in the study. The process during stimulation period and with additional two months there may be some changes and processes occurring in both experimental and control group is the throughput. The output in the study is seen by assessing neurological status on 7th, 21st, 42nd, 63rd, and 84th day.
Input in the study:

**Stimuli:**
- **Focal**
  - **Olfactory Stimulation:** applying a drop of lavender oil on the pillow and on patient’s dress using a cotton swab and applying talcum powder on the body with the lavender aroma.
  - **Auditory Stimulation:** Shehanoi music was provided with 50% strength and 50 decibel for 30 minutes twice daily at morning and evening and also researcher spoke directly to patients during interventional period on their interesting topic.
  - **Visual Stimulation:** Mirror therapy
  - **Tactile Stimulation:** Massage.
  - **Gustatory Stimulation:** Sour cold lemon juice 50%/ twice daily to drink.
- **Contextual:** Age, Gender, Education, Physical Activity, Exercise, Occupation, Income, Lifestyle of the samples in the study.
- **Residual:** Vascular Diseases, Habits, Serum Cholesterol Level, Diabetes, HTN.
- **Process in this Study:** Patients in the experimental group received lavender oil aroma as olfactory stimulation, shahnoi music as auditory stimulation, and massage as tactile stimulation, mirror therapy as visual stimulation and cold lime juice as gustatory stimulation for 28 days twice daily.
- **Effectors in this study:** The Researcher observed the neurological status of both experimental and control group of patients on 1st day of contact as pre assessment and series of neurological assessment was done on 7th, 21st, 42nd, 63rd, and 84th-day after the intervention to experimental group only using hemispheric stroke scale and Barthel Index Scale.

**Output in the study:** Based on Hemispheric Stroke Scale the neurological status was interpreted as good, satisfactory and bad. Based on Barthel Index Scale the neurological status is interpreted as total dependence, severe dependence, moderate dependence, slight dependence and independence. Improvement in neurological status or no improvement in neurological status is assessed and proven statistically.
CONCEPTUAL FRAME WORK - ROY’S ADAPTATION MODEL

Figure -1 Conceptual frame work of the study based on Roy’s Adaptation Mode