EFFECTIVENESS OF VIRTUAL REALITY THERAPY UPON SYMPTOMATIC DISTRESS AMONG CANCER PATIENTS

BY

DEBIKA DAS

A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF

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DECLARATION

I do hereby declare that the present dissertation entitled **"Effectiveness of Virtual Reality Therapy upon Symptomatic Distress among Cancer Patients"** is the outcome of the original research carried out by me under the guidance of **Dr. Latha Venkatesan, M.Sc. (N), M. Phil. (N), Ph.D. (N), MBA (HM), Ph.D. (HDFS),** Principal, Apollo College of Nursing, Chennai, **Mrs. J. Jaslina Gnanarani, M.Sc. (N),** Reader, Medical-Surgical Nursing, Apollo College of Nursing, Chennai and **Dr. M. Kumaresan, MBBS, DLO, MS-ENT**, Consultant, Apollo Hospitals & Shiva ENT hospital, Chennai. I also declare that the material of this has not formed in anyway, the basis for the award of any degree or diploma in this university or any other universities.

Debika Das

M.Sc. (N) II year

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To the pillars of my life - my parents, aunts and my brother, because I owe it all to you.

"Humility is the acknowledgement that without God you would not have made it thus far."

----Gugu Mona

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SYNOPSIS

An Experimental Study to Assess the Effectiveness of Virtual Reality Therapy upon Symptomatic Distress among Cancer Patients in Selected Hospital, Chennai.

Objectives of the Study

1. To assess the level of pain and stress among control and experimental group of cancer patients before and after the virtual reality therapy.
2. To determine the effectiveness of virtual reality therapy by comparing the pre test and post test scores of pain and stress in control and experimental group of cancer patients.
3. To determine the level of satisfaction of experimental group of cancer patients on virtual reality therapy.
4. To determine the correlation between pain and stress scores in the control and experimental group of cancer patients.
5. To find out the association between selected demographic variables and level of pain and stress in the control and experimental group of cancer patients after the virtual reality therapy.
6. To find out the association between selected clinical variables and level of pain and stress in the control and experimental group of cancer patients after the virtual reality therapy.

An extensive review of literature was made based on the opinions of the experts. The conceptual frame work adopted for present study is based on "**Sister Callista Roy's Adaptation Model"** (1981) which addresses the process of action, reaction, interaction whereby clients share information about their perceptions.

Methods

The variables selected for this study were the level of pain and stress of cancer patients. Null hypotheses were formulated.

The present study is of Quasi experimental design. The Study was conducted at Apollo Cancer Hospital, Teynampet, Chennai. A total of 60 cancer patients who met the inclusion criteria were selected using purposive sampling. Cancer patients were divided into control and experimental group with each group containing 30 members.

The various tools used by the researcher were, Demographic Variable Proforma, Clinical Variable Proforma, Cohen et al's. Perceived Stress Scale, McCaffery-Beebe Numeric Pain Rating Scale, and Level of Satisfaction Rating Scale. Validity was obtained from experts and reliability was established using the test- retest method. The main study was conducted after the pilot study.

Data was collected for a period of 6 weeks on selected cancer patients. A pretest was done to assess the level of pain and stress of control group of cancer patients. The control group of patients received the regular treatment including chemotherapy and on the third day, the level of stress and pain was assessed again. This was followed by the period of data collection for the experimental group of cancer patients who fulfilled the inclusion criteria. The study participants in the experimental group received virtual reality therapy for 15-20 minutes consecutively for 3 days in addition to the regular treatment including chemotherapy. Data obtained were analyzed using descriptive and inferential statistics. On the whole virtual reality therapy was found to be effective.

Major Findings of the Study

- Study findings revealed that one third of the cancer patients in the control group were in the age group of 30-40 years (36.66%) and 50-60 years (33.33%) in the experimental group respectively. Most of the cancer patients in the control group were males (56.66%) and females (63%) in the experimental group respectively. Most of the cancer patients (43.33%) were higher secondary passed in the control group and graduates in the experimental group (33.33%).

- The clinical profile of cancer patients has shown that majority of them in the control group (73.33%) and the experimental group (76%) had illness for duration of 1-5 yrs. A majority of the cancer patients in the control group (83.33%) were on medication for major illnesses whereas in the experimental group the majority of the cancer patients (73.33%) were not on any medication for any major illnesses. A majority of the cancer patients in the control group (43.33%) and the experimental group (53.33%) had a history of hospitalization for 1-2 times within the last five years. Most of the cancer patients in the control (56.66%) and the experimental groups (50%) were undergoing chemotherapy, radiation therapy and a combined treatment approach. Most of the cancer patients in the control (93.33%) and the experimental group (93.33%) had never used any stress relaxation therapy before.

- Findings also revealed that in the control group 43.3% & 40% of them had severe pain in pretest and posttest respectively.

- The level of pain was severe in the experimental group of cancer patients (60%) before the therapy and the pain was mild (53%) after the therapy. None of them complained of severe pain (0%) after the therapy.

- The study findings showed that equal numbers of cancer patients were having a moderate and high level of stress before the therapy (50%, 50%) in the control group whereas during the post assessment the stress level was high for the majority of the cancer patients (66.66%).

- A majority of the cancer patients in the experimental group (73.33%) had high level of stress before the therapy and a low level of stress (66.66%) after the therapy.

- The findings denote that there was no difference in pain scores between pre and post test in the control group whereas in the experimental group there was a statistically significant difference in pain scores between pretest (M=6.5, SD=2.09) and post test (M= 1.76, SD=18.84) at $p<0.001$.

- Findings also showed that there was no difference in stress scores between pre and post test in the control group whereas in the experimental group there was a statistically significant difference in stress scores between pretest (M=25.96, SD=7.54) and post test (M= 11.7, SD=3.32) at $p<0.001$.

- Findings also revealed that there is no statistically significant difference in the pretest scores of pain and stress between the control and the experimental group. There is a statistically significant difference in posttest score of pain in the control group (M=6.16, SD=2.93) and the experimental group (M=1.6, SD=1.76) with 't' value of 7.40 at $p<0.01$. The comparison of post scores of stress of patient in the control group (M=26.23, SD=7.00) and the experimental group (M=3.32, SD=2.77) also shows a statistically significant difference with 't' value of 2.77 at $p<0.001$.

- It was inferred from the analysis that majority of the cancer patients (96.66%) were highly satisfied with the virtual reality therapy.

- From the analysis it was revealed that there was a positive correlation between pain and stress in the control group of cancer patients (r=0.79) and low correlation between pain and stress of experimental group of cancer patients (r= 0.02).

- There was no significant association between selected demographic variables and level of pain and stress among the control and the experimental group of cancer patients after VR therapy.

- There was no significant association between selected clinical variables and level of pain and stress among control and experimental group of cancer patients after VR therapy.

Recommendations

- The same study may be conducted on a larger number of cancer patients.
- The same study can be conducted among various groups like patients suffering from long term illnesses, students, or workers of different settings.
- The same study can be conducted in different settings.
- The same study can be conducted using a true experimental design.
- The same study can be conducted using other different forms of virtual goggle or oculus rift.
- A comparative study can be done using usual relaxation techniques and virtual reality therapy to assess the stress level among various groups.
- A comparative study can be done between virtual reality therapy and the usual anti-anxietic and/ or analgesic medications to see the effectiveness.

- A comparative study can be done between the virtual reality therapy and other forms of stress relaxation and pain management strategies available like music therapy, meditation and yoga.
- Study may be conducted to assess the level of knowledge of family members in identifying symptomatic distress among cancer patient and the various strategies to control the symptoms.
- Study may be conducted to assess the level of knowledge of nurses in identifying symptomatic distress among cancer patient and the various strategies to control the symptoms.
- The same study may be conducted on stress levels of caregivers among family members of cancer patients.

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CHAPTER-I

INTRODUCTION

Background of the Study

“We don’t know who we are until we see what we can do”

--Anonymous

Cancer as a single word incorporates a vast diversity of diseases since there are as many tumor types as there are cell types in the human body. All cancer patients and families faces challenges during their life cycle; some are sudden such as unexpected death or disaster, whereas others are expected such as divorce and remarriage or retirement but both are the ultimate. Many patients, even today, consider a cancer diagnosis as a sentence of impending and painful death which is the obvious truth, with the result that it has a great psychological impact on their functioning and that of their families. Initially, a psychological crisis is created, which causes many emotions ranging from anxiety, fear, anger, and depression caused by the often emotionally paralyzing diagnosis and treatment options.

The World Cancer Research Fund International Organization has mentioned that the age-standardized rate for all cancers excluding non-melanoma skin cancer for men and women combined was 182 per 100,000 in 2012. The rate was higher for men (205 per 100,000) than women (165 per 100,000). The cancer rate was found to be highest for men and women in Denmark with 338 people per 100,000 in 2012. The highest cancer rate was found in France in 2012 with 385 men per 100,000 being diagnosed (International Agency for Research on cancer; 2014).

The age-standardized rate was at least 350 per 100,000 in eight countries (France, Australia, Norway, Belgium, Martinique, Slovenia, Hungary and Denmark). The highest cancer rate was found in Denmark with 329 women per 100,000 being diagnosed in 2012. For Denmark, United States of America, Republic of Korea, The Netherlands and Belgium the age-standardized rate was 280 per 100,000 populations (International Agency for Research on cancer;2014).

ICMR in New Delhi in a conference has mentioned that the estimated new cancer cases may turn to over 17 lakh in India by 2020. A premier medical research body in India has predicted an increase in number of breast, lung and cervical cancer in India with overall 17.3 lakh new cases and over 8.8 lakh of by 2020. The Indian Council of Medical Research has projected that the number of new cases as almost 14.5 lakh by 2016. The study also has found breast cancer as most common among females whereas mouth cancer was found to be more common in males in India (Press Trust of India, 5/19/2016).

The Northeast Part of India was found to have the highest number of cancer cases in both males and females. Cancer in males is more common among the people of Aizawl, Mizoram while Papumpare, Arunachal Pradesh has highest number of female sufferers. Mouth cancer is most common among females of East Khasi hills in Meghalaya. Nandkumar, Head of National Cancer Registry, has mentioned that at least one in every eight Indians is prone to develop cancer during their lifetime.

Tobacco has been marked as the main reason for 30% of all cancers in India, among both the genders by ICMR. A survey conducted by ICMR from 2012-2014 from various Cancer Registries have found that Bangalore, Chennai, and Delhi have increased numbers of males with rectum and colon cancer and it is high in females of

Barshi and Bhopal. Cases of cancer of the lung rank next to breast cancer and are estimated to be 1.14 lakh out of which the number of males is higher (83,000) than females (31,000). The next in the list is the cancer of the cervix which is estimated to turn to new 1 lakh cases in 2016 and by 2020 the number will turn approximately to 1.04 lakh (Press Trust of India, 5/19/2016).

Stress affects the biophysical and emotional wellbeing of the people, but it varies with age, gender, mental capabilities and environmental conditions. As good as visualization exercises are for stress relief, the addition of virtual reality therapy sounds incredible for those who do not find time, and for those who are physically unable to have an easy access to natural settings, this is a won. The human body responds to stressors by activating the nervous system and specific hormones. There are four dimensions of stress namely, cognitive, affective, behavioral and psychomotor. Cognitive manifestations of stress have a lot to do with our thought processes. Likewise, at the affective level, one's emotions can be affected by stress as evidenced by rapid mood swings, depression, anxiety, irritability, unpredictable anger and sadness (Tamara et. al, 2016).

There are various risk factors behind the occurrence of pain. Pain can be due to disease related factors (abdominal pain, visceral pain, nerve compression) or treatment related factors (chemotherapy, radiation therapy and surgery) or may be related to patient related factors (social or spiritual pain). Concerns about unmanageable adverse side effects and fear of becoming tolerant to analgesics may create reluctance in patient to take pain relief medication. Finally, lack of accountability is a barrier since health care providers do not consistently integrate

thorough assessment and documentation of assessment, interventions and evaluations into practice (Yang et. al, 2012).

On learning of cancer diagnosis patients experience a multiple kind of physical and psychological distress. Unrelieved symptoms continue to be a common problem as the most feared and distressing symptoms that people living with cancer and their families. Despite more than 30 years of advancement, the science of pain management persists together with educational initiatives for health care clinicians and the public about pain management and its treatment. Virtual reality therapy refers to immersive, interactive, multisensory, viewer centered, sensored, projector viewed theater environment which can be explored and interacted by a person. A person feels relief from his problem for the time being. Continuous practice results in lasting positive effect that gets registered into the brain. It was invented by Morton H. Eilig in 1956 and was introduced in medicine by Dr. Ralph Larson in 1990 which he used for treating his own fear of height (Acrophobia).

Distraction is an emotion-focused coping strategy because it diverts the focus of attention away from unpleasant stimuli by manipulating the environment. Distraction interventions are effective because individuals can concentrate on pleasant or interesting stimuli instead of focusing on unpleasant symptoms. Techniques such as humor, relaxation, music, imagery, and VR, all are classified as distraction interventions, and they can relieve physical symptoms such as pain, anxiety, nausea, and stress. Latest research studies also show its effectiveness on reduction of symptoms in conditions like pain in cancer, side effects of cancer chemotherapy, lowering blood glucose level. (Schneider et.al, 2007)

There are many obvious advantages of virtual reality exposure therapy that makes it more desirable. Virtual reality exposure therapy can be done from anywhere in the world if given the necessary tools even when the participants physically cannot be moved to the therapy centre. Again, because virtual reality exposure therapy can be conducted from anywhere in the world, those with mobility issues will no longer face discrimination. Another major advantage is fewer ethical concerns than in-vivo exposure therapy (Parsons 2008).

There are now multiple types of virtual kits available in the world of technology and affordable for anybody, though the costly types also do exist. With the advancement of modern technology the various applications are now easily downloadable from play stores (Google play store, *i*-playstore) and can be uploaded in a mobile or a computer system (laptop, desktop, tablet) which people can use as a gaming or relaxation therapy sitting in the room or even while resting on bed. Some expensive devices with preset VR modes are also available. In the field of cancer treatment, virtual reality therapy has scored a significant position and has become a turning point not only for the treatment of cancer but also has opened the door for other diseases to be treated.

The present study supports the use of the Roy's Adaptation model using virtual reality therapy (virtual mobile cardboard application) with the aim of increasing the comfort of a patient suffering from a protracted chronic illness.

Need For the Study

Most countries are experiencing health transitions with the rapidly rising burden of various diseases (communicable, non-communicable, age related, long term

and most specifically cancer). The complex nature of physical and psychosocial problems faced by these patients demand good medical and nursing attention. Such a system of care will be more effective with the use of advanced stress relief therapies like Virtual Reality.

Over the recent years there has been growing concerns about the multidimensional treatment strategies for cancer treatment in every setup. Being responsible and honest professionals, nurses have a great responsibility in taking an important part in the care of cancer patients. The Study to Understand Prognoses and Preferences for Outcome and Risk of Treatments (SUPPORT) concluded that more proactive and forceful measures are needed to improve the care for seriously ill and dying patients. (Knaus et. al, 2001)

Weisman et al. in their landmark study on preventing psychological intervention with newly diagnosed cancer patients (1984) have described the "existential plight" of individual during the first 100 days after diagnosis. Of all the physical illnesses that cause suffering to human beings, cancer is such a disease which not only affects a single person but rather a whole family or a group of people experiencing chaos and suffering following the diagnosis. The person diagnosed with cancer does not only suffer from the physical symptoms of the disease but also because of the side effects of the treatment process. Besides the knowledge of the universal truth regarding certain death due to the disease and also liabilities for adults regarding their families are matters of vast amount of stress during the phase of illness and treatment.

Pain management is an important aspect in the care of cancer patients. Mayank et al. (2016) in their study on Prospective evaluation of symptom prevalence among

cancer patients identified pain as the most common and most distressing symptom reported by 40% of patients with 64.55% patients reporting that one or more symptoms severe enough to interfere with their sleep. Factors relating to the medical professionals, patients, and the health care system have been identified as causes of this apparent under-treatment of cancer pain among patients. Specifically, medical professionals' inadequacy in pain assessment and management has been pointed out as an important barrier to cancer pain control.

VR technologies are being developed by companies such as START VR (Sydney), Flix Films (London) and Screen NSW specifically for cancer patients. Various investigators have hypothesized that VR can act as non-pharmacologic type of analgesia that has a direct effect on the emotional, cognitive, affective and attentive domains of the individual's pain modulation system.

According to Gate control theory of Melzack et al. individuals' reaction to pain differs according to their emotions, attention and past experiences. Gold et al. have hypothesized that the analgesic effect of VR develops from an intercortical modulation between various pain signaling pathways through auditory, visual or touch senses. So, the action of anterior cingulate will increase, when there is a decrease the pain level. Also they have hypothesized that the function of brain's orbitofrontal region i.e. regulation of emotion, decision making process and also regulation of vital functions, will alter due to immersive VR (Angela et. al, 2012).

Indeck and Bunny have reported that as a patient begins to create meaning in relation to the illness, he senses a victory over many life changing events leading to an increased sense of control. As an increased sense of control emerges, the patient can

think more effectively and act constructively and become active rather than passive in his plan of care.

Vainio and members of the symptom prevalence Group (1996) investigated the prevalence of eight symptoms associated with cancer in an international study of 40 palliative care patients. This prospective study of 1640 patients with advanced or terminal cancer revealed pain and weakness as the most common symptoms, each reported by 51% of population. The prevalence of other symptoms includes weight loss (39%), anorexia (30%), constipation (23%), nausea (21%), dyspnea (19%), insomnia (9%) and confusion (8%). Therefore, if the individual is attending to another stimulus away from the noxious stimuli, they would perceive lesser pain.

Studies have proved that virtual reality therapy has an extensive effect on relieving stress related symptoms during treatment phases or during a palliative treatment phase for the dying. Four independent meta-analysis have concluded that immersive VR leads to remarkable decrease in anxiety related symptoms (Parsons and Rizzo, 2008; Powers and Emmelkamp, 2008; Opris et al., 2012; Morina et al., 2015).

There is a higher level of stress present in all cancer patients. Stress is caused by multiple factors. Patients suffering from cancer not only have physical pain, but also social and mental agony. The unbearable stress may lead to various psychological problems among cancer patients. Pain is uncontrollable and unmanageable in cancer patients. Medications provide only symptomatic relief and may be associated with undesirable side effects.

Virtual Reality Therapy can help medical professionals in the treatment and control of a variety of symptomatic distress related to cancer especially anxiety, stress, depressions and other physiological symptoms. So, the investigator has undertaken the

study to assess the effectiveness of virtual reality therapy upon symptomatic distress among cancer patients.

Statement of the Problem

An Experimental Study to Assess the Effectiveness of Virtual Reality Therapy upon Symptomatic Distress among Cancer Patients in Selected Hospital, Chennai.

Objectives of the Study

1. To assess the level of pain and stress among control and experimental group of cancer patients before and after the virtual reality therapy.
2. To determine the effectiveness of virtual reality therapy by comparing the pre test and post test scores of pain and stress in control and experimental group of cancer patients.
3. To determine the level of satisfaction of experimental group of cancer patients on virtual reality therapy.
4. To determine the correlation between pain and stress scores in the control and experimental group of cancer patients.
5. To find out the association between selected demographic variables and level of pain and stress in the control and experimental group of cancer patients after the virtual reality therapy.
6. To find out the association between selected clinical variables and level of pain and stress in the control and experimental group of cancer patients after the virtual reality therapy.

Operational Definitions

Effectiveness

In this study, it refers to the reduction in the pain and stress scores before and after virtual reality therapy.

Virtual Reality Therapy

It is the simulation in real or imaginary world through an immersive, interactive, multisensory theatre environment which can be explored and interacted by a person.

In this study, Virtual Reality Therapy was provided by a Virtual Cardboard Goggle using mobile VR application which provides 3 dimensional image of an object through 3D lenses. VR therapy was administered for 3 consecutive days for 15-20 minutes every day, after appropriate explanation for each person.

Symptomatic Distress

These are the symptoms experienced by the cancer patients due to the disease and treatment procedures. In this study symptomatic distress includes level of pain and stress of cancer patients.

Pain

It is a highly unpleasant physical sensation caused by illness or injury. It is the subjective experience of a person. In cancer patient pain is mainly caused by physical, psychosocial and spiritual reasons.

In this study, pain was measured by using McCaffery, Beebe Numeric Pain Rating Scale.

Stress

A state of mental or emotional strain or tension resulting from adverse or demanding circumstances as measured by Cohen's et al.'s Perceived Stress Scale.

Satisfaction

It is a feeling of gratification attained or achieved after virtual reality therapy by patients suffering from cancer as measured by using the rating scale on satisfaction regarding virtual reality therapy.

Cancer Patients

Cancer is a disease or a malignant growth or tumor caused by an uncontrolled division of abnormal cells in a part of the body. In this study, group of patients diagnosed as stage II and above of cancer were selected as sample.

Assumptions

- Cancer is one of the most devastating diseases in the world along with diabetes and cardiovascular diseases.
- There is a higher level of stress present in all cancer patients. Stress is caused by multiple factors.
- Patients suffering from cancer not only have physical pain, but also social and mental agony.
- The unbearable stress may lead to various psychological problems among cancer patients.
- Pain is uncontrollable and unmanageable in cancer.
- Medications provide only symptomatic relief and may be associated with undesirable side effects.

- Symptomatic distresses can be minimized using virtual reality therapy type of relaxation treatment.

Null Hypotheses

$H_0$1: There will be no significant difference in pretest and posttest scores of pain and stress in control and experimental group of cancer patients.

$H_0$2: There will be no significant correlation between posttest scores of pain and stress in control and experimental group of cancer patients

$H_0$3: There will be no significant association between selected demographic variables and level of pain and stress in the control and experimental group of cancer patients after virtual reality therapy.

$H_0$4: There will be no significant association between selected clinical variables and level of pain and stress in control and experimental group of cancer patients after virtual reality therapy.

Delimitations

1. Study period was limited for 6 weeks only.
2. The study was limited to cancer patients in stage II and above.
3. The study was limited to those cancer patients who were present in the selected hospital, during the time of data collection.

Conceptual Framework for the Study

A conceptual framework is a group of concepts and a set of propositions that spell out the relationship between them. Their overall purpose is to make specific findings meaningful and generalized.

A conceptual framework deals with the interrelated concepts on abstractions that are assembled together in some rational scheme by virtue of their relevance to a common theme. It is a device that helps to stimulate research and extend knowledge by providing both direction and impetus. A framework may serve as a springboard for scientific advancement (Polit and Beck, 2012).

Conceptual frame work for this study was developed based on Roy's Adaptation Model which was designed by Sr. Callista Roy in 1976. This model represents the person's own standard to which one can respond with ordinary responses. The individual is considered as an open system, adjusting with the stimuli of self and environment. Adaptation occurs when the person responds to stimuli that promote the individual's health. Ineffective response leads to ill health.

This system has input (stimuli), control process (the regulator and cognator mechanism), effectors modes and output (adaptive and maladaptive response). The adaptation level of cancer patients is determined by three stimuli which include focal stimuli, contextual stimuli, and residual stimuli. In the present study, people suffering from Cancer stage –II and above will face the focal, contextual and residual stimuli.

Input

It is defined as a stimulus which can come from the environment or from within the person. Three types of stimuli influence the person's ability to cope with

the environment to adapt to this stimuli the person requires various types of comfort and supportive measures.

All inputs are channeled through the process of a regulator and a cognator that produce responses by means of 4 effectors modes-

- Physiologic
- Self-concept
- Function
- Interdependence

✓ Physiologic mode

Physiological changes including neuro transmitter level of serotonin as evidenced by reduction in pain and stress.

✓ Self-concept

This is the patient's improved self image, satisfaction from treatment, his life expectancies, and decision making capacities and understanding of the disease.

✓ Role Function

Individual role function after the diagnosis is directly affected by his occupational status, family role and individual role.

✓ Interdependence

Individual shall have interaction with other Support system (Family, friends, other Relatives). Support systems are helpful in relieving social pain and stress.

❖ Focal stimuli

Focal stimuli are those that immediately confront the individual in a particular situation. It includes age, gender, educational status, duration of disease, no of hospitalization etc. Underlying physical condition is a greater focal stimulus too.

❖ Contextual stimuli

Contextual stimuli are those that influence the situation. They include, fatigue, anxiety, unrelieved symptoms, mental incapacitation, complicated treatment of cancer family lead role, lack of family support, depression, stress of long term therapy.

❖ Residual stimuli

They include the attitude of cancer patients towards the disease, their previous experiences with pain and stress management.

These three types of stimuli act together and influence the adaptive response of cancer patients residing in hospital.

Throughput

Throughput makes use of a person's control process as refers to the control mechanism that a person uses as an adaptive system. Effectors refer to physiologic mode, self-concept mode, role function mode and interdependence mode. The adaptive responses are modulated mechanisms such as cognator and regulator systems.

Regulators are the subsystem of coping mechanism that responds automatically through neural, chemical and endocrine process.

Cognators are the subsystem of coping mechanism that responds through complex process of perception and information processing, learning, judgments and emotions.

Output

Output is the outcome of the system. It includes adaptive or maladaptive responses of cancer patients. It is categorized as an adaptive response (that promote a person's integrity) and maladaptive response (that do not promote goal achievement).

Adaptive responses for the cancer patients include reduction in pain and stress and increase in their coping mechanisms. Maladaptive response includes increased pain and high level of stress.

Feedback

By providing Virtual Reality therapy to cancer patients, nurses can help them to adapt to their present condition which, in turn, will help them to cope with their own problems (physical and psychological) to a certain level thus will provide a better way to deal with various complications (personal, social, familial, psychological and physical) arising out due to the process of deadly disease. The present study is an attempt to assess the effectiveness of virtual reality therapy upon symptomatic distress among cancer patients. The aim is to enable them to be able to cope with own physical and psychological distress.

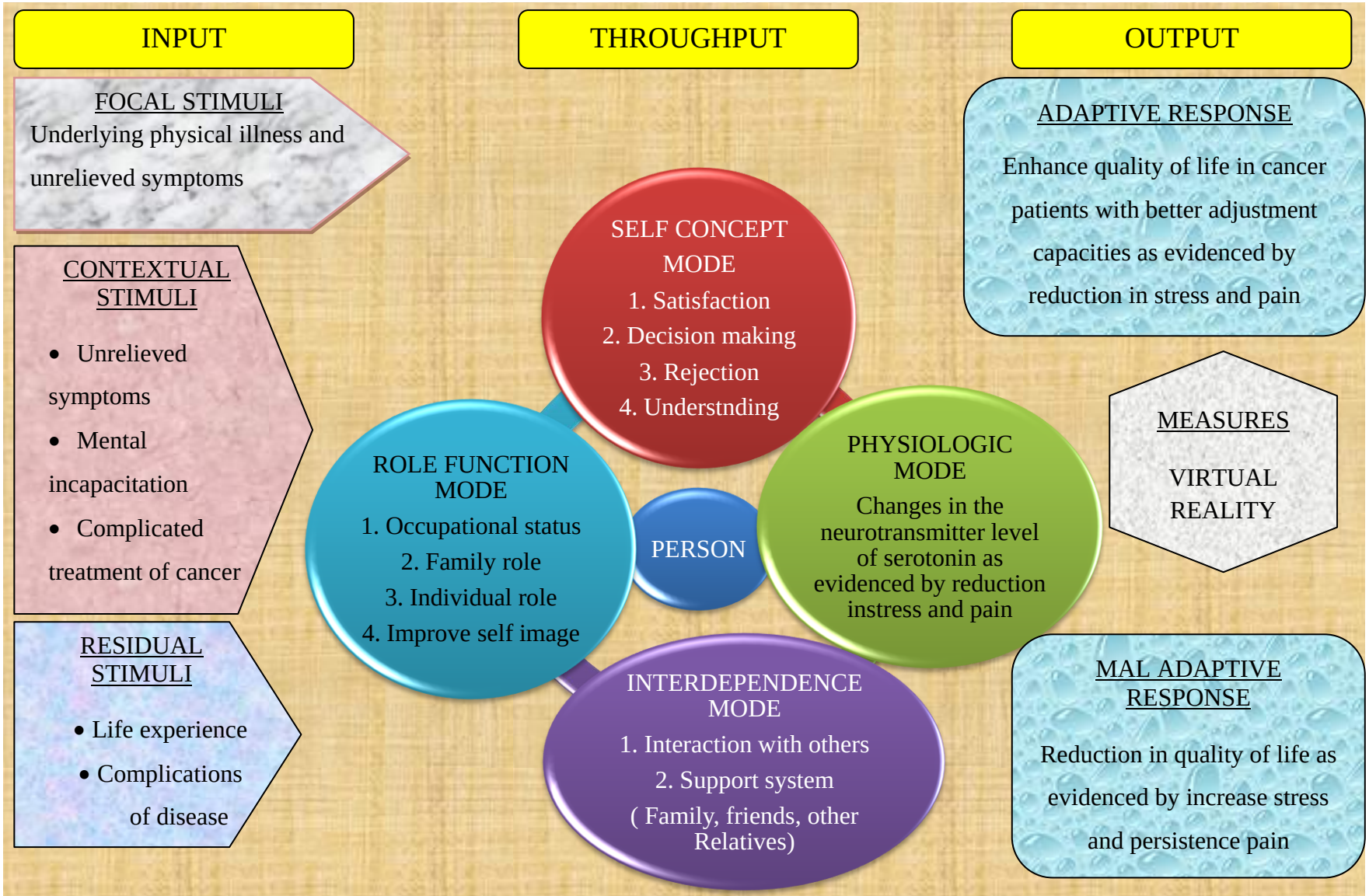

FIG 1: CONCEPTUAL FRAMEWORK ON CANCER PATIENTS BASED UPON SISTER CALLISTA ROY'S ADAPTATION MODEL

Projected Outcome

This study will be useful to reduce the pain and stress of Cancer Patients undergoing chemotherapy.

Summary

This chapter has dealt with the back ground, need for the study, operational definitions, assumptions, null hypotheses, delimitations and conceptual framework of the study.

Organization of the Report

Further aspect of the study are presented in the following five chapters –

Chapter-II **:** Review of Literature

Chapter III **:** Research Methodology which includes, research approach, research design, setting, population, sample and sampling techniques, tool description, content validity, and reliability of tools, pilot study, data collection procedure and plan for data analysis.

Chapter IV **:** Analysis and interpretation of data

Chapter V **:** Discussion

Chapter VI **:** Summary, conclusion, implications and recommendations.

CHAPTER II

REVIEW OF LITERATURE

A review of literature involves the systematic identification, location, scrutiny and summary and written material that contain information on the research problem (Polit and Beck, 2012).

This chapter represents the reviews (published and unpublished) of research studies and related material for the present study. These reviews have helped the investigator to understand and develop an insight into the problem area which also has helped in building the foundation of the study.

The Review of Literature for the present study is presented under the following headings-

- **Literature related to pain management among cancer patients.**
- **Literature related to stress management among cancer patients.**
- **Literature related to symptomatic distress management among cancer patients.**
- **Literature related to effectiveness of virtual reality in various field of study.**
- **Literature related to virtual reality in symptomatic distress among cancer patients.**

Pain Management in Cancer Patients

A study on differences in demographic, clinical and symptom characteristics and quality of life outcomes among oncology patients with different types of pain was conducted by Victoria et al. (2017). The study aimed at describing the incidence of different types (Cancer and Non- Cancer pain) of pain and association between various demographic-clinical characteristics and quality of life among 926 cancer patients. The researchers found that 72.5% of the patients had pain and out of that 21.5 % had reported NCP, 37.0% had CP whereas 41.5% had both CP and NCP. Pain was common among younger female patients

who have also reported higher levels of depression and stress. The researchers suggested that oncology outpatients should have assessments facilities for both cancer and non-cancer conditions.

Mercadante (2015) has conducted a study on prevalence, mechanism and treatment options for breakthrough pain in cancer (BTP) patients by a critical review of diverse literatures. The review found that transmucosal preparation of Fentanyl provides good pain relief within 30 minutes of administration. The review also found the incidence of BTP is heterogeneous and vary among individuals. All the studies have suggested of dose titration for years as per the opioid tolerance.

The impact of cancer diagnosis and treatment on a patient's daily activities is drastic. A cross sectional survey on current practices in cancer pain management in Asia across 10 countries have analyzed the self reports of 463 physicians and 1190 patients suffering from cancer pain (Yong et al. (2015)). Samples selected were aged ≥18 years. Most of the patients (86.2%) complained of moderate-to-severe pain. Pain was managed by pain specialists in only 5.9% of cases as reported by them. The researchers also found that out of 77.6% of patients 41.8% had stopped working due to chronic unbearable and cancer pain. Of them 69.7% employed patients had reported that pain affected their level of functioning.

An ethnography study on barriers to cancer pain management and opioid availability in South Indian Cancer Hospital (SICH) was conducted by Virginia et al. (2014). They aimed to examine the various barriers to opioid availability and experience of nurses in managing pain. Purposive and Snowball sampling were used for selecting the samples. The study found that though morphine was available more in that hospital than most of India, but access was limited to patients (20%). They also have found several gaps in oral morphine supply lasting

3–5 days. The other barriers found were inaccurate information about pain management, less or no written protocols, standard practices and documentation guidelines.

Although opioids are administered in various guidelines their use for managing non-cancer pain is far from commendable. Massaccesi et al. (2013) in their study on incidence and management of non-cancer pain in cancer patients referred to radiotherapy center aimed at finding the incidence, severity and impact of Cancer pain (CP) and Non- cancer pain (NCP) on Quality of Life (QoL). Out of 865 patients 46.0% had pain. 11.2 % had CP and 34.8% had NCP. CP was higher compared to NCP ($p=0.024$) and NCP was better managed compared to CP ($p<0.001$). Patients with CP had low QoL compared to patients with patients with NCP ($p<0.001$).

A meta-analysis of cultural differences in Western and Asian patient-perceived barriers to managing cancer pain was conducted in by Chen (2012). The analysis compared 22 studies that had used Ward's Barrier Questionnaire. Meta regression analysis was used for comparing the scores which indicated that there was a significant difference between Perceived pain barriers among Asian and Western patients (weighted mean difference [WMD] = 1.32, $p< 0.0001$), the analysis has shown differences in tolerance (WMD= 1.63, $p< 0.0001$) and fatalism (WMD= 0.89, $p= 0.004$) also. The study concluded that Asian cancer patients had higher barrier scores than Western patients.

There is a need for improvement in training in cancer pain management among physicians. A survey of 259 physicians (Liao et al. 2011) on assessment of cancer pain management knowledge in southwest China was done using a questionnaire on pain management to assess their ideas on barriers to pain management in cancer. The study findings had revealed that most of the doctors strongly believed that 70% of cancer patients

suffer from pain. A Majority of the physicians (90%) had reported regarding poor training in cancer pain management during study period. The study concluded that

Pain management in metastatic cancer is still a persistent challenge especially for those referred for radiotherapy. To assess the prevalence of inadequate pain management in radiotherapy palliative clinic a retrospective study using pain management index was conducted by Mitera et al. The study aimed to assess the prevalence of inadequate pain management among 1000 patients from 1999-2006 with bone metastasis. The study findings revealed that prevalence of negative Pain Management Index (PMI) continued to increased over years ($p<0.0001$). They also found that higher performance status and breast cancer was significantly associated with negative PMI ($p<0.0001$).

Lim (2008) has conducted a survey on improving cancer pain management in Malaysia. The study findings reported that only 24% of cancer patients received regular opioid analgesia for cancer pain, 46% of the physicians had lack of knowledge in managing cancer pain and 64% had fear administering analgesics due to various side effects such as respiratory depression. Additional barriers include the fact that no training in palliative care is given to medical students, and that smaller clinics often lack facilities to prepare and stock cheap oral morphine. The study also found the presence of very poor training facilities in palliative other analgesics in smaller clinics.

Van Den et al. (2007) have conducted a study on a systematic review of 40 years of 52 studies on prevalence of pain in patients with cancer. The rate of pain was assessed for four subgroups- 33% studies had included patients after curative treatment, 59% studies had included patients under anticancer treatment, 64% of the studies had included advanced/metastatic/terminal diseased cancer patients and 53% of the studies have included patients at all disease stages. More than one third of the patients suffering from pain had

graded their pain as moderate or severe. Pooled prevalence of pain was more than 50% in all cancer types and patients with head/neck cancer had the highest prevalence (70%).

Stress Management in Cancer Patients

A Meta-analysis of 24 published studies in Cochrane, PubMed, ASCO, WHO, ICTRP etc was conducted by Cramer et al. (2017) on Yoga for improving health related quality of life and cancer related symptoms in women with breast cancer who had received active treatment. The study included 2,166 participants. It was seen from the review that 17 comparative studies between yoga versus no therapy found moderate-quality evidence of yoga in improving health-related quality of life after yoga (pooled SMD [standardized mean difference] =0.22) and four studies on yoga versus psychosocial /educational interventions had proved that yoga can reduce depression (pooled SMD= 2.29) anxiety (pooled SMD=2.21) and fatigue (pooled SMD= 0.90).

Demir (2015) has done an analysis of 6 randomized control trial and case reports of published articles on effects of laughter therapy on anxiety, stress, depression and quality of life in cancer patients in Turkey. One of the study findings revealed that there was reduction in stress level ($p=0.03$) of patients before chemotherapy. Another randomized control trial and Quasi experimental study among breast cancer patients found that there was a significant change in anxiety ($p < 0.01$), depression ($p < 0.01$) and stress level ($p< 0.01$) after the laughter therapy.

Web-Based Self-Management for Psychological Adjustment after Primary Breast Cancer was conducted by Van Den (2015) using an intervention named The Breast Cancer E-Health (BREATH) trial and Care As Usual (CAU) protocol. This multicenter, randomized, controlled, parallel-group trial was conducted among 160 patients using a stratified block design. The study found that CAU + BREATH patients had significantly less distress than

CAU-alone (-7.79, p=0.02). CAU + BREATH participants (56%) showed clinically significant improvement and reduced distress than CAU-alone participants (p= 0.03) after the therapy.

A pre experimental research on the impact of medical intervention on stress and quality of life in patients with cancer was conducted by Vijay et al. (2015) among 105 lung, breast and head and neck cancer patient selected through purposive sampling method in Telangana, India. The study findings reveal that there was a significant difference in stress score ($t = 2.46$, $p < 0.05$) before and after the medical intervention. The stress score before the planned treatment was ($M = 73.52$, $SD = 15.75$) whereas there was increase in the stress score of the patients after the intervention ($M = 68.97$, $SD = 16.68$) which shows that medical interventions have moderate effect in reducing stress among cancer patients.

A number of studies have been conducted on cognitive behavior therapy among cancer patients to have control on a range of symptoms. A systematic review and meta-analysis was conducted by Anderrson et al. (2014) on guided internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders. Systematic researches of 13 studies (n=1053) were included in the review. The pooled effect size of post-treatment was -0.01 (95% CI: -0.13 to 0.12), which indicates that guided ICBT (Internet delivered cognitive behavioral therapy) and face-to-face treatment produce similar effects on symptom release in both psychiatric and somatic disorders.

A meta-analysis by Zanial et al. (2013) aims to investigate the evidence of the efficacy of Mindfulness-Based Stress Reduction (MBSR) in improving stress, depression and anxiety in breast cancer patients. The extensive review was carried out from October-November 2011 for nine published studies. The pooled effect size for MBSR on stress was 0.710 (0.511-0.909), for depression was 0.575 (0.429-0.722) and for anxiety was 0.733

(0.450-1.017). The study concluded that MBSR has moderate to large positive effect on the improvement of mental health of breast cancer patients.

Another meta-analysis on the effectiveness of behavioral techniques and physical exercise on psychosocial functioning and health-related quality of life in breast cancer patients and survivors was conducted by Duijts et al. (2011). The study was carried out to understand the effects of behavioral and exercise interventions on fatigue, depression, anxiety, body-image, stress and HRQoL (Health Related quality of life). In total, 56 studies were included. The study results were found to be statistically significant. The analysis of the data showed the effect of behavioral techniques on fatigue was $p<0.001$, depression $p<0.001$, anxiety $p<0.001$ and stress $p=0.038$.

Prashwas et al. (2010) have conducted a cross sectional case control study on depression and anxiety in 50 cancer patients undergoing treatment for cancer and 50 non-cancer patients in Nepal medical college. The aim of the study was to find out the prevalence of psychological symptoms (depression and anxiety) in cancer patients using Hospital anxiety and depression scale. The study found that there was a higher rate of psychiatric morbidity among cancer patients (60%) compared to the non cancer individual. Out of all the samples in cancer patients 28% had depression and 40% had anxiety. The study concluded that psychiatric morbidity is higher in cancer patients compared to healthy individual.

A randomized controlled trial of psychosocial interventions using the psycho-physiological framework among breast cancer patients was conducted in China by Chan et al. (2006). The researchers had randomly assigned participants into 3 groups namely Body-Mind-Spirit (BMS), Supportive-Expressive (SE), and Social Support Self-Help (SS) groups. The control group did not receive any treatment. Physiological marker was salivary cortisol and psychological factors were depression, stress, emotional control and mental adjustment.

BMS was found to have superior effect on controlling psychological distress and there was lowered salivary cortisol level after the three interventions. Study findings suggest that psychosocial interventions have stronger contribution in dealing with psychological stress.

Another study conducted by Choumanova et al. (2006) upon religion and spirituality in coping with breast cancer among Chilean women tried to examine the roles of religion and spirituality in relation to coping with breast cancer. Twenty-seven (27) women with breast cancer who were patients at a clinic in Santiago, Chile were selected for one-on-one interviews. The study result found that religion and spirituality was primary resources for women with breast cancer to cope with their disease. Half (13/26) of the women reported a deeper faith in God which helped them to cope with cancer. Almost all (26/27) participants had a strong belief that spiritual faith can help cancer patients to overcome from their illness.

Psychosocial factors affect cancer progression via bio-behavioral pathways (Costanzo et al. 2005). Study on relationship between the psychosocial factors and interleuikin-6 among 61 women with advanced ovarian cancer using psychosocial tool, peripheral blood smear and plasma assay found an elevated IL-6 in more distressed patients. They found that association of social attachment with lower level of IL-6 ($p= 0.03$) whereas poorer quality of life was associated with higher IL-6 ($p=0.01$ to 0.03). There was a significant correlation between IL-6 levels in peripheral blood plasma and IL-6 in the ascites ($p < 0.001$). The study concluded saying that increase level of IL-6 leads to poor prognosis among cancer patients.

A cross-sectional study on mood disturbance in community cancer support groups was conducted by Cordova, et al. (2003) with the objective to test whether the coping styles of emotional suppression and fighting spirit were associated with mood disturbance in cancer patients or not. Total participants were 121 cancer patients (71% female, 29% male). The result showed a lower emotional suppression and a greater adoption of a fighting spirit. Older

age and higher income were also associated with lower mood disturbance. The researcher concluded that the expression of negative effect and an attitude of realistic optimism may enhance adjustment and reduce distress for cancer patients in support groups.

Symptomatic Distress Management in Cancer Patients

There is a notion of a link between mental health and physical health. A Meta analysis of 16 prospective cohort studies (Batty, et al. 2017) aimed to examine the role of psychological distress (anxiety and depression) in relation to site specific cancer mortality. Self report on psychological distress from 1, 63,363 men and women aged ≥16 was analyzed using GHQ-12 (General Health Questionnaire). Carcinoma of the colorectal (1.84, 1.21 to 2.78), prostate (2.42, 1.29 to 4.54), pancreas (2.76, 1.47 to 5.19), esophagus (2.59, 1.34 to 5.00), and for leukemia (3.86, 1.42 to 10.5) were having higher levels of distress (score 7-12) death rates.

Tamara et al. (2016) conducted a study on identifying factors of psychological distress on the experience of pain and symptom management among cancer patients among 232 patients. A total of 58% of the patients have reported that their pain was cancer related whereas less than one-third has reported pain was the result of both cancer and other medical conditions. Most commonly reported symptoms were difficulty in sleeping (M=2.32, SD=1.08) and worry (M=2.15, SD=1.10). Difficulty in sleeping (M=2.50, SD=1.22) and feeling nervous (M=2.34, SD=1.29) were also reported as the most common psychologically distressing symptoms.

Despite advances in supportive care, psychological distress remains as a significant issue in cancer. Xiao et al. (2015) in a controlled cross-sectional survey in China tried to find the relationship between psychological distress and cancer pain. The study was conducted among 126 patients aged >18years. Among them 64 reported pain and 62 did not. Results

showed that patients who reported pain had mean State-Trait Anxiety Inventory (STAI) scores of 46.38 for state anxiety and 44.64 for trait anxiety, as well as a mean BDI (Beck Depression Inventory) score of 19.17. The pain-free patient group had mean STAI scores of 40.73 for state anxiety and 42.87 for trait anxiety and a mean BDI score of 15.35.

In a study on the review on symptom burden and quality of life in survivorship (Wu et al. 2013) have found survivors and caregivers struggle with symptom burden and QoL diminishes after treatment termination. The study result found that 1/3 of cancer survivors experienced symptoms after treatment cessation which was almost equal to those experienced during the time of treatment. Fatigue, depression or mood disturbance, sleep disruption, pain, and cognitive limitation were commonly reported by survivors of various malignancies. Younger age and lower income were associated with greater distress and poorer QoL in caregivers.

Social wellbeing is a major indicator of overall QoL for patients with cancer. A longitudinal descriptive study on quality of life and barriers to symptom management (Sun et al. 2012) have recognized pain and fatigue as the most critical symptoms in colon cancer. This study was conducted among 56 patients with colon cancer. Statistical analysis revealed a majority of the subjects (58%) having moderate to severe fatigue (4-6) and overall QoL was moderate (M= 5.20, SD= 1.43) and lowest score was found in social well-being subscale (M= 4.57, SD= 1.82). Of the patients, 77% had correct knowledge on pain and 88% had correct knowledge on fatigue.

Kwekkeboom et al. (2012) have conducted a pilot randomized controlled trial of Patient-controlled Cognitive-Behavioral (CB) intervention for the pain, fatigue, and sleep disturbance symptom cluster in cancer patients. A total of 86 patients were selected using stratified random sampling. Study findings revealed the use of the CB strategies an average

of 13.65 times (SD=6.98) by the patients. It was found that the symptom cluster severity at time 2 was found to be lower in the intervention group (M=2.99, SE=0.29) than in the waitlist group (M=3.87, SE=0.36, F=1.65 =3.57, p=0.032). The study findings have suggested that the CB intervention was an effective approach to treat symptom cluster among cancer patients.

A cross-sectional study was conducted by Heydarnejad et.al (2011) on quality of life in cancer patients undergoing chemotherapy. The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QoL-C30) was used for 200 cancer patients to measure their quality of life. The statistical analyses showed that there was a significant relationship between the intensity of pain body performance and quality of life ($p<0.05$). The majority of patients (54.5%) were male, aged 18-75 years, with a mean age of 46.2 (65%), unmarried (44%), primary school graduates (65%), and without sufficient income (79.5%).

The level of psychological and emotional distress associated with cancer leads to increased rates of co-morbidities and mortalities. To explore the relationships between demographic/treatment-related characteristics and QoL, Akin et al. (2010) have conducted a study on symptom experience and distress of lung cancer patients among 154 patients undergoing chemotherapy. The scores were the lowest on the Health and Functioning subscale (20.33 ± 5.59) comparing to Family subscale (27.66 ± 2.77). The most common physical symptoms were coughing, pain, lack of appetite, and nausea etc. while the psychological symptoms were feeling nervous, difficulty sleeping, feeling sad, and worrying. The study also have found a negative relationship between the symptom distress and quality of life scores ($r= [-0.45]$, $p<0.000$).

Another study by Baker (2004) on identifying factors of psychological distress on the experience of pain and symptom management among cancer patients was conducted among 232 patients receiving outpatient services in a comprehensive cancer center. Participants were surveyed for symptoms of psychological distress, physical symptoms, behavioral and demographic characteristics. Patients who had functional limitations were also suffering from varying degree of pain especially with complains of difficulty in sleeping and feeling irritable. Data also have revealed that younger adult had higher rate of pain-related distress.

Jenifer et al. (2003) have conducted a study on symptomatic distress, hopelessness, and the desire for hastened death (DHD) in hospitalized cancer patients among randomly selected 224 cancer inpatients. The objective of the study was to evaluate the desire for hastened death (DHD) in cancer patients at varying stages of disease to determine its frequency and relationship to physical and psychological distress. The study found that there was a significant change in the physical and psychological distress in this sample with a mean of nine (9) physical symptoms reported by each subject. Of all the samples 7% has reported moderate DHD and 2% has reported high DHD.

Virtual Reality Therapy

Study on Virtual Reality as a distraction technique in 40 patients with chronic pain, aged between 22-68 years was conducted by Brenda et al. (2014). The study reported that mean scores of sickness exploration questionnaire (general discomfort, fatigue, headache, eyestrain, and nausea) were all <1.5, where the scales range from 0 to 3 when, 0=absent, 3=severe. There was a significant change in pain ($p<0.05$ to $p<0.001$) with a significant decrease in heart rate ($p<0.05$) during VR therapy.

After a thorough search in the databases of PsycINFO, PubMed, Web of Knowledge, and Scopus a meta-analysis on the relationship between self-reported presence and anxiety in

virtual reality exposure therapy for anxiety disorders was conducted by Yun, et al. (2014). The weighted mean correlation between self-reported presence and anxiety was r=.28, p<001.

A study conducted by Mark et al. (2014) among five patients on clinical use of virtual reality distraction system to reduce anxiety and pain in dental procedures have found a significant change in the anxiety level as measured by self evaluation questionnaire before (p=0.28, t= 0.632) and after (p=0.86, t=0.181) which is a strong evidence for VR as a supportive measure for pain and stress reduction.

In 2013, Sarig et al. conducted a study on virtual reality therapy for pain management. A total of 25 patients were selected for the study. A positive correlation (0.4–0.6) was found between self-reported outcomes and cervical range on two measurements. This finding indicates that self reported pain ratings can be supplemented with range of motion measurements. In this study there was an increase in the functional level of the participants along with reduction of pain.

Tommaso (2013) have conducted a study on virtual visual effect of hospital waiting room on pain modulation in healthy people and patients with chronic migraine. The main aim of the study was to assess the effects of a visual distraction among 32 patients. The sLORETA analysis confirmed that in CM patients the two VR simulations improve the functioning factor of different modulation of bilateral parietal cortical areas and superior frontal and cingulated gyrus.

A case series have evaluated the use of virtual reality hypnosis (VRH) for the treatment of pain associated with multiple fractures from traumatic injuries. The study was conducted by Tetley et al. (2012). VRH treatment was administered on 2 consecutive days.

Pain and anxiety were assessed every day before and after treatment and on Day 3. There was reduction in Pain (70% - 30%) from the initial day of assessment to Day 3. The subjective pain reduction reported by patients was encouraging. The researchers have suggested to frame a similar study with larger samples using randomized controlled.

A study on a single patient (32 years age) with multiple blunt force trauma using virtual reality therapy during physical therapy and range of motion exercises (Hoffman, 2009) have found significant reduction in pain. During usual (ROM) leg exercises over a period of two days, the patient also received 10 minutes of physical therapy without distraction and 10 minutes with distraction. There was a reduction in pain as reported by patient from severe (mean= 8.5) to mild/moderate (mean = 4.56]. The patient was able to perform 15 degrees greater ROM during VR on day 2.

Sander et al. (2002) in their study on effects of distraction using virtual reality glasses during lumbar punctures in adolescents with cancer have proved that VR helps in distraction of individual from pain (77% of subjects in the experimental group). Researchers involved in this study have provided standardized treatment for both control and experimental group with and additionally VR for the experimental group. The median Visual Analogue Scale (VAS) score in experimental group was 7.0 (range 0 - 48) whereas in control group it was 9.0 (range 0 - 59).

Virtual Reality in Symptomatic Distress among Cancer Patients

Schneider et al. (2010) have conducted a study on effect of virtual reality therapy upon time perceptions in patients receiving chemotherapy have found that VR was found to have an attention diversion ability. The study was conducted among 137 patients with breast, lung and colon cancer. The findings have shown that the diagnosis, gender and anxiety have a

significant variability upon time perception among patients receiving chemotherapy (F=5.06, p=0.0008).

Pain is a primary symptom among cancer patients especially in children where at least more than 70% of them have severe pain (Gershon et al. 2004). In a pilot and feasibility study among 7-19 years old children undergoing chemotherapy, the researcher found that VR intervention during invasive medical procedure reduced pain and anxiety ($p<0.05$).

Virtual reality can be used a powerful distraction tool during distressing medical procedures for cancer patients. Heden et al. (2009) in their randomized interventions for needle procedures in children with cancer used a soap bubble VR therapy to assess whether children have less fear, distress and pain. The study findings have shown that children had less fear ($p<0.05$) and distress ($p<0.05$) when associated to the activity of blowing soap bubbles as compared to standard treatment alone (n=14). Also they found that pain and fear were significantly correlated ($p=0.01$) in treatment groups,

Adequate Pain management has become an important determinant of quality of life among cancer patients. Dahlquist et al. (2002) in their study on distraction intervention for preschoolers undergoing intramuscular injections and subcutaneous port access have found that children receiving distraction intervention (n=29) had decreased distress behavior and lower levels of anxiety and pain ($p<0.001$).

Summary

This chapter has dealt with the review of literature related to the problem stated. It has helped researcher to understand the impact of the problem under study. It has been enabled the investigator to design the study, develop the tool, plan the data collection procedure and to analyze the data. The literature review was based on 42 primary sources and 2 secondary sources.

CHAPTER III

RESEARCH METHODOLOGY

The research methodology is defined as the way the data is gathered in order to answer the questions to analyze the research question or to analyze the research problem (Polit and Beck, 2012). It enables the researcher to project a blue print for the research undertaken. The present study was conducted to assess the effectiveness of virtual reality therapy on pain and stress level among patients suffering from cancer in a selected hospital in Chennai.

This chapter provides a brief description of the various steps taken by the researcher for conducting the study. It involves research approach, research design, setting, population, sample and sampling technique, sampling criteria, selection and development of instruments, validity and reliability of instruments, pilot study, data collection procedure, and plan for data analysis.

Research Approach

Approach is the most significant part of any research. An evaluation research is most often used by the researcher when he/ she is trying to determine the effectiveness of a rather complex program (Polit and Beck, 2012). In this study, the investigator has assessed the effectiveness of virtual reality therapy upon symptomatic distress among cancer patients. An experimental approach was used as the researcher has assessed the effectiveness of virtual reality therapy on pain and stress level of cancer patients.

Research Design

According to Polit and Beck (2012), the research design is the overall plan for addressing a research question, including specification for enhancing the study's integrity.

The present study was done using a Quasi Experimental research design. The research design is represented diagrammatically as follows-

O1 --- O2

O1 X O2

O1- Pretest of pain and stress level among cancer patients.

X- Virtual reality therapy. It was given for 3 days for 15-20 minutes each day, followed by explanation for each person.

O2- Post test of pain and stress level among cancer patients.

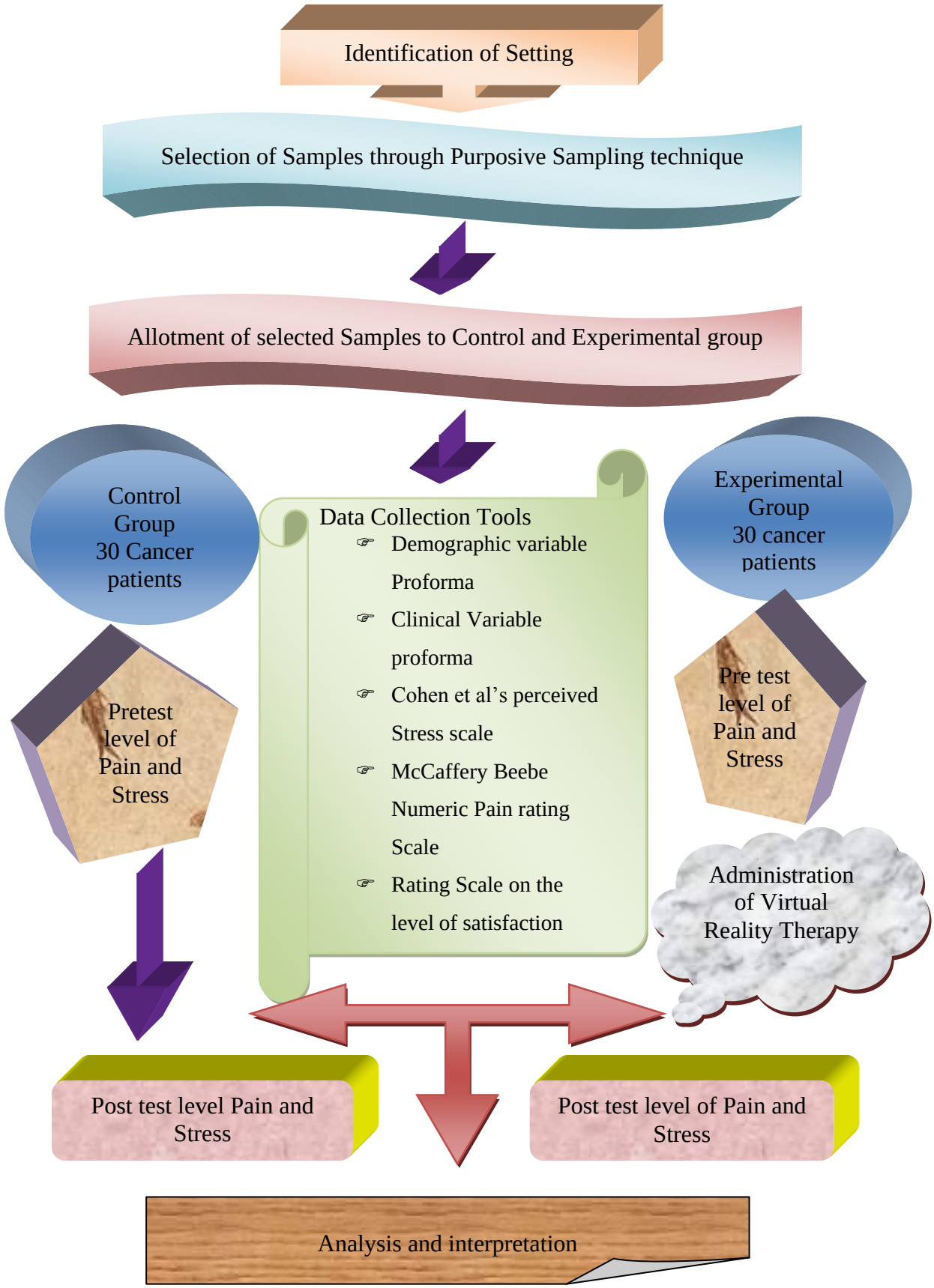

Fig 2: Schematic Presentation of Research Design

Intervention Protocol

The data was collected for a period of 6 weeks on selected samples. Informed consent was obtained from the patients only after explaining about the procedure. A pretest was done to assess the level of pain and stress among the control group of cancer patients. After regular treatment including chemotherapy, on the third day, the level of stress and pain was assessed again. This was followed by the period of data collection for experimental group of cancer patients who fulfilled the inclusion criteria. The study participants in the experimental group received virtual reality therapy for 15-20 minutes consecutively for 3 days. Data obtained were analyzed using descriptive and inferential statistics. On the whole virtual reality therapy was found to be effective.

The patients were exposed to the augmented reality using a VR cardboard goggle device for 15-20 minutes every day for 3 days. The VR applications were downloaded from mobile play store. The various VR applications used in this study were VR Deep Space, VR Cave, VR Fish Schooling, Cherry Blossom VR, VR Iceland and Christmas Tour, VR Cinema, and VR Relax. After installation of the various applications, the smart phone was placed in the Cardboard goggle device using a head phone for total external noise control and helping patient for concentrating on the VR mode.

The researcher was with the patients throughout the intervention. Inspection was done for any signs of complications like dizziness, nausea, or other cyber sickness was done during the therapy. There were no signs of these complications in the patients during and after therapy. After the therapy the VR cardboard goggle was given to the patients for further use.

Variables

A variable is an attribute that varies on different values when taken (Polit and Beck, 2012).

Independent Variable

It is the variable hypothesized to get the outcome variable of interest. In this study the independent variable is Virtual reality therapy.

Dependent Variables

It is the variable hypothesized to depend on or to be caused by another variable. In this study dependent variables are level of pain and stress of cancer patients.

Demographic Variables

Demographic variable proforma is consists of information such as age, gender and education level of the participants.

Attribute Variables

This is to assess the clinical variables such a history of any medical illness, duration of present illness, history of taking medication, history of hospitalization, relaxation therapy used before.

Research Setting

According to Polit and Beck (2012) it is the physical location and condition in which a data collection takes place in a study. The study was conducted in Apollo Cancer Hospital, Teynampet, Chennai. Apollo Cancer Hospital is an NABH accredited 630 bedded hospital, which provides advanced form of treatment in the field of Oncology, Neurosurgery and Head and Neck Cancer. The hospital is located in Anna Salai, Teynampet.

Population

Population is the entire aggregate of cases which meet designated criteria.

Target Population

Target population is the group that the researcher aims to study and to whom the study findings will be generalized.

In this study the target population comprises all people diagnosed with cancer who are undergoing treatment for the condition.

Accessible Population

It is the group that the researcher finds in the study area.

In this study the accessible population is the group of cancer patients who are getting treatment in Apollo Cancer Hospital, Chennai.

Sample

Sample consists of subset of units that comprise the population (Polit & Beck, 2012). Samples for the present study selected were patients diagnosed with cancer stage II and above who were undergoing treatments in Apollo Cancer Hospital Teynampet, Chennai.

Sample Size

A sample size of 60 stage II and above cancer patients who met the inclusion criteria was chosen for the study.

Sampling Technique

Purposive Sampling was used to select sample for the present study. All the available sample who met the inclusion criteria were included in the study.

Sampling Criteria

Inclusion Criteria

- Patients diagnosed with cancer stage II and above.
- Age group >20 years of age.
- Available at the time of data collection.
- Undergoing treatment in the selected Hospital.

Exclusion Criteria

- Not willing to participate in the study.
- Patients having head & neck cancer.
- Patients with visual & hearing problem.
- Physically challenged with GCS < 15.
- Patients who did not have a smart phone.

Selection & Development of Study Instruments

The instruments that were used in the study are-

- Demographic variable proforma
- Clinical variable proforma
- Cohen et al's Perceived Stress scale.
- McCaffery Beebe Pain rating scale.
- Level of satisfaction rating scale.

Demographic Variable Proforma

In this study demographic variable proforma consisted of information relating to patient's age, gender and education level.

Clinical Variable Proforma

The proforma consisted of information of participants regarding number of hospitalization, history of any medical illness, medications used for any major illness, duration of present illness, type of treatment undergoing presently, relaxation therapy used before etc.

Cohen et al's Perceived Stress Scale

It is a standardized tool for assessing the level of stress of patients. The instrument consists of 10 items to be answered by the participants on a rating scale form (scores =4, 3, 2, 1, 0). The responses include- never, never almost, sometimes, fairly often, very often.

Score Interpretation

Score	Interpretation
<13	Low stress
13-19	Average stress
>20	High stress

McCaffery Beebe Pain Rating Scale

It is a numeric pain rating scale that indicates the intensity of current, best, and worst pain levels on a scale of 0 (no pain) to 10 (worst pain imaginable).

Rating Scale on Level of Satisfaction Regarding Virtual Reality Therapy

This rating scale consisted of 12 items to assess the satisfaction level of the participants regarding virtual reality therapy. The participants are supposed to select their best possible response depending on the four response items, highly satisfied (4), satisfied (3), dissatisfied(2), highly dissatisfied (1).

Obtained score is interpreted as follows:-

Score	Level of satisfaction
>36	Highly satisfied
23-35	Satisfied
11-22	Dissatisfied
1-10	Highly dissatisfied

Psychometric Properties of the Tools

Validity

Content validity refers to the adequacy of the sampling domain being studied. The content validity of the tool was obtained by getting opinions from five experts in the field of Medical-surgical nursing and from guide. The evaluators suggested some specific modifications in the demographic tools and clinical variable tools which were incorporated in the final draft of the tool.

Reliability

The reliability of the tool was tested by using the split half method. The 'r' found to be 0.93 by using Karl Pearson's correlation coefficient which shows high positive correlation indicating that the tool was highly reliable. Pain level assessment tool- 0.75 (interrater reliability). Satisfaction rating scale on VR therapy -0.84 (split half method).

Pilot Study

According to Polit & Beck (2012) pilot study is a miniature or some part of the actual study, in which the instruments are administered to the subjects drawn from the population. It is small scale version or trial run, done in preparation of the major study. The purpose is to find out feasibility and practicability of the study design.

The pilot study was conducted at Apollo Cancer Hospital, Teynampet, Chennai, from 18.12.16-24.12.16. A total no of 12 cancer patients were selected for the pilot study (6 patients in the experimental group, and 6 patients in the control group). Baseline data was collected using Demographic variable proforma, Clinical variable proforma, McCaffery Beebe pain rating scale and Cohen et al' s Perceived Stress Scale. After obtaining consent from the patients VR therapy was given for 15-20 minutes for 3 consecutive days. After three days of regular treatment including chemo therapy post test of pain and stress was done using the same tools.

Protection of Human Rights

- Permission from the, Principal and HOD of the Dept of Medical Surgical Nursing of the institution was obtained for conducting the study.
- The study was conducted after obtaining ethical clearance from Ethics committee, Apollo Hospitals, Chennai.
- Consent was obtained from the participants/ bystanders before the data collection.
- Confidentiality was maintained throughout the study.

Data Collection Procedure

Data collection is the systematic gathering of information related to the research purpose. The researcher presented the research to the Ethics Committee of Apollo Hospitals and got ethical clearance to get proceed with the study. The researcher has collected the data from Apollo Specialty Hospital, Teynampet after obtaining proper administrative permission from the concerned authorities.

A group of 60 cancer patients who were undergoing the treatment were selected using the Purposive sampling method. At first, 30 cancer patients who fulfill the inclusion criteria

were selected as control group. After obtaining informed consent, a pre test was conducted among the control group of cancer patients using Demographic variable proforma, Clinical variable proforma, McCaffery Beebe pain rating scale and Cohen et al's Perceived stress scale. After three days of regular treatment including chemo therapy post test of pain and stress was done using the same tools.

On the following week, 30 patients who fulfilled the inclusion criteria were selected as experimental group and Baseline data was collected using Demographic variable, Clinical variable proforma, McCaffery Beebe pain rating scale and Cohen et al's Perceived stress scale. On completion of three days of Virtual reality therapy for 15-20 minutes a day for three days during the time of regular treatment including chemotherapy a post test assessment of pain and stress was done again using the same tools. The patients' satisfaction with virtual reality therapy was assessed using a rating scale on satisfaction.

Problems Faced during Data Collection

Initially some patients felt that Virtual reality therapy will be harmful and affect their health.

Plan for Data Analysis

Data analysis is the systematic organization and synthesis of research data and testing of null hypotheses by using the obtained data (Polit, Beck, 2011). Data analysis and interpretation was carry out using descriptive and inferential statistics like Frequency, Mean, Standard Deviation, 't' test, Chi square test and Pearson's Correlation test.

Summary

This chapter dealt with the selection of research approach, research design, setting, population, sample, sapling technique, sampling criteria, selection and development of study instruments, validity and reliability of study instrument, intervention protocol, pilot study, data collection procedure, problems faced during data collection and plan for data analysis. The following chapter deals with the analysis and interpretation of data using descriptive and inferential statistics.

CHAPTER IV

ANALYSIS AND INTERPRETATION

The data were analyzed after completion of data collection from both the control and experimental group of cancer patients undergoing treatment in Apollo Cancer Hospital, Teynampet, Chennai. Analysis was done according to the objectives and hypothesis of the study.

This chapter deals with the analysis and interpretation including both descriptive and inferential statistics. Statistics is the field of the study concerned with the techniques or methods of collection of data, classification, summarizing, interpretation, drawing inferences, testing hypothesis, making recommendations (Mahajan, 2004). The data was analyzed, tabulated and interpreted using descriptive and inferential statistics.

Organization of the Study Findings

- Frequency and percentage distribution of demographic variables among the control and experimental group of cancer patients.
- Frequency and percentage distribution of clinical variables among control and experimental group of cancer patients.
- Frequency and percentage distribution of level of pain among control and experimental group of cancer patients before and after the VR therapy.
- Frequency and percentage distribution of level of stress among control and experimental group of cancer patients before and after the VR therapy.
- Comparison of mean and standard deviation of pre test and post test score of pain in control and experimental group of cancer patients.

- Comparison of mean and standard deviation of pre test and post test score of stress in control and experimental group of cancer patients.
- Comparison of mean and standard deviation of pre test and post test score pain and stress in control and experimental group of cancer patients.
- Frequency and percentage distribution of level of satisfaction regarding virtual reality therapy among experimental group of cancer patients after the therapy.
- Correlation between pain and stress scores in control and experimental group of cancer patients.
- Association between selected demographic variables and level of pain in control and experimental group of cancer patients after VR therapy.
- Association between selected demographic variables and level of stress in control and experimental group of cancer patients after VR therapy
- Association between selected clinical variables and level of pain level of in control and experimental group of cancer patients after VR therapy.
- Association between selected clinical variables and level of stress in control and experimental group of cancer patients after VR therapy.

Table 1

Frequency and Percentage Distribution of Demographic Variables among Control and the Experimental Group of Cancer Patients

N= 60

Demographic variables	Control group (n= 30)		Experimental group (n=30)		Chi Square	p value
	n	p	n	p		
Age in years						
30-40	11	36.6	8	26.26	0.26	N.S.
41-50	2	6.66	7	23.13		
51-60	9	30	10	33.33		
>60	8	26.16	5	13.33		
Gender						
Male	17	56.6	11	36	2.41	N.S.
Female	13	43.3	19	63		
Education						
Primary	3	10	5	16.66	1.07	N.S.
Secondary	13	43	7	23.33		
Higher secondary	13	43	8	26.6		
Graduate and above	1	3.33	10	33.33		

The data from table 1 shows that one third of the cancer patients in control group belong to the age group of 30-40 years (36.66%) and 50-60 years (33.33%) in experimental group respectively. Most of the cancer patients (56.66%) were males in control group and

females in the experimental group (63%). Most of the cancer patients (43.33%) were higher secondary passed in control group and graduates in the experimental group (33.33%) respectively.

Findings also reveal that there is no statistical significant difference between control group and experimental group of cancer patients with regard to background characteristics of patients indicating the homogeneity of the groups. Relevant categories were clubbed for the computation of chi square analysis.

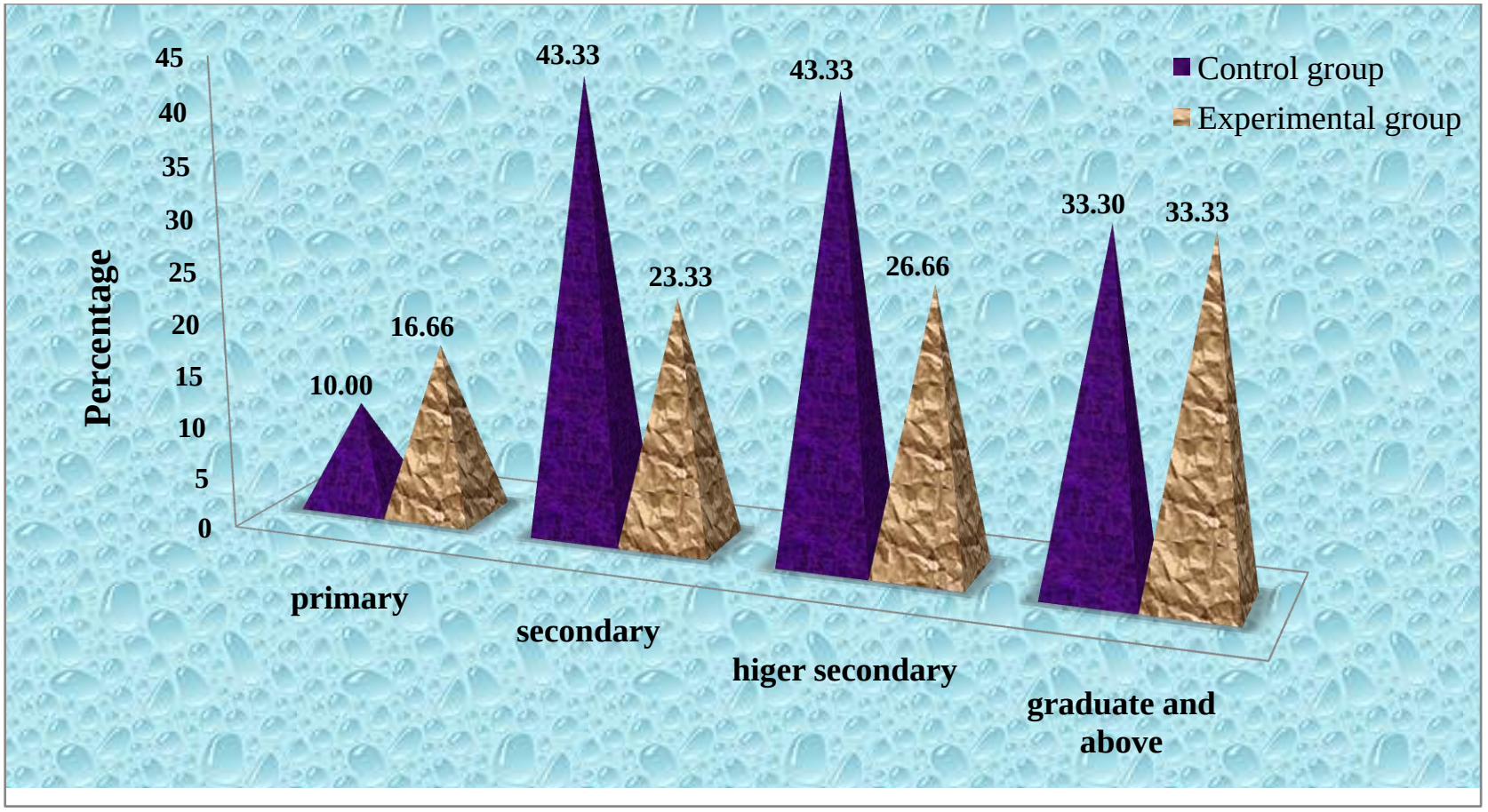

Fig 3:Percentage Distribution of Educational Status of Control and Experimental Group of Cancer Patients

Table 2

Frequency and Percentage Distribution of Selected Clinical Variables among the Control and Experimental Group of Cancer Patients

N=60

Clinical variables	Control group (n= 30)		Experimental group (n= 30)	
	n	p	n	p
Medication for major illness				
Yes	25	83.33	8	26.66
No	5	16.66	22	73.33
No. of hospitalization within last five years				
Nil	8	26.66	4	13.33
1-2	13	43.33	16	53.33
>3	9	30	10	33.33
Treatment seeking behavior for any illness				
Use medical facilities	18	60	16	53.33
Self medication	10	33.33	8	26.66
Any other, specify	2	6.66	6	20
Types of stress relaxation				
Yoga/meditation	1	3.33	2	6.66
Antianxietic drugs	1	3.33	0	0
Counseling	0	0	0	0
Cancer support group	0	0	0	0
Nil	28	93.33	28	93.33

The findings of the above table denote that majority of the cancer patients in control group (83.33%) were on medication for other major illness whereas in experimental group majority of the cancer patients(73.33%) were not on any medication for any major illness.

Majority of the cancer patients in control group (43.33%) and experimental group (53.33%) had a history of hospitalization for 1-2 times within last five years. Most of the cancer patients in control (93.33%) and experimental group (93.33%) have never used any stress relaxation therapy before.

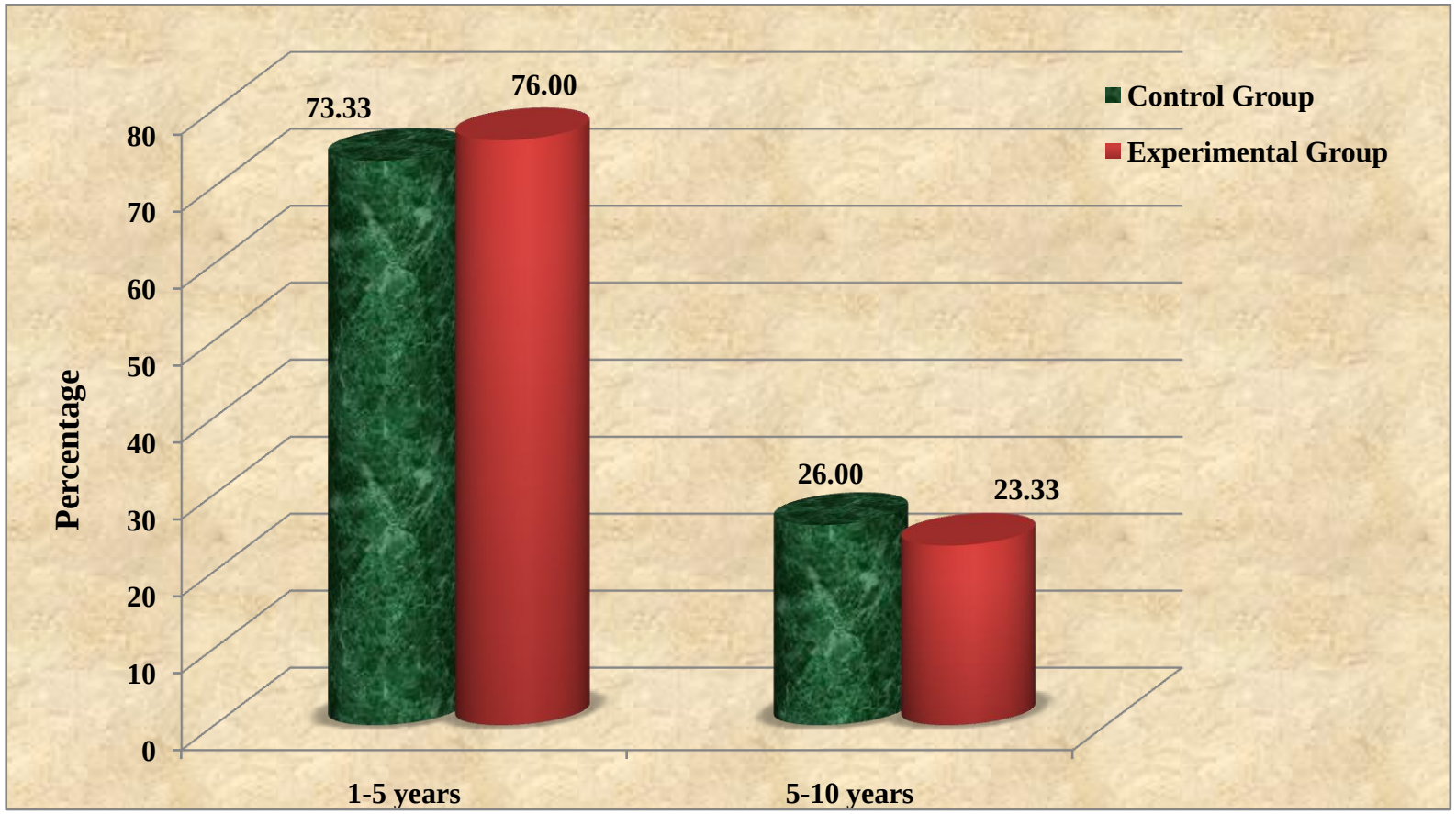

FIG 4: Percentage Distribution of Duration of Medical Illness among Control and Experimental Group of Cancer Patients.

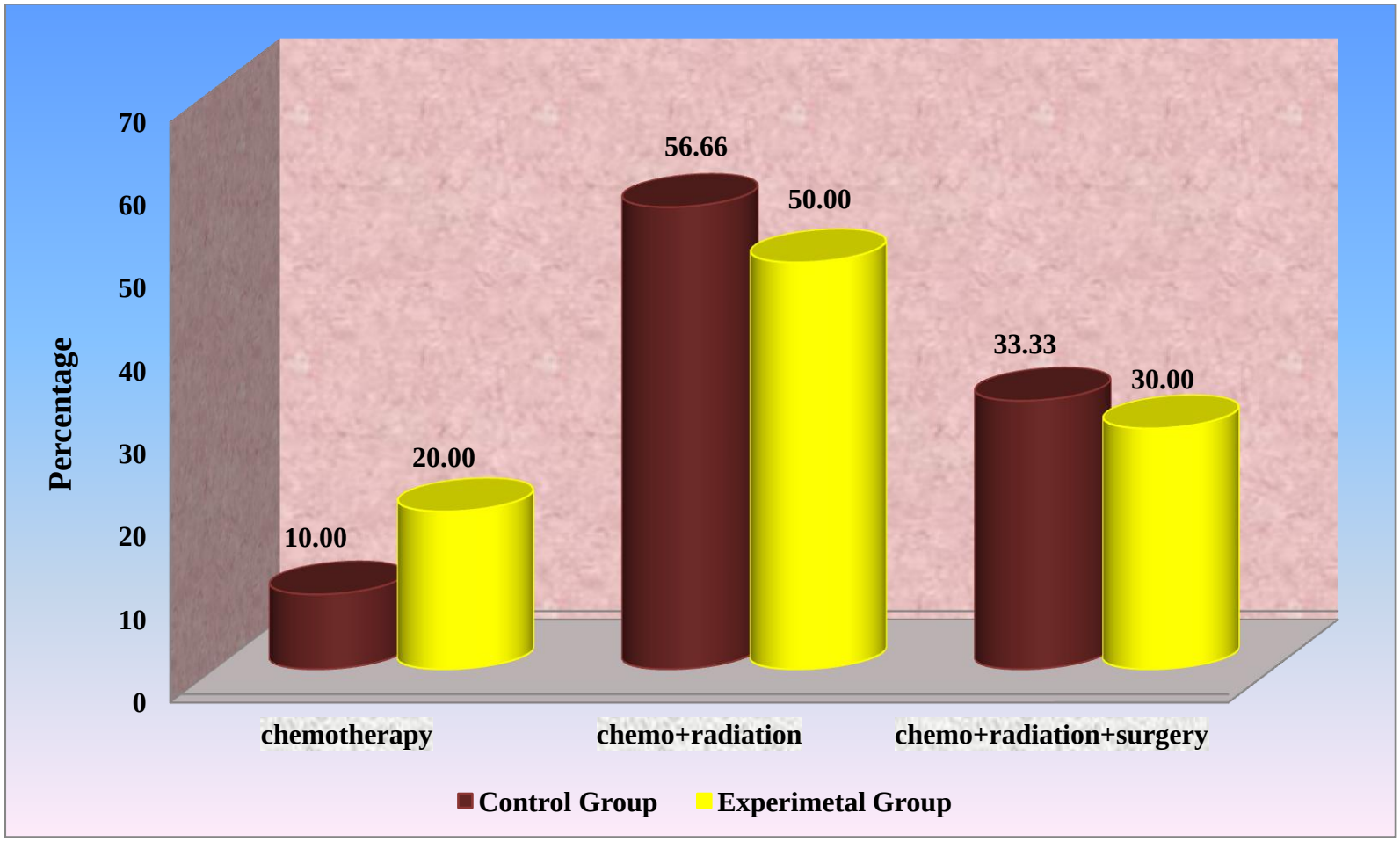

Fig 5:Percentage Distribution of Types of Treatment in Control and Experimental Group of Cancer Patients

Table -3

Frequency and Percentage Distribution of Level of Pain among Control and Experimental Group of the Cancer Patients before and after the VR therapy

N=60

Group	Before therapy								After therapy							
	None		**Mild**		**Mod**		**Severe**		**None**		**Mild**		**Mod**		**Severe**	
	n	p	n	p	n	p	n	p	n	p	n	p	n	p	n	p
Control group **n= 30**	0	0	5	16	12	40	13	43.3	0	0	4	13.3	14	46.6	12	40
Experi-mental group **n= 30**	0	0	3	10	9	30	18	60	10	33.3	16	53	4	13.3	0	0

The data presented in the table 3 depicts that less than half of the cancer patients (43.3%) in control group had severe level of pain before the therapy and a significant group of the patients (40%) continued to have severe pain in control group after the therapy.

The level of pain was severe (60%) before therapy and the pain was mild (53%) after the therapyin the experimental group of cancer patients. None of them had severe pain (0%) after the therapy.

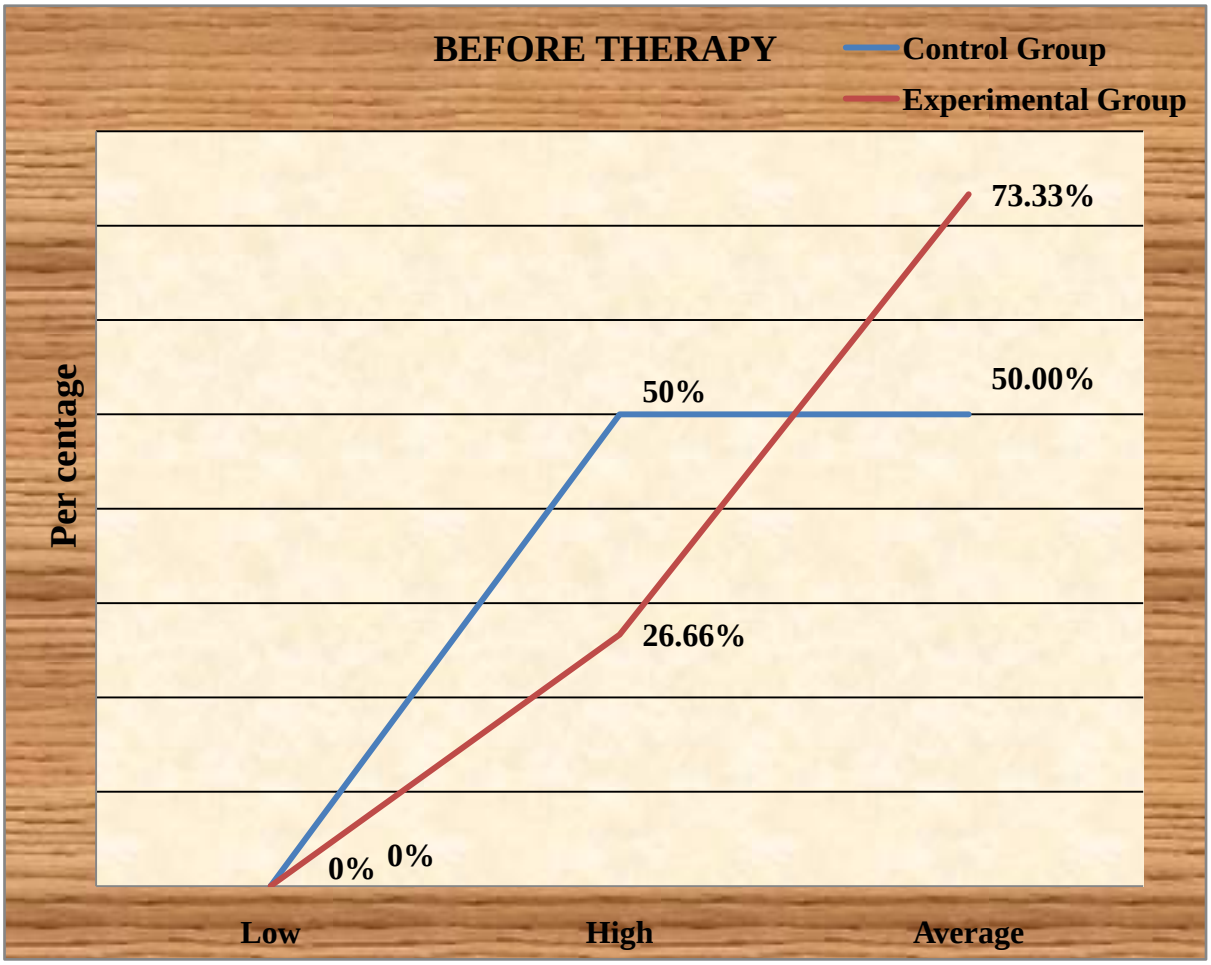

Fig 6: Percentage Distribution of Level of Stress among Control and Experimental Group of Cancer Patient after the Virtual Reality Therapy

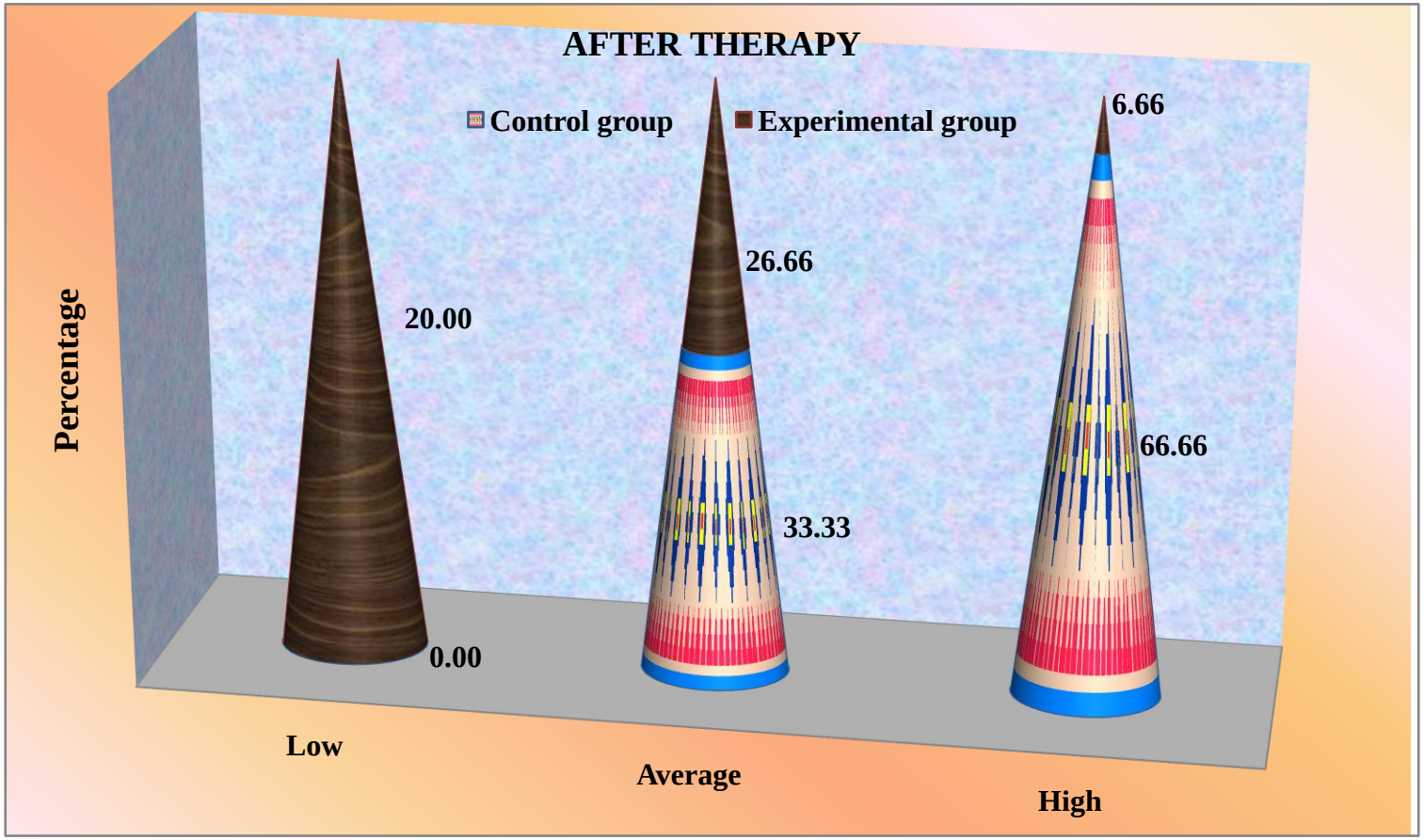

Fig 7: Percentage Distribution of Level of Stress among Control and Experimental Group of Cancer Patient after the Virtual Reality Therapy

Table -4

Comparison of Mean and Standard Deviation of Pretest and Posttest Score of Pain in Control and Experimental Group of Cancer Patients

N= 60

Group	Pre-test		Post-test		Paired 't' value	p value
	M	SD	M	SD		
Control group n= 30	6.36	2.23	6.16	2.93	0.93	N.S.
Experimental group n=30	6.5	2.09	1.6	1.76	18.84	<0.001

The inference from table 4 shows that there was no difference in pain scores between pre and post test in control group whereas in experimental group there was a statistically significant difference in pain scores between pretest (M=6.5, SD=2.09) and post test (M= 1.76, SD=18.84) at $p<0.001$.

Table - 5

Comparison of Mean and Standard Deviation of Pretest and Posttest Score of Stress in Control and Experimental Group of Cancer Patients

N= 60

Group	Pre-test		Post-test		Paired 't' value	p value
	M	SD	M	SD		
Control n= 30	25.4	8.17	26.23	7.00	0.85	N.S.
Experimental n= 30	25.96	7.54	11.7	3.32	11.1	<0.001

Table 5 shows that there was no difference in stress scores between pre and post test in control group whereas in experimental group there was a statistically significant difference in stress scores between pretest (M=25.96, SD=7.54) and post test (M=11.7, SD=3.32) at $p<0.001$.

Table- 6

Comparison of Mean and Standard Deviation of Pretest and Posttest Score of Pain in Control and Experimental Group of Cancer Patients

N=60

Parameters	Before therapy						After therapy					
	Control Group n=30		Experimental group n=30		Independent t value	p value	Control group n=30		Experimental group n=30		Independent t value	p value
	M	SD	M	SD			M	SD	M	SD		
Pain	6.36	2.23	6.5	2.09	0.25	N.S.	6.16	2.93	1.6	1.76	7.40	p<0.001
Stress	25.4	8.17	25.96	7.54	0.27	N.S.	26.23	7.00	11.7	3.32	2.77	p<0.001

Data presented in the table 6 reveals that there is no statistically significant difference in the pretest scores of pain and stress between control and experimental group of cancer patients. The comparison of posttest scores of pain in the control group (M=6.16, SD=2.93) and experimental group (M=1.6, SD=1.76) shows a statistically significant differencewith‘t’ value of 7.40 at p<0.01.

The comparison of posttest scores of stress of cancer patient in the control group (M=26.23, SD=7.00) and experimental group (M=3.32, SD=2.77) also shows a statistically significant difference with‘t’ value of 2.77 at p<0.001 which may be attributed to the effectiveness of VR therapy

Hence the null hypothesis $H_0$1,“There will be no significant difference in pretest and posttest scores of pain and stress among cancer patients” was rejected.

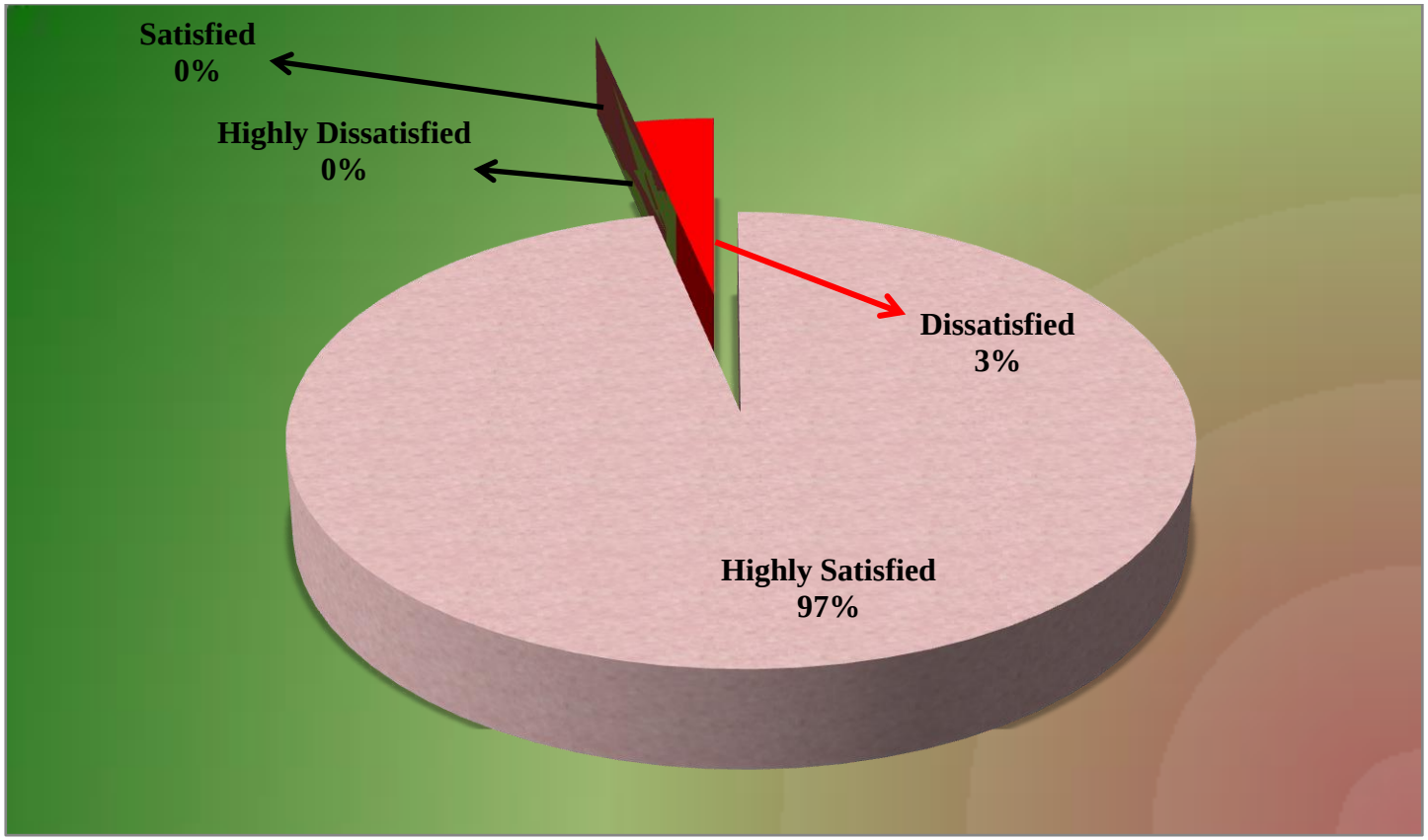

Fig 8: Percentage Distribution of Level of Satisfaction Regarding Virtual Reality Therapy among Experimental Group of Cancer Patients

Table -7

Correlation between Pain and Stress in Control and Experimental Group of Cancer Patients after the VR Therapy

N=60

Parameters	Control group n=30		Correlation r	Experimental group n=30		Correlation r
	M	SD		M	SD	
Pain	6.16	2.93	0.79	1.6	1.76	0.02
Stress	26.23	7.00		11.7	3.32	

From the table 7 it can be interpreted that there was a positive correlation between pain and stress for control group of cancer patients (r=0.79) and low correlation between pain and stress among cancer patients in experimental group (r= 0.02).

Hence the null hypothesis $H_0$2,"There will be no significant correlation between posttest scores of pain and stress in control and experimental group of cancer patients"was rejected.

Table -8

Association between Selected Demographic Variables and Level of Pain in Control and Experimental Group of Cancer Patients after the VR Therapy

N=60

Demographic Variables	Control group (n=30)					Experimental group(n=30)				
	Upto mean		Above mean		Chi square and df	Upto mean		Above mean		Chi square and df
	n	p	n	p		n	p	n	p	
Age in years										
30-40	4	13.33	7	23		5	16.66	3	10	
40-50	2	6.66	0	0	0.47	4	13.33	3	10	0.34
50-60	5	16.66	4	13.33	df=1	6	20	4	13.33	df=1
>60	5	16.66	3	10	N.S.	3	10	2	6.66	N.S.
Gender										
Male	10	33.33	7	23.33	0.02	6	20	5	16.66	0.21
Female	8	26.66	5	16.66	df=1	12	40	7	23.33	df=1
					N.S.					N.S.
Education										
Primary	1	3.33	2	6.66		3	10	2	6.66	
Secondary	7	23.33	6	20	1.42	5	16.66	2	6.66	0.37
Higher secondary	9	30	4	13.33	df=1 N.S.	4	13.33	4	13.33	df=1 N.S.
Graduate & above	1	3.33	0	2		6	20	4	13.33	

Adjacent categories were clubbed for the chi square analysis.

It can be inferred from the table 8 that there is no significant association between selected demographic variables and pain level of cancer patients after the therapy.

Hence the null hypothesis $H_0$3, “There will be no significant association between selected demographic variables and level of pain among control and experimental group of cancer patients after therapy” was retained.

Table -9

Association between Selected Demographic Variables and Level of Stress in Control and Experimental Group after the VR Therapy

N=60

Demographic Variables	Control group (n=30)					Experimental group(n=30)				
	Up to mean		Above mean		Chi square and df	Up to mean		Above mean		Chi square and df
	n	p	n	p		n	p	n	p	
Age in years										
30-40	3	3.33	8	26.66	0.62 df=1 N.S.	5	16.66	3	10	1.2 df=1 N.S.
40-50	2	6.66	0	0		4	13.33	3	10	
50-60	5	16.66	4	13.33		5	16.66	5	16.66	
>60	4	13.33	4	13.33		1	3.33	4	13.33	
Gender										
Male	8	26.66	9	30	0.002 df=1 N.S.	6	20	5	16.66	0.03 df=1 N.S.
Female	6	20	7	23.33		11	36.66	8	26.66	
Education										
Primary	2	6.66	1	3.33	0.11 df=1 N.S.	1	3.33	4	13.33	0.45 df=1 N.S.
Secondary	5	16.66	8	26.66		3	10	4	13.33	
Higher secondary	7	23.33	6	20		3	10	5	16.66	
Graduate and above	0	0	1	3.33		1	3.33	9	30	

Adjacent categories were clubbed for the chi square analysis.

The inference from the table9 shows that there is no significant association between selected demographic variables and stress level of cancer patients after the therapy.

Hence the null hypothesis $H_0$3, “There will be no significant association between selected demographic variables and level of stress among control and experimental group of cancer patients after therapy” was retained.

Table- 10

Association between Selected Clinical Variables and Level of Pain in Control and Experimental Group after the VR Therapy

N=60

Clinical variable	Control group (n=30)					Experimental group(n=30)				
	Up to mean		Above mean		Chi square anddf	Up to mean		Above mean		Chi square and df
	n	p	n	p		n	p	n	p	
Duration of illness										
1-5 years	13	43.33	9	30	0.02 df=1 N.S.	12	40	11	36.66	2.51 df=1 N.S.
5-10 years	5	16.66	3	10		6	20	1	3.33	
Medication for major illness										
Yes	16	53.33	9	30	2.51 df=1 N.S.	7	23.33	1	3.33	3.43 df=1 N.S.
No	3	10	2	6.66		11	36.66	11	36.66	
Type of treatment										
Chemo therapy only	3	10	0	3.33	0.36 df=1 N.S.	5	16.66	1	3.33	2.22 df=1 N.S.
Chemo + Radiation therapy	11	36.66	6	20		7	23.33	8	26.66	
Chemo + Radiation + Surgery	4	13.33	6	20		6	20	3	10	

Adjacent categories were clubbed for the chi square analysis.

It can be inferred from the table 10 that there is no significant association between selected demographic variables and stress level of cancer patients after the therapy.

Hence the null hypothesis $H_0$4, “There will be no significant association between selected clinical variables and level of pain among control and experimental group of cancer patients after therapy” was retained.

Table-11

Association between Selected Clinical Variables and Level of Stress in Control and Experimental Group after the VR Therapy

N=60

Clinical variables	Control group (n=30)					Experimental group(n=30)				
	Up to mean		Above mean		Chi square	Up to mean		Above mean		Chi square and df
	n	p	n	p		n	p	n	p	
Duration of illness										
1-5 years	11	36.66	11	36.66	0.36 df=1 N.S.	12	40	11	36.66	0.05 df=1 N.S.
5-10 years	3	10	5	16.66		4	13.33	3	10	
Medication for major illness										
Yes	11	36.66	14	46.66	0.42 df=1 N.S.	5	16.66	3	3.10	0.02 df=1 N.S.
No	3	10	2	6.66		13	43.33	9	30	
Type of treatment										
Chemo therapy only	2	6.66	1	3.33	0.56 df=1 N.S.	4	13.33	2	6.66	0.13 df=1 N.S.
Chemo + Radiation therapy	8	36.66	9	30		10	33.33	5	16.66	
Chemo + Radiation + Surgery	4	13.33	6	20		4	13.33	5	16.66	

Adjacent categories were clubbed for the chi square analysis.

It can be inferred from the table 11 that there is no significant association between selected demographic variables and stress level of cancer patients after the therapy.

Hence the null hypothesis $H_0$4, “There will be no significant association between selected clinical variables and level of pain among control and experimental group of patients after therapy” was retained.

Summary

This chapter has dealt with the analysis and interpretation of the data regarding the frequency and percentage distribution of demographic and clinical variables, level of pain, level of stress, and level of satisfaction, comparison of mean and standard deviation of pain and stress after the virtual reality therapy,correlation between pain and stress and association between selected demographic and clinical variables and pain and stress after virtual reality therapy. The analysis showed that virtual reality therapy has a positive effect on the levels of pain and stress of cancer patients.

CHAPTER V

DISCUSSION

An Experimental Study to assess the Effectiveness of Virtual Reality Therapy upon Symptomatic Distress among Cancer Patients in Selected Hospital, Chennai.

Objectives of the Study

1. To assess the level of pain and stress among control and experimental group of cancer patients before and after the virtual reality therapy.

2. To determine the effectiveness of virtual reality therapy by comparing the pre test and post test scores of pain and stress in control and experimental group of cancer patients.

3. To determine the level of satisfaction of experimental group of cancer patients on virtual reality therapy.

4. To determine the correlation between pain and stress scores in the control and experimental group of cancer patients.

5. To find out the association between selected demographic variables and level of pain and stress in the control and experimental group of cancer patients after the virtual reality therapy.

6. To find out the association between selected clinical variables and level of pain and stress in the control and experimental group of cancer patients after the virtual reality therapy.

The discussion is presented as follows

- Frequency and percentage distribution of demographic variables among the control and experimental group of cancer patients.
- Frequency and percentage distributions of clinical variables control and experimental group of cancer patients.
- Frequency and percentage distributions of levels of pain and stress among control and experimental group of cancer patients before and after the VR therapy.
- Comparison of mean and standard deviation of pretest and posttest score of pain and stress in control and experimental group of cancer patients
- Frequency and percentage distribution of level of satisfaction regarding virtual reality therapy among experimental group of cancer patients after theVR therapy.
- Correlation between pain and stress in control and experimental group of cancer patients after the VR therapy.
- Association between selected demographic variables and levels of pain and stress in control and experimental group of cancer patients after VR therapy.
- Association between selected clinical variables and levels of pain and stress in control and experimental group of cancer patients after VR therapy.

Frequency and Percentage Distribution of Demographic Variables among the Control and Experimental Group of Cancer Patients

One third of the cancer patients in the control group were in the age group of 30-40 years (36.66%) and 50-60 years (33.33%) in the experimental group respectively. Most of the cancer patients (56.66%) were males in control group and females in the experimental group

(63%) respectively. Most of the cancer patients (43.33%) were higher secondary passed in control group and graduates in the experimental group (33.33%).

A Meta analysis done among Spanish population by Ronaldino et al. (2011) on the prevalence of cancer pain at one or more location found that women had a higher prevalence of (86%) of cancer compared to men (72%). Another study by Lucas et al. (2005) on the prevalence of cancer pain in various age group found that majority of the population were males comparing to females (76%, 24%).

A survey (2012-2014) done by Cancer Research UK have found that the incidence of cancer was more in elderly people (50-85+ years of age) worldwide. They also have said that half (53%) of the newly diagnosed cases in UK were in the age group of 50-74years and above. The mortality is higher in people aged above 85 years old.

So, it may be inferred that gender variation for prevalence of cancer may have geographical or anatomical variations. The type of cancer also may vary among various genders. Breast cancer is the most common cancer among females and prostate cancer is the most common cancer among male.

From the result of above mentioned survey it is clear that mortality and morbidity of cancer is higher in the older age group. The stress level is higher when the physical symptoms are severe due to the interaction of physiological and psychological variables. Therapies like Virtual Reality with augmented reality exposure will therefore be very effective for this group of people to cope with symptomatic distress in cancer.

Frequency and Percentage Distribution of Clinical Variables among Control and Experimental Group of Cancer Patients

The clinical profileof cancer patients has shownthat majority of them in the control group (73.33%) and experimental group (76%) had duration of illness of 1-5 yrs. Majority of the cancer patients in control group (83.33%) were on medication for major illness whereas in the experimental group, the majority of cancer patients (73.33%) were not on any medication for any major illness. Majority of the cancer patients in control group (43.33%) and experimental group (53.33%) had a history of hospitalization for 1-2 times within last five years. Most of the samples in control (56.66%) and experimental group (50%) were undergoing chemotherapy and radiation and combined treatment approach. Most of the cancer patients in control (93.33%) and experimental group (93.33%) have never used any stress relaxation therapy before.

A study by Razali (1998) on life event, stress and illness among cancer patient claims that stress is negative when it exceeds our ability to cope causing symptomatic distress. In his study on patients with different types of cancer in various stages, the majority (73%) had other major illnesses, and mostly cardiac diseases. The study identified that stress was higher in people receiving neoadjuvant therapy (60%).

Therefore it can be said that multiple physical illness, prolonged and complicated cancer treatment will increase the physical and mental stress of people. When mental and physical stress levels are higher, the other physical symptoms especially pain, will persist. Therefore various divertional therapies will be effective for this population to reduce their stress at that time period and also later. As VR therapy is a widely accepted form of advanced divertional therapy, it can be used in the hospital set up when the time patient undergoes therapy.

The First Objective was to Assess the Level of Pain and Stress among Control and Experimental Group of Cancer Patients Before and After the Therapy.

The data depicted that about half of the cancer patients (43.3%) in control group were having severe level of pain before the therapy and a significant group of the cancer patients in the control group (40%) continued to have severe pain after the therapy.

Whereas, the level of pain was severe in experimental group of cancer patients (60%) before therapy and was mild (53%) after the therapy. None of them have complained of severe pain (0%) after the therapy.

The data also depicted that equal number of cancer patients were having moderate and high level of stress before the therapy (50%, 50%) in the control group and during the post assessment the level of stress was high for the majority of the cancer patients in control group (66.66%).

A majority of the cancer patients in the experimental group (73.33%) had a high level of stress before the therapy and low level of stress (66.66%) after the therapy.

A study of differences in demographic, clinical and symptom characteristics and quality life outcomes among oncology patients with different types of pain was conducted by Victoria et al. (2017). The study aimed at describing the incidence of different types of pain (Cancer and Non- Cancer pain) and association between various demographic and clinical characteristics and quality of life among 926 cancer patients. The researchers found that out of the 72.5% of the patients with pain, 21.5 % had NCP, 37.0% had CP and 41.5% had both CP and NCP. Pain was common among younger female patients who have reported higher levels of depression and stress. The researchers suggested that oncology outpatients should have assessment facilities for both cancer and non-cancer conditions.

Mayank et al. in their study on a prospective evaluation of symptom and overall burden among a cohort of 110 critically ill cancer patients (2016) interpreted the prevalence of symptoms in cancer patients using the ESAS.(Edmonton Symptom Assessment Scale), as moderate when ESAS $\geq$ 40 and severe ESAS if $\geq$ 70 as symptomatic distress. Pain was the most distressing factor (40%), followed by shortness of breath (34.555) and tiredness (6.36%). Similar findings by Alshemmari (2010) et al. in Symptom burden in hospitalized patients with cancer in Kuwait have found that pain was the most reported complaint (31%).

Tamara et al. (2016) did the work of identifying factors of psychological distress on the experience of pain and symptom management among 232 cancer patients. Many (58%) of the patients have reported that their pain was cancer related, whereas less than one-third has reported that pain was the result of both cancer and other medical conditions. Most commonly reported symptoms were difficulty in sleeping (M= 2.32, SD=1.08), worry (M=2.15, SD=1.10), Difficulty in sleeping (M=2.50, SD=1.22) and feeling nervous (M=2.34, SD=1.29) as the most common psychologically distressing symptom.

Epidemiological and clinical studies over the past 30 years have provided strong evidence of a relationship between chronic stress, depression and social isolation and cancer progression which not only validates the present findings but also points towards pain as the more common distressing factor among cancer patients.

The Second Objective was to Determine the Effectiveness of Virtual Reality Therapy by Comparing the Pre and Post Test Scores of Pain and Stress in Control and Experimental Group of Cancer Patients.

Data reveals that there is no statistically significant difference in the pretest scores of pain and stress of control and experimental group. There is a statistically significant

difference in posttest score of pain in the control group (M=6.16, SD=2.93) and experimental group (M=1.6, SD=1.76) with 't' value of 7.40 at $p<0.01$. The comparison of post scores of stress of patient in the control group (M=26.23, SD=7.00) and experimental group (M=3.32, SD=2.77) also shows a statistically significant difference with 't' value of 2.77 at $p<0.001$ which may be attributed to the effectiveness of VR therapy.

Hence the null hypothesis $H_0$1, "There will be no significant difference in pretest and posttest scores of pain and stress among control and experimental group of cancer patients"was rejected.

Jones et al. (2016) have conducted a study on impact of virtual reality therapy on variety of chronic pain in Tennessee among thirty patients aged $\geq$18 years using a 0-10 numeric pain rating scale. The study reported the average pre-session rating of pain as 5.7 and post session pain rating as 4.1 and that during the virtual reality therapy the average pain rating was 2.6 only. The result found thatpaired 't' test was significant at $p<0.001$.

The Third Objective was to Determine the Level of Satisfaction of Experimental Group of Cancer Patients on Virtual Reality Therapy

From the analysis it was seen that majority of the population (96.66%, n=29) were highly satisfied with the virtual reality therapy.

A cross sectional study among women aged 50 years and above conducted by Schneider et al.(2004) on virtual reality intervention for older women with breast cancer (n= 16) found an improvement in the symptoms on all physical and psychological measures after virtual reality therapy. All the women (n=16, p=100%) in the study readily agreed to use the VR device again. Head mounted VR devices and therapy is proved to have no cyber sickness

like nausea, dizziness, vomiting by the researchers. Various research studies using VR therapy have not reported any complication by the user.

There were no complaints from the patients after the therapy, in the present study also. Already VR therapy is used for various complicated surgical procedures like amputation. Therefore, it can be incorporated as protocol in the treatment of cancer patients.

The Fourth Objective was to Determine the Correlation between Pain and Stressin Control and Experimental Group of Cancer Patients after the VR Therapy

A positive correlation was seen between pain and stress for the control group of cancer patient (r=0.79) and low correlation between pain and stress in experimental group of cancer patients (r= 0.02) after the therapy which may be attributed to the virtual reality therapy.

Hence the null hypothesis $H_0$2,"There will be no significant correlation between posttest scores pain and stress in control and experimental group of cancer patients" was rejected

A controlled cross-sectional survey on Psychological distress and cancer pain by Xiao et al. (2015) was conducted among 126 patients aged >18yearsin China. 64 reported pain and 62 did not. Results showed that patients who reported pain had mean State-Trait Anxiety Inventory (STAI) scores of 46.38 for state anxiety and 44.64 for trait anxiety, as well as a mean BDI (Beck Depression Inventory) score of 19.17. The pain-free patient group had mean STAI scores of 40.73 for state anxiety and 42.87 for trait anxiety, and a mean BDI score of 15.35.

From the above findings it can be said that pain and stress may be interrelated. But complicated treatment process and the physical symptoms together can result in symptomatic

distress. Therefore VR therapy will be an effective treatment for the patient to cope with pain and stress.

The Fifth Objective was to Find out the Association between Selected Demographic Variables and Pain in Control and Experimental Group of Cancer Patients after the Therapy.

There was no significant association between selected demographic variables and pain and level of stress of patients in control and experimental group after the therapy.

Hence the null hypothesis $H_0$3,"There will be no significant association between selected clinical variables and level of pain and stress among control and experimental group of patients after therapy" was retained.

A cross sectional study was conducted by Sema (2011) on factors affecting quality of life in patients undergoing chemotherapy among 352 cancer patients in Turkey. Patients were mostly women (83.5%), school graduates (57.1%) and housewives (44.6%). Almost all the patients reported having religious and cultural connotation for the disease. The study found no significant association between age and educational status of patients and quality of life ($p>0.05$).

The above findings show the absence of association between demographic factors and physical symptoms such as pain in cancer patients. So the changes in pain level may be attributed to the effect of the Virtual reality therapy despite the presence of other factors.

The Sixth Objective was to Find out the Association between Selected Clinical Variables and Level of Stress among Control and Experimental Group of Cancer Patients After the Therapy.

There was no significant association between selected clinical variables and pain and level of stress of patients among control and experimental group after the therapy.

Hence the null hypothesis $H_0$4, "There will be no significant association between selected clinical variables and pain and level of stress among control and experimental group of cancer patients after virtual reality therapy" was retained.

Heydarnejad et al. (2011) have conducted a cross sectional study among 200 cancer patients in Tennessee on factors affecting quality of life in cancer patients undergoing chemotherapy. Findings of their study pointed out that fear about the future (29%), depression (17.5%) and thinking about future and its consequences (26.5%) as some of the most common problems among the patients. The researcher did not find any association between QOL and variables duration of disease, despite a strong correlation between QOL and number of chemotherapy cycles. Nevertheless significant difference was found between the level of QOL in patients undergoing<2 chemotherapy cycles ($P<0.001$).

The above findings say that various clinical variable and psychological symptoms such as stress in cancer patients may have some association. So the change in stress level is attributable to the effect of the Virtual reality therapy and not affected by other factors.

Summary

This chapter has dealt with the discussion of the findings in the present study which includes demographic variables, clinical variables, level of pain, level of stress, effectiveness of virtual reality therapy on pain and stress level of cancer patient, association between selected demographic variables and clinical variables on level of pain and stress and the level of satisfaction of patients regarding virtual reality therapy.

CHAPTER VI

SUMMARY CONCLUSION, IMPLICATION AND RECOMMENDATIONS

This is the most creative and demanding part of the study. This chapter provides a brief account of the present study and the conclusion drawn from the findings, recommendations, limitations of the study, suggestions for the study and nursing implications.

Summary

An experimental study to assess the effectiveness of virtual reality therapy upon symptomatic distress among cancer patients in selected hospital, Chennai.

The Objectives of the Study were

1. To assess the level of pain and stress among control and experimental group of cancer patients before and after the virtual reality therapy.
2. To determine the effectiveness of virtual reality therapy by comparing the pre and post test scores of pain and stress incontrol and experimental group cancer patients
3. To determine the level of satisfaction of experimental group cancer patientson virtual reality therapy.
4. To determine the correlation between pain and stress scoresin control and experimental group of cancer patients.
5. To find out the association between selected demographic variables and level of pain and stress in the control and experimental group of cancer patients after the virtual reality therapy.
6. To find out the association between selected clinical variables and level of pain and stress in the control and experimental group of cancer patients after the therapy.

Null Hypotheses

$H_0$1: There will be no significant difference in pretest and posttest scores of pain and stress in control and experimental group of cancer patients.

$H_0$2: There will be no significant correlation between posttest scores of pain and stress in control and experimental group of cancer patients.

$H_0$3: There will be no significant association between selected demographic variables and level of pain and stress in the control and experimental group of cancer patients after virtual reality therapy.

$H_0$4: There will be no significant association between selected clinical variables and level of pain and stress in control and experimental group of cancer patients after virtual reality therapy.

The conceptual framework for the study was based on "Sister Callista Roy's Adaptation Model". The study variables – level of pain, level of stress among patient with cancer stage II and above were formulated by the input, throughput, output model. The level of significancewas selected as $p<0.05$ and $p<0.001$. An extensive review of literature and guidance by experts formed the foundation of the tool.

AQuasi experimental approach was used to achieve the objectives of the study. The present study was conducted at Teynampet Apollo Speciality Hospital, Chennai.A purposive samplingwas used for the present study. Study was conducted among 60 cancer patients who were assigned to control (30) and experimental (30) groups.

The investigator has used a demographic variable proforma, a clinical variable proforma, McCaffery Beebe pain assessment scale, Cohenet al'sPerceived stress scale and a

rating scale for assessing the level of satisfaction on virtual reality therapy using cardboard goggle device. The tools for data collection were validated and reliability was established. After confirming the feasibility and researchability through the pilot study, the data for the main study was collected. The collected data was tabulated and analyzed using descriptive and inferential statistics like mean, standard deviation, 't' test, chi square and Pearson's correlation.

Major Findings of the Study

Frequency and percentage distributions of demographic variables among control and experimental group of cancer patients

The data shows that one third of the cancer patients in the control group were in the age group of 30-40 years (36.66%) and 50-60 years (33.33%) in experimental group respectively. Most of the cancer patients in the control group were males (56.66%) and females (63%) in the experimental group respectively. Most of the cancer patients (43.33%) were higher secondary passed in control group and graduates in the experimental group (33.33%).

Frequency and percentage distributions of clinical variables among control and experimental group of cancer patients

The clinical profile of cancer patients has shown that majority of them in the control group (73.33%)and experimental group (76%)had illness forthe duration of 1-5 yrs.A majority of the cancer patients in the control group (83.33%) were on medication for major illnesses whereas in the experimental group the majority of the cancer patients (73.33%) were not on any medication for any major illnesses. A majority of the cancer patients in the control group (43.33%) and experimental group (53.33%) had a history of hospitalization for 1-2

times within the last five years. Most of the cancer patientsin the control (56.66%)and the experimental groups (50%) were undergoing chemotherapy, radiation therapy and a combined treatment approach. Most of the cancer patients in the control (93.33%) and the experimental group (93.33%) had never used any stress relaxation therapy before.

Frequency and percentage distribution of level of pain among control and experimental group of cancer patients before and after the VR therapy

Findings also reveals that in the control group 43.3% & 40% of them had severe pain in pretest and posttest respectively.

The level of pain was severe in the experimental group of cancer patients (60%) before the therapy and the pain was mild (53%) after the therapy. None of them complained of severe pain (0%) after the therapy.

Frequency and percentage distributions of level of stress among control and experimental group of cancer patients before and after the VR therapy

The data showed that equal numbers of cancer patients werehaving a moderate and high level of stress before the therapy (50%, 50%) in control group whereas during the post assessment the stress level was high for the majority of the cancer patients in control group (66.66%).

A majority of the cancer patients in the experimental group (73.33%) had high level of stress before the therapy and a low level of stress (66.66%) after the therapy.

Effectiveness of virtual reality therapy upon pain and stress in control and experimental group of cancer patients before and after the therapy

Data reveals that there is no statistically significant difference in the pretest scores of pain and stress between control and experimental group. There is a statistically significant difference in posttest score of pain in the control group (M=6.16, SD=2.93) and experimental group (M=1.6, SD=1.76) with 't' value of 7.40 at $p<0.01$. The comparison of post scores of stress of patient in the control group (M=26.23, SD=7.00) and experimental group (M=3.32, SD=2.77) also shows a statistically significant difference with't' value of 2.77 at $p<0.001$ which may be attributed to the effectiveness of VR therapy.

Frequency and percentage distributions of level of satisfaction of experimental group of cancer patients after the VR therapy

From the analysis it was inferred that majority of the cancer patients (96.66%) were highly satisfied with the virtual reality therapy.

Correlation between pain and stress in control and experimental group of cancer patients after the therapy

From the analysis it was revealed that there was a positive correlation between pain and stress for control group of cancer patients (r=0.79) and low correlation between pain and stress among cancer patients of experimental group (r= 0.02) which may be attributed to the virtual reality therapy.

Association between selected demographic variables and the level of painin control and experimental group of cancer patients after the therapy

There is no significant associationbetween selected demographic variables and level of pain in control and experimental group of patients after the therapy.

Association between selected demographic variables and the level of stress in control and experimental group of cancer patients after the therapy

There is no significant associationbetween selected demographic variables and level of stress among control and experimental group of patients after the therapy.

Association between selected clinical variables and the level ofpain in control and experimental group of cancer patients after the therapy

There is no significant association between selected clinical variables and level of pain in control and experimental group after the therapy.

Association between selected clinical variables and the level of stress in control and experimental group of cancer patients after the therapy

There is no significant association between selected clinical variables and level of stress among control and experimental group after the therapy.

Conclusion

There is a wide variety of alternative therapies available which helps in the reduction of cancer pain and stress. All those interventions can be incorporated in the conventional care and practice. From the present study the researcher concluded that virtual reality therapy using Cardboard goggle and Mobile VR applications are useful in reducing pain and stress among cancer patients. Hence the therapy should be incorporated into the existing conventional care of the cancer patient due to its wide impact on the cancer treatment.

Implications

The researcher has derived the following implications from the study. These are of vital concern in the field of nursing practice, nursing education, nursing administration and nursing research.

Nursing Practice

Nurses should use various stress and pain assessment techniques to assess the level of stress in cancer patients especially for those who have been suffering from a longer duration. The multipurpose approach to treat the cancer is quite stressful for patient more particularly chemotherapy. The stress and physical and mental stress that the patient bears, also affect the family members. Nurses can use various stress relaxation techniques and pain relieving measures other than the usual pharmacological/ surgical approach to deal with those situations.Their use should be made in treatment field as well as in advance nursing care practice curriculum for the generation of new knowledge. Training programme should be arranged for the staff in hospital settings to improve awareness of the use of high technology through Virtual Reality in patient care module. In addition, the nurse as a team leader can plan, organize and coordinate activities for the patients, so that the physical and mental stress can be reduced and the complicated treatment will be easily adaptable for the patient.

Nursing Education

The nurse educators should involve the nurses and nursing students in various home care practices to manage certain emergency situations. Nurse can help nurses to learn various stress relieving exercises (yoga) or techniques (VR therapy, music, reading). Nurses can be educated on the various management strategies to help patient’s learn and manage health transitions. Integration of theory and practice is a vital need and it is important in nursing

education. Various other strategies to control symptomatic distress in hospital and home setup should be integrated with practice.

Nurse educators should initiate protocol for assessing the pain and stress level of cancer patient as routine assessment especially in clinical setup. Nurse educators should take initiatives to organize Continuing Nursing Education programmes for the nurses on assessing various symptomatic distress and the nursing aspects to control them. Early recognition, prompt management and aspects of continuing care should comprise the education protocol. With changing health trends, and increase in demands of health needs, improvised health care technologies in symptomatic management of the disease, nursing education should be implemented for the nurses in such a way that makes the nurses overall skillful to handle a patient with cancer.Initiative should be taken to add Virtual Reality therapy as relaxation module in present nursing curriculum. In colleges Nurse Leaders can take initiatives to organize for CNE programmes and workshops on various aspects of Virtual Reality therapy.

Nursing Administration

Considering today's technological advances and continuous growing health challenges, health care needs or demands, rising health concerns, the administrators have the highest responsibility in providing opportunity for the nurses to use different modes of therapy in reducing symptomatic distress among cancer patient. This will also enable the nurses to update their knowledge and to acquire skill in managing the patients who are suffering due to deadly disease.

The nurse administrator should take steps with National bodies in formulating policies and protocols in providing patient education and for allocating resources such as manpower, money, material and methods and also should find time to conduct successful and useful; patient education programmes. Nurse administrator should provide opportunity for the nurses to attend the various training programmes.

Nursing Research

The growing demand has triggered a heightened urgency to expand the evidence based support for identifying and controlling symptomatic distress among cancer patients. There is a need for extensive and intensive research in the field of oncology nursing to generate more specific database and to identify the benefits of research and provide much information for practice. It can open a big avenue for research on innovative and alternative methods to control and reduce stress and pain in cancer patients. The professional should conduct further researches on the application of various other alternative methods of stress relaxation and pain management in cancer patients. Student nurses should conduct further studies on alternative methods of symptomatic distress control in cancer patients. This will generate more scientific data.

Dissemination of findings can be done through conference, seminars, publication in professional, national and international journals and through the World Wide Web. More research needs to be conducted with the use of locally available therapeutic measures in controlling symptomatic distress among cancer patients. More theories can be generated based on research findings.

Recommendations

The researcher recommends the followings:

- ☞ The same study can be conducted for a larger number of samples.
- ☞ The same study can be conducted among various groups like patients suffering from long term illnesses, students, or workers of different settings.
- ☞ The same study can be conducted in different settings.
- ☞ The same study can be conducted using other different forms of virtual goggle or oculus rift.

- ☞ A comparative study can be done using other usual relaxation techniques and virtual reality therapy to assess the stress level among various groups
- ☞ A comparative study can be done between virtual reality therapy and usual anti-anxietic and/ or analgesic medications to see the effectiveness.
- ☞ Along with VR therapy other forms of stress relaxation and pain management strategies should be also made available like music therapy, meditation and yoga.
- ☞ Study should be conducted to assess the level of knowledge of family members in identifying symptomatic distress among cancer patient and the various strategies to control the symptoms.
- ☞ Study should be conducted to assess the level of knowledge of nurses in identifying symptomatic distress among cancer patients and the various strategies to control the symptoms.
- ☞ The same study can be conducted on family members of cancer patients to reduce their stress burdens.

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APPENDIX I

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

Apollo College of Nursing

(Recognised by the Indian Nursing Council and Affiliated to the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0200/16 **30.08.2016**

To

The Medical Superintendent
Apollo Specialty hospitals
Teynampet
Chennai – 600 035

Respected Madam,

Sub: To request permission for research study- Reg

Greetings! As a part of the curriculum requirement our 2nd year M.Sc (N) student Ms.Debika Das has selected the following title for her research study.

"An experimental study to assess the effectiveness of virtual reality therapy upon symptomatic distress among patients with cancer".

So I kindly request your good selves to permit her to conduct study in your esteemed hospital.

Thanking you,

Dr.LATHA VENKATESAN
PRINCIPAL

forward to ethics committee

Dr. GEORGE JACOB
DMS-ACH, Teynampet

IS/ISO 9001:2000

Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095.
Ph. : 044 - 2653 4387 Tele fax : 044 - 2653 4923 / 044- 2653 4386

APPENDIX II

ETHICS COMMITTEE CLEARANCE LETTER

Institutional Ethics Committee - Clinical Studies

Reg.No.: ECR/37/Inst/TN/2013

Apollo HOSPITALS TOUCHING LIVES

25 Nov 2016

To,
Ms. Debika Das
First year, M.Sc. (Nursing),
Department of Medical Surgical Nursing,
Apollo College of Nursing, Chennai.

Ref: An Experimental Study to Assess the Effectiveness of Virtual Reality Therapy upon Symptomatic distress among Cancer patients in Selected Hospital, Chennai.

Sub: Approval of the above referenced project and its related documents.

Dear Ms. Debika Das,

The Institutional Ethics Committee-Clinical Studies has received the following document submitted by you related to the conduct of the above-referenced study -

- Project Proposal

The Institutional Ethics Committee-Clinical Studies reviewed and discussed the project proposal documents submitted by you at a meeting held on 22 November 2016.

The following Institutional Ethics Committee – Clinical Studies members were present at the meeting held on 22nd Nov 2016 at 3.30 PM at, Apollo Research & Innovations, Conference Hall, Room No: 19, 2nd Floor, Krishnadeep Chambers, (Apollo Hospitals, Annex No: 1), Wallace Garden, Chennai – 600006

S. No	Name	Gender	Designation	Affiliation	Position in the committee
1	Dr. Rema Menon	F	Blood Bank Transfusion Services	Apollo Hospitals, Chennai	Member Secretary
2	Dr. Pradeep Kumar	M	Pharmacologist	Apollo Hospitals, Chennai	Pharmacologist
3	Ms. Maimoona Badsha	F	Lawyer	Independent legal Practitioner, Chennai	Lawyer
4	Mrs. Malathy Chandrasekhar	F	Home based teacher	Freelance	Layperson
5	Dr. K. Sathyamurthi	M	Asst. Professor	Madras School of Social work, Chennai	Social Scientist

Apollo Hospitals Enterprise Limited,
21, Greams Lane, Off Greams Road, Chennai - 600 006, Tamil Nadu, India. Tel : +91-44-2829 5045 / 6641 Fax : +91-44-2829 4449
E-mail : ecapollochennai@gmail.com

Institutional Ethics Committee - Clinical Studies

Reg.No.: ECR/37/Inst/TN/2013

Apollo HOSPITALS
TOUCHING LIVES

The Institutional Ethics Committee-Clinical Studies reviewed the proposal, its methodology and design of the study. The proposed thesis work is approved in the presented form without any modifications.

The Institutional Ethics Committee-Clinical Studies review and approval of the report is only to meet their academic requirement and will not amount to any approval of the conclusion / recommendations as conclusive, deserving adoption and implementations, in any form, in any health care institution.

The Institutional Ethics Committee-Clinical Studies is constituted and works as per ICH-GCP, ICMR and revised Schedule Y guidelines.

Regards,

Rema Menon

Dr. Rema Menon,
Member Secretary, .
Institutional Ethics Committee-Clinical Studies,
Apollo Hospitals,
Chennai.

Date: 25/11/2016

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE CLINICAL STUDIES
APOLLO HOSPITALS, AHEL
CHENNAI, TAMILNADU.

Apollo Hospitals Enterprise Limited,
21, Greams Lane, Off Greams Road, Chennai - 600 006, Tamil Nadu, India. Tel : +91-44-2829 5045 / 6641 Fax : +91-44-2829 4449
E-mail : ecapollochennai@gmail.com

APPENDIX III

CERTIFICATION OF VIRTUAL REALITY THERAPY COMPLETION

Medical Advance Research Foundation

(Public Charitable Trust)

Recipient : Science Popularisation Award, Government of Tamil Nadu 2001 - 2002

Managing Trustee :

Dr. M. KUMARESAN, M.S. (E.N.T.) D.L.O.

MEMBER, POLITZER SOCIETY, USA
President, Madras - India Regional Chapter of the Acoustical Society of America
Secretary, Acoustical Foundation Education and Charitable Trust
Director, International Research Institute for the Deaf.
RECIPIENT OF NATIONAL AND STATE GOVERNMENT AWARDS
Managing Director, Bharath Institute of Para-Medical Sciences
Chairman, Bharath Community College.

Office :

SIVA E.N.T. HOSPITAL

No.159, Avvai Shanmugam Salai,
Royapettah, Chennai - 600 014.
Tamil Nadu, India.
Phone : 2811 6807
E-mail : kumaresan@doctor.com
Cell : 98410 55774

Research :

Virtual Reality Medicine

Date : 9.11.16

Certification of Virtual Reality Therapy Completion

This is to certify Miss. Debika Das, M.Sc Nursing II year has Successfully Completed the Training for Virtual Reality Therapy Aim, Target People, Methodology, outcome Conducted from 4/11/2016 to 8/11/2016

9.11.16

APPENDIX IV

LETTER REQUESTING OPINIONS AND SUGGESTIONS OF EXPERTS FOR ESTABLISHING CONTENT VALIDITY OFRESEARCH

From

Ms. Debika Das

M.Sc. N II Year

Apollo College Of Nursing

Chennai-95

To

Dr. Latha Venkatesan

Principal Apollo College Of Nursing

Chennai-95

Through Proper Channel

Sub: - Requesting for opinions and suggestions of experts for establishing content validity of research tool.

Respected Madam,

Greetings! As a part of the curriculum requirement the following research title is selected for the study.

"**An Experimental Study to Assess the Effectiveness of Virtual Reality Therapy upon Symptomatic Distress among Cancer Patients in Selected Hospital, Chennai"**

I will be highly privileged to have your valuable suggestions with regard to the establishment of content validity of research tool. So I request you to kindly validate my research tool and give suggestions about the tool.

Thanking you

Place: Yours

Sincerely

Date: (Ms. Debika Das)

APPENDIX V

LIST OF THE EXPERT FOR CONTENT VALIDITY

1. **Dr. Latha Venkatesan, M. Sc (N), M. Phil (N), Ph. D (N), MBA (HM), Ph.D. (HDFS)**
   Principal cum professor
   Apollo College Of Nursing,
   Chennai -95

2. **Dr. Lizy Sonia, M. Sc (N), Ph. D (N)**
   Vice-Principal,
   Apollo College Of Nursing,
   Chennai -95

3. **DR. K Vijayalakshmi M. Sc (N), M.A. (Psy), MBA, Ph. D (N)**
   HOD
   Mental Health Nursing,
   Apollo College Of Nursing,
   Chennai -95

4. **Mrs. Jaslina Gnanarani, M. Sc (N),**
   Reader
   Dept of Medical Surgical Nursing,
   Apollo College Of Nursing,
   Chennai -95

5. **Mrs. Sasikala D., M. Sc (N),**
   Reader
   Dept of Medical Surgical Nursing,
   Apollo College Of Nursing,
   Chennai -95

6. **Dr M Kumaresan**
   MBBS, DLO, MS- ENT,
   Consultant, Apollo Hospitals
   Shiva ENT Hospital,
   Chennai

APPENDIX VI

CONTENT VALIDITY CERTIFICATE

This is to certify that tools and content for the research study developed by Ms. Debika das, M.Sc. (N) II year student of Apollo College of Nursing, Chennai, for her dissertation "**An Experimental Study to Assess the Effectiveness of Virtual Reality Therapy upon Symptomatic Distress among Cancer Patients in Selected Hospital, Chennai"** was validated and approved and found suitable for the study.

Signature of the expert

Name and Designation

APPENDIX VII

RESEARCH PARTICIPANTS CONSENT FORM

Dear Participants,

I, Ms. Debika Das, student of M.Sc. (N) II year of Apollo College of Nursing, Chennai-95, is going to conduct a research as a part of the curriculum. The following statement has been selected for the purpose of the study, "**An Experimental Study to Assess the Effectiveness of Virtual Reality Therapy upon Symptomatic Distress among Cancer Patients in Selected Hospital, Chennai.**"

I hereby seek your consent and kind co-operation to participate in the study. Please be frank and honest in your responses. The information collected will be kept confidential and anonymity will be maintained.

Signature of the Researcher

I…….do hereby give my consent to participate and undergo the study.

Place:

Date:

Signature of the Participant

APPENDIX VIII

APPENDIX

CERTIFICATE FOR ENGLISH EDITING

TO WHOM EVER IT MAY CONCERN

This is to certify that the dissertation "**An Experimental Study to Assess the Effectiveness of Virtual Reality Therapy upon Symptomatic Distress among Cancer Patients in Selected Hospital, Chennai "** by Ms. Debika Das, student of M.Sc. (N), II year, Apollo college of Nursing, Chennai, was edited for **English Language** appropriateness.

Signature of the Evaluator

Prof. J.L. NARASIMHAN
New No.8, Second Main Road,
Block B - F1, Krishna Nagar,
Chromepet, Chennai-600 044.
Cell : 94446 54720
e-mail : profjln@yahoo.com

APPENDIX IX

LETTER REQUESTING TO USE STUDY TOOL

Perceived Stress Scale (PSS)

Author:	Sheldon Cohen
Date:	(Originally published) 1983
Constructs:	Child and Family Health, Family Relationships
Standardized:	Not specified
Instrument Type(s):	4-item self-report instrument with a five-point scale: (0 = never, 1 = almost never, 2 =sometimes, 3 = fairly often, 4 = very often). The PSS is also available in a 10 and 14 item self-report instrument with the same five-point scale.
Uses of Information:	The 4-item version is appropriate for use in situations requiring a very brief measure of stress perceptions. It was previously employed when collecting perceived stress levels over the phone during follow-up interviews. It is not a diagnostic instrument, but intended to make comparisons of subjects' perceived stress related to current, objective events. The higher the degree and longer the duration of self-perceived stress, indicated by a higher score, is considered a risk factor for a clinical psychiatric disorder.
Environment:	Not specified, but flexible
Description:	The short version, PSS-4, is an economical and simple psychological instrument to administer, comprehend, and score. It measures the degree to which situations in one's life over the past month are appraised as stressful. Items were designed to detect how unpredictable, uncontrollable, and overloaded respondents find their lives. The PSS-4 poses general queries about relatively current levels of stress experienced. All items begin with the same phrase: In the past month, how often have you felt…? Since the questions are of a general nature and are not directed at any particular sub-population group, using this abbreviated version (or any version) with a diverse population is predicted to yield equally reliable results.
References:	(1.) Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, 24, 385-396. Link to full-text (pdf) (2.) Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the U.S. In S. Spacapam & S. Oskamp (Eds.), The social psychology of health: Claremont Symposium on Applied Social Psychology. Newbury Park, CA: Sage.Link to full-text (pdf) http://www.psy.cmu.edu/~scohen/
Cost:	Permission for use of the scale is not necessary when use is for academic research or educational purposes. Use of the PSS in profit making ventures requires special permission and a nominal charge. Inclusion of the scale within a larger scale that will be copyrighted also requires specific permission. For permission, send a request letter to the contact person with a self-addressed and stamped envelope enclosed.
Availability of Test Manual	N/A

FRIENDS National Resource Center February 2006

APPENDIX X

PLAGIARISM ORIGINALITY REPORT

Plagiarism Detector - Originality Report

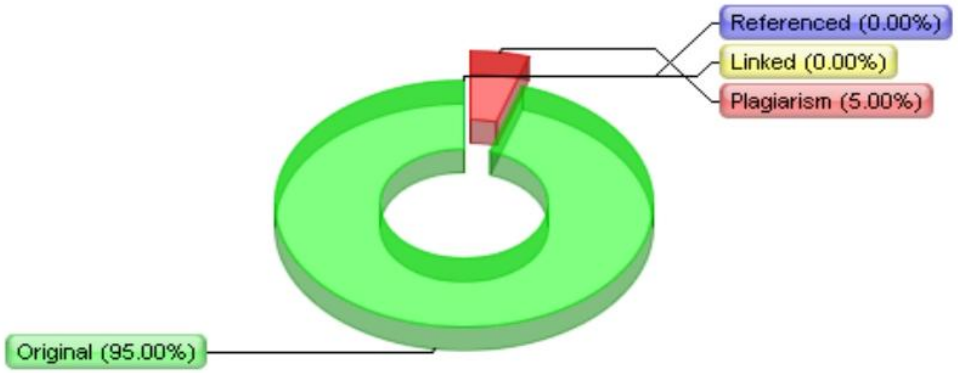
Plagiarism Detector Project: [http://plagiarism-detector.com] Application core version: 557

Originality report details:

Generation Time and Date:	7/17/2017 09:01:55 PM
Document Name:	DEBIKA DAS RESEARCH.docx
Document Location:	C:\Documents and Settings\Administrator\Desktop\DEBIKA DAS RESEARCH.docx
Document Words Count:	25540

Important Hint: to understand what exactly is meant by any report value - you can click "Help Image" . It will navigate you to the most detailed explanation at our web site.

Plagiarism Detection Chart:



Referenced 0% / Linked 0%

Original - 95% / 5% - Plagiarism

APPENDIX XI

DEMOGRAPHIC VARIABLE PROFORMA

Purpose:

This proforma is used to measure the demographic variables such as age, gender, education, etc.

Instructions

Please put tick mark in the following options. Please be frank in choosing your options.

1. **Age in years**. ☐ Years.

2. **Gender**

   2.1. Male

   2.2. Female

   2.3. Transgender

3. **Education**

   3.1. Primary education

   3.2. Secondary education

   3.3. Higher secondary education

   3.4. Graduate & above.

APPENDIX XII

CLINICAL VARIABLE PROFORMA

Purpose:

This proforma is used to measure the clinical variables such as duration of illness, medications taking, no. of times of hospitalization, medication for illness, any relaxation therapy used before, type of treatment taken for cancer etc.

Instructions

Please put tick mark in the following options. Please be frank in choosing your options.

1. **Duration of medical illness**
   - 1.1 1 -5 years
   - 1.2 5-10 years
   - 1.3. >10 years
2. **History of taking medications for major illness. if yes specify**
   - 2.1. Yes
   - 2.2. No
3. **No of times hospitalized within last five years**
   - 3.1. Nil
   - 3.2. 1-2
   - 3.3. >3
4. **Treatment seeking behavior of any illness**
   - 4.1. Uses medical facilities
   - 4.2. Self-medication
   - 4.3. Any other , specify

5. **Have you received relaxation therapy before? If yes, specify**.

    5.1. No

    5.2. Progressive muscle relaxation

    5.3. Yoga

    5.4. Meditation

    5.5. Any other specify_____

6. The type of cancer treatment you are on

    6.1. Chemo therapy only

    6.2. Radiation therapy only

    6.3. Combined chemo and radiation therapy

    6.4. Surgery with radiation and/ or chemo.

7. The type of stress relaxation treatment you are on

    7.1. Yoga / Meditation

    7.2. Antianxietic

    7.3. Counseling

    7.4. Cancer support group.

    7.5. None

APPENDIX XIII

THE NUMERIC PAIN RATING SCALE

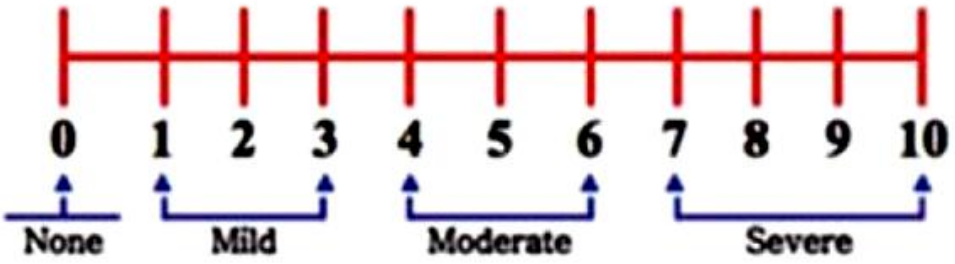
(McCAFFERY, BEEBE et. al,)

General Information:

1. The patient is asked to make one (1) pain rating, corresponding to current, best and worst pain experienced.

Patient Instructions:

Please indicate the intensity of current, best, and worst pain levels on a scale of 0 (no pain) to 10 (worst pain imaginable).



APPENDIX XIV

COHEN'S et. al' s PERCIEVED STRESS SCALE

Purpose:

This observation sheet is used to measure the level of stress among peoples suffering from Cancer.

Instruction:

For each statement, please tell me if you have had these thoughts or feelings: Never almost, never, sometimes, fairly often, or very often. (Read all answer choices each time)

Sl. No	STATEMENTS	Never	Almost Never	Sometimes	Fairly Often	Very Often
1.	In the past few days, how oftenhave you been upset because ofsomething that happened unexpectedly?	0	1	2	3	4
2.	In the past few days, how oftenhave you felt unable to control theimportant things in your life?	0	1	2	3	4
3.	In the past few days how oftenhave you felt nervous or stressed?	0	1	2	3	4
4.	In the past few days how oftenhave you felt confident about yourability to handle personalproblems?	0	1	2	3	4
5.	In the past few days, how oftenhave you felt that things were goingyour way?	0	1	2	3	4

6.	In the past few days, how oftenhave you found that you could notcope with all the things you had todo?	0	1	2	3	4
7.	In the past few days, how oftenhave you been able to controlirritations in your life?	0	1	2	3	4
8.	In the past few days, how oftenhave you felt that you were on topof things?	0	1	2	3	4
9.	In the past few days, how oftenhave you been angry because ofthings that happenedoutside of your control?	0	1	2	3	4
10.	In the past few days, how oftenhave you felt that difficulties werepiling up so high that you could notovercome them?	0	1	2	3	4

Perceived Stress Scale Scoring:

Score	**Interpretation**
<13	Low stress
13-19	Average stress
>20	High stress

APPENDIX XV

RATING SCALE TO ASSESS THE LEVEL OF SATISFACTION REGARDING VIRTUAL REALITY THERAPY

Purpose

This rating scale is used to assess the level of satisfaction of the participants regarding Virtual reality therapy.

Instructions

Please keep your frank responses to the questions given below. The information will be kept confidential& will be used for research purpose only.

Sl No.	Statements	Highly Satisfied 4	Satisfied 3	Dissatisfied 2	Highly Dissatisfied 1
1.	I feel comfortable about the therapy				
2.	Duration of VR therapy is sufficient for me				
3.	I would like to do it regularly				
4.	It has improve my self-image				
5.	I have experienced decrease in mental stress after the therapy				
6.	My mind stays relaxed after the therapy.				
7.	It has console my mind				

8.	I am able to cope up with anxiety effectively				
9.	The researcher has explained clearly about the therapy & how to follow the command.				
10.	The researcher has cleared all the doubts regarding Virtual reality therapy				
11.	I am satisfied with the manner of demonstration				
12.	The researcher has provided all the needed guidance needed throughout the therapy.				

Blue Print on the Level of Satisfaction of Virtual Reality Therapy

SL No.	Content	Item No.	Total No. items
1.	Virtual reality therapy	1,2,3,4	4
2.	Outcome of virtual reality therapy	5,6,7,8	4
3.	Researcher's approach	9,10,11,12	4

Level of Satisfaction

Score	Level of satisfaction
>36	Highly satisfied
23-25	Satisfied
11-22	Dissatisfied
1-10	Highly dissatisfied

APPENDIX XVI

CONTENT OF VIRTUAL REALITY THERAPY

Topic	:	Virtual reality Therapy
Group	:	Patient suffering from stage II cancer, undergoing treatment for cancer in Apollo Cancer Hospital, Teynampet and their caregiver.
Place	:	Apollo Cancer Hospital Teynampet.
Duration of teaching	:	45 minutes
Method of teaching	:	Lecture and demonstration
Educator	:	II year M. Sc (N) student, Apollo College of Nursing, Chennai

OBJECTIVES

At the end of the session patient and their caregiver will be able to

- Understand what virtual reality therapy is.
- Justify the need for virtual reality therapy. Among patients suffering from cancer.
- Practice virtual reality therapy.
- Demonstrate the use of virtual cardboard goggle headset by own selves.
- Ventilate their feelings during and after virtual reality therapy.

Specific objectives	Content	Learning activities
To brief the topic of virtual reality therapy	**Introduction:** Stress is inevitable nowadays; stress affects the physical, psychosocial health of every human being. Numerous studies has proved that various stress relaxation techniques are thereby necessary especially for those who are suffering from stress or stress related disorders for a prolonged period of time. Numerous stress relaxation techniques have been invented and applied for patients and their family or caregivers to reduce the stress related symptoms. Virtual reality therapy is an emerging technique in the field of science And technology and is also widely accepted in the field if medicine for the purpose of treatment. Virtual reality therapy was invented by Morton H. Eilig in 1956 and was introduced in medicine in 1990 by Dr. Ralph Larson. With numerous advancement in the field of technology, virtual reality also has become easier to be used and affordable by people of all level.Present Virtual reality therapy is the use of a Cardboard goggle invented by Google Cardboard company for the use in its most easiest from in anywhere by anybody.	Listening

To justify the nature of Virtual reality therapy	**Nature of virtual reality therapy:** Virtual reality therapy is form of technology that forms a three dimensional world or an immersive environment which people can interact with. The term Virtual reality also means "Near reality".It is an immersive, interactive, multisensory, viewer centered, sensor projector viewed or non viewed theatre environment which can be explored and interacted with by a person. The person becomes the part of the virtual world or is immersed within the therapeutic environment. In this environment they can manipulate a object or perform a series of actions which are controlled by the gyro sensors, accelerometer, of the device.Thereby the person feels relief from his problems by permanently registering the positive effects of the brain.Virtual reality therapy is the simulation of physical presence in the real or imaginary world seeing the world through different eyes.	Listening

To specify the aims of virtual reality therapy	**Aims of virtual reality:** • To promote and protect people from various stress related events. • To reduce the occurrence of various stress related diseases. • To make people more assertive towards their self image**.**	Listening
To discuss about the uses of virtual reality therapy	**Uses of virtual reality therapy"** • To help patent overcome insomnia. • To register positive effects in the brain. • Rehabilitative programme for ✓ Vertigo, tinnitus ✓ Vocal injuries. ✓ Stress headache ✓ Dementia ✓ Parkinson's disease ✓ Behavioral problems ✓ Cancer treatments	Listening

To specify the advantages of the virtual reality therapy	**Advantages Of Virtual Reality Therapy** • Prevention of chronic disease • Distraction from pain • Reliving stress and stress related disorders. • Improve coping mechanism • Modulation of the effects of stimuli perceived by brain.	Listening
To make people understand the need of virtual reality therapy	**Need For Virtual Reality Therapy Upon Cancer Patients** Distraction of mind is a very powerful method to withdraw patient from the situations causing stress and pain. Cancer patients have numerous symptomatic distresses which are very strong to control only with the administration of medication. Thereby use of some other distraction methodology is useful to reduce the stress and pain. Use of cardboard goggle Virtual reality headset can be used by any person as it is very easy to use and is affordable too. People can use it in their bed also even without moving or causing any physical exertion.Thus the use by the patient at anytime of the day especially during the time of receiving chemotherapy or even after can help to distract their mind and thus reduce the level of pain and stress.	Listening

To instruct people about the use of cardboard goggle headset	**How The Cardboard Goggle Is Use:** The present virtual reality therapy requires a virtual cardboard headset and a smart mobile that have either a gyro sensor or an accelerometer or both. In the Google play store numerous cardboard supportive applications are available which are free downloadable. After downloading the free application place the mobile phone in the cardboard room and attach a headphone set. Let the patient wear the headset a get immersed into the imaginer interactive 3-D world.	Listening
To make people aware about the benefits of virtual reality therapy	**Benefits Of Virtual Reality Therapy:** • Stimulates sleep • Reduces symptomatic distresses in patients suffering from chronic illness • Improve concentration and memory. • Reduces insomnia and induces sleep at night • Improve decision making skills. • Improves self esteem • Good relaxation therapy for mind	Listening

	CONCLUSION: Virtual reality therapy is a new method of treating patient with multiple stress related symptoms. Also it is very effective in reducing pain sensation for patients who are suffering from chronic pain. Virtual simulation also stimulates the physical presence of the individual in a real or imaginary world. More specially designed environments with user friendly atmosphere can be created which allow for broader virtual reality usage in treatment and research. This can also be done in monitored controlled, sensored, projector viewed theatre environment, tailored to the needs of each individual patient. It permanently register positive effect to the brain	

APPENDIX XVII

DATA CODE SHEET

DEMOGRAPHIC VARIABLE PROFORMA OF CANCER PATIENTS

SAMPLE NO:

1. **Age in years**. ☐ Years. (**AGE)**
2. **Gender** **(GEN)**

    2.1. Male

    2.2. Female

    2.3. Transgender

3. **Education** **(EDU)**

    3.1. Primary education

    3.2. Secondary education

    3.3. Higher secondary education

    3.4. Graduate & above.

DATA CODE SHEET

CLINICAL VARIABLE PROFORMA OF CANCER PATIENTS

SAMPLE NO:

1. **Duration of medical illness (DUR)**

   1.1 1-5 years

   1.2 5-10 years

   1.3 >10 years

2. **History of taking medication for major illness. If yes specify. (HIS)**

   2.1. Yes

   2.2. No

3. **No of times hospitalized within last five years (HOS)**

   3.1. Nil

   3.2. 1-2 times

   3.3. >3 times

4. **Treatment seeking behavior for any illness (TRT)**

   4.1 Use medical facilities

   4.2. Self medication

   4.3. Any other, specify

5. Have you received relaxation therapy before? If yes, specify. (REL)

5.1. No

5.2. Progressive muscle relaxation

5.3. Yoga

5.4. Meditation

5.5 Any other specify_____

6.The type of cancer treatment you are on (TYP)

6.1. Chemotherapy only

6.2. Radiation therapy only

6.3. Combined chemo and radiation therapy

6.4. Surgery with radiation and/ or chemo

7. The type of stress relaxation treatment you are on (STR)

7.1. Yoga/ Meditation

7.2. Antianxietic

7.3. Counseling

7.4. Cancer support group

7.5. None

APPENDIX XVIII

MASTER CODE SHEET (CONTROL GROUP)

Sl. No	Demographic			Clinical							Symp.Dist			
	AGE	GEN	EDU	DUR	HIS	HOS	TRT	REL	TYP	STR	BEF (P)	AFT (P)	BEF (S)	AFT (S)
1	61	M	GRA	1.1	2.1	3.2	4.1	5.3	6.3	7.1	4	6	34	38
2	62	M	PRI	1.1	2.1	3.2	4.2	5.1	6.4	7.5	9	10	39	36
3	30	F	SEC	1.2	2.1	3.2	4.1	5.1	6.3	7.5	9	5	30	34
4	56	F	SEC	1.1	2.1	3.1	4.2	5.1	6.1	7.5	3	1	13	18
5	65	F	HS2	1.2	2.2	3.1	4.1	5.1	6.1	7.5	4	6	28	25
6	31	M	SEC	1.1	2.1	3.3	42	5.1	6.4	7.5	8	10	27	30
7	32	M	HS2	1.1	2.1	3.3	4.1	5.1	6.3	7.5	10	6	18	32
8	42	M	PRI	1.1	2.1	3.3	4.1	5.1	6.4	7.5	6	5	18	19
9	59	M	PRI	1.1	2.2	3.1	4.1	5.1	6.3	7.5	9	10	39	23
10	37	M	HS2	1.1	2.1	3.2	4.1	5.1	6.4	7.5	4	4	16	19
11	56	F	SEC	1.1	2.1	3.2	4.2	5.1	6.3	7.5	9	10	36	30
12	55	M	HS2	1.2	2.1	3.3	4.2	5.5	6.3	7.2	5	6	19	18
13	39	F	SEC	1.1	2.1	3.1	4.1	5.1	6.4	7.5	8	10	34	34
14	62	M	HS2	1.1	2.1	3.2	4.2	5.1	6.3	7.5	3	1	35	23
15	63	M	SEC	1.1	2.	3.3	4.1	5.1	6.3	7.5	3	1	16	18
16	39	F	HS2	1.1	2.1	3.2	4.1	5.1	6.1	7.5	6	6	17	32
17	35	F	HS2	1.1	2.1	3.3	4.2	5.1	6.3	7.5	9	8	32	36
18	54	M	SEC	1.1	2.1	3.1	4.1	5.1	6.4	7.5	6	5	17	19
19	53	M	HS2	1.2	2.1	3.2	4.3	5.1	6.4	7.5	6	9	32	28
20	57	F	SEC	1.2	2.2	3.1	4.1	5.1	6.3	7.5	7	4	18	19
21	61	F	SEC	1.1	2.1	3.3	4.2	5.1	6.4	7.5	2	1	16	16
22	40	M	HS2	1.2	2.2	3.1	4.1	5.1	6.3	7.5	8	9	30	28
23	51	F	SEC	1.1	2.1	3.2	4.1	5.1	6.4	7.5	9	10	39	36
24	66	M	HS2	1.2	2.1	3.2	4.1	5.1	6.3	7.5	6	9	30	28
25	38	M	SEC	1.1	2.1	3.3	4.2	5.1	6.3	7.5	6	8	19	28
26	36	F	HS2	1.1	2.1	3.1	4.1	5.1	6.3	7.5	9	4	36	18
27	58	M	SEC	1.2	2.2	3.1	4.3	5.1	6.3	7.5	6	5	16	29
28	64	F	SEC	1.1	2.1	3.2	4.1	5.1	6.4	7.5	8	8	18	32
29	49	M	HS2	1.1	2.1	3.3	4.2	5.1	6.3	7.5	3	4	19	19
30	31	F	HS2	1.1	2.1	3.2	4.1	5.1	6.3	7.5	6	4	19	24

MASTER CODE SHEET (EXPERIMENTAL GROUP)

SL N0	Demographic			Clinical							Symp.dist				LOS
	AGE	GEN	EDU	DUR	HIS	HOS	TRT	REL	TYP	STR	BEF (P)	AFT (P)	BEF (S)	AFT (S)	
1.	59	M	PRI	1.1	2.1	3.1	4.2	5.1	6.1	7.5	4	1	39	13	45
2	60	F	HS2	1.2	2.2	3.2	4.2	5.1	6.3	7.5	3	0	19	9	45
3	56	M	PRI	1.1	1.2	3.1	4.1	5.1	6.3	7.5	7	3	29	8	43
4	61	F	HS2	1.1	2.2	3.2	4.1	5.1	6.4	7.5	7	2	39	13	46
5	30	M	SEC	1.1	2.2	3.2	4.2	5.1	6.3	7.5	7	2	24	7	46
6	31	M	SEC	1.2	2.1	3.3	4.1	5.1	6.3	7.5	2	1	19	11	47
7	50	F	PRI	1.2	2.2	3.3	4.1	5.1	6.3	7.5	4	1	15	14	47
8	65	M	HS2	1.1	2.1	3.1	4.1	5.1	6.1	7.5	7	0	35	21	47
9	38	F	HS2	1.1	2.2	3.2	4.2	5.1	6.1	7.5	9	3	30	12	47
10	36	F	SEC	1.1	2.1	3.3	4.2	5.1	6.4	7.5	8	0	27	11	48
11	46	F	HS2	1.1	2.2	3.1	4.2	5.1	6.4	7.5	9	3	15	10	46
12	44	F	SEC	1.1	2.1	3.2	4.1	5.1	6.4	7.5	5	0	30	13	43
13	58	F	GRA	1.1	2.2	3.2	4.2	5.3	6.3	7.1	9	3	22	9	42
14	31	F	GRA	1.2	2.2	3.2	4.1	5.1	6.4	7.5	8	4	20	8	46
15	55	M	PRI	1.1	2.2	3.2	4.2	5.1	6.3	7.5	7	3	26	15	18
16	55	M	HS2	1.2	2.2	3.3	4.1	5.1	6.4	7.5	6	0	39	14	46
17	35	F	GRA	1.1	2.2	3.2	4.3	5.1	6.3	7.5	3	1	26	11	46
18	49	M	GRA	1.1	2.2	3.3	4.1	5.1	6.3	7.5	9	4	25	10	44
19	47	F	GRA	1.1	2.2	3.2	4.3	5.1	6.3	7.5	5	1	13	16	48
20	52	M	HS2	1.2	2.2	3.3	4.3	5.1	6.4	7.5	8	1	15	12	46
21	51	F	GRA	1.1	2.1	3.2	4.1	5.1	6.1	7.1	8	0	28	11	46
22	54	F	HS2	1.1	2.2	3.3	4.1	5.1	6.3	7.5	9	6	27	9	46
23	32	F	SEC	1.1	2.2	3.2	4.1	5.1	6.4	7.5	7	0	29	13	44
24	34	F	PRI	1.1	2.1	3.3	4.3	5.2	6.3	7.5	4	0	31	12	46
25	46	M	GRA	1.1	2.2	3.3	4.1	5.1	6.1	7.5	6	1	28	8	48
26	49	F	GRA	1.1	2.2	3.3	4.3	5.1	6.3	7.5	9	3	32	11	47
27	52	F	GRA	1.2	2.2	3.2	4.1	5.1	6.3	7.5	4	1	19	9	42
28	70	F	GRA	1.1	2.2	3.2	4.1	5.1	6.4	7.5	8	0	35	8	48
29	62	F	SEC	1.1	2.2	3.2	4.3	5.1	6.1	7.5	6	0	13	12	47
30	62	M	SEC	1.1	2.1	3.2	4.1	5.1	6.3	7.5	9	6	30	21	47

APPENDIX XIX

Photographs Taken during Data Collection