

**EFFECTIVENESS OF CINNAMON CHEWING GUM ON  
MEMORY AND ANXIETY AMONG ADOLESCENTS  
AT SELECTED SEVENTH DAY ADVENTIST  
HIGH SCHOOLS, ANDHRA PRADESH.**



*A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R MEDICAL  
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REQUIREMENT FOR THE DEGREE OF AWARD OF*

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**EXAMINERS,**

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**“No duty is more urgent than that of returning thanks”**

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## ABSTRACT

**BACKGROUND:** Teenage years are the “best years of one’s life”. For many college and high school students today, nothing is more agonizing than their poor academic performance and anxiety. Our sense of smell plays a major role in solving these problems. **Objectives:** To assess the level of memory and anxiety among adolescents before and after cinnamon chewing gum. **Design:** True Experimental design where one group pre test and post test with control group design. **Setting:** Seventh Day Adventist High School, Vijayawada, Andhra Pradesh. **Participants:** Adolescents who fulfilled the inclusion criteria. **Selection criteria:** Adolescents who were both male and female and studying 8<sup>th</sup> – 10<sup>th</sup> standard were selected **Methods:** out of 30, 15 adolescents in control group and 15 adolescents in experimental group were selected by using stratified random sampling technique. Pre and post test assessment was done by using modified P.G.I memory assessment scale to assess memory and modified Max Hamilton’s anxiety rating scale to assess anxiety. **Results:** Most of them were in the age group of 13 and 14 years studying 9<sup>th</sup> standard. From the findings, in memory the mean difference was 31% and in anxiety 22% in experimental group whereas in control group memory 1% and anxiety 7%. Paired ‘t’ test score in control group was 0.54 in memory and 1.86 in anxiety. In experimental group, paired ‘t’ test score was 23.7 in memory and 17.2 in anxiety when compared to the level of significant ( $p < 0.05$ ) it was high. Unpaired ‘t’ test score for memory was 18.6 and anxiety was 24.1. It seems that cinnamon chewing gum on memory and anxiety among



adolescents was effective. There was a moderately negative co-relation between memory and anxiety which revealed that when the level of memory increased, level of anxiety was decreased. There was no significant association between post test scores on memory and anxiety in control and experimental group and their demographic variables. **Conclusion:** Olfaction in human beings plays a major role in recollecting memories and relaxation. The scent of cinnamon acts on the cerebral cortex, boosting the brain function and as a tranquilizing agent in stress. **Clinical practice:** To prove this study they need supportive research to be warranted. Cinnamon can be used for type 2 diabetes, atherosclerosis. This study can be applied for Alzheimer's patients in improving memory and stress in elderly people.

# CHAPTER – I

## INTRODUCTION

**“God will make a way where there seems to be no way, He works in ways we cannot see, He will do something new today”**

**Don Moen**



In the life cycle of a homosapien organism, adolescence is a period of transition from childhood to adulthood. It is characterized by rapid physical, biological and hormonal changes resulting in to psychosocial, behavioural and sexual maturation between the age of 10-19 years in an individual. Adolescence is often described as a phase of life that begins in biology and ends in society, **(Sharma, 1996)**.

The largest generation of adolescents in history is 1.2 billion where nearly half of all people are under the age of 25 years and 85 percent of the

youth live in developing countries and the rest of the population in less developed countries. The population of the 50 poorest countries is projected to more than double by 2050, from 800 million in 2005 to 1.7 billion people. There are 62,133 adolescents residing in the United States of America, 56,160 persons residing in United Kingdom, 21 percent of adolescents in Kenya, 20 percent of them in Nigeria, 13 percent of them in Canada, **(Census, 2010)**

As on March 2001, adolescents accounted for 22.8% of the population of India. There are around 239 million adolescents in India in the age group of 10-19 years presently. As per 2004 statistics, there are 120,085 persons who are in the age group of 10 – 14 years, 119,161 persons in the age group of 15 to 19 years, and 239,246 persons in the age group of 10 – 19 years. In the urban areas, 58.9 percent of the population is adolescents and 51 percent of them reside in the rural areas. Over the next two decades the number of adolescents is likely to increase further to 430,664 adolescents, **(Planning Commission, 2001).**

India has the largest adolescent population in the world. As per 2011 statistics, there are 225 million adolescents comprising nearly one-fifth (22 percent) of India's total population. Of the total adolescent population, 12 percent belong to the 10-14 years age group and nearly ten percent are in the 15-19 years age group, **(Census, 2011)**

The data available from the reviewed literature on physical growth, nutritional and health status demonstrate that health scenario of a large proportion of adolescents in India is plagued by memory problems, anemia resulting from ignorance (**Anand et al. ,1999, Chaturvedi et al. , 1996 and Kanada et al. , 1999**).

It is often said that the teenage years are the “best years of one’s life’ but during those years also adolescents face certain problems which are very common during that age group. The common problems in adolescence are failure or inadequate academic performance, unaccepted behaviour, drugs and substance abuse, unwanted pregnancy and sexually transmitted diseases, stress and depression, violent behaviour, sleep disorders, eating disorders such as ‘anorexia nervosa’, bulimia or obesity, (**Frotherjill D J, 2010**)

Children experience ups and downs in school. If school problems do come up, it’s important that you quickly recognize and address them. Problems at school can show up as poor academic performance, lack of motivation for school, loss of interest in school work, or poor relationships with peers or teachers. School difficulties range from minor to severe, might be very short-lived or last for longer. Even short-term school problems can have a negative impact on how young people feel about school – and themselves, (**Akenaga M, 2004**)

There are many other reasons why a young person might not be achieving academically. The personal causes are chronic illness, intellectual or cognitive disability, behavioral or developmental difficulties or disorder, mental health issues such as depression or anxiety, history of abuse and neglect, poor self-concept or self-esteem, poor communication skills, poor social skills, difficulty with listening, concentrating or sitting still. School factors may be being bullied, disliking, or not feeling connected to, the school culture or environment, poor school or academic support, especially in relation to heavy workloads, not getting along with teachers or other students at school and family factors may be parents who aren't involved in their child's education, family problems such as relationship breakdowns, a home environment that doesn't or can't adequately support a young person's learning, (Froese A P, 2008)

*"All improvement in memory consists of one's habitual method of recording facts"*

**Dr. William James**

Human beings are superior of all the creatures present on this planet earth, this is because of the fact that human beings have the most advanced brain out of all the creatures on earth, and that is why we human beings

dominate the entire planet and are on top of the food table. The most important function of our brain which helps us in achieving such great intelligence is memory **(Kevin Peter, 2009)**.

Today memory has great importance in different fields of human life. In psychology, memory is defined as mental ability for storing, retaining and recalling information in the human mind basically. The memory has made useful place in human life without it one can't lead the life, **(Ellie, 2008)**.

The importance of memory has increased in colleges and schools today. There are three stages of memory according to the information processing perspective in many countries. Every stage of memory has certain role in varied forms such as first one in encoding meaning receiving, processing and combining of received information in society. The second memory is a storage meaning creation of permanent record of the encoded information in several studies. And the third type of memory is retrieval meaning calling back the stored information in the human mind. If certain people have good IQ then the credit goes to the memory only, **(Michael Cabalhin, 2010)**.

Scientists found that humans exhibit two types of memory. They call one "verbatim trace", in which events are recorded very precisely and factually. Children have more "verbatim trace", but as they mature, they develop more and more of a second type of memory: "gist trace," in which they recall the

meaning of an event, its emotional flavor, but not precise facts. Gist trace is the most common cause of false memories, occurring most often in adults. Research shows that children are less likely to produce false memories, because gist trace develops slowly. As a result, children's recollections could be more reliable than those of adults, **(Carlson, 2009)**.

Memory is so important that if not present then the child will begin to have learning disabilities such as dyslexia, attention deficit hyperactive disorder, below average intelligence, and other medical problems, including anxiety and depression. This can result in symptoms including forgetfulness, confusion and mental fatigue, **(Melinda smith, 2011)**.

Nurses recommend some memory improvement techniques for memory problems such as mnemonics. Mnemonics are techniques for remembering information that is otherwise quite difficult to recall. To have good memory, brain should be nurtured with good diet and other healthy habits. Exercises are necessary because when you exercise the body, you exercise the brain and sufficient sleep required according to their respective age, **(Lawrence Robinson, 2011)**.

It is believed that sleep leads in improving memory consolidation of information stored in the mind. Not only good sleep enhances memory of the person but also delivering good performances, **(Annie, 2008)**.

The ultimate memory booster is to have healthy relationships. Research shows that having meaningful relationships and a strong support system are

vital not only to emotional health, but to brain health. Listening to jokes as laughter is good for the brain, **(Rosa, 2010)**.

**Anxiety** is a psychological and physiological state characterized by somatic, emotional, cognitive, and behavioral components. The root meaning of the word anxiety is 'to vex or trouble'; in either presence or absence of psychological stress, anxiety can create feelings of fear, worry, uneasiness and dread. Anxiety is considered to be a normal reaction to a stressor. It may help someone to deal with a difficult situation by prompting them to cope with it, **(Smith and Melinda, 2008)**.

Everyone has worries and fears. Anxiety can be adaptive, if the discomfort that goes with it motivates people to learn new ways of approaching life's challenges. But whether it's adaptive or maladaptive the discomfort can be intense. The anxious person who's waiting for the worst to happen is often unable to enjoy a personal life or gain gratification from work. Anxious people may thus prevent themselves from experiencing positive outcome in life, **(Casey A & Benson H, 2006)**.

The anxious person worries a lot, particularly about unknown dangerous. In addition the anxious individual shows combination of the following symptoms like rapid heart rate, shortness of breath, loss of appetite, dizziness, sweating, sleeplessness and tremors. All of these physical symptoms accompany fear as well as anxiety, **(Hanson R, 2009)**.



Anxiety includes the feeling of uncertainty, helplessness and physiological arousal. A person who has experienced anxiety complains of nervous, tense, jumpy and irritable. Often he or she has difficulty falling asleep at night. An anxious person becomes fatigued easily and can have “butterflies in the stomach” as well as headaches, muscle tension and difficulty in concentrating, **(Margolis H, 2007)**.

Importantly, school avoidance, decreased problem-solving abilities, and lower academic achievement have also been noted as consequences. Anxiety is considered to be a universal phenomenon existing across cultures, although its contexts and manifestations are influenced by cultural beliefs and practices. In India, the main documented cause of anxiety among school children and adolescents is parents’ high educational expectations and pressure for academic achievement, **(Guarnaccia, 2002)**.

Anxiety is associated with substantial negative effects on children’s social, emotional and academic success. Specific effects include poor social and coping skills, often leading to avoidance of social interactions, loneliness, low self-esteem, perceptions of social rejection, and difficulty forming friendships, **(Essau, Conradt & Petermann, 2000)**.

Anxiety can be relieved by providing positive psychology which has three central concerns, i.e. positive emotions, positive individual traits and positive institutions. Then the students are provided with career and educational counseling. Relaxation strategies can be taught to the child, i.e

meditation, progressive muscle relaxation and diaphragmatic breathing, **(Alexander, 2007).**

**“For the sense of smell, almost more than any other, has the power to recall memories and it is a pity that we use it so little”**

**Rachel carson**

The sense of smell is a primal sense for humans as well as animals. From an evolutionary standpoint it is one of the most ancient of senses. Smell (or Olfaction) allows vertebrates and other organisms with olfactory receptors to identify food, mates, predators, and provides both sensual pleasure (the odor of flowers and perfume) as well as warnings of danger (e.g., spoiled food, chemical dangers). For both humans and animals, it is one of the important means by which our environment communicates with us, **(John C. Leffingwell, 1999).**

For many college and high school students today, nothing is more agonizing than the prospect of studying for hours on end. They might decide instead to sit and watch TV, play a video game, go out with a friend, and eventually they find that an inordinate amount of time has gone by and they still aren't ready for that big test. People are often surprised by the vividness of the memories that can be brought to the surface by a smell. This phenomenon

occurs because our brains process olfactory information in a very unique way, **(Sandersy, 2009)**

**Cinnamon** is a spice obtained from the inner bark of several trees from the genus “Cinnamomum” that is used in both sweet and savoury foods. Cinnamon trees are native to South East Asia, and its origin was mysterious in Europe until the sixteenth century. The Hebrew Bible makes specific mention of the spice many times: first when Moses is commanded to use both sweet cinnamon (Hebrew qinnāmôn) and cassia in the holy anointing oil; in Proverbs where the lover's bed is perfumed with myrrh, aloes, and cinnamon; and in Song of Solomon, a song describing the beauty of his beloved, cinnamon scents her garments like the smell of Lebanon. Cinnamon was a component of the Ketoret which is used when referring to the consecrated incense described in the Hebrew Bible and Talmud. It was offered on the specialized incense altar in the time when the Tabernacle was located in the First and Second Jerusalem Temples. The ketoret was an important component of the Temple service in Jerusalem, **(Russey , 2004).**

Cinnamon was so highly prized among ancient nations that it was regarded as a gift fit for monarchs and even for a god: a fine inscription records the gift of cinnamon and cassia to the temple of Apollo at Miletus. Though its source was kept mysterious in the Mediterranean world for centuries by the middlemen who handled the spice trade, to protect their monopoly as suppliers, cinnamon is native to Sri Lanka, **(Kingsley, 2006).**

The spice cinnamon has long been used in both cooking and in medicine. Since Egyptian times, cinnamon's healing abilities have been recognized and utilized. Chinese medical journals record cures with cinnamon dating back to 2,800 B. C. Cinnamon has also been used in Ayurvedic Medicine in India. Cinnamon is a known antibacterial and antifungal and has anti-inflammatory properties, **(Melanie Grimes)**

### **NEED FOR STUDY**

Experts estimate that 6 to 10 percent of the school-aged population in the United States is having poor memory. Nearly 40 percent of the children enrolled in the nation's special education classes suffer from poor memory, **(Child Development Institute, 2010)**

In 2009, 5 million children aged 3–17 had memory problems (8%); 11% of boys had a memory problems compared with 6% of girls. Black children (9%) and white children (8%) were more likely to have memory problems than Asian children (3%), **(Edward J. Sondik, 2009).**

In families with an income of less than \$35,000, the percentage of children with a learning disability (12%) was more than twice that of children in families with an income of \$100,000 or more (5%). Five million children aged 3–17 had poor memory (9%). Boys (12%) were more than twice as likely as girls to have poor memory (5%). Hispanic children were less likely to have learning disability (5%) than non-Hispanic white children (10%) or non-

Hispanic black children (10%). Children in single-mother families were more likely to have learning disabilities (11%) compared with children in two-parent families (7% and 8%). When compared with children with an excellent or very good health status, children with a fair or poor health status were almost six times as likely to have a learning disability (35% and 6%) and more than twice as likely to have learning disability (21% and 8%), (**Jennifer H. Madans, Jane F. Gentleman, 2007**).

Most of the adolescents might have complained about their memory one time or other. But some of them have been frequently complaining about their poor memory. When we generally talk about poor memory we are really talking about poor recollection. Recollection is possible only if the content is retained in memory. This is possible only if we have recorded it into memory, (**U.S. Dept. of Education, 1992**).

50% of all students in special education in the public schools have memory problems . 35% of students identified with memory problems drop out of high school. This is twice the rate of their non-disabled peers, (**Wagner, 1991**).

Anxiety affects one in every five young people at any given time. An estimated two-thirds of all young people with anxiety are not getting the help they need. Studies indicate that 1 in 5 children and adolescents (20 percent) may have a diagnosable disorder. Estimates of the number of children who

have mental disorders range from 7.7 million to 12.8 million, (**Department of Health & Human Services, 2010**).

About 13 out of every 100 children and adolescents ages 9 to 17 experience some kind of anxiety disorder such as panic disorder, obsessive-compulsive disorder, or generalized anxiety disorder, (**Borchardt, 2009**).

Approximately 18.8 million American adolescents, or about 9.5 percent of the U.S. population age 13 and older in a given year, have anxiety disorder. Nearly twice as many girls (12.0 percent) as boys (6.6 percent) are affected by a depressive disorder each year. These figures translate to 12.4 million women and 6.4 million men in the U.S, (**Rose, 2008**).

There are 4.5 million children ages 3 to 17 (7% of this age group) with anxiety. Boys are more than twice as likely to have anxiety, with 11% of boys in this age range having the disorder and 4% of girls. When compared with children who have excellent or very good health, children who have fair or poor health status are nearly 3 times more likely to have anxiety (7% vs. 19%), (**Spence, 2005**).

Anxiety disorders affect one in eight children. Research shows that untreated children with anxiety disorders are at higher risk to perform poorly in school, miss out on important social experiences, and engage in substance abuse., (**Donovan, 2000**).

Anxiety is one of the most common psychological disorders in school-aged children and adolescents worldwide. The prevalence rates range from 4.0% to 25.0%, with an average rate of 8.0%, (**Bernstein, 1991**).

**“Memories, imagination, old sentiments and associations are more readily reached through the sense of smell than through any other channel”**

**Oliver Wendell**

Our sense of smell is the only exception to this treatment. Olfaction is processed in an area called the primary olfactory cortex, which is very closely linked to the amygdale and the hippocampus. These two areas are very important to the creation and retrieval of memories. When the olfactory cortex tells the amygdale and hippocampus about a scent, we literally can't help but think about what was going on the last time we detected that smell. This technique can prove very helpful for students to boost their brain function, (**Anderson, 2003**).

Cinnamon is gathered from the dried inner bark of the branches of a small, tropical, evergreen laurel tree. The bark is peeled off and, as the pieces are dried, they curl up into quills. These are the common cinnamon sticks that are used in herb teas and for baking, ( **Polansky, 2000**).

In Chinese medicine, cinnamon is one of the most widely used “warming” herbs that aid in circulation and digestion. It is a common ingredient used in tea for nausea during pregnancy. It is also used following delivery to decrease hemorrhage. Cinnamon raises vitality, warms the system, stimulates all the vital functions of the body, counteracts congestion, improves digestion, relieves abdominal spasms and aids in peripheral circulation. The health benefits of cinnamon can be attributed to its antibacterial, antifungal, antimicrobial, astringent and anti clotting properties. Cinnamon is rich in essential minerals such as manganese, iron and calcium. It is also rich in fiber, **(Lindsley, 2005).**

Cinnamon, it turns out, has long been used to cure everything from athlete’s foot to indigestion. Early civilizations recognized its ability to stop bacterial growth. The Egyptians used it in embalming. During the Middle Ages, it was mixed with cloves and warm water, and placed in the sick rooms of victims of the Bubonic Plague. Cinnamon boosts the activity of the brain and hence acts as a good brain tonic. It helps in removing nervous tension and memory loss. Research at the Wheeling Jesuit University in the US has proved that the scent of cinnamon has the ability to boost brain activity, **(Francois, 2003).**

**Dr. P. Zoladz (2004)**, conducted a research study and found that chewing cinnamon flavored gum or just smelling cinnamon enhanced study participants’ cognitive processing. Specifically, cinnamon improved



participants' scores on tasks related to attentional processes, virtual recognition memory, working memory, and visual-motor speed while working on a computer-based program. Participants were exposed to four odorant conditions: no odor, peppermint odor, jasmine, and cinnamon, with cinnamon emerging the clear winner in producing positive effects on brain function. Encouraged by the results of these studies, researchers will be evaluating cinnamon's potential for enhancing cognition in the elderly, individuals with test-anxiety, and possibly even patients with diseases that lead to cognitive decline.

At least 1 in every 10 children of school age is facing memory problems and emotionally affected and not many studies were done to assess the effectiveness of cinnamon on memory and anxiety. Hence the investigator felt the need to perform an experimental study to assess its effectiveness.

## **STATEMENT OF PROBLEM**

**“Effectiveness of Cinnamon Chewing gum on Memory and Anxiety among adolescents at selected Seventh Day Adventist High Schools, Andhra Pradesh.”**

## **OBJECTIVES**

- To assess the level of memory and anxiety among adolescents in experimental and control group before and after cinnamon chewing gum

- ☛ To determine the effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in experimental and control group
- ☛ To find out the correlation between memory and anxiety among adolescents in experimental group.
- ☛ To find out the association between post test scores of memory and anxiety among control and experimental group of adolescents with their demographic variables.

## **OPERATIONAL DEFINITIONS**

### **Effectiveness**

It refers to improvement in memory and reduction in anxiety status among adolescents as determined by significant difference between post test scores of experimental and control group.

### **Cinnamon chewing gum**

It refers to smelling the aroma of cinnamon for 5 minutes produced by cinnamon flavoured chewing gum twice a day for 15 days. The cost of cinnamon chewing gum is Rs. 10 per packet which contains 5 chewing gums in each packet.

### **Memory**

It refers to measuring the adolescent's remote memory, recent memory, mental balance, attention and concentration, immediate recall, delayed recall,

visual retention and visual recognition which is measured by using modified P.G.I memory assessment scale.

### **Anxiety**

It refers to symptoms such as anxious mood, tension, fear, insomnia and behaviour of adolescents which is measured by using modified Max Hamilton Anxiety rating scale.

### **Adolescents**

Refers to school children aged between 12 – 14 years.

### **Selected Seventh Day Adventist High Schools**

- It refers to seventh day Adventist high school, Vijayawada, Andhra Pradesh for the experimental group.
- It refers to seventh day Adventist high school, Ibrahimpatnam, Andhra Pradesh for the control group.

### **HYPOTHESES**

**H<sub>1</sub>:** There is a significant level in memory and anxiety among adolescents in experimental and control group before and after cinnamon chewing gum

**H<sub>2</sub>:** There is a significant effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in experimental than control group

**H<sub>3</sub>:** There is a significant correlation between the pre test scores and post test scores of memory and anxiety among adolescents in experimental group.

**H<sub>4</sub>:** There is a significant association between the post test scores of memory and anxiety among experimental and control group of adolescents with their demographic variables

### **DELIMITATIONS**

The study was delimited to

- ☛ Assess the effectiveness of cinnamon chewing gum
- ☛ Identify changes in memory and anxiety.
- ☛ Adolescents aged between 12 – 14 years.
- ☛ Seventh Day Adventist High School at Vijayawada and Ibrahimpatnam, Andhra Pradesh.

## **CONCEPTUAL FRAMEWORK BASED ON IMOGENE KING'S GOAL ATTAINMENT THEORY**

Theoretical framework provides clear description of variables suggesting ways or methods to conduct the study and guiding the interpretation, evaluation and integration of study findings.

**(Wood and Haber, 1994).**

A theoretical framework can be defined as set of concepts and assumptions that integrates them into meaningful configuration.

**(Pawcett, 1994).**

This study is based on Imogene King's Goal Attainment theory, (1997) which would be relevant to improve the level of memory and anxiety by providing cinnamon chewing gum among adolescents.

Imogene King's system is an "open" system. In this system, humans are in constant interaction with their environment. According to Imogene King each individual on this system has good directed choice of perceived alternatives in made and acted by individuals or groups to attain a goal. It is a process of human interaction in which two people who are usually strangers come together in a health care organization to help and to be helped to maintain a state of health that permit, functioning the roles.

The main concepts in Imogene King's open system are:

### **Perception**

A process of organizing, interpreting and transforming information from sense data and memory that gives meaning to one's experience represents one's image of reality and influence one's behaviour.

In this study the researcher and the subjects were come together for an interaction, a different set of perception to exchange. The researcher perceived that adolescents had memory impairment and anxious mood.

### **Judgement**

Each member of the dyad perceives the other and makes judgement for goal attainment.

The researcher wants to improve the level of memory and reduce the level of anxiety.

### **Action**

Each member dyad makes judgement and thereby action follows to attain goal.

The researcher planned to give cinnamon chewing gum

### **Mutual goal setting**

It is an activity that includes the client and family when appropriates in

prioritizing the goal care and in developing a plan of action to achieve the goal. To take Cinnamon chewing gum for the duration of 5 minutes twice a day for 15 days.

### **Interaction**

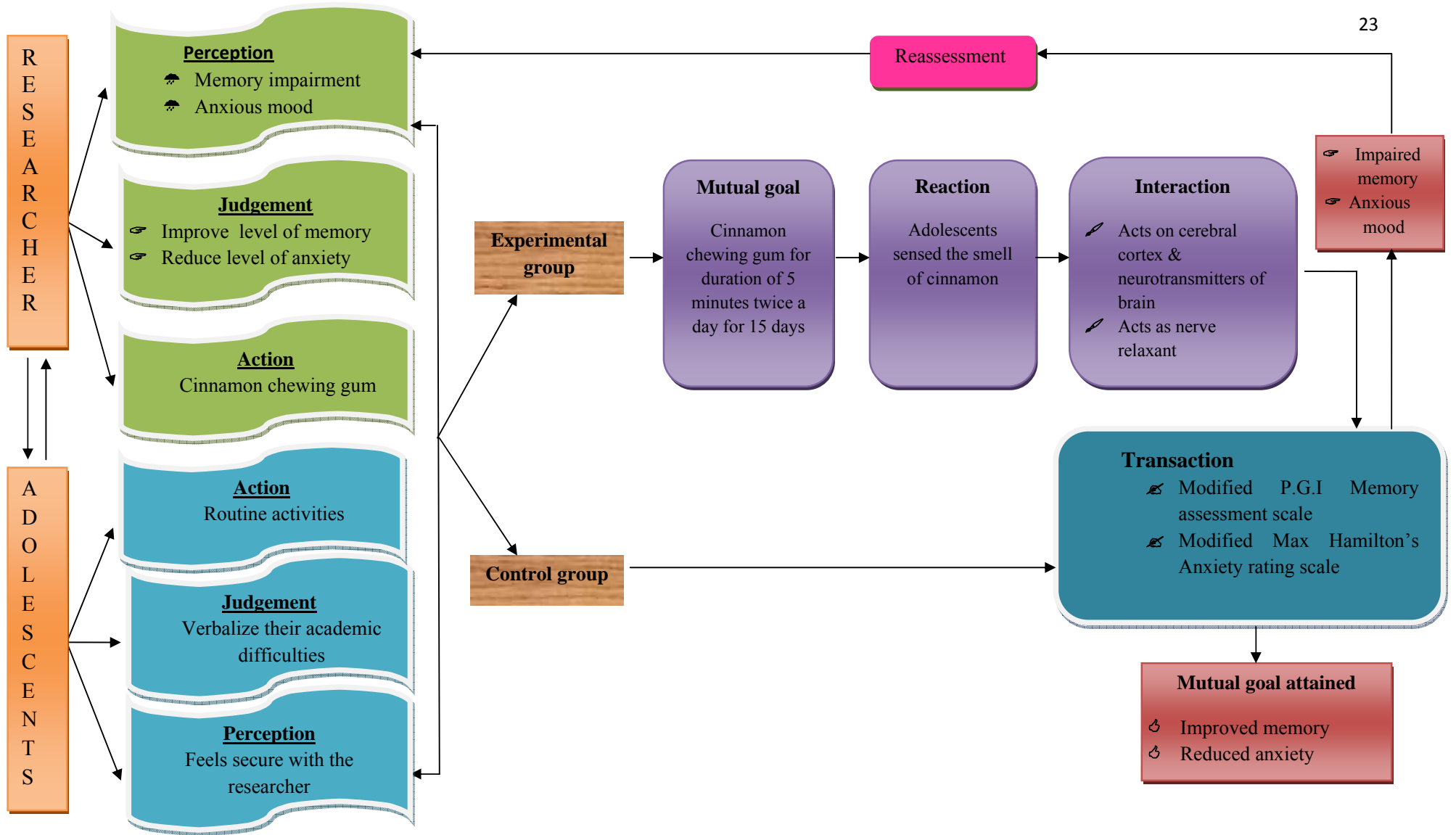
The acts of two or more persons in mutual presence a sequence of verbal and non verbal behaviours that are goal directed.

The researcher boosts the brain function where cinnamon acts on the cerebral cortex and neurotransmitters of the brain and acts as a nerve relaxant reducing tension.

### **Transaction**

A process of interaction in which human beings communicate with the environment to achieve goals that a value goal directed human behavior. In this model, human are in constant interaction with their environment. Adjustment to life and health are influenced by individual interaction with the environment. Each human being perceives the world as a total person in making transaction with the individual and things in the environment.

The transactions between the subjects and the researcher was the post test which was conducted by Modified P.G.I Memory Assessment Scale to assess memory and Modified Max Hamilton's Anxiety Rating Scale to assess anxiety. The goal is said to be achieved when there is improved memory and reduced anxiety among adolescents.



**Fig. 1.1 CONCEPTUAL FRAMEWORK BASED ON KING'S GOAL ATTAINMENT THEORY**



## CHAPTER – II

### REVIEW OF LITERATURE

The review of literature is a broad, comprehensive, in depth, systematic and critical review of scholarly publication, unpublished scholarly print materials audiovisual material and personal communication.

A literature review is a written summary of the state of existing knowledge on a research problem. The task of reviewing research literature involves the identification, selection, critical analysis and written description of existing information on a topic, **(Polit and Hungler, 1999)**.

The review of literature in this study is organized under following headings;

- 1) Studies related to cinnamon
- 2) Studies related to memory and anxiety among adolescents
- 3) Studies related to complimentary therapies on memory and anxiety
- 4) Studies related to cinnamon chewing gum on memory and anxiety among adolescents

## 1) STUDIES RELATED TO CINNAMON

**Paul A. (2011)**, study on the effect of cinnamon on blood glucose. A meta-analysis of clinical studies of the effect of cinnamon intake on people with type 2 diabetes and/or prediabetes that included three new clinical trials along with five trials used in previous meta-analyses was done to assess cinnamon's effectiveness in lowering FBG. The subjects were selected from individuals with type 2 diabetes based on American Diabetes Association criteria ( $n = 9$ ), stratified by sex and randomized to consume one capsule containing either 500 mg of total cinnamon (*C. cassia*) or placebo (wheat flour) at both breakfast and dinner for 3 months. Compliance was assessed by capsule count, and dietary patterns were monitored using a monthly 3-day food journal. The meta-analysis of the eight trials showed that the intake of supplements of cinnamon or as cinnamon extract only results in a statistically significant lowering of FBG:  $-0.49 - 0.2$  mmol/L ( $8.77 - 3.52$  mg/dL) for all studies ( $n = 8$ ,  $P = .025$ ) and  $-0.48 - 0.17$  mmol/L ( $8.7 - 3.10$  mg/dL) for cinnamon extract only ( $n = 5$ ,  $P = .008$ ).

**Hashimoto R (2010)**, study to examine whether cinnamaldehyde stimulates secretion of progesterone and other steroid hormones in human adrenal cells and reduces menstrual pain. Human adrenal cells, H295R were exposed for 24h in a serum-free medium to various concentrations of cinnamaldehyde. Steroid hormones in the cultured medium were measured by a

highly sensitive LC-electrospray ionization-tandem mass spectrometry. Exposure to cinnamaldehyde increased progesterone release in a dose-dependent manner. Testosterone and dehydroepiandrosterone concentrations decreased in the presence of cinnamaldehyde. The release of cortisol or estradiol was not affected by treatment with cinnamaldehyde. cAMP in the cultured medium was increased from  $0.06 \pm 0.0007$  pmol/ml to  $0.12 \pm 0.0028$  pmol/ml by exposure to cinnamaldehyde. The addition of isobutylmethylxanthine, a phosphodiesterase inhibitor, caused a doubling of the amount of cAMP up to  $0.397 \pm 0.036$  pmol/ml in the presence of cinnamaldehyde. SIGNIFICANCE: These data suggest that cinnamaldehyde selectively induced progesterone production and inhibited production of testosterone and dehydroepiandrosterone in human adrenal cells.

**Tim N Ziegenfuss, (2009), conducted a study** to determine the effects of supplementation with a water-soluble cinnamon extract (Cinnulin PF) on body composition and features of the metabolic syndrome. Twenty-two subjects with pre diabetes and the metabolic syndrome (mean  $\pm$  SD: age, BMI, systolic blood pressure [SBP], fasting blood glucose [FBG]:  $46.0 \pm 9.7$  y;  $33.2 \pm 9.3$  kg/m<sup>2</sup>;  $133 \pm 17$  mm Hg;  $114.3 \pm 11.6$  mg/dL) were randomly assigned to supplement their diet with either Cinnulin PF (500 mg/d) or a placebo for 12-weeks. Main outcome measures were changes in FBG, SBP, and body composition measured after 12-weeks of supplementation. The primary statistical analyses consisted of two factor (group  $\times$  time), repeated-measures

ANOVA for between group differences over time. In all analyses, an intent-to-treat approach was used and significance was accepted at  $P < 0.05$ . Subjects in the Cinnulin PF<sup>®</sup> group had significant decreases in FBG (-8.4%:  $116.3 \pm 12.8$  mg/dL [pre] to  $106.5 \pm 20.1$  mg/dL [post],  $p < 0.01$ ), SBP (-3.8%:  $133 \pm 14$  mm Hg [pre] to  $128 \pm 18$  mm Hg [post],  $p < 0.001$ ), and increases in lean mass (+1.1%:  $53.7 \pm 11.8$  kg [pre] to  $54.3 \pm 11.8$  kg [post],  $p < 0.002$ ) compared with the placebo group. Additionally, within-group analyses uncovered small, but statistically significant decreases in body fat (-0.7%:  $37.9 \pm 9.2\%$  [pre] to  $37.2 \pm 8.9\%$  [post],  $p < 0.02$ ) in the Cinnulin PF<sup>®</sup> group. No significant changes in clinical blood chemistries were observed between groups over time. These data support the efficacy of Cinnulin PF<sup>®</sup> supplementation on reducing FBG and SBP, and improving body composition in men and women with the metabolic syndrome and suggest that this naturally-occurring spice can reduce risk factors associated with diabetes and cardiovascular diseases

**Dember (2007)**, conducted a study to determine whether cinnamon can lower HbA1c in patients with type 2 diabetes. The randomized, controlled trial included 109 pediatric, adult and geriatric patients with type 2 diabetes. The patients were then randomly assigned to either usual care with management changes by their primary care physician or usual care with management changes plus 1 gram cinnamon capsules daily for 90 days. HbA1c was drawn at baseline and after 90 days. The results revealed that cinnamon lowered HbA1c 0.83% compared with usual care alone, which lowered HbA1c 0.37%. These

results indicate that taking cinnamon in addition to usual care could be useful for reducing HbA1c in patients with type 2 diabetes.

**Safdar M (2003)**, conducted a study to determine whether cinnamon improves blood glucose, triglyceride, total cholesterol, HDL cholesterol, and LDL cholesterol levels in people with type 2 diabetes. A total of 60 people with type 2 diabetes, 30 men and 30 women aged 52.2 +/- 6.32 years, were divided randomly into six groups. Groups 1, 2, and 3 consumed 1, 3, or 6 g of cinnamon daily, respectively, and groups 4, 5, and 6 were given placebo capsules corresponding to the number of capsules consumed for the three levels of cinnamon. The cinnamon was consumed for 40 days followed by a 20-day washout period. After 40 days, all three levels of cinnamon reduced the mean fasting serum glucose (18-29%), triglyceride (23-30%), LDL cholesterol (7-27%), and total cholesterol (12-26%) levels; no significant changes were noted in the placebo groups. Changes in HDL cholesterol were not significant. The results of this study demonstrate that intake of 1, 3, or 6 g of cinnamon per day reduces serum glucose, triglyceride, LDL cholesterol, and total cholesterol in people with type 2 diabetes and suggest that the inclusion of cinnamon in the diet of people with type 2 diabetes will reduce risk factors associated with diabetes and cardiovascular diseases.

**Steve Blevins M (2003)**, conducted a clinical trial to evaluate the effect of cinnamon in individuals with type 2 diabetes in Pakistan. Participants were

recruited through e-mail announcements to campus employees and through an article in the local newspaper. Individuals of any age with type 2 diabetes, based on criteria from the American Diabetes Association were eligible for the study. Enrolled subjects were stratified by sex and randomized to receive either cinnamon (*C. cassia*) or placebo (wheat flour). Investigators and subjects were blinded to group assignment and to capsule content. Each capsule contained 500 mg product. Subjects were instructed to ingest one capsule with breakfast and one with dinner for 3 months. Compliance was assessed by capsule count. Follow-up visits were scheduled at 1, 2, and 3 months. Fasting glucose, cholesterol (total, LDL, and HDL), triglyceride, and insulin levels were measured at each visit. A1C was measured at baseline and at 3 months. Dietary patterns were monitored monthly using a 3-day food journal. Outcomes were analyzed using a general linear model for the three-way ANOVA (two treatments  $\times$  2 sexes  $\times$  4 visits) with repeated measures on the time factor. Significance was set at 0.05. A total of 58 subjects completed the initial visit, of which 30 had been randomized to the cinnamon group and 28 to the placebo group. In the cinnamon group, 77% of the subjects showed lower levels of fasting glucose, triglycerides, LDL cholesterol and total cholesterol than the placebo group.

**Rogério Lobo (2000)**, studied the Effects of Oral Cinnamon Extract on Menstrual Cyclicity in PolyCystic Ovary Syndrome. All patients will eat a balanced diet containing 1800 calories per day, but half of the patients in the

study will take pre-made cinnamon extract pills three times a day, while the other half will take placebo pills (pills with no cinnamon extract) three times a day for 6 months. During this time, every patient will keep track of her period on a calendar. Blood tests measuring insulin, substances important for insulin action, cholesterol, and glucose (sugar) will be taken before and after the 6 months of medication. A total of 8 separate visits will be needed to finish the study. At the end of the study, the investigators will then compare the number of periods, blood glucose, insulin, and cholesterol levels between the patients that took cinnamon and the patients that took placebo. The experimental group showed better results than the control group.

**Joanna Hlebowicz (2000)**, studied the effect of cinnamon on the rate of gastric emptying, the postprandial blood glucose response, and satiety in healthy subjects. The gastric emptying rate (GER) was measured by using standardized real-time ultrasonography. Fourteen healthy subjects were assessed by using a crossover trial. The subjects were examined after an 8-h fast if they had normal fasting blood glucose concentrations. GER was calculated as the percentage change in the antral cross-sectional area 15–90 min after ingestion of 300 g rice pudding (GER1) or 300 g rice pudding and 6 g cinnamon (GER2). The median value of GER1 was 37%, and that of GER2 was 34.5%. The addition of cinnamon to the rice pudding significantly delayed gastric emptying and lowered the postprandial glucose response ( $P < 0.05$  for both). The reduction in the postprandial blood glucose concentration was much

more noticeable and pronounced than was the lowering of the GER. The effect of cinnamon on satiety was not significant and concluded that the intake of 6 g cinnamon with rice pudding reduces postprandial blood glucose and delays gastric emptying without affecting satiety. Inclusion of cinnamon in the diet lowers the postprandial glucose response.

## **2) STUDIES RELATED TO MEMORY AND ANXIETY AMONG ADOLESCENTS**

**Michael H. Boyle, (2011)**, conducted a study to examine the contribution of adolescents' sleep problems and tiredness to psychological symptoms after accounting for shared risk and psychological co-morbidity. Secondary analyses of cross-sectional data on 12–16-year-old ( $N = 980$ ) adolescents without chronic illness, functional limitation, or developmental delay. Adolescents rated sleep problems, tiredness, and psychological symptoms. Parents provided information about risk factors, adolescent tiredness, and psychological symptoms. Parent- and adolescent-rated aggression, attention problems, anxiety/depression, and withdrawal scores were calculated for each adolescent. Internal consistencies for the parent-rated scales in our sample were: aggression ( $\alpha = .87$ ), attention problems ( $\alpha = .77$ ), anxiety/depression ( $\alpha = .83$ ), and withdrawal ( $\alpha = .73$ ). Internal consistencies for the adolescent-rated scales in our sample were: aggression ( $\alpha = .81$ ), attention problems ( $\alpha = .71$ ), anxiety/depression ( $\alpha = .84$ ), and withdrawal ( $\alpha =$



.57).After accounting for psychological co-morbidity: nightmares were associated with adolescent-rated anxiety/depression; sleeping more than others was associated with adolescent-rated aggression; trouble sleeping was associated with adolescent-rated attention problems, anxiety/depression, and withdrawal; and adolescent-rated tiredness was associated with adolescent-rated aggression and withdrawal. He concluded that Studies examining sleep and psychopathology should control for psychological co-morbidity.

**Fayegh Yousefi et.al. (2010)** conducted a study to determine the effect of test-anxiety on memory which was carried out among adolescents in Iran. The respondents of the study were 400 high school students (200 males and 200 females) in the age range of 15-19 years old. Instruments used for data collection were Test-Anxiety Inventory (25 items) and Wechsler Memory Scale –3rd Edition (WMS-III). The finding showed that test-anxiety and memory were significantly correlated, ( $r=-0.12$ ,  $P<0.04$ ). Thus, it is recommended that in enhancing academic achievement and mental health in school setting, support strategies such as educational guidance and counseling, teaching life skill programs and psychotherapy should be promoted. Limitation of this study was that this study is limited to only student aged 15-19 years in public school and should not be generalized to the other private schools and to adolescent or young adult population.

**Karen Schneider (2010)**, a study conducted to evaluate executive and memory function among adolescents born preterm compared with term

controls at 16 years. A total of 337 of 437 (77%) adolescents born in 1989 to 1992 with a birth weight < 1250 g and 102 term controls were assessed with a battery of executive function and memory tasks. Multiple regression analyses were used to compare groups and to identify associations between selected factors and outcomes among preterm subjects. Adolescents born preterm, compared with term controls, showed deficits in executive function in the order of 0.4 to 0.6 SD on tasks of verbal fluency, inhibition, cognitive flexibility, planning/organization, and working memory as well as verbal and visuospatial memory. Preterm subjects, compared with term controls, were at increased risk of exhibiting problems related to executive dysfunction, as measured with the Behavior Rating Inventory of Executive Function, on the Metacognition Index (odds ratio [OR]: 2.5 [95% confidence interval (CI): 1.2–5.1]) and the Global Executive Composite (OR: 4.2 [95% CI: 1.6–10.9]), but not on the Behavioral Regulation index (OR: 1.5 [95% CI: 0.7–3.5]). Among adolescents born preterm, severe brain injury on neonatal ultrasound and lower maternal education were the most consistent factors associated with poor outcomes and concluded that adolescents born preterm in the early 1990s were at increased risk of deficits in executive function and memory.

**Pooja Chatterjee, (2010)**, conducted a study to understand better anxiety among adolescents in Kolkata city, India. Specifically, the study compared anxiety across gender, school type, socio-economic background and mothers' employment status. The study also examined adolescents' perceptions

of quality time with their parents. A group of 460 adolescents (220 boys and 240 girls), aged 13-17 years were recruited to participate in the study via a multi-stage sampling technique. The data were collected using a self-report semi-structured questionnaire and a standardized psychological test, the State-Trait Anxiety Inventory. Results show that anxiety was prevalent in the sample with 20.1% of boys and 17.9% of girls found to be suffering from high anxiety. More boys were anxious than girls ( $p < 0.01$ ). Adolescents from Bengali medium schools were more anxious than adolescents from English medium schools ( $p < 0.01$ ). Adolescents belonging to the middle class (middle socio-economic group) suffered more anxiety than those from both high and low socio-economic groups ( $p < 0.01$ ). Adolescents with working mothers were found to be more anxious ( $p < 0.01$ ). Results also show that a substantial proportion of the adolescents perceived they did not receive quality time from fathers (32.1%) and mothers (21.3%). A large number of them also did not feel comfortable to share their personal issues with their parents (60.0% for fathers and 40.0% for mothers).

**David Cawthorpe, (2008)**, A study tested a structural model, examining the relationship between a latent variable termed demoralization and measured variables (anxiety, depression and hopelessness) in a community sample of Canadian youth. The combined sample consisted of data collected from four independent studies from 2001 to 2005. Nine hundred and seventy one ( $n=971$ )

participants were high school students (grades 10–12) from three geographic locations: Calgary, Saskatchewan and Lethbridge. Participants completed the Beck Anxiety Inventory (BAI), Beck Depression Inventory-Revised (BDI-II), Beck Hopelessness Scale (BHS), and demographic survey. Structural equation modeling was used for statistical analysis. The analysis revealed that the final model, including depression, anxiety and hopelessness and one latent variable demoralization, fit the data (chi-square value,  $X^2(2) = 7.25$ ,  $p < .001$ , goodness of fit indices (CFI=0.99, NFI=0.98) and standardized error (0.05). Overall, the findings suggest that close relationships exist among depression, anxiety, hopelessness and demoralization that is stable across demographic variables. The present findings will help guide further preventative research on examining demoralization as a precursor to sub-clinical anxiety and depression.

**Reena Bhansali, (2008)**, A comparative study between boys and girls of 16-18 years was conducted to know the academic anxiety prevailing amongst them. The objective of the study was to find out the gender differences in incidences and intensity of Academic Anxiety amongst adolescents. Incidental purposive sampling technique was used in the selection of the sample. A total sample of 240 adolescent, 120 boys and 120 girls from different high schools of Jodhpur city were selected. Self-constructed Adolescent Problem Inventory was pilot tested and applied on the chosen sample. The obtained results were statistically analyzed. The Results revealed that all adolescents had some amount of Academic anxiety, 35.4% had low level of Academic anxiety, 41.3 had border line and as high as 23.3% Ss had high academic anxiety. However

when split on gender it was observed that girls (66.1%) as compared to boys (33.9%) were high on this problem. The significance of difference between the genders is at considerable high level on Academic Anxiety ( $p < 0.01$  level) where girls are having more academic anxiety than boys.

**Marlene Janet (2007)**, conducted a study which explored the possible roles of meta comprehension strategy knowledge and use, verbal long-term memory (LTM), and verbal working memory (WM) in actual text comprehension, as well as the inter-relationships among these variables, in a sample of 30 adolescents with LDs. In the present study, half of the sample had participated in a remedial reading intervention, the Taylor Adolescent Program (TAP group,  $n = 15$ ), in which they received direct teaching and guided practice in the use of meta comprehension strategies. The other half had been on the waiting list for the program (WL group,  $n = 15$ ). Data were collected on general intellectual functioning, language comprehension, sight-word vocabulary, and cloze-passage comprehension and on verbal LTM, verbal WM, and meta comprehension strategy knowledge. In addition, participants read two easier and two harder expository texts, and reported on the meta comprehension strategies they used to understand the texts. Actual comprehension of the four texts was measured using multiple-choice questions. Comparisons of the TAP and WL groups indicated no significant differences on measures of meta comprehension strategy knowledge or meta comprehension strategy use. A co-relational analysis of all the data for the

entire sample revealed significant relationships between actual text comprehension and the general intellectual measures, language comprehension, sight-word vocabulary, cloze-passage comprehension, verbal LTM, and verbal WM.

**Bryndis B (2007)**, conducted a study to examine the trends in adolescent depression and anxiety symptoms from 1997 to 2006, using four time-points (1997, 2000, 2003, and 2006), and adolescent mental health service use in the same period, using three time-points (1997, 2000, and 2006). Four cross-sectional population-based samples of 14- and 15-year-old students, attending the compulsory 9th and 10th grades of the Icelandic secondary school system, completed questionnaires relating to mental health. In total, 21,245 students participated in the four studies. Results were anxiety symptoms increased significantly for both boys and girls, throughout the period from 1997 to 2006. Depressive symptoms increased significantly for girls, while there were no significant changes in depression among boys. During the same time period, the proportion of adolescents who visited healthcare specialists, i.e. psychiatrists, psychologists and social workers, increased significantly. The results revealed that regular visits (six times or more during 1 year) to psychiatrists and psychologists increased significantly over the same period among girls but not among boys. The findings show that symptoms of depression and anxiety have increased among adolescents in Iceland. The

findings call particular attention to the increasing risk for depression and anxiety symptoms among girls.

**Wilkerson (2005)**, conducted a study to investigate memory of threatening and non-threatening information among adolescents. Specifically, the study tested the prediction of cognitive theories of anxiety that anxious and non-anxious individuals process threatening information differently. High school students ( $n = 187$ ) from a moderately sized Midwestern city were screened for anxiety using self-report measures. Students ( $n = 18$ ) who obtained scores above a designated cut-off, and a contrast group matched on gender and grade ( $n = 18$ ), completed implicit and explicit memory tasks along with a second administration of the self-report measures. Subsequently, adolescents were divided into anxious ( $n = 8$ ) and mixed (anxiety and depression;  $n = 10$ ) groups. These groups produced more threat-related words on a word-stem completion task than the contrast group. However, their ability to reproduce the primed (i.e., previously studied) threat words did not differ from the contrast group. The mixed group identified more threat words on a word recognition task than either the anxious or contrast groups. When recognition was adjusted for guessing, no group differences existed.

**Mark S. Smith (2001)**, *A Comparative Study of Anxiety, Depression, Somatization, Functional Disability, and Illness Attribution in Adolescents With Chronic Fatigue or Migraine*. Adolescents referred to Children's Hospital and Regional Medical Center for behavioral treatment of migraine ( $n = 179$ ) or

evaluation of chronic fatigue ( $n = 97$ ) were compared with a group of healthy controls of similar age and sex from a middle school ( $n = 32$ ). Subjects completed the Spielberger State-Trait Anxiety Inventory-Trait Form, the Children's Depression Inventory, the Childhood Somatization Inventory, and estimated the number of school days missed in the past 6 months because of illness. Migraine and fatigued subjects completed an illness attribution questionnaire. Subjects in the 3 groups were 56% to 70% female and ranged from 11 years old to 18 years old with a mean age of  $14.0 \pm 2.0$ . Forty-six of the 97 chronically fatigued adolescents met 1994 Centers for Disease Control and Prevention (CDC) criteria for chronic fatigue syndrome (CDC-CFS), while 51 had idiopathic chronic fatigue syndrome (I-CFS) that did not meet full CDC criteria. Adolescents with migraine had significantly higher anxiety scores than those with I-CFS or controls and higher somatization scores than controls. Adolescents with CDC-CFS had significantly higher anxiety scores than those with I-CFS or controls, and higher depression and somatization scores than all other groups. There were significant differences between all groups for school days missed with CDC-CFS more than I-CFS more than migraine more than controls. Parents of adolescents with unexplained I-CFS had significantly lower attribution scores relating illness to possible psychological or stress factors than parents of adolescents with CDC-CFS or migraine.



### 3) STUDIES RELATED TO COMPLIMENTARY THERAPIES ON MEMORY AND ANXIETY

**Nurcan (2011)**, conducted a study to determine the use of complementary and alternative medicine (CAM) by mothers with a chronically ill child and their anxiety levels. This study used a descriptive design. The study was conducted with 135 mothers of a chronically ill child at a general pediatric and oncology unit in Uludağ University Hospital, Bursa, Turkey. A questionnaire, including sociodemographic items and the State-Trait Anxiety Inventory, were given to the mothers. In the study, 42.29% of the mothers reported using one or more CAM therapies for their child with a chronic disease, including herbal medicine, taking the child to *hodja* (prayers), a special diet, and a special massage. The mothers experienced anxiety and the presence of a disease within the close family circle increased the anxiety level of the mothers. he concluded that Herbs and other alternative supplements were used by some children with a chronic disease in Turkey. The most commonly used CAM therapies included oral herbal medicine, taking the child to *hodja*, massage, and diets. Most of the mothers used more than one of these therapies for their child and the anxiety level of the mothers was found to be moderate.

**Lakhan SE (2010)**, conducted a study to assess the effectiveness of herbal supplements for anxiety and anxiety-related disorders. A total of 24 studies that investigated five different CAM monotherapies and eight different combination treatments and involved 2619 participants met the inclusion

criteria and were analyzed. There were 21 randomized controlled trials and three open-label, uncontrolled observational studies. Most studies involved patients who had been diagnosed with either an anxiety disorder or depression (n = 1786). However, eight studies used healthy volunteers (n = 877) who had normal levels of anxiety, were undergoing surgery, tested at the upper limit of the normal range of a trait anxiety scale, had adverse premenstrual symptoms or were peri-menopausal, reported anxiety and insomnia, or had one month or more of elevated generalized anxiety. Heterogeneity and the small number of studies for each supplement or combination therapy prevented a formal meta-analysis. Of the randomized controlled trials reviewed, 71% (15 out of 21) showed a positive direction of evidence. Any reported side effects were mild to moderate. Based on the available evidence, it appears that nutritional and herbal supplementation is an effective method for treating anxiety and anxiety-related conditions without the risk of serious side effects

**Katharina M (2009)**, conducted a study to compare the efficacy of group and individual cognitive-behavioral therapy (CBT) in children with Axis I anxiety disorders. Seventy-eight children aged 8–12 years with diagnosed anxiety disorders were randomly assigned to a 12-week, manual-based program of group or individual CBT, both with parental involvement. Outcomes included child anxiety (child and parent report) and global functioning as estimated by clinicians. Repeated-measures analyses of variance (ANOVAs) were done. The sample was then dichotomized by self-reported social anxiety

(high/low) and parent-reported hyperactivity (high/low) using median splits, and diagnostically by generalized anxiety disorder versus phobic disorders. ANOVAs were repeated. Children and parents reported significantly decreased anxiety and clinicians reported significantly improved global functioning regardless of treatment modality. Children reporting high social anxiety reported greater gains in individual treatment than in group treatment ( $p < .01$ ). Parent reports of hyperactivity and diagnostic differences were not associated with differential treatment response by modality. Children with anxiety disorders appear to improve with CBT, whether administered in a group or individual format. A subgroup of children reporting high social anxiety may respond preferentially to individual treatment. Replication of these findings is indicated

**Angela Kaminski (2009)**, conducted a study on Bach Flower Remedies to help balance emotional state. For efficacy, they included all prospective studies with a control group and for safety, they also included retrospective, observational studies with more than 30 subjects. Two authors abstracted data and determined risk of bias using a recognized rating system of trial quality. Four randomized controlled trials (RCTs) and two additional retrospective, observational studies were identified and included in the review. Three RCTs of BFRs for students with examination anxiety, and one RCT of BFRs for children with attention-deficit hyperactivity disorder (ADHD) showed no overall benefit in comparison to placebo. Analysis of the four controlled trials

of BFRs for examination anxiety and ADHD indicates that there is no evidence of benefit compared with a placebo intervention.

**Biswajit Majumder (2008)**, conducted to compare three different integrated yoga modules on Associative memory in 241 school children of both genders aged between 13-17 years were randomly allocated to three groups after stratifying for age /sex. The groups are 1(CV group) Creativity group (n=81), 2 (IQ group) Intelligent quotient group (n=81) & (PS group) Physical stamina group (n=79). All the groups prescribed specific yoga modules for 10 days. Associative memory was assessed by using Wechsler's memory scale test. The assessments were taken day 1&day 9th. The percentage of improvement in the three groups are as (CV -12.2%, IQ-11.4%, P.S- 11.3%). The result showed significant improvement found in all groups with using paired sample 't' test. No significant difference found between the groups in ANOVA test.

**Naveen KV (2007)**, conducted a study on Uninostril breathing that facilitates the performance on spatial and verbal cognitive tasks, respectively. Since hemispheric memory functions are also known to be lateralized, the present study assessed the effects of uninostril breathing on the performance in verbal and spatial memory tests. School children (N = 108 whose ages ranged from 10 to 17 years) were randomly assigned to four groups. Each group practiced a specific yoga breathing technique: (i) right nostril breathing, (ii) left nostril breathing, (iii) alternate nostril breathing, or (iv) breath awareness

without manipulation of nostrils. These techniques were practiced for 10 days. Verbal and spatial memory was assessed initially and after 10 days. An age-matched control group of 27 were similarly assessed. All 4 trained groups showed a significant increase in spatial test scores at retest, but the control group showed no change. Average increase in spatial memory scores for the trained groups was 84%. It appears yoga breathing increases spatial rather than verbal scores, without a lateralized effect.

**H Woelk (2007)**, tested for clinical efficacy in younger patients suffering from anxiety. One hundred and seven patients with generalized anxiety disorder (GAD, n=82) or adjustment disorder with anxious mood (ADWAM, n=25) according to the diagnostic and statistical manual of mental disorders, third edition - revised (DSM-III-R) were randomized to daily doses of 480 mg EGb 761, 240 mg EGb 761 or placebo for 4 weeks. Intention-to-treat (ITT) analyses were performed on the primary outcome measure, the Hamilton rating scale for anxiety (HAMA), and the secondary variables, the clinical global impression of change (CGI-C), the Erlangen anxiety tension and aggression scale (EAAS), the list of complaints (B-L'), and the patient's global rating of change. The HAMA total scores decreased by -14.3 (+/-8.1), -12.1 (+/-9.0) and -7.8 (+/-9.2) in the high-dose EGb 761, the low-dose EGb 761 and the placebo group, respectively. Changes were significantly different from placebo for both treatment groups with  $p=0.0003$  (high-dose group) and  $p=0.01$  (low-dose). Regression analyses revealed a dose-response trend ( $p=0.003$ ).

EGB 761 was significantly superior to placebo on all secondary outcome measures. It was safe and well tolerated and may thus be of particular value in elderly patients with anxiety related to cognitive decline

**Toledo (2006)**, study to identify controlled trials, which evaluated effectiveness of herbal medicines in subjects suffering generalized anxiety disorder. Controlled studies (randomized, comparative with placebo and/or standard drug, double-blind) were sought through electronic and hand-searches. Piper methysticum presented an unequivocal anxiolytic effect, but most studies also included patients with other anxiety disorders (e.g. phobias). Isolated studies with Ginkgo biloba, Galphimia glauca, Matricaria recutita, Passiflora incarnata and Valeriana officinalis showed a potential use for anxious diseases. Despite this low number of studies, Ginkgo biloba and Matricaria recutita showed an effect size (Cohen's  $d = 0.47$  to  $0.87$ ) similar or higher to standard anxiolytics drugs (benzodiazepines, buspirone and antidepressants -  $0.17$  to  $0.38$ ). Despite the therapeutic potential of medicinal plants in generalized anxiety disorder, very few controlled trials assessing herbal medicines in generalized anxiety disorder were found.

**Nagarathna R (2005)**, conducted to compare the three different specific Integrated Yoga Modules on Verbal Memory in 500 school students whose age ranged from 9-12 years. After stratifying for sex and age (Boys=181, Girls=129), 310 school students were randomly allotted to three groups. All the

three groups were trained in specific yoga modules designed for improving Physical Stamina (PS=100), Creativity (CR=107) and Analytical Intelligence (IQ=103), for ten days in a residential set up in South India. Verbal Memory was assessed using modified Wechsler's Memory Scale Test on day first and after ninth day. There was significant improvement (Student Paired 't'test  $p < 0.001$ ) in Verbal Memory in all three groups (PS=17.01%, CR=15.61% and IQ=15.05%). Results showed that the boys in the PS group (17.43%) had the maximum improvement compared to girls (3.94%).

**Anthony ACJ (2005)**, conducted a study to determine whether Cognitive Behavior Therapy is an effective treatment for adolescent anxiety disorders in comparison to waiting list or attention controls. Each identified study was assessed for possible inclusion by two reviewers independently. Inclusion criteria consisted of randomised controlled trials of CBT versus waiting list/attention controls in adolescents (under the age of 19 years) with a DSM(Diagnostic Statistical Manual) or ICD (International Classification of Diseases) anxiety diagnosis. Thirteen studies with 498 subjects and 311 controls met the inclusion criteria and were included in the analyses. The studies involved community or outpatient subjects only, with anxiety of only mild to moderate severity. ITT analyses showed a response rate for remission of any anxiety diagnosis of 56% for CBT versus 28.2% for controls (RR 0.58,95%CI 0.50 to 0.67), with no evidence of heterogeneity. The number needed to treat (NNT) was 3.0 (95%CI 2.5 to 4.5). For reduction in anxiety

symptoms, the SMD was -0.58 (95% CI -0.76 to -0.40) with no significant heterogeneity indicated. He concluded that Cognitive behavioural therapy appears an effective treatment for childhood and adolescent anxiety disorders in comparison to waiting list or attention control.

**Shruddha S (2004)**, conducted a study to assess the visual memory in school children following general yoga practices. Children (n= 297 whose ages ranged from 10-12 years) were randomly assigned. Yoga techniques were practiced and visual memory was assessed initially and after 9 days. There were 277 children who were got after dropouts and checking for abnormal data and that were taken for assessment. All showed significant increase in visual memory ( $p < 0.001$ , paired sample t- test). The scores showed results with regard to gender too. The total males between groups showed significant difference. ( $p = 0.000$ ) The total females did not show significant difference between groups ( $p = 0.067$ ).

**Sripad H (2003)**, conducted a study to compare the effect of chanting group, who had minimum two-years experience on memory and sustained attention with that of non-chanting group who had no exposure to such type of chanting. 35 subjects were chosen in both pre-selected groups and their age ranged from 13 to 15 years (mean age + 14). Two groups were matched for age and only males were selected. Matching of age, ambiance, daily routine and socio-economic background for both the groups assured that the results could



be attributed to chanting. Base line scores of memory and sustained attention were assessed by means of delayed recall tests and cancellation tests respectively. Data was analyzed using non-parametric Mann Whitney U test. Chanting group showed significant increased scorings in both the memory tests (VMS,  $p=0.001$ ; SMS,  $p=0.002$ ) and considerable reduction in total error and total time taken for cancellation tests. (TTT,  $p=0.017$ ; TE,  $p=0.013$ ) compared to non-chanting practitioners. He concluded that 35 healthy male volunteers in both chanting (chanting group subjects having minimum two year chanting experience) and non-chanting groups, whose ages ranged between 14 to 16 years, were considered. Memory was tested using Delayed recall tests (verbal memory and spatial memory). Hence, the practicing of Vedic chanting in a traditional way can also be used as one of the powerful means as any other yogic practices like asanas, pranayama, or meditation in calming down the mind and enhancing memory.

**Naderi F (2001)**, conducted a study to examine the Efficacy of Play Therapy on Anxiety in 8-12 years old male and female children. The sample subsumed 80 boys and girls whom were selected randomly via simple sampling procedure from clientele children whom were identified and diagnosed for Anxiety in counseling clinics. The subjects randomly allocated to two groups, giving equal chance to every client to be included in each group: the experimental and control group. Experimental group was involved in play therapy for ten sessions; 1 h each. Control group did not. Pre-test and post-test

experimental design with control group was processed by administrating Conner's Parent Rating Scale (CPRS), hwaz Children Anxiety Test (ACAT). Multivariate Analysis of Variance (MANOVA) as statistical implement revealed that: Play therapy decreased Anxiety. The results authenticated that play therapy as an effective therapeutic procedure is a conceivable intervention for children experiencing a broad range of problems such as anxiety involving no any significant risk.

**Liza Dion (2000)**, conducted a study to Measure the Effect of Massage on Anxiety and Tension. There were 245 participants in this study. The analysis was performed using intent-to-treat analysis, with the the mean difference from pre to post was -3.0122 on the visual analog scale (0-10). With Standard Error 0.1294, the paired t-test the P value was = <0.0001. Participant's comments were positive related to the experience of receiving massage and relief of anxiety

#### **4) STUDIES RELATED TO CINNAMON CHEWING GUM ON MEMORY AND ANXIETY AMONG ADOLESCENTS**

**Raudenbush et al. , (2002)**, conducted a study to determine the effectiveness of odorants on memory and mood which have a differential effect on human behavior, dependent upon route of administration (retronasal vs. orthonasal). Participants were 31 young adult volunteers (13

males, 18 females, mean age = 20.19 years) obtained through convenience sampling. Participants then began chewing a piece of gum (cinnamon, peppermint, cherry, or flavorless) for five minutes prior to the cognitive assessment, or, in the control condition, sat quietly for five minutes instead of chewing gum. The Impact[c] test has five different versions of each sub-test, which limited practice effects. ANOVAs were performed to compare composite scores of verbal memory, visual memory, visual motor speed, reaction time, and impulse control in the gum conditions. Measures of mood were calculated before and after each condition by use of the POMS questionnaire. There was a significant Gum x Task interaction for design memory indicating that among the flavored gum conditions, cinnamon- and peppermint-flavored gum produced the greatest delayed memory percent correct scores,  $[F_{sub.20,580}] = 2.034, p < .01$ . These results suggest that a retronasal administration of a cinnamon odorant has the potential to increase an individual's attentional processes, virtual recognition memory, working memory, and visual-motor response speed and reduce anxiety and fatigue.

**Monika Meulman (2004)**, conducted a study to determine the effectiveness of essential oils on anxiety among autistic children in a classroom. Mild to Medium level autistic children were selected randomly. Pre and post study was conducted using. Sample Child Assessment to assess level of function of ASD child. She used 6 single essential oils, provided via tea bags scented with drops of essential oil 1 per week in the classroom by

providing background information about oils to the teachers and teacher aides (and parents) each week. She provided children time and inhaler with chosen essential oil for each child for classroom and home use under supervision. The essential oils were bergamot, lavender, benzoin, cinnamon, frankincense, neroli, duration of 25-30 minutes, for 6 weeks. Most interestingly, lavender became a stimulant when each child received a tea bag infused with lavender drops. Results revealed that Contrastingly, frankincense elicited a pleasant and inquiring response and the most successful oils in calming and focusing, were cinnamon bark and benzoin.

## **CHAPTER – III**

### **METHODOLOGY**

The methodology of research indicates the general patterns of organizing the procedure of gathering valid and reliable data for the problem under investigation, **(Kothari, 1996)**.

The methodology of the study includes the description of research design, research approach, setting of the study, variables, population, criteria for sample selection, sample, sample technique, developing and description of the tool and reliability of the tool, methods of data collection and plan for analysis and interpretation of the data.

#### **RESEARCH APPROACH**

The research approach is the most essential part of any research. The entire study based on it. The research approach used in this study is applied form of research, to find out how well a program and intervention is effective. In this study the effectiveness of cinnamon chewing gum on memory and anxiety was evaluated. Therefore a quantitative evaluative approach was essential to test the effectiveness of the intervention.

## RESEARCH DESIGN

**Ram Ahuja (2007)**, states that research design is a master plan specifying the methods and procedure for collecting and analyzing the needed information.

The research design used for the present study was “**True experimental design where one group pre test and post test with control group design**” was selected to evaluate the effectiveness of cinnamon chewing gum on memory and anxiety among adolescents.

In this design, two groups are randomly selected. The treatment is then introduced into the experimental group and withheld from the control group, **(Kothari C.R., 2009)**.

**Table ( 3.1 ) Diagrammatic representation of research design**

<b>Randomly selected adolescents</b>	<b>Pretest</b>	<b>Intervention</b>	<b>Post test</b>
Experimental group	O <sub>1</sub>	X	O <sub>2</sub>
Control group	O <sub>3</sub>	-	O <sub>4</sub>

The symbols used are,

**O<sub>1</sub>**: Pre test on level of Memory and anxiety among adolescents in experimental group

**X:** cinnamon chewing gum

**O<sub>2</sub>:** Post test on level of memory and anxiety among adolescents in experimental group

**O<sub>3</sub>:** Pre test on level of memory and anxiety among adolescents in control group

**O<sub>4</sub>:** Post test on level of memory and anxiety among adolescents in control group

### **SETTING OF THE STUDY**

The study was conducted at Seventh Day Adventist High school, Vijayawada, for the experimental group. The school strength is about 700 children where 300 are girls and 400 are boys out of which 60 Children are in the age group of 12 – 14 years.

The study was conducted at Seventh Day Adventist High school, Ibrahimpatnam, for the control group. The school strength is about 850 students where 320 are girls and 530 are boys out of which 75 children are in the age group of 12 – 14 years.

### **VARIABLES**

A concept which can take a different qualitative values are called as variable, (**Kothari C.R., 2002**).

The variables under the study are following,

### **Independent variables**

According to **Polit and Hungler (1999)**, the variable that is believed to care or influence the behaviour and ideas.

In this present study the independent variable refers to cinnamon chewing gum

### **Dependent variables**

The dependent variable is the variable that researcher is interested in understanding, explaining and preceding, (**Polit and Hungler, 1999**).

In the present study the dependent variables refers to memory and anxiety.

### **POPULATION**

According to **Polit and Hungler (1999)**, population refers to the aggregate or totality of all the objects, subjects or numbers that conform to a set of specification.

The population for the present study was adolescents.

### **SAMPLE**

According to **Polit and Hungler (1999)**, the sample is a subset of a population and selected to participate in a research study. It is a portion of the



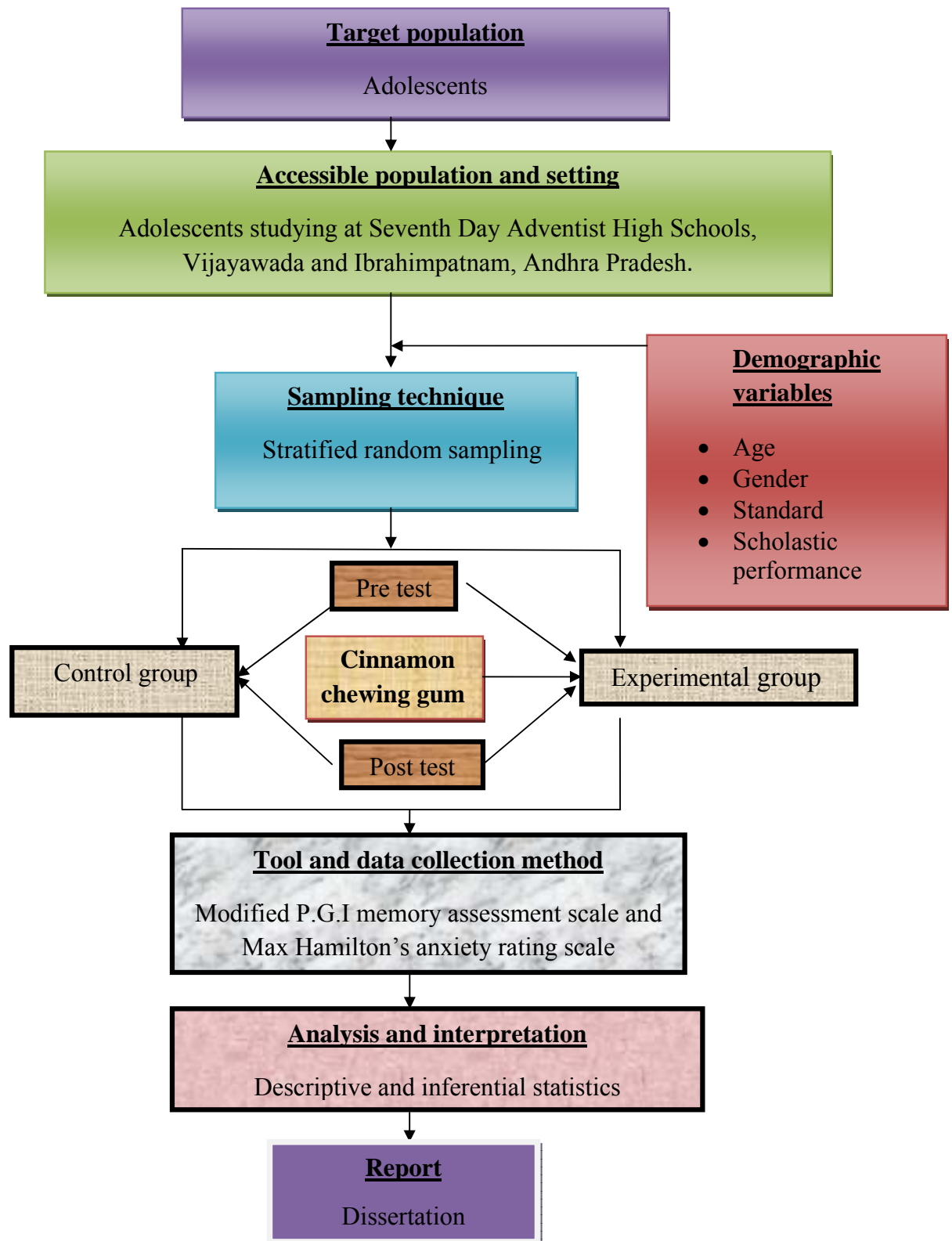
population, which represents the entire population.

In this present study the sample for the experimental group, adolescents studying at Seventh Day Adventist High School, Vijayawada, and for the control group, adolescents studying at Seventh Day Adventist High School, Ibrahimpatnam, Andhra Pradesh, willing to participate and present during the period of data collection.

### **SAMPLE SIZE**

Sample size is normally decided by nature of the study, nature of the population, type of sampling technique, total variables, statistical test adopted for data analysis, sensitivity of the measures and attribution, **(Polit and Beck, 2004)**.

The total sample size was 30 adolescents out of which 15 were in experimental group and 15 were in control group.



**Fig. 3.2: SCHEMATIC PRESENTATION OF RESEARCH METHODOLOGY**

## **SAMPLING TECHNIQUE**

Sampling technique refers to the process of selecting the portion of population to represent the entire population, **(Polit and Hungler, 1999)**.

In this present study stratified random sampling technique was used to select all the adolescents in Seventh Day Adventist High School and who are present during the period of data collection were selected as sample.

All the adolescents who were in the age group of 12 years to 14 years studying in 8<sup>th</sup> standard to 10<sup>th</sup> standard were selected. Totally there were 60 adolescents who met the inclusion criteria. Sampling was done where the entire universe was divided into three strata in such a way that there was a great homogeneity as possible within each stratum and a marked difference as possible between the strata. The sample was then taken by selecting a certain number of units from each stratum. Totally 15 samples were selected for experimental group and 15 were selected for control group. The total period of data collection was 20 days.

Stratified random sampling procedure is followed when the population is not homogenous. The population under study is first divided into homogenous groups called strata and the sample from each stratum at random in proportion to its size. This procedure gives more representative sample than sampling in a given large population, **(K Visweswara Rao, 2007)**.

## CRITERIA FOR THE SAMPLE SELECTION

### Inclusion criteria,

Adolescents who are,

- ◆ Male and female
- ◆ Studying in 8<sup>th</sup> to 10<sup>th</sup> standard
- ◆ Present during the period of data collection
- ◆ Gave consent to participate

### Exclusion criteria,

Adolescents who are,

- ✗ Sick
- ✗ Allergic to cinnamon chewing gum
- ✗ Having respiratory problems
- ✗ Irregular in attendance

## DEVELOPMENT OF THE TOOL

The instrument selected in a research must be the vehicle that obtains best data for drawing conclusion to the study, **(Treece & Treece, 1986)**.

The tool acts as an instrument to assess and collect the data from the respondents of the study.

There are two sections of tools which were used. They are;

**Section A:** Demographic variables of the adolescents.

It consists of demographic characteristics of adolescents such as Age, Gender, standard and scholastic performance.

**Section B:** Modified P.G.I memory assessment scale.

It contains 10 subsets. It is a standardized tool used to assess the memory among adolescents.

Subset	Instructions	Maximum score
Remote memory	One score for each correct response	6
Recent memory	One score for each correct response	5
Mental balance	<p><b>Alphabet and counting backward:</b></p> <p>i. If all correct within 15 seconds</p> <p>ii. If it takes longer than 15 seconds</p> <p><b>iii.</b> If there is one mistake or omission</p> <p><b>Counting backward by 3's:</b></p> <p>i. If all correct within 30 seconds</p> <p>ii. If it takes longer than 30 seconds</p> <p>iii. If there is one error or omission</p>	<p>3</p> <p>2</p> <p>1</p> <p>3</p> <p>2</p> <p>1</p>
Attention and concentration	Summation of digits forward and backward	13
Immediate recall	One score for each clause correctly reproduced	12
Delayed recall	One score for each word correctly recalled	10
Verbal retention for similar pairs	One score for each correct reproduction of the associated word of the pair	5
Verbal retention for dissimilar pairs	One score for correctly reproduced pair, separately for each trial. Summation of scores on three trials	15

	is the score	
Visual retention	One score for each type of geometric figure correctly reproduced in sequence and number <ul style="list-style-type: none"> <li>• Card 1 to 3</li> <li>• Card 4</li> <li>• Card 5</li> </ul>	2 3 4
Visual recognition	Each object correctly recognized and named is to be given a score of one.	10
<b>Total</b>		<b>98</b>

### SCORING PROCEDURE

Based on the percentage of scores the level of memory was graded in 4 categories. They are “poor memory”, “average memory”, “good memory” and “excellent memory”.

**Table 3.2. Level of memory based on percentage of scores.**

<b>Level of memory</b>	<b>Actual scores</b>	<b>Percentage</b>
Poor memory	0 – 24	0 – 25%
Average memory	25 – 48	26 – 49%
Good memory	49 – 72	50 – 73%
Excellent memory	73 - 98	74 – 100%

### **Section C:** Modified Max Hamilton's anxiety rating scale

This tool was formulated by Max Hamilton and is modified by the investigator. It is a standardized tool used to assess the anxiety among adolescents. It contains 5 domains. This tool is a 5 point scale with responses 'never' scored as 0, 'occasionally' scored as 1, 'sometimes' scored as 2, 'frequently' scored as 3 and 'always' scored as 4. This scale consists of both positively worded and negatively worded items. The positive items were 1,2,3,4,5,6,7,8,9,10,13,14,15,17 and 19. The negative items were 11, 12, 16, 18 and 20.

<b>Modified Max Hamilton's Anxiety Rating scale</b>	<b>Number of items</b>
Anxious mood	3
Tension	6
Fear	3
Insomnia	4
Behaviour of the adolescent	4
<b>Total</b>	<b>20</b>

## SCORING PROCEDURE

Based on the percentage of scores the level of anxiety was graded in 4 categories. They are “mild”, “moderate”, “severe” and “very severe”.

**Table 3.3. Level of anxiety based on percentage of scores.**

Level of anxiety	Actual scores	Percentage
Mild anxiety	0 – 20	0 – 25%
Moderate anxiety	21 – 40	26 – 50%
Severe anxiety	41 - 60	51 – 75%
Very severe anxiety	61 – 80	76 – 100%

## VALIDITY

The content validity refers to the degree to which instrument measures, what is supported to be measured, **(Polit and Hungler., 1999)**.

The content validity of the demographic variables, modified P.G.I memory assessment scale and modified Max Hamilton’s anxiety rating scale and content of cinnamon chewing gum was validated with guide and experts. The experts were Community Health Nurse Specialist, Siddha Doctor, psychologists and statistician. The tool was modified according to the suggestions and recommendations of the experts, **(Annexure VII)**



## **RELIABILITY**

According to **Polit and Hungler (1999)**, reliability of research instrument defined as the extent to which the instrument has the same result o repeated measures.

The reliability of modified P.G.I memory assessment scale and modified Max Hamilton's anxiety rating scale was tested by implementing the tool on 5 adolescents in Seventh Day Adventist Matriculation School, Erode, which is other than the sample area. A test re-test method was used to test the reliability of modified P.G.I Memory Assessment Scale and modified Max Hamilton's Anxiety Rating Scale. The tools modified P.G.I Memory Assessment Scale ( $r^1 = 0.96$ ) and modified Max Hamilton's Anxiety Rating Scale ( $r^2 = 0.69$ ) were found to be reliable.

## **DATA COLLECTION PROCEDURE**

According to the **Polit and Hungler (1999)**, data collection is the gathering of information needed to address a research problem.

The word "data" means information that is systematically collected in the course of a study.

**Permission from the concern authority**

Prior to collection of data, permission was obtained from The Principals of Seventh Day Adventist High School, Vijayawada for the experimental group and Seventh Day Adventist High School, Ibrahimpatnam, Andhra Pradesh for the control group, (**Annexure I and II**).

**Period of data collection**

The data was collected from 10.8.11 – 11.9.11. The investigator collected for both pre and post test data from both the groups. The experimental group adolescents were selected in Seventh Day Adventist High School, Vijayawada whereas control group adolescents were selected in Seventh Day Adventist High School, Ibrahimpatnam.

**Pre test**

The pre test was conducted from 15.08.11 – 19.08.11 by using modified P.G.I memory assessment scale to assess the level of memory and modified Max Hamilton's anxiety rating scale was used to assess the level of anxiety among adolescents. In an average of daily 5 adolescents were observed. The time of observation was varied from 15 - 20 min.

**Implementation of Cinnamon chewing gum**

The intervention started on 22.08.11 where cinnamon chewing gum was given to the adolescents in experimental group and was instructed to smell

when chewing the gum. The time period was 5 minutes, 2 times per day for 15 days.

### **Evaluation of Cinnamon chewing gum**

The post test was conducted by using modified P.G.I memory assessment scale to assess the level of memory on every 7<sup>th</sup> day of the week. Two post tests were done.

One post test was conducted by using Modified Max Hamilton's anxiety rating scale to assess the level of anxiety among adolescents at the end of the 20<sup>th</sup> day.

### **PLAN FOR DATA ANALYSIS**

- The level of memory and anxiety among experimental and control group of adolescents before and after cinnamon chewing gum was analyzed by using frequency and percentage
- The effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in experimental and control group was analyzed by using mean, standard deviation, mean percentage, paired and unpaired 't' test.

- The co-relation between the pre test scores and post test scores of memory and anxiety among experimental group was analyzed by Pearson's co-efficient of correlation.
- The association between post test scores of memory and anxiety among experimental group and control group of adolescents with their demographic variables was analyzed by using chi square test

## **SUMMARY**

True experimental design where pre test and post test with control group design was selected on 15 adolescents in Seventh Day Adventist High School, Vijayawada and 15 adolescents in Seventh Day Adventist High School, Ibrahimpatnam, Andhra Pradesh. By using stratified random sampling technique, modified P.G.I memory assessment scale was used to assess the level of memory and modified Max Hamilton's anxiety rating scale was used to assess the level of anxiety among adolescents. The data were collected after obtaining the permission from the principal of Seventh Day Adventist High School, Vijayawada and Seventh Day Adventist High School, Ibrahimpatnam. Data were planned to analysis by using descriptive and inferential statistics and to be presented in the form of tables, graphs and figures.

## **CHAPTER – IV**

### **DATA ANALYSIS AND INTERPRETATION**

Analysis is a “process of organizing and synthesizing data in such a way that research questions can be answered and hypothesis tested” (**Polit and Hungler, 2003**).

Analysis enables the researcher to reduce, summarize, organize, evaluate, interpret and communicate numerical information (**Polit and Hungler, 2004**).

This chapter deals with the analysis and interpretation of data collected from 30 (15 Control group and 15 experimental group) adolescents studying in Seventh Day Adventist High School, Vijayawada, Andhra Pradesh, “to assess the effectiveness of Cinnamon Chewing Gum on memory and anxiety among adolescents”.

The data were coded and analyzed as per objectives of the study under the following headings;

**Section A:** Description of samples characteristics.

**Section B:** Assess the memory and anxiety among control and experimental group of adolescents before and after Cinnamon Chewing Gum.

- Frequency and percentage distribution of the control group pre and post test scores of memory among adolescents.

- Frequency and percentage distribution of the control group pre and post test scores of anxiety among adolescents.
- Frequency and percentage distribution of the experimental group pre and post test scores of memory among adolescents.
- Frequency and percentage distribution of the experimental group pre and post test scores of anxiety among adolescents.
- Frequency and percentage distribution of the control and experimental group post test scores of memory among adolescents.
- Frequency and percentage distribution of the control and experimental group post test scores of anxiety among adolescents.

**Section C:** Compare the effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in control and experimental group.

- Paired 't' test value of pre and post test scores of memory in control and experimental group.
- Paired 't' test value of pre and post test scores of anxiety in control and experimental group.
- Area wise comparison of Mean, SD, and Mean percentage of pre and post test scores of memory in control and experimental group.
- Area wise comparison of Mean, SD, and Mean percentage of pre and post test scores of anxiety in control and experimental group.
- Unpaired 't' test value of post test scores of memory and anxiety in control and experimental group.
- Area wise comparison of Mean, SD, and Mean percentage of post test scores in control and experimental group.

**Section D:** Find out the co-relation between memory and anxiety among the experimental group of adolescents.

- Karl pearson's co-efficient of Co-relation between memory and anxiety among the experimental group of adolescents.

**Section E:** Find out the association between post test scores of memory and anxiety among control and experimental group of adolescents with their demographic variables

- Association between the control group post test scores of memory among adolescents with their demographic variables.
- Association between the control group post test scores of anxiety among adolescents with their demographic variables.
- Association between experimental group post test scores of memory among adolescents with their demographic variables
- Association between experimental group post test scores of anxiety among adolescents with their demographic variables.



## SECTION – A

**Table – 4.1 DESCRIPTIONS OF SAMPLES CHARACTERISTICS**

**Frequency and percentage distribution of control and experimental groups  
of adolescents according to their demographic variables.**

**Table 4.1****(N<sub>1</sub> = 15, N<sub>2</sub> = 15)**

<b>Demographic variables</b>	<b>Control group</b>		<b>Experimental group</b>	
	<b>Frequency (N<sub>1</sub>)</b>	<b>Percentage (%)</b>	<b>Frequency (N<sub>2</sub>)</b>	<b>Percentage (%)</b>
<b>1. Age in years</b>				
a) 12 years	1	6	3	20
b) 13 years	7	46	6	40
c) 14 years	7	48	6	40
<b>2. Gender</b>				
a) Male	6	40	5	33
b) Female	9	60	10	67
<b>3. Standard</b>				
a) 8 <sup>th</sup> standard	2	13	3	20
b) 9 <sup>th</sup> standard	9	60	7	47
c) 10 <sup>th</sup> standard	4	27	5	33
<b>4. Scholastic performance</b>				
a) Good	6	40	5	33
b) Average	6	40	8	54
c) Poor	3	20	2	13

**Table 4.1** Reveals the frequency and percentage distribution of adolescents according to their demographic variables

Distribution of control and experimental group samples according to their age group depicts that the highest percentage (46% and 48%) of adolescents were in the age group of 13 years and 14 years respectively in control group whereas in experimental group similar percentage (40% and 40%) of adolescents were in the age group of 13 years and 14 years respectively. However 20% of them in experimental group and 6% of them in control group were in the age group of 12 years, (fig 4.1). Similarly, **Bernstein, (2004)** also concluded in his descriptive study that about 65 percent of the adolescent population in the age group of 13 and 14 years suffer with memory problems and anxiety disorders.

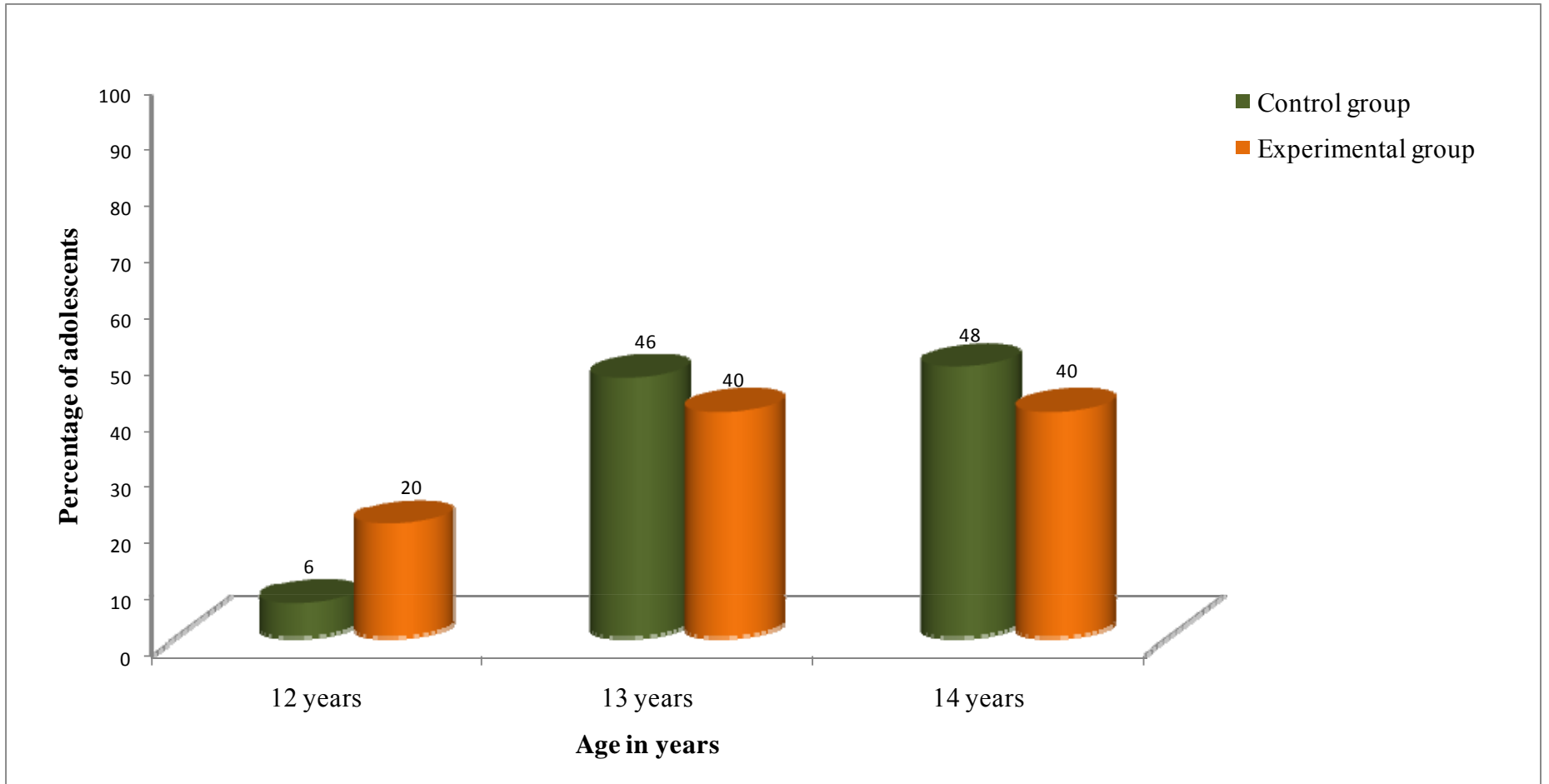
With regard to gender, control and experimental group samples reveals that, the highest percentage (60% and 67%) of adolescents were females in both the groups. However 40% of them in control group and 33% of them in experimental group were males, (Fig.4.2). according to **Borchardt, (2004)**, 63% of girls are affected by anxiety disorder each year globally.

With regard to standard, control and experimental group reveals that, higher percentage (60% and 27%) of adolescents were in 9<sup>th</sup> standard and 10<sup>th</sup> standard respectively in control group whereas in experimental group higher percentage (47% and 33%) of adolescents were in 9<sup>th</sup> standard and 10<sup>th</sup> standard respectively. However 20% of them in experimental group and 13%

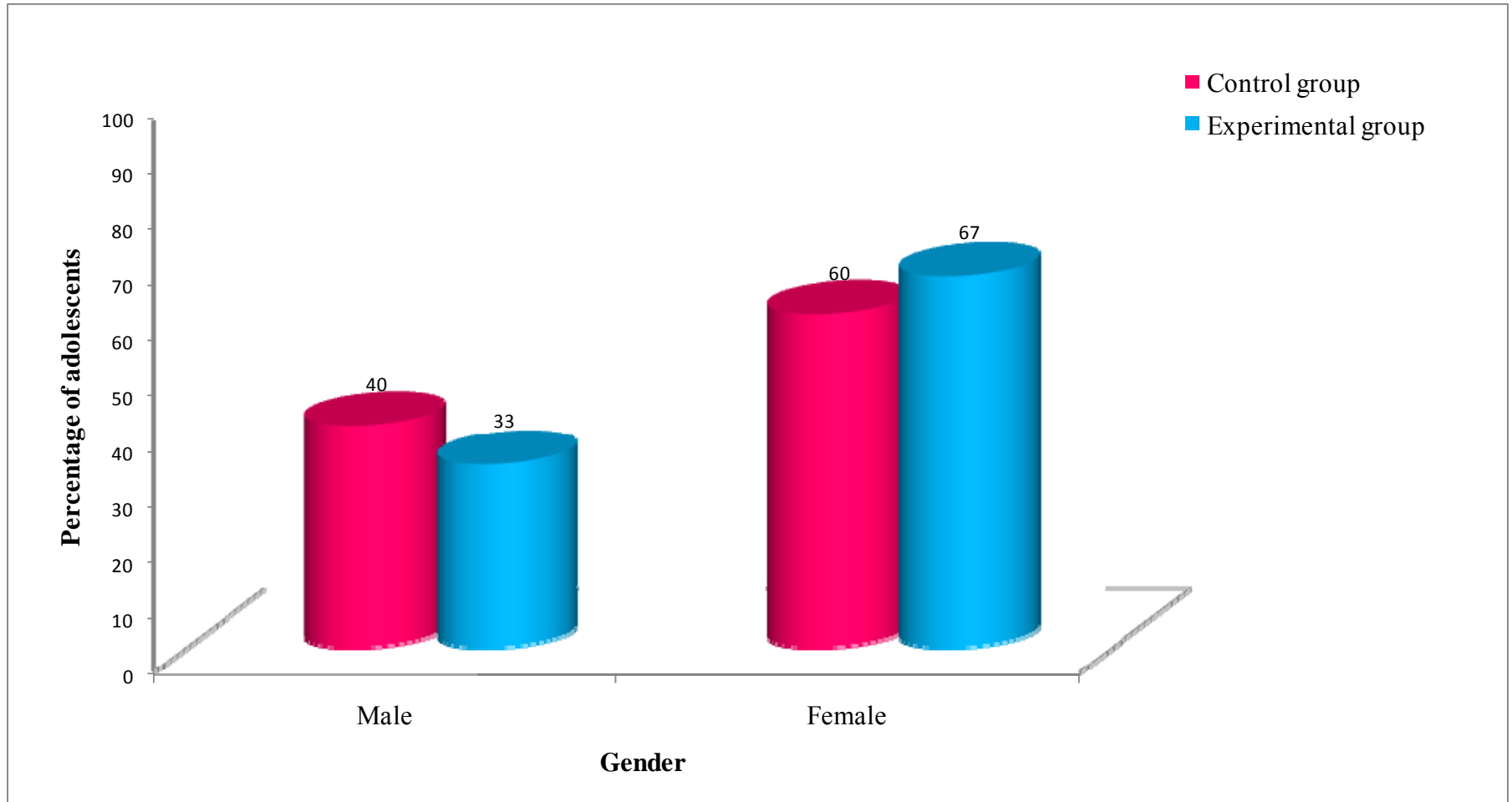
of them in control group were in 8<sup>th</sup> standard, (Fig.4.3). **Clasta Roy, (2008)** says that about 53% of adolescents studying in standard 9 and 10 are shown to be affected with memory and anxiety disorder globally.

Distribution of control and experimental group of adolescents according to their scholastic performance depicts that most (40%) of the adolescents had average and good scholastic performance in control group and 53% of adolescents had average scholastic performance in experimental group. However, 20% and 13% of adolescents from each group had poor scholastic performance, (Fig 4.4).

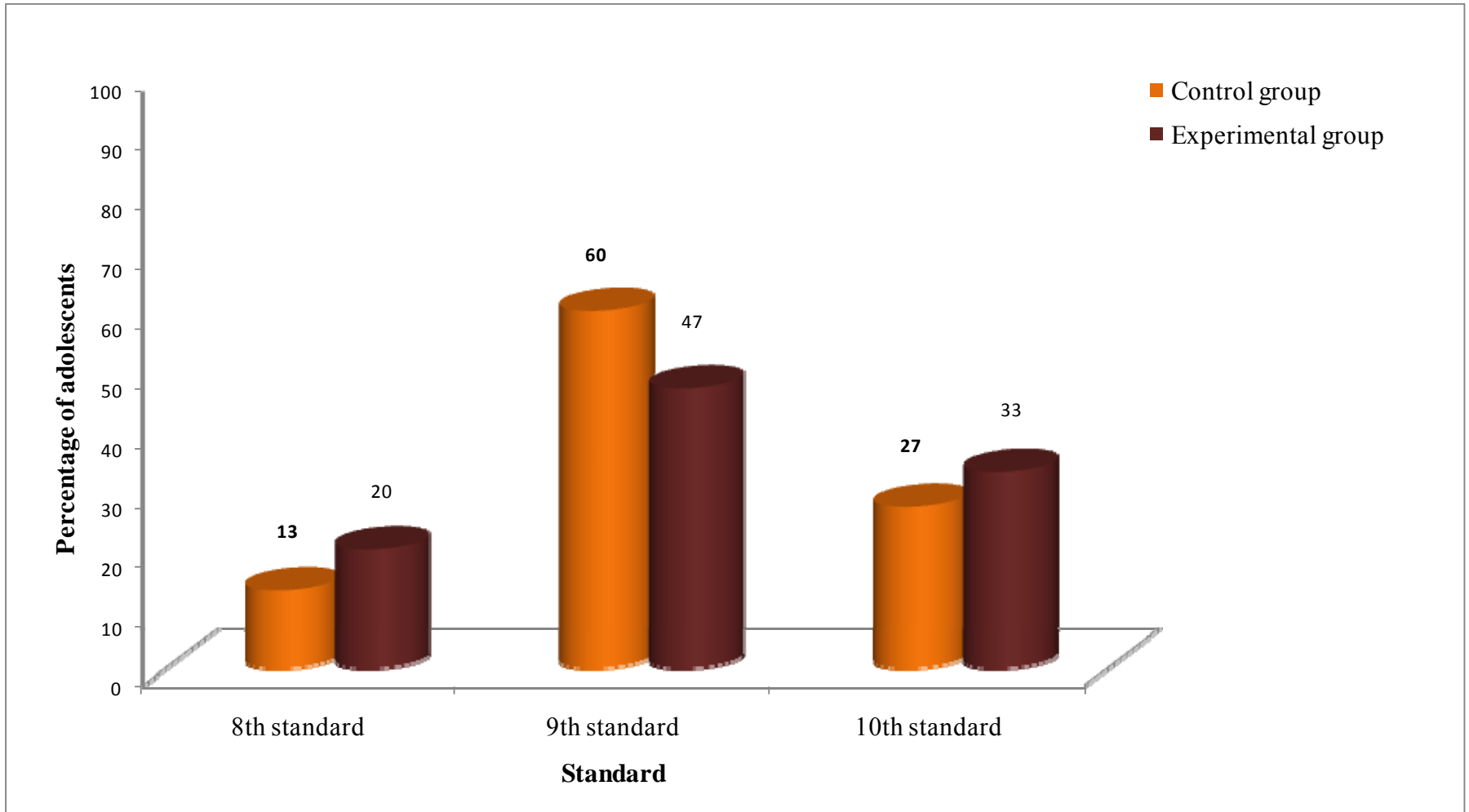
According to **Patricia, (2006)**, 45% of adolescents having poor scholastic performance are having memory problems and affected with anxiety disorder globally.



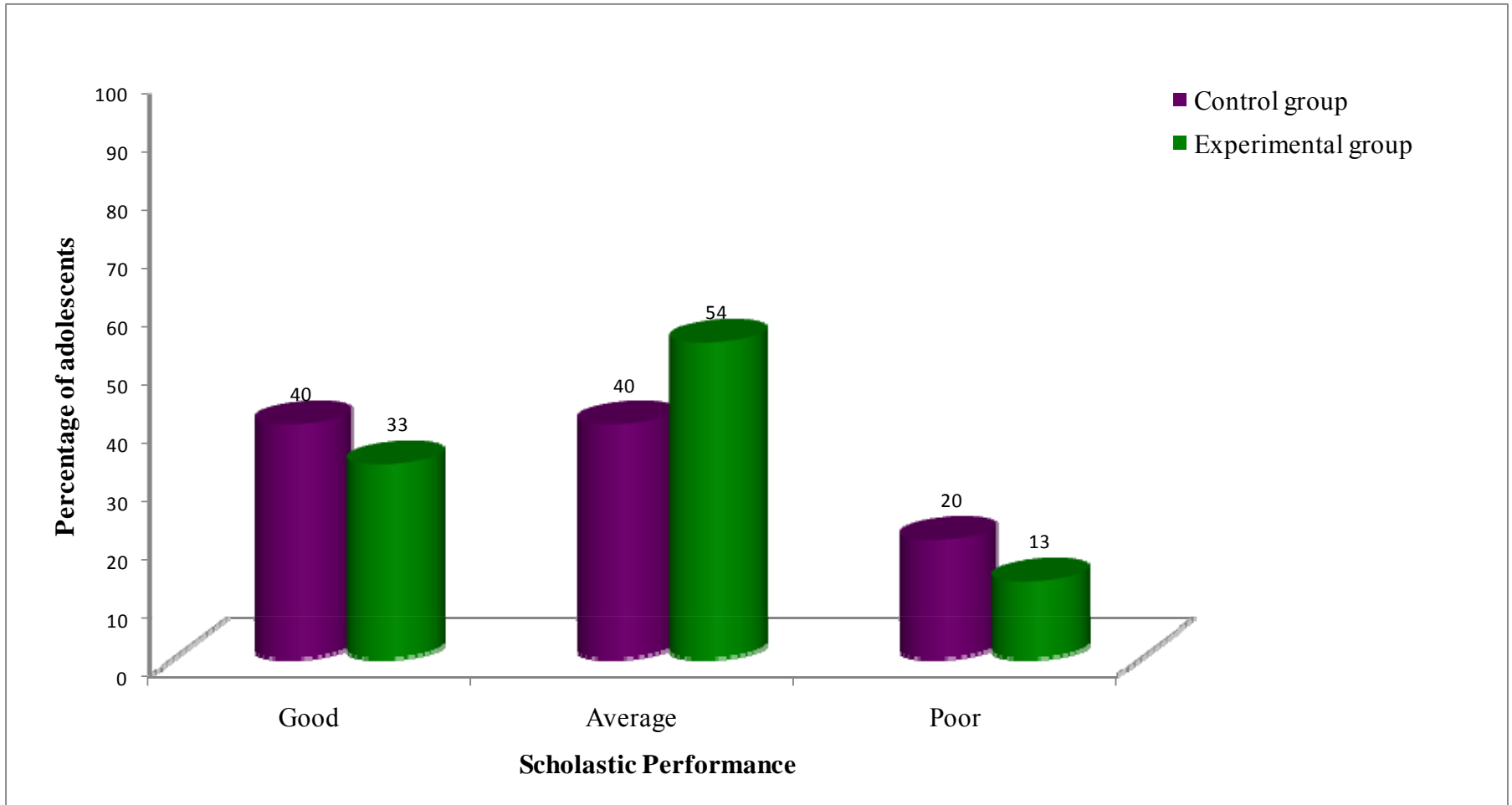
**Fig.4.1: Clustered Cylinder diagram showing the percentage distribution of control and experimental group adolescents according to their Age group**



**Fig.4.2: Clustered Cylinder diagram showing the percentage distribution of control and experimental group adolescents according to their Gender**



**Fig.4.3: Clustered Cylinder diagram showing the percentage distribution of control and experimental group adolescents according to their Standard**



**Fig.4.4: Clustered Cylinder Diagram showing the percentage distribution of control and experimental group adolescents according to their Scholastic Performance**

## SECTION – B

### ASSESS THE LEVEL OF MEMORY AND ANXIETY AMONG CONTROL AND EXPERIMENTAL GROUP OF ADOLESCENTS BEFORE AND AFTER CINNAMON CHEWING GUM.

**Table-4.2**

**Frequency and percentage distribution of the control group pre and post  
test scores of memory among adolescents.**

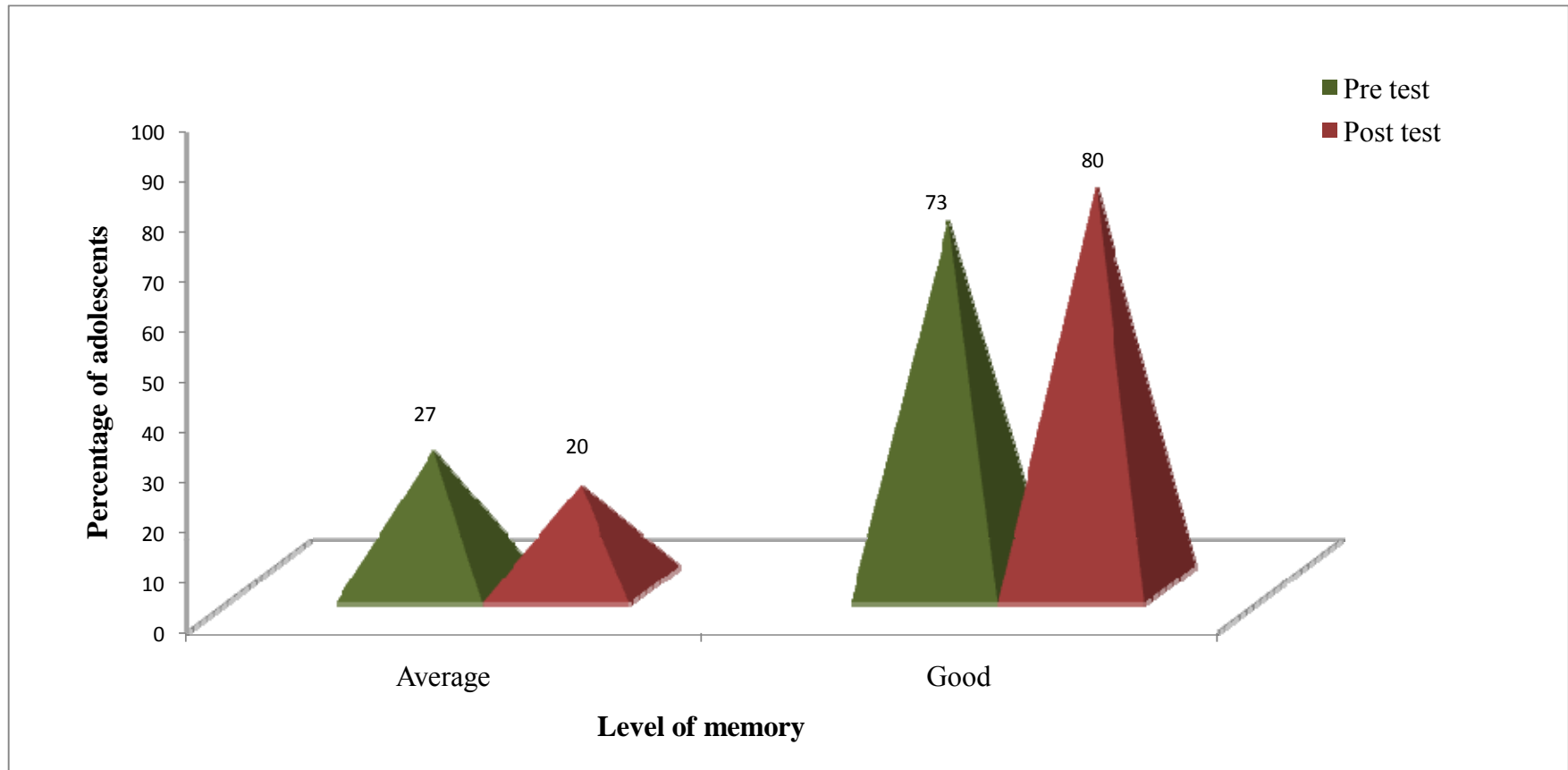
(N<sub>1</sub>=15)

Level of memory	Control group			
	Pre test scores		Post test scores	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Poor memory	-	-	-	-
Average memory	4	27%	3	20%
Good memory	11	73%	12	80%
Excellent memory	-	-	-	-

Frequency and percentage distribution of control group pre test and post test scores of memory among adolescents depicts that, in pre test 73% of them had good memory and 27% of them had average memory whereas in post test 80% of them had good memory and 20% of them had average memory. It seems that without intervention, there was not much improvement



in the level of memory among adolescents. The findings are graphically represented in (Fig. 4.5)



**Fig.4.5: Clustered Pyramid diagram showing the percentage distribution of control group pre test and post test scores of memory among adolescents**

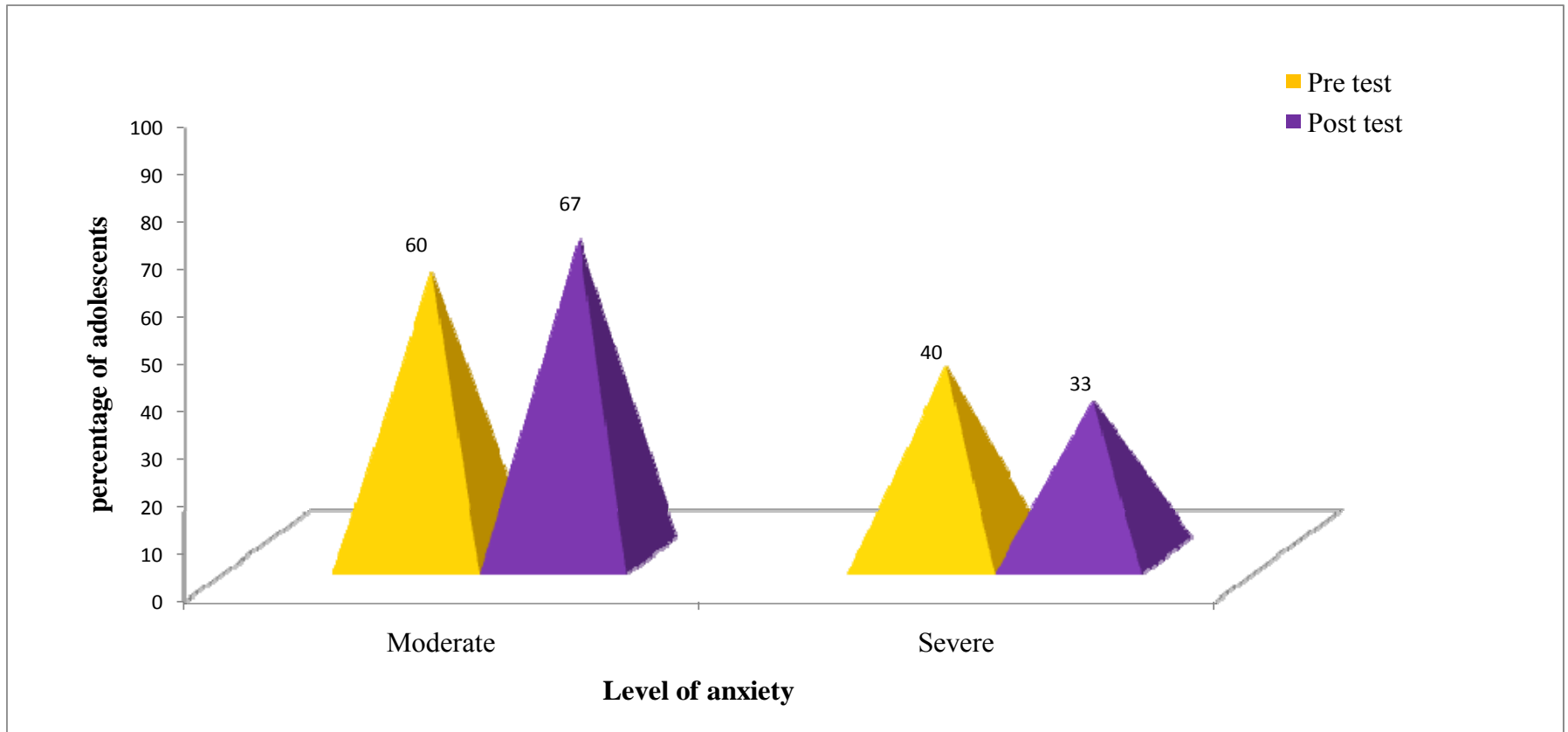
**Table-4.3**

**Frequency and percentage distribution of the control group pre and post test scores of anxiety among adolescents.**

**(N<sub>1</sub>=15)**

<b>Level of anxiety</b>	<b>Control group</b>			
	<b>Pre test scores</b>		<b>Post test scores</b>	
	<b>Frequency</b>	<b>Percentage</b>	<b>Frequency</b>	<b>Percentage</b>
Mild anxiety	-	-	-	-
Moderate anxiety	9	60%	10	67%
Severe anxiety	6	40%	5	33%
Very severe anxiety	-	-	-	-

Frequency and percentage distribution of control group pre test and post test scores of anxiety among adolescents reveals that, in pre test most (60%) of adolescents had moderate anxiety and 40% of adolescents had severe anxiety. In post test 67% of adolescents had moderate anxiety and only 33% of adolescents had moderate anxiety. It seems that without intervention there was not much reduction in the level of anxiety. The findings are graphically represented in (Fig. 4.6)



**Fig.4.6: Clustered pyramid diagram showing the percentage distribution of control group pre test and post test scores of memory among adolescents**

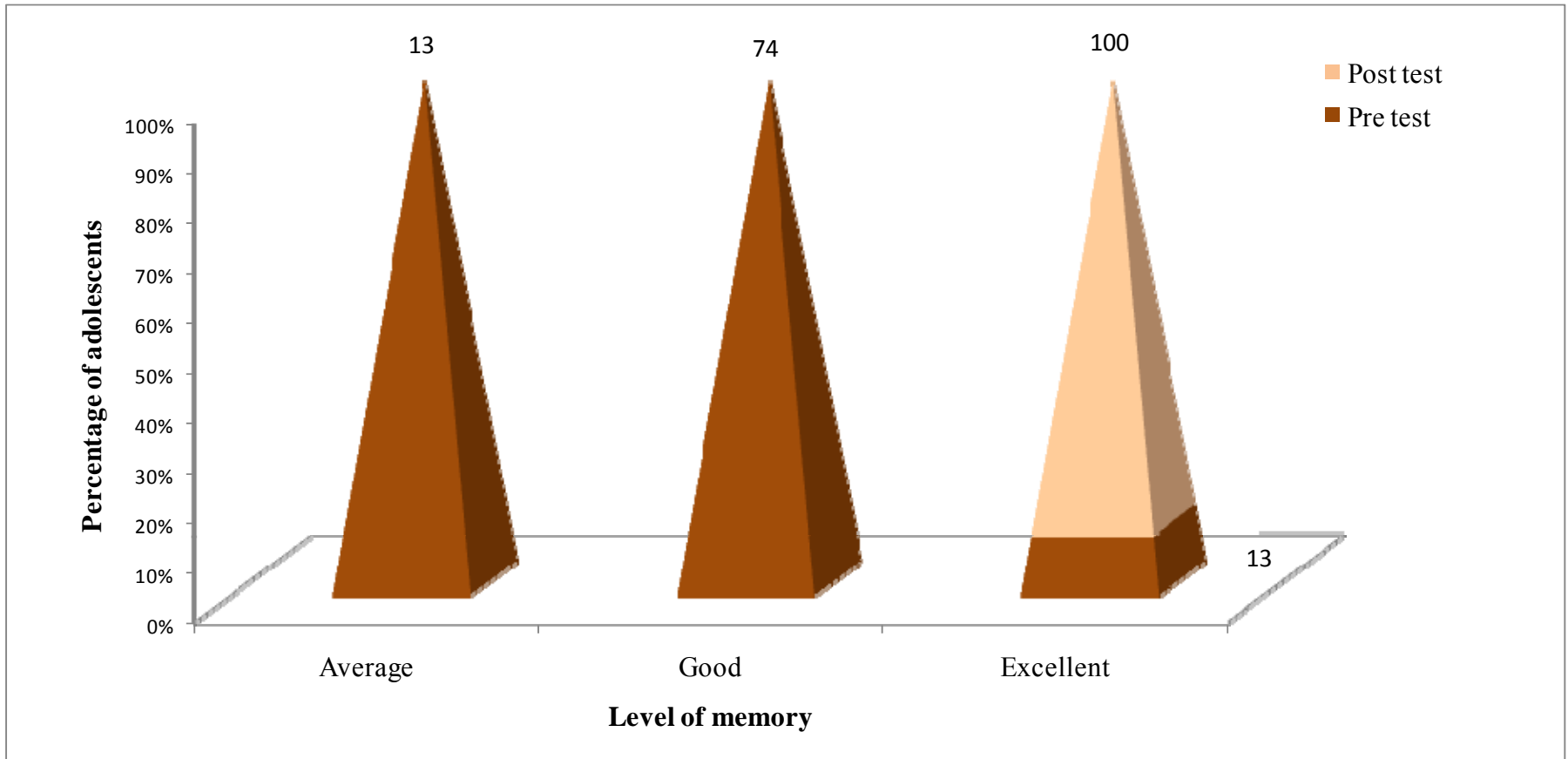
**Table-4.4**

**Frequency and percentage distribution of the experimental group pre and post test scores of memory among adolescents.**

(N<sub>2</sub>=15)

Level of memory	Experimental group			
	Pre test scores		Post test scores	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Poor memory	-	-	-	-
Average memory	2	13%	-	-
Good memory	11	74%	-	-
Excellent memory	2	13%	15	100%

Frequency and percentage distribution of experimental group pre test and post test scores of memory among adolescents depicts that, in pre test majority (74%) of adolescents had good memory, similar percentage (13% and 13% respectively) of adolescents had average and excellent memory respectively, whereas in post test all (100%) of them had excellent memory. It seems that Cinnamon Chewing Gum was effective in adolescents to improve the level of memory. The findings are graphically represented in (Fig. 4.7)



**Fig.4.7: Stacked Pyramid Diagram showing the percentage distribution of experimental group pre test and post test scores of memory among adolescents**

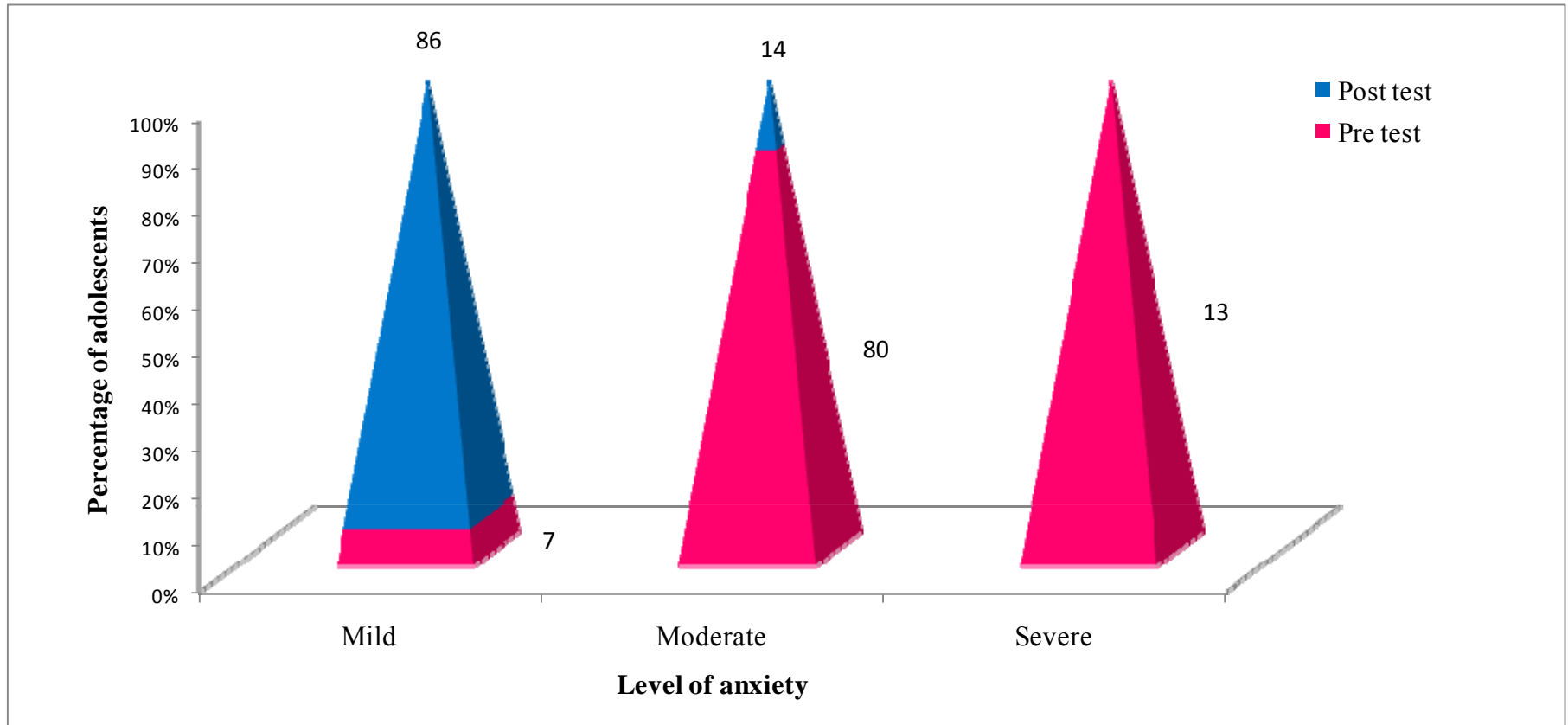
**Table-4.5**

**Frequency and percentage distribution of the experimental group pre and post test scores of anxiety among adolescents.**

**(N<sub>2</sub>=15)**

<b>Level of anxiety</b>	<b>Experimental group</b>			
	<b>Pre test scores</b>		<b>Post test scores</b>	
	<b>Frequency (N)</b>	<b>Percentage (%)</b>	<b>Frequency (N)</b>	<b>Percentage (%)</b>
Mild anxiety	1	7%	13	86%
Moderate anxiety	12	80%	2	14%
Severe anxiety	2	13%	-	-
Very severe anxiety	-	-	-	-

Frequency and percentage distribution of experimental group pre test and post test scores of anxiety among adolescents shows that, in pre test most (80%) of adolescents had moderate anxiety, 13% of adolescents had severe anxiety and only 7% of adolescents had mild anxiety, whereas in post test majority (86%) of adolescents had mild anxiety and only 14% of adolescents had moderate anxiety. It seems that Cinnamon Chewing Gum was effective in reducing the level of anxiety. The findings are graphically represented in (Fig. 4.8)



**Fig.4.8: Clustered Cylinder diagram showing the percentage distribution of experimental group pre test and post test scores of anxiety among adolescents**



**Table-4.6**

**Frequency and percentage distribution of the control and experimental group post test scores of memory among adolescents.**

**(N<sub>1</sub>=15, N<sub>2</sub>=15)**

Level of memory	Post test Scores			
	Control group		Experimental group	
	Frequency (N <sub>1</sub> )	Percentage (%)	Frequency (N <sub>2</sub> )	Percentage (%)
Poor memory	-	-	-	-
Average memory	3	20%	-	-
Good memory	12	80%	-	-
Excellent memory	-	-	15	100%

Frequency and percentage distribution of control and experimental group post test scores of memory among adolescents depicts that, in control group majority (80%) of adolescents had good memory and only 20% of them had average memory, whereas in experimental group all (100%) of them had excellent memory. It seems that Cinnamon Chewing Gum was effective in adolescents to improving the level of memory, (Table 4.6).

**Table-4.7**

**Frequency and percentage distribution of the control and experimental group post test scores of anxiety among adolescents.**

**(N<sub>1</sub>=15, N<sub>2</sub>=15)**

Level of anxiety	Post test scores			
	Control group		Experimental group	
	Frequency (N <sub>1</sub> )	Percentage (%)	Frequency (N <sub>2</sub> )	Percentage (%)
Mild anxiety	-	-	13	87%
Moderate anxiety	10	67%	2	13%
Severe anxiety	5	33%	-	-
Very severe anxiety	-	-	-	-

Frequency and percentage distribution of control and experimental group post test scores of anxiety among adolescents reveals that, in control group, most (67%) of the adolescents had moderate anxiety and 33% of adolescents had severe anxiety. In experimental group most (87%) of adolescents had mild anxiety and only 13% of adolescents had moderate anxiety. It seems that Cinnamon Chewing Gum was effective in reducing the level of anxiety, (Table 4.7).

## SECTION C

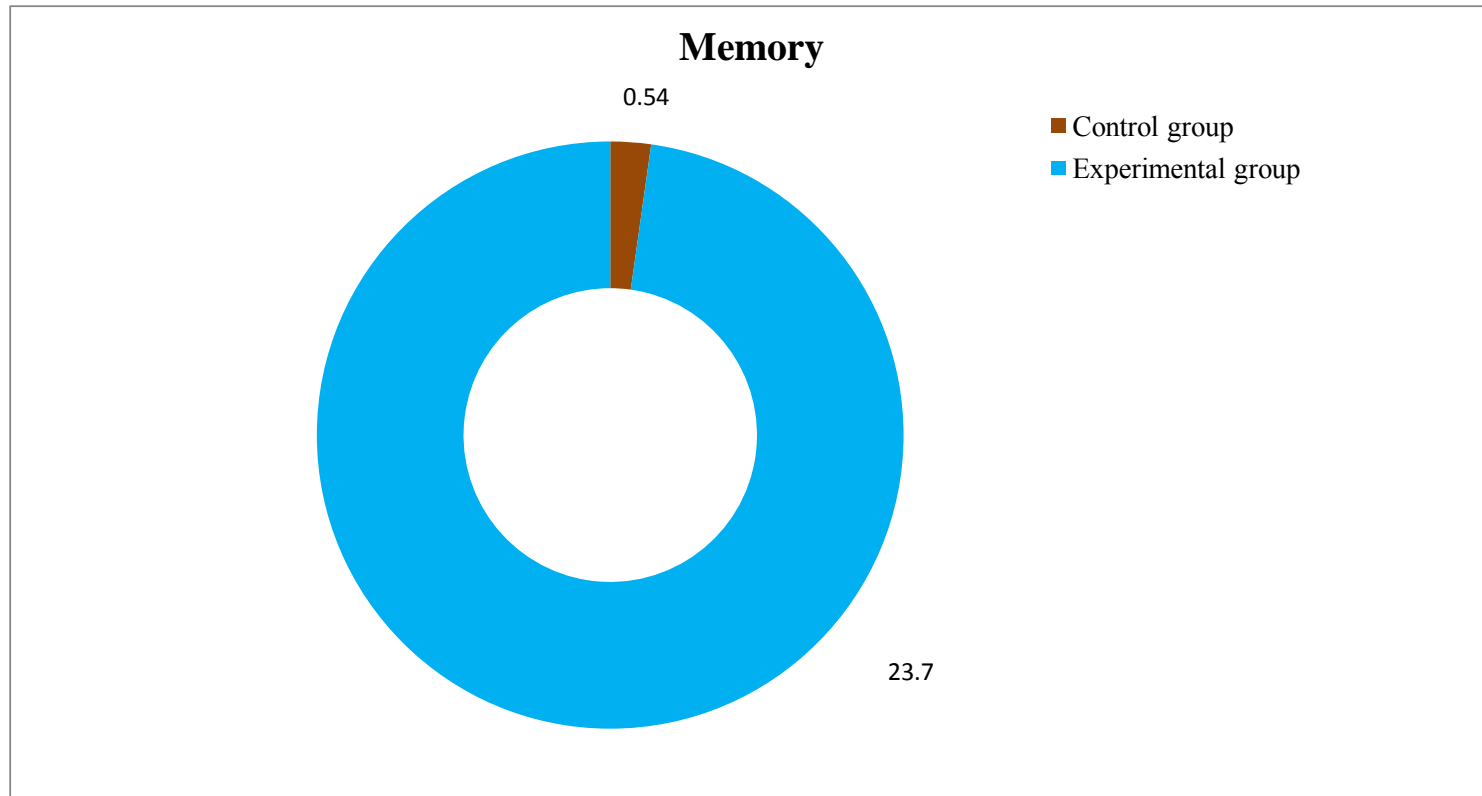
### DETERMINE THE EFFECTIVENESS OF CINNAMON CHEWING GUM ON MEMORY AND ANXIETY AMONG CONTROL AND EXPERIMENTAL GROUP OF ADOLESCENTS.

**Table – 4.8**

**Paired ‘t’ test value of pre and post test scores of memory**

Adolescents	Paired ‘t’ value	Table value	Level of significant (P)
Control group	0.54	2.15	P > 0.05 Not significant
Experimental group	23.7	2.15	P < 0.05 Significant

Paired ‘t’ test was calculated to analyze the effectiveness between pre and post test scores of memory among adolescents in control and experimental group. From the above table, in control group, the calculated value of ‘t’(0.54) is lesser than the tabulated value of ‘t’ (2.15) at 5% level of significance whereas in the experimental group, the calculated value of ‘t’(23.7) is higher than the tabulated value of ‘t’ (2.15) at 5% level of significance. This shows that there was a significant difference in the level of memory among adolescents in the experimental group than the control group. It seems that cinnamon chewing gum was highly effective in improving the level of memory. The findings are graphically represented in (Fig. 4.9)



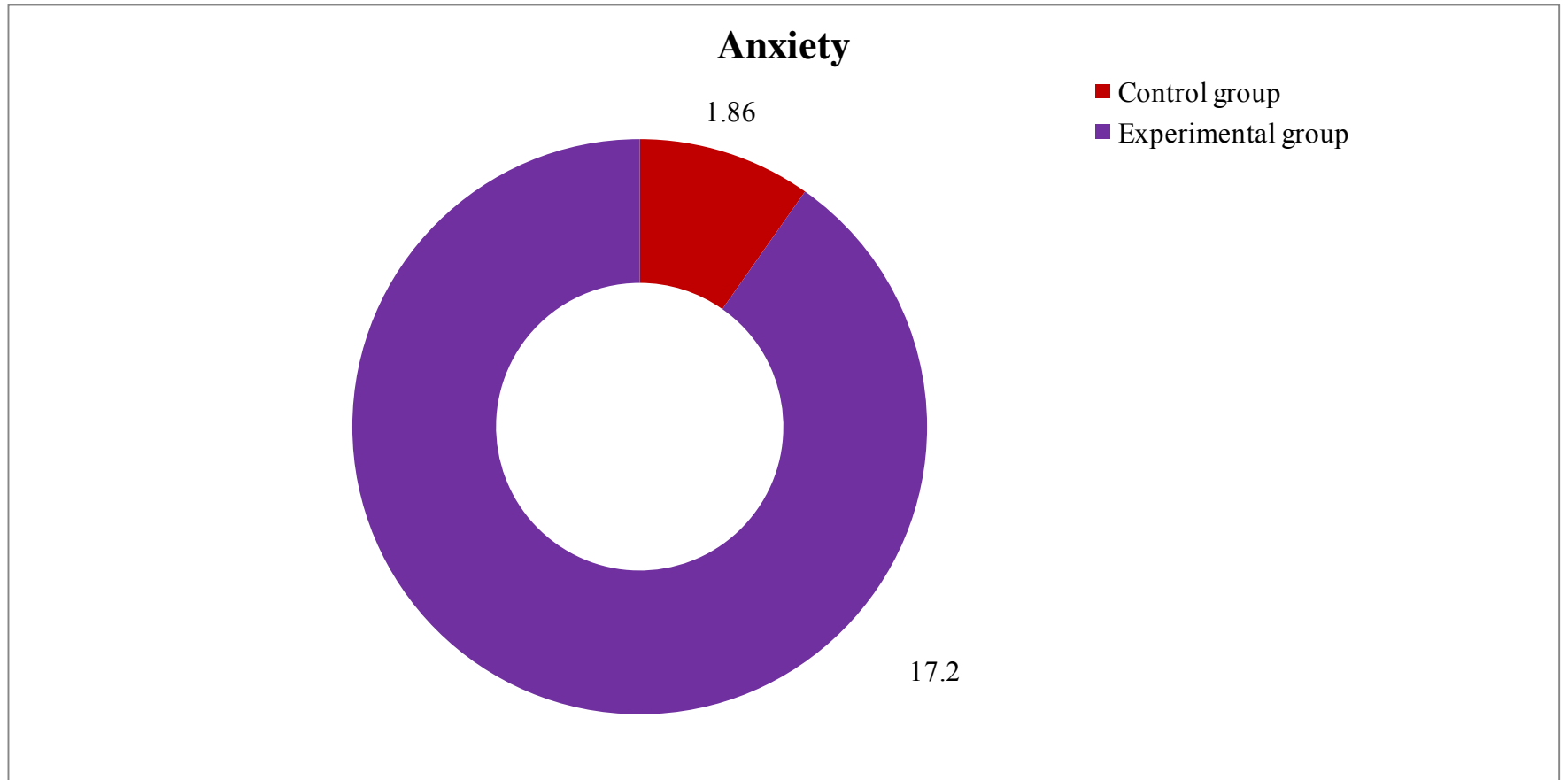
**Fig.4.9: Doughnut diagram showing the paired 't' value of memory among adolescents in control and experimental group.**

**Table – 4.9****Paired ‘t’ test value of pre and post test scores of anxiety**

<b>Adolescents</b>	<b>Paired ‘t’ value</b>	<b>Table value</b>	<b>Level of significant (P)</b>
Control group	1.86	2.15	P > 0.05 Not significant
Experimental group	17.2	2.15	P < 0.05 Significant

**Df=14****Table value=2.15****P<0.05 significant**

Paired‘t’ test was calculated to analyze the effectiveness between pre and post test scores of anxiety among adolescents in control and experimental group. From the above table, in control group, the calculated value of ‘t’(1.86) is lesser than the tabulated value of ‘t’ (2.15) at 5% level of significance whereas in experimental group, the calculated value of ‘t’(17.2) is greater than the tabulated value of ‘t’ (2.15) at 5% level of significance. This shows that there was a significant difference in the level of anxiety among adolescents in experimental group than the control group. It seems that cinnamon chewing gum was highly effective in reducing the level of anxiety among adolescents. The findings are graphically represented in (Fig. 4.10)



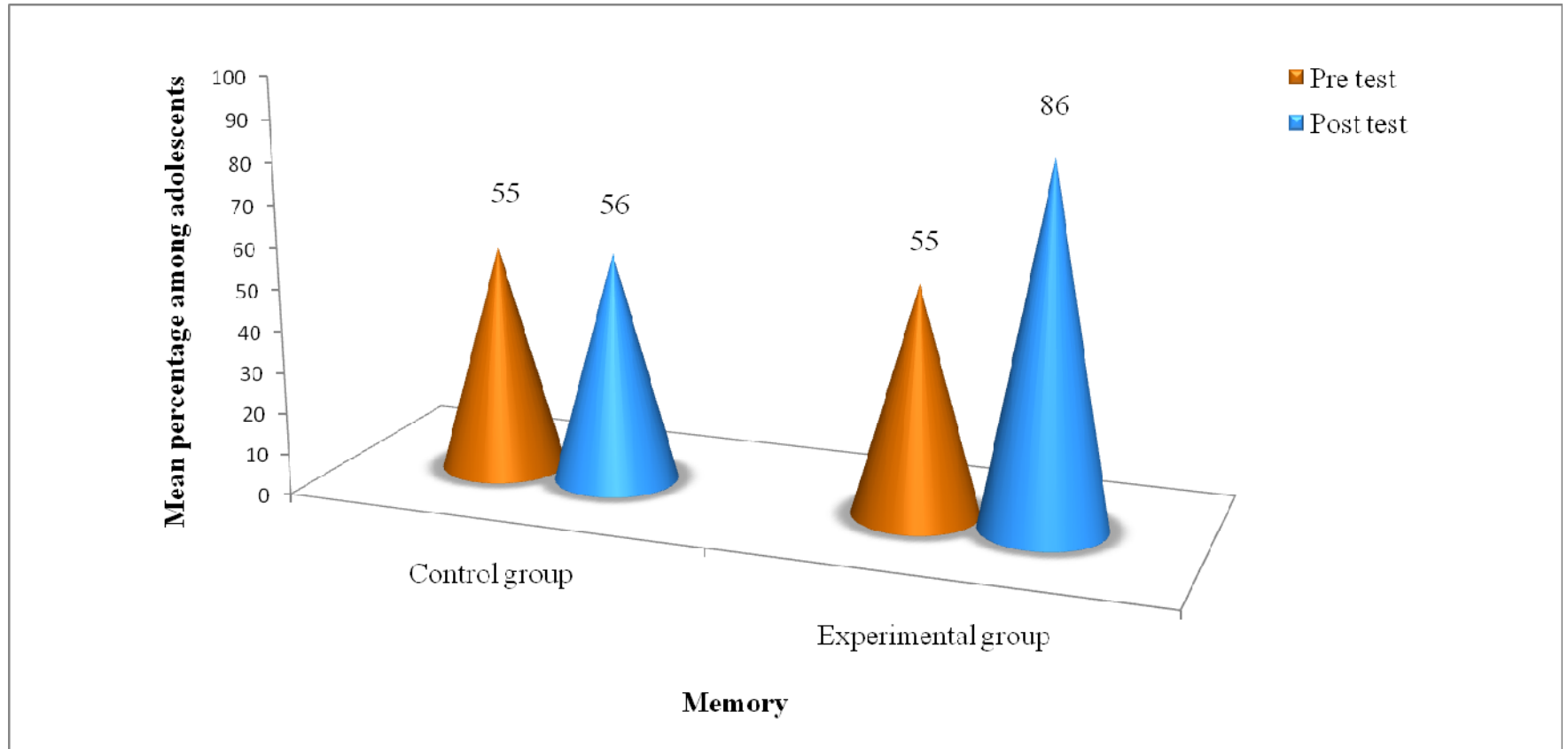
**Fig.4.10: Doughnut diagram showing the paired 't' value of anxiety among adolescents in control and experimental group.**

**Table – 4.10**

**Area wise comparison of mean, SD, and mean percentage of memory in control and experimental group pre and post test scores**

Adolescents	Max score	Pre Test			Post Test			Difference in mean %
		Mean	SD	Mean %	Mean	SD	Mean %	
Control group	98	54	6.5	55%	55	6.6	56%	1%
Experimental group	98	50	4.5	55%	84.4	2.5	86%	31%

Comparison of mean, SD, and mean percentage of memory in control and experimental group pre and post test scores reveals that, in control group, the pre test mean score was  $(54 \pm 6.5)$ , which is 55% whereas in post test the mean score was  $(55 \pm 6.6)$ , which is 56% showing a difference of 1% on the level of memory. And in experimental group, the pre test mean score was  $(50 \pm 4.5)$ , which is 55%, whereas in post test the mean score was  $(84.2 \pm 2.5)$ , which is 86%. It shows a difference of 31% on level of memory. It depicts that Cinnamon Chewing Gum was highly effective in improving the level of memory among adolescents in the experimental group, (Fig: 4.10)



**Fig.4.11: Clustered cone diagram showing the mean percentage distribution of control and experimental group pre and post test scores of memory among adolescents**

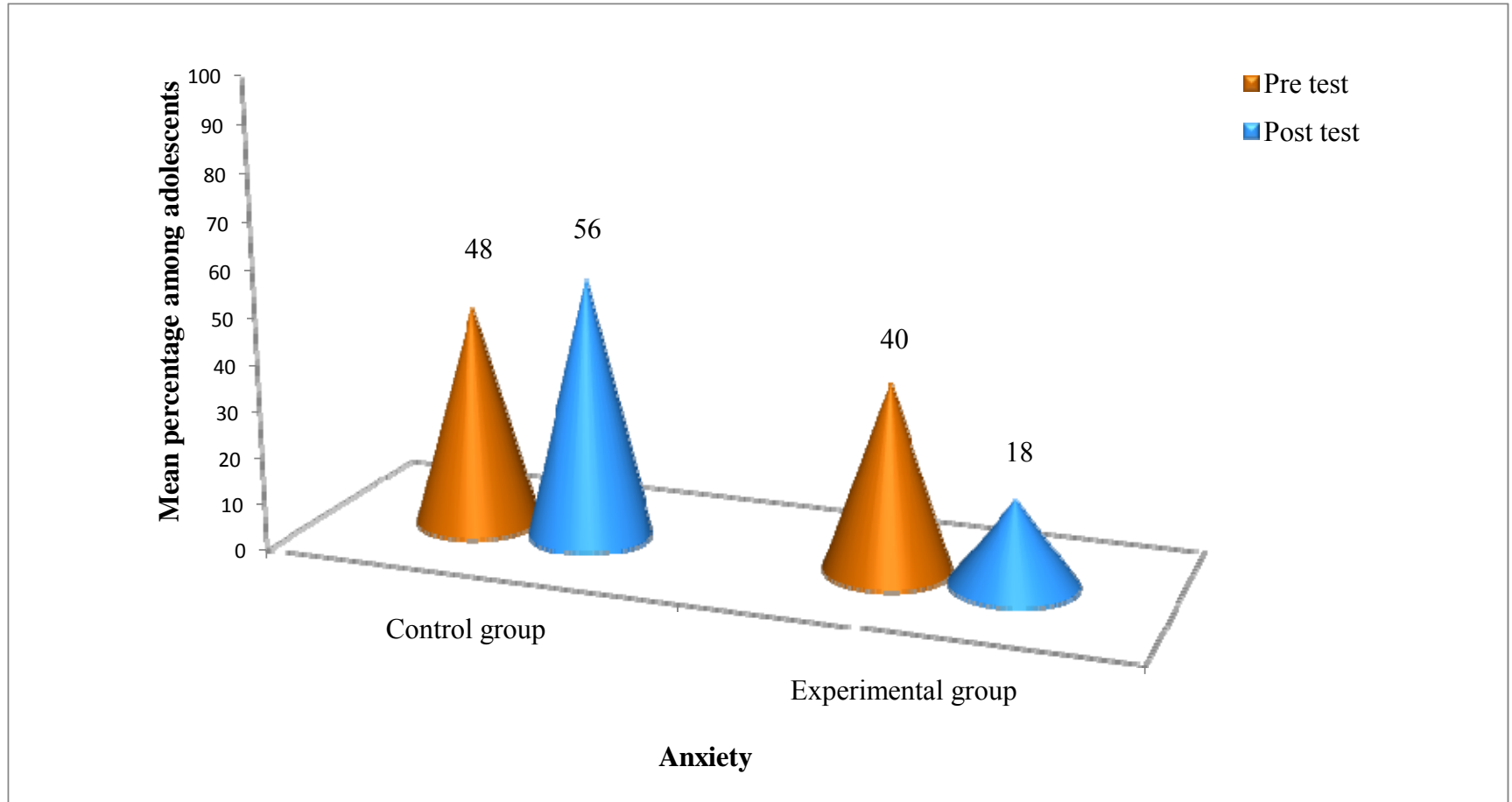


**Table -4.11**

**Area wise comparison of mean, SD, and mean percentage of anxiety in control and experimental group pre and post test scores**

Adolescents	Max Score	Pre test			Post test			Difference in mean %
		Mean	SD	Mean %	Mean	SD	Mean %	
Control group	80	38	9	48%	44.4	7.6	56%	7%
Experimental group	80	32.2	6.3	40%	14.1	5.6	18%	22%

Comparison of mean, SD, and mean percentage of memory in control and experimental group pre and post test scores reveals that, in control group, the pre test mean score was  $(38 \pm 9)$ , which is 48%, whereas in post test the mean score was  $(44.4 \pm 2.5)$ , which is 56%. It shows a difference of 7% on level of anxiety. In the experimental group, the pre test mean score was  $(32.3 \pm 6.3)$ , which is 40%, whereas in post test the mean score was  $(14.1 \pm 5.6)$ , which is 18%. It shows a difference of 22% on the level of anxiety. It depicts that Cinnamon Chewing Gum was effective in reducing the level of anxiety among adolescents. The findings are graphically represented in (Fig: 4.12).



**Fig.4.12: Clustered cone diagram showing the mean percentage distribution of control and experimental group pre and post test scores of anxiety among adolescents.**

**Table - 4.12****Unpaired 't' test value of control and experimental group post test scores**

<b>Areas</b>	<b>Unpaired 't' value</b>	<b>Table value</b>	<b>Level of significant (P)</b>
Memory	18.6	2.05	P < 0.05 Significant
Anxiety	24.1	2.05	P < 0.05 Significant

**Df=29****Table value=2.05****P<0.05 significant**

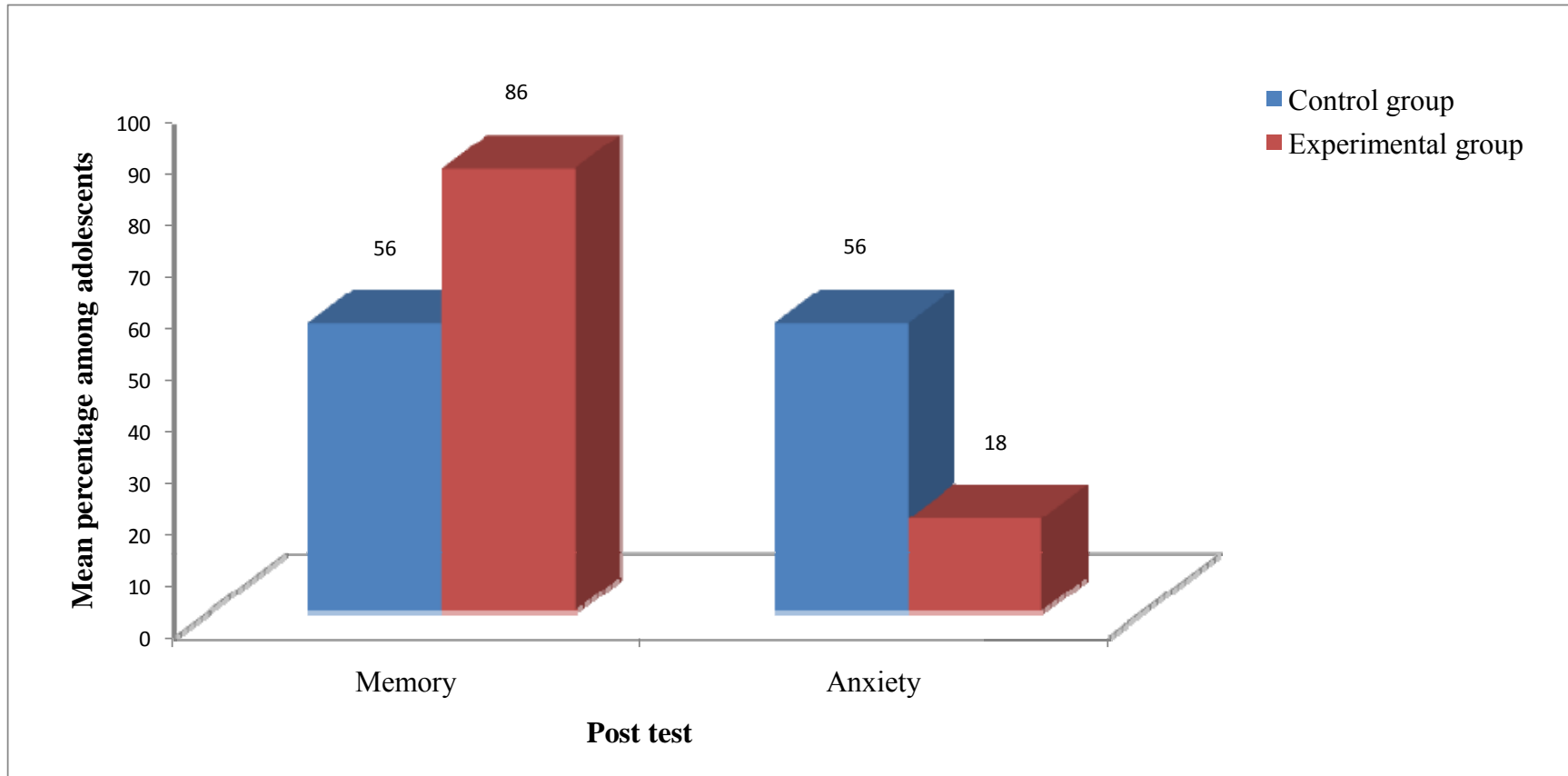
Unpaired 't' test was calculated to analyze the effectiveness between control and experimental groups post test scores on memory and anxiety among adolescents. Unpaired 't' test value was 18.6 for memory and 24.1 for anxiety and when compared to table value (2.05) it was high. It seems that Cinnamon Chewing Gum was highly effective on the improvement of memory and anxiety among adolescents, (Table: 4.12).

**Table -4.13**

**Area wise comparison of mean, SD, and mean percentage of memory and anxiety in control and experimental group post test scores**

Areas	Max Scores	Post test scores						Difference in mean %
		Control group			Experimental group			
		Mean	SD	Mean %	Mean	SD	Mean %	
Memory	98	55	6.5	56%	84.2	2.5	86%	30%
Anxiety	80	44.4	7.6	56%	14.1	5.6	18%	38%

Comparison of mean, SD and mean percentage of post test scores of both control and experimental groups depicts that in control group the mean scores of memory was  $(55 \pm 6.5)$ , which is 56% whereas in experimental group the mean score was  $(84.2 \pm 2.5)$ , which is 86% on the level of memory. It shows a difference of 30%. And in control group the mean scores of anxiety was  $(44.4 \pm 7.6)$ , which is 56% whereas in experimental group the mean score was  $(14.1 \pm 5.6)$ , which is 18% on the level of anxiety. It shows a difference of 38%. It seems that Cinnamon Chewing Gum was effective in improving the level of memory and reducing the level of anxiety. The findings are graphically represented in (Fig: 4.13).



**Fig.4.13: Clustered column diagram showing the mean percentage distribution of control and experimental group post test scores of memory and anxiety among adolescents.**

## SECTION – D

### FIND OUT THE CO-RELATION BETWEEN THE PRE TEST SCORES AND POST TEST SCORES OF MEMORY AND ANXIETY AMONG ADOLESCENTS IN EXPERIMENTAL GROUP

Karl Pearson's co-efficient of co-relation test was calculated to analyze the co-relation between the pre test scores and post test scores of memory and anxiety among adolescents in the experimental group.

**Table – 4.14**

**Co-relation between the pre test scores and post test scores of memory and anxiety among adolescents in experimental group**

<b>Memory and anxiety</b>	<b>'r' value</b>	<b>Level of significance</b>
Pre test	-0.9	P < 0.05 significant
Post test	-0.89	P < 0.05 significant

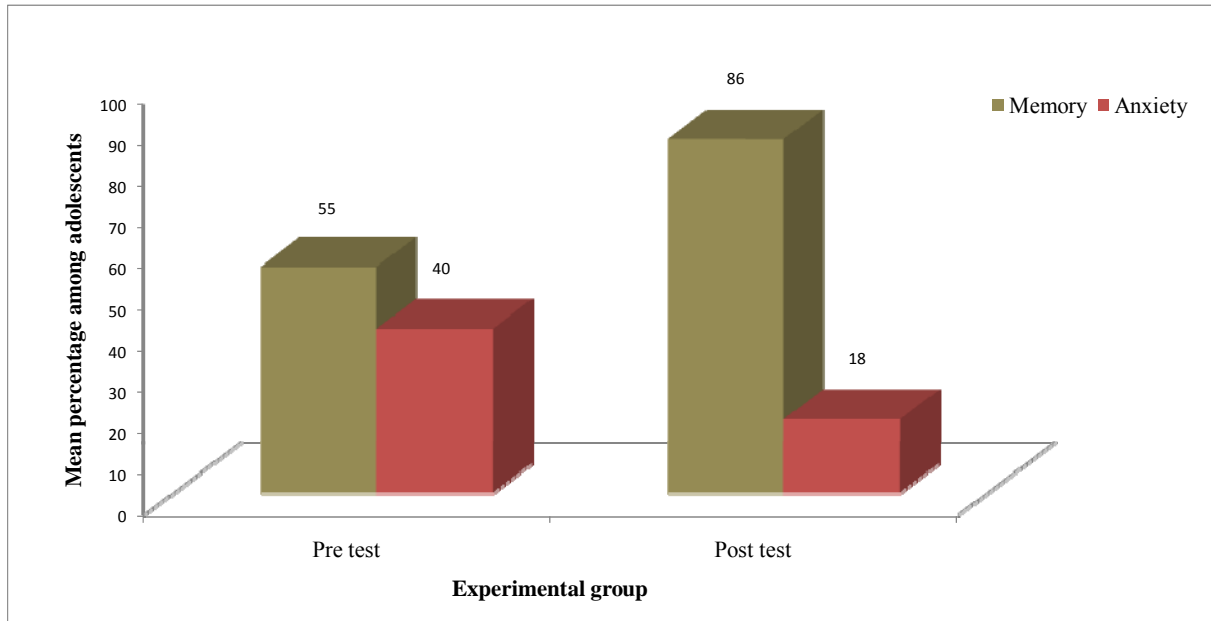
Karl Pearson's co-efficient of co-relation analysis between memory and anxiety scores shows a significant relationship which reveals that when memory level increases, anxiety level decreases. Hence, there was a moderately negative relationship between these variables, (Table 4.14).

**Table -4.15**

**Area wise comparison of mean, SD, and mean percentage of memory and anxiety pre test and post test scores among adolescents in experimental group**

Areas	Max Scores	Experimental group						Difference in mean %
		Pre test scores			Post test scores			
		Mean	SD	Mean %	Mean	SD	Mean %	
Memory	98	50	4.5	55%	84.4	2.5	86%	31%
Anxiety	80	32.2	6.3	40%	14.1	5.6	18%	22%

Comparison of mean, SD and mean percentage of memory and anxiety pre test and post test scores experimental groups depicts that in pre test the mean scores of memory was  $(50 \pm 4.5)$ , which is 55% whereas in post test the mean score was  $(84.4 \pm 2.5)$ , which is 86% on the level of memory. It shows a difference of 31%. And in anxiety, the mean scores of pre test was  $(32.2 \pm 6.3)$ , which is 40% whereas in post test, the mean score was  $(14.1 \pm 5.6)$ , which is 18% on the level of anxiety. It shows a difference of 22%. The findings are graphically represented in (Fig: 4.14).



**Fig.4.14: Clustered column diagram showing the mean percentage distribution of pre test and post test scores of memory and anxiety among adolescents in experimental group**



## SECTION – E

### FIND OUT THE ASSOCIATION BETWEEN POST TEST SCORES ON MEMORY AND ANXIETY AMONG CONTROL AND EXPERIMENTAL GROUPS OF ADOLESCENTS AND THEIR DEMOGRAPHIC VARIABLES

Chi – square was calculated to analyze the association between demographic variables with the control and experimental group post test scores on memory and anxiety among adolescents.

**Table – 4.16**

**Association between control group post test scores of memory with their demographic variables**

<b>Demographic variables</b>	<b>Df</b>	<b><math>\chi^2</math></b>	<b>Table Value</b>	<b>Level of significance</b>
Age	1	1.05	3.84	P > 0.05 Not significant
Sex	1	0.3	3.84	P > 0.05 Not significant
Standard	2	2.4	5.9	P > 0.05 Not significant
Scholastic performance	1	0.3	3.84	P > 0.05 Not significant

Chi-square was calculated to find out the association between the post test scores of control group on memory among the adolescents and their demographic variables regarding Cinnamon Chewing Gum. It reveals that there was no significant association between the post test scores of control group when compared to age, sex, standard, scholastic performance, ( $P > 0.05$ ). Hence the differences observed in the mean scores values were only by chance and not true difference. It seems that cinnamon chewing gum was effective to all the adolescents irrespective of their demographic variables.

**Table – 4.17**

**Association between control group post test scores of anxiety with their demographic variables**

<b>Demographic variables</b>	<b>Df</b>	<b><math>\chi^2</math></b>	<b>Table Value</b>	<b>Level of significance</b>
Age	1	0.3	3.84	$P > 0.05$ Not significant
Sex	1	0.3	3.84	$P > 0.05$ Not significant
Standard	2	2.4	5.9	$P > 0.05$ Not significant
Scholastic performance	1	0.3	3.84	$P > 0.05$ Not significant

Chi-square was calculated to find out the association between the post test scores of control group on anxiety among the adolescents and their demographic variables regarding Cinnamon Chewing Gum. It reveals that there was no significant association between the post test scores of control group when compared to age, sex, standard, scholastic performance, ( $P > 0.05$ ). Hence the differences observed in the mean scores values were only by chance and not true difference. It seems that cinnamon chewing gum was effective to all the adolescents irrespective of their demographic variables.

**Table – 4.18**

**Association between experimental group post test scores of memory with their demographic variables**

<b>Demographic variables</b>	<b>Df</b>	<b><math>\chi^2</math></b>	<b>Table Value</b>	<b>Level of significance</b>
Age	1	1.66	3.84	$P > 0.05$ Not significant
Sex	1	0.42	3.84	$P > 0.05$ Not significant
Standard	2	4.1	5.9	$P > 0.05$ Not significant
Scholastic performance	1	0.3	3.84	$P > 0.05$ Not significant

Chi – square was calculated to find out the association between the post test scores of experimental group on memory among adolescents with their demographic variable regarding cinnamon chewing gum. It reveals that there was no significant association between post test scores of experimental group when compared to age, sex, standard, scholastic performance, ( $P > 0.05$ ). Hence the differences observed in the mean scores values were only by chance and not true difference. It seems that cinnamon chewing gum was effective to all the adolescents irrespective of their demographic variables.

**Table – 4.18**

**Association between experimental group post test scores of anxiety with their demographic variables**

<b>Demographic variables</b>	<b>Df</b>	<b><math>\chi^2</math></b>	<b>Table Value</b>	<b>Level of significance</b>
Age	1	0.3	3.84	$P > 0.05$ Not significant
Sex	1	1.4	3.84	$P > 0.05$ Not significant
Standard	2	0.8	5.9	$P > 0.05$ Not significant
Scholastic performance	1	0.3	3.84	$P > 0.05$ Not significant

Chi – square was calculated to find out the association between the post test scores of experimental group on anxiety among adolescents with their demographic variable regarding cinnamon chewing gum. It reveals that there was no significant association between post test scores of experimental group when compared to age, sex, standard, scholastic performance, ( $P > 0.05$ ). Hence the differences observed in the mean scores values were only by chance and not true difference. It seems that cinnamon chewing gum was effective to all the adolescents irrespective of their demographic variables.

## **SUMMARY**

This chapter deals with analysis and interpretation of data collected to evaluate the effectiveness of cinnamon chewing gum. Findings revealed that in the area of memory the mean post test scores of adolescents in control group was  $55 \pm 6.6$  whereas in experimental group, the post test score was  $84.2 \pm 2.5$  and in the area of anxiety, the post test score of adolescents in control group was  $44.4 \pm 7.6$  whereas in experimental group, the post test score was  $14.1 \pm 5.6$ . It indicates that Cinnamon chewing gum was highly effective among adolescents in both the areas. The paired 't' test and unpaired 't' test showed that there is a significant difference in Cinnamon chewing gum on memory and anxiety among adolescents. The correlation test showed that there was a moderately negative relationship between the pre test scores and post test scores of memory and anxiety among

adolescents in the experimental group and chi – square test showed no association between their demographic variables with control and experimental groups post test scores.

## **CHAPTER – V**

### **DISCUSSION**

This chapter deals with the discussion which was based on the findings obtained from the statistical analysis and its relation to the objectives of the study, the conceptual frame work and the related literature.

This study was used to assess the effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in Seventh Day Adventist High School, Vijayawada, Andhra Pradesh. The following were the objectives of this study.

### **OBJECTIVES**

1. To assess the level of memory and anxiety among adolescents in experimental and control group before and after cinnamon chewing gum
2. To determine the effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in experimental and control group
3. To find out the correlation between the pre test scores and post test scores of memory and anxiety among adolescents in experimental group.

4. To find out the association between the post test scores of memory and anxiety among control and experimental group of adolescents with their demographic variables.

### **Objective 1**

**To assess the level of memory and anxiety among adolescents in experimental and control group before and after cinnamon chewing gum.**

#### **The findings are**

- 1) In control group, pre test scores of memory among adolescents depict that, majority (73%) of adolescents had good memory and only 27% of adolescents had average memory.
- 2) In control group, pre test scores of anxiety among adolescents reveals that, most of adolescents (60%) had moderate anxiety and 40% of adolescents had severe anxiety.
- 3) In experimental group, pre test scores of memory among adolescents showed that majority (74%) of adolescents had good memory and similar percentage (13%) of adolescents had average and excellent memory.
- 4) In experimental group pre test scores of anxiety among adolescents shows that, most (80%) of adolescents had moderate anxiety, 13% of adolescents had severe anxiety and only 7% of adolescents had mild anxiety.



- 5) In control group, post test scores of memory among adolescents depicts that 80% of adolescents had good memory and 20% of adolescents had average memory.
- 6) In control group, post test scores of anxiety among adolescents reveals that, 67% of adolescents had moderate anxiety and only 33% of adolescents had moderate anxiety.
- 7) In experimental group, post test scores of memory among adolescents showed that majority (100%) of the adolescents had excellent memory.
- 8) In experimental group, post test scores of anxiety among adolescents shows that, majority (86%) of adolescents had mild anxiety and only 13% of adolescents had moderate anxiety.

### **Hypothesis: 1**

There is a significant level in memory and anxiety among control and experimental group of adolescents before and after cinnamon chewing gum, so the hypothesis is accepted.

These findings are supported by **Richard et al, (1998)**, on adolescents, who smelled the cinnamon chewing gum for 5 minutes had excellent memory and relieved tension than the adolescents in control group. The study suggests that smelling cinnamon is very beneficial for anxiety and memory.

## Objective 2

**To compare the effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in control and experimental group**

**The results are:**

### 1. Memory

✝ Control group:

- ◆ Paired 't' test value was 0.54, ( $P > 0.05$ , not significant)
- ◆ Pre test mean and SD score was  $54 \pm 6.5$
- ◆ Post test mean and SD score was  $55 \pm 6.6$
- ◆ Difference in mean percentage was 1%

✝ Experimental group

- ◆ Paired 't' test value was 23.7, ( $P < 0.05$ , significant)
- ◆ Pre test mean and SD score was  $50 \pm 4.5$
- ◆ Post test mean and SD score was  $84.2 \pm 2.5$
- ◆ Difference in mean percentage was 31%

☉ Unpaired 't' test was 18.6, ( $P < 0.05$ , significant)

### 2. Anxiety

✝ Control group

- ◆ Paired 't' test value was 1.86, ( $P > 0.05$ , not significant)
- ◆ Pre test mean and SD score was  $38 \pm 9$

- ◆ Post test mean and SD score was  $44.4 \pm 7.6$
- ◆ Difference in mean percentage was 7%

#### ✠ Experimental group

- ◆ Paired 't' test value was 17.2, ( $P < 0.05$ , significant)
- ◆ Pre test mean and SD score was  $32.3 \pm 6.3$
- ◆ Post test mean and SD score was  $14.1 \pm 5.6$
- ◆ Difference in mean percentage was 22%

- ☉ Unpaired 't' test value was 24.1, ( $P < 0.05$ , significant)

#### **Hypothesis 2:**

There is a significant effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in experimental group than control group, so the hypothesis is accepted.

The present study is supported by **Vanderbilt (1999)**, he found that chewing cinnamon-flavored gum, or just smelling cinnamon, improved memory and performance of certain tasks while working on a computer-based program, all improved significantly and test anxiety was reduced.

#### **Objective 3:**

**To find out the co-relation between memory and anxiety among experimental group of adolescents.**

1. Karl Pearson's co-efficient of co-relation analysis value in pre test was (-0.9)
2. Karl Pearson's co-efficient of co-relation analysis value in post test was (-0.89)
3. Hence, there was a moderately negative co-relation between these variables.

**Hypothesis 3:**

There is a significant co-relation between memory and anxiety among experimental group of adolescents, so the hypothesis is accepted.

**Objective 4:**

**To find out the association between the post test scores of memory and anxiety among control and experimental group of adolescents and their demographic variables**

- 1) Chi-square value reveals that there was no significant association between the post test scores of control and experimental group when compared to age, sex, standard and scholastic performance, ( $P > 0.05$ ).

**Hypothesis 4:**

There is a significant association between the post test scores of memory and anxiety among experimental group and control group of adolescents with their demographic variables

There is no significant association between post test scores of memory and anxiety among experimental and control group of adolescents and their demographic variables, so the hypothesis is rejected.

## CHAPTER VI

### SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATION

This chapter deals with the summary of the study, its findings, conclusion and the implications for Nursing administration, Nursing practice, Nursing education and Nursing research. This study has been started with a few limitations and ends with suggestions and recommendation for research in future.

#### SUMMARY

The primary aim of the study was to assess the effectiveness of cinnamon chewing gum on memory and anxiety among adolescents at Seventh Day Adventist High School, Vijayawada, Andhra Pradesh.

#### **The objectives of the study are,**

- <sup>✱</sup> To assess the level of memory and anxiety among adolescents in experimental and control group before and after cinnamon chewing gum
- <sup>✱</sup> To determine the effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in experimental and control group
- <sup>✱</sup> To find out the correlation between the pre test scores and post test scores of memory and anxiety among adolescents in experimental group.

- To find out the association between post test scores of memory and anxiety among control and experimental group of adolescents with their demographic variables.

### **Hypotheses**

Researches formulated and tested the following research hypothesis,

**H<sub>1</sub>:** There is a significant level in memory and anxiety among adolescents in experimental and control group before and after cinnamon chewing gum

**H<sub>2</sub>:** There is a significant effectiveness of cinnamon chewing gum on memory and anxiety among adolescents in experimental than control group

**H<sub>3</sub>:** There is a significant correlation between memory and anxiety among adolescents in experimental group.

**H<sub>4</sub>:** There is a significant association between the post test scores of memory and anxiety among experimental and control group of adolescents with their demographic variables

The review of literature on related studies helped the investigator to design the methodology, conceptual frame work and find out the tool. The literature reviews for the present study were presented under the following heading.

- The studies related to cinnamon.
- The studies related to memory and anxiety among adolescents.

- The studies related to complimentary therapies on memory and anxiety
- The studies related to cinnamon on memory and anxiety among adolescents

The investigator developed Imogene King's Goal Attainment Theory. The research design adopted for the study was "True experimental design where one group pre test and post test with control group design". Setting chosen to conduct the study was at Seventh Day Adventist High School, Vijayawada, for experimental group and Seventh Day Adventist High School, Ibrahimpatnam, Andhra Pradesh for the control group. In this study the samples were adolescents. The sample size was 15. In this study probability stratified random Sampling technique was used. In this study, modified P.G.I Memory assessment scale was used to assess memory and Modified Max Hamilton's Anxiety rating scale was used to assess anxiety among adolescents.

The reliability was tested by implementing the tool on 5 adolescents at Seventh Day Adventist High School, Erode, which is other than the sample area. A test re-test method was used to test the reliability of modified P.G.I Memory Assessment Scale and modified Max Hamilton's Anxiety Rating Scale. The tools modified P.G.I Memory Assessment Scale ( $r^1 = 0.96$ ) and modified Max Hamilton's Anxiety Rating Scale ( $r^1 = 0.69$ ) were found to be reliable.



The adolescents who fulfilled the inclusion criteria was selected as samples and was given cinnamon chewing gum twice a day for 15 days. Data were gathered through modified memory assessment scale and modified Max Hamilton's anxiety rating scale. The data gathered are analyzed by using descriptive and inferential statistical method and interpretation is made on the objectives of the study.

### **Major findings of the study**

The major findings of the study were presented under the following headings.

1. Findings related to description of adolescents according to their demographic variables.
2. Findings related to level of memory and anxiety among adolescents in control and experimental group before and after cinnamon chewing gum.
3. Findings related to effectiveness of cinnamon chewing gum on level of memory and anxiety among adolescents.
4. Findings related to co-relation between the pre test scores and post test scores of memory and anxiety among the experimental group of adolescents.
5. Findings related to the association of the post test scores on level of memory and anxiety among adolescents with their selected demographic variables.

**1. Findings related to description of adolescents according to their demographic variables.**

**Control group**

1. Most of the adolescents (48% and 46%) were in the age group of 13 and 14 years.
2. Most of the adolescents (60%) were females.
3. Most of the adolescents (60%) were studying in 9<sup>th</sup> standard.
4. Most of the adolescents (40% and 40%) were having good and average scholastic performance.

**Experimental Group**

1. Most of the adolescents (40% and 40%) were in the age group of 13 and 14 years.
2. Most of the adolescents (67%) were females.
3. Most of the adolescents (47%) were studying in 9<sup>th</sup> standard.
4. Most of the adolescents (54%) were having average scholastic performance.

## **2. Findings related to levels of memory and anxiety among adolescents in control and experimental group before and after Cinnamon Chewing Gum**

### **Control group**

#### **☞ Pre test**

- ➔ Mostly (73%) were having good level of memory.
- ➔ Mostly (60%) were having moderate level of anxiety.

#### **☞ Post test**

- ✓ Mostly (80%) were having good level of memory.
- ✓ Mostly (67%) were having moderate level of anxiety.

### **Experimental group**

#### **☞ Pre test**

- \* Most (74%) were having good level of memory.
- \* Most (80%) were having moderate level of anxiety.

#### **☞ Post test**

- \* All (100%) were having excellent level of memory.
- \* Most (86%) were having mild level of anxiety.

### 3. Findings related to effectiveness of Cinnamon Chewing Gum on memory and anxiety among adolescents

#### Memory

##### ✝ Control group:

- ◆ Paired 't' test value was 0.54, ( $P > 0.05$ , not significant)
- ◆ Pre test mean and SD score was  $54 \pm 6.5$
- ◆ Post test mean and SD score was  $55 \pm 6.6$
- ◆ Difference in mean percentage was 1%

##### ✝ Experimental group

- ◆ Paired 't' test value was 23.7, ( $P < 0.05$ , significant)
- ◆ Pre test mean and SD score was  $50 \pm 4.5$
- ◆ Post test mean and SD score was  $84.2 \pm 2.5$
- ◆ Difference in mean percentage was 31%

☉ Unpaired 't' test was 18.6, ( $P < 0.05$ , significant)

#### Anxiety

##### ✝ Control group

- ◆ Paired 't' test value was 1.86, ( $P > 0.05$ , not significant)
- ◆ Pre test mean and SD was  $38 \pm 9$
- ◆ Post test mean and SD score was  $44.4 \pm 7.6$
- ◆ Difference in mean percentage was 7%

⚡ Experimental group

- ◆ Paired 't' test value was 17.2, ( $P < 0.05$ , significant)
- ◆ Pre test mean and SD score was  $32.3 \pm 6.3$
- ◆ Post test mean and SD score was  $14.1 \pm 5.6$
- ◆ Difference in mean percentage was 22%

☉ Unpaired 't' test value was 24.1, ( $P < 0.05$ , significant)

**4. Findings related to co-relation between the pre test scores and post test scores of memory and anxiety among the experimental group of adolescents.**

☉ Karl Pearson's co-efficient of co-relation test was used to calculate to analyze the co-relation between the pre test scores and post test scores of memory and anxiety among adolescents in the experimental group.

☉ In pre test, 'r' value was (-0.9), moderately negative co-relation

☉ In post test, 'r' value was (-0.89), moderately negative co-relation

**5. Findings related to the association of the post test scores on level of memory and anxiety among adolescents with their selected demographic variables.**

**(Control group)**

- Chi square was calculated to find out the association between the post test scores of memory among adolescents with their demographic variables
  - ✂ Chi square value for the age in year was 1.05 ( $P > 0.05$ ).
  - ✂ Chi square value for gender was 0.3 ( $P > 0.05$ ).
  - ✂ Chi square value for standard was 2.4 ( $P > 0.05$ ).
  - ✂ Chi square value for scholastic performance was 0.3 ( $P > 0.05$ ).
  
- Chi square was calculated to find out the association between the post test scores of anxiety among adolescents with their demographic variables
  - ✂ Chi square value for the age in year was 0.3 ( $P > 0.05$ ).
  - ✂ Chi square value for gender was 0.3 ( $P > 0.05$ ).
  - ✂ Chi square value for standard was 2.4 ( $P > 0.05$ ).
  - ✂ Chi square value for scholastic performance was 0.3 ( $P > 0.05$ ).

**(Experimental group)**

- Chi square was calculated to find out the association between the post test scores of memory among adolescents with their demographic variables
  - ◆ Chi square value for the age in year was 1.66 ( $P > 0.05$ ).
  - ◆ Chi square value for gender was 0.42 ( $P > 0.05$ ).
  - ◆ Chi square value for standard was 4.1 ( $P > 0.05$ ).
  - ◆ Chi square value for scholastic performance was 0.3 ( $P > 0.05$ ).
  
- Chi square was calculated to find out the association between the post test scores of anxiety among adolescents with their demographic variables
  - ◆ Chi square value for the age in year was 0.3 ( $P > 0.05$ ).
  - ◆ Chi square value for gender was 1.4 ( $P > 0.05$ ).
  - ◆ Chi square value for standard was 0.8 ( $P > 0.05$ ).
  - ◆ Chi square value for scholastic performance was 0.3 ( $P > 0.05$ ).

**CONCLUSION**

From the findings of the study it can be concluded that,

- Most of the adolescents, in the age group of 13 and 14 years, females, studying in 9<sup>th</sup> standard having average and good scholastic performance

in control group and average scholastic performance in experimental group

- Cinnamon Chewing Gum was highly effective on the level of memory among adolescents in experimental group.
- Cinnamon Chewing Gum was moderately effective on the level of anxiety among adolescents in experimental group.
- There was a moderately negative co-relation between memory and anxiety among adolescents in experimental group.

## **IMPLICATIONS FOR NURSING**

The findings of the study have implication in Nursing service, Nursing administration and Nursing research.

### **Nursing service**

- <sup>\*</sup> This therapy can be used by the Nursing professionals who are working in all hospitals, clinical settings, schools and colleges for further reinforcing their practice.
- <sup>\*</sup> This therapy can be used in the community set up for improving the memory and reducing the level of anxiety in children and elderly people.

### **Nursing Education**

- ✚ Nurse educator should educate the students regarding Cinnamon Chewing Gum and its implementation.



- ✱ Nurse educator should educate the Nursing personnel about Cinnamon Chewing Gum among adolescents and its effectiveness.
- ✱ Nurse educator should educate the Nursing personnel about how to improve memory and reduce anxiety.

### **Nursing Administration**

- ☺ Nurse administrator can organize an in-service program on memory and anxiety problems in various health sector or agencies.
- ☺ Nurse administrator can support the Nurses for conducting research on memory and anxiety problems.

### **Nursing Research**

- ✍ The study may be issued for further reference.
- ✍ Further large scale study can be done in different settings.

### **RECOMMENDATIONS**

Based on the findings of the study the following recommendations have been made for further study.

- 🍎\* A study can be conducted with large samples to generalize the findings.
- 🍎\* A similar study can be conducted in different settings like ICDS centers, schools, colleges, old age home etc.
- 🍎\* A similar study can be conducted with brain training programmes for improving memory.

- \* A similar study can be conducted for Alzheimer's patients to improve memory
- \* A comparative study can be undertaken to compare the effectiveness of cinnamon with other flavors (jasmine flavor, peppermint flavor, etc).
- \* A similar study can be conducted to test the effectiveness of Cinnamon Chewing Gum on all age groups.

## **SUMMARY**

This chapter is dealt with the summary of the study, major findings, conclusions, implication of the study in Nursing field and recommendations for future.

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- ☛ [www.discovernursing.com](http://www.discovernursing.com)

## ANNEXURE I

### LETTER SEEKING PERMISSION TO CONDUCT STUDY

**From**

Ms. Katherina Rajan U,  
M.Sc. Nursing II Year, Dhanvantri college of Nursing,  
Ganapathypuram, No.1, Ranganoor Road,  
Muniyapan Kovil, Pallakkapalayam (po),  
Sankagiri West, Namakkal (Dist).

**To.**

Mr. U Rajan Babu, M.A, B.Ed, M.phil,  
Principal, SDA High School, Vijayawada,  
Andhra Pradesh.

Through,

The principal,  
Dhanvantri College of nursing,  
Namakkal (Dist).

**Respected sir,**

**Sub:** permission to conduct study at Seventh Day Adventist High School, Vijayawada, Andhra Pradesh.

I, Ms. Katherina Rajan U, II Year M.Sc.(Nursing) student of Dhanvantri college of nursing, Pallakkapalayam as a partial fulfillment of master of science in nursing. I have undertaken the following research study for my dissertation which has to be submitted to the DR.M.G.R Medical University, Chennai during december2011.

The Statement of the problem chosen for my study is **“Effectiveness of Cinnamon Chewing Gum on memory and anxiety among adolescents at selected Seventh Day Adventist High Schools, Andhra Pradesh.”**

I am in need of your help and co – operation to conduct this research study among elderly residents in your esteemed old age home.

I request you to permit me to collect the data from your school and allow me to utilize the needed facilities.

I assure you that my study will not in any way affect the routine work of the school nor would it harm the study participants subjected for Cinnamon Chewing Gum.

Kindly do the needful.  
Thanking you

Date: 10. 08. 2011  
Place: Pallakkapalayam

Yours faithfully,



## ANNEXURE II

**From**

The principal,  
Dhanvantri College of Nursing, Ganapathypuram,  
No: 1 Ranganoor Road, Munniyappan kovil,  
Pallakkapalayam, (PO), Sankagiri west, Namakkal (DT).

**To**

**Respected Sir/Madam,**

**Sub:** M.Sc., (Nursing) student – research – data collection – regarding.

Ms. Katherina Rajan U, II year M.Sc.N, student of Dhanvantri College of Nursing, Pallakkapalayam as a partial fulfillment of master of science in nursing, he is to conduct a research and submit the desertion work to the Tamil Nadu Dr M.G.R Medical University, Chennai by December 2011.

The statement of the problem chosen for my study is **“Effectiveness of Cinnamon Chewing Gum on memory and anxiety among adolescents at selected Seventh Day Adventist Schools, Andhra Pradesh.”**

She is in need for your help and cooperation to conduct this research study among adolescents in your esteemed school

I request you to permit her to collect the data from your school and allow my student to utilize the needed facilities.

I assure you that her study will not in anyway affect the routine work of your school nor would it harm the study subjected for Cinnamon Chewing Gum.

Kindly do the needful.

Thanking you,

Yours sincerely,

Date:

Place: Pallakkapalayam.

## ANNEXURE III

### LETTERS SEEKING EXPERTS OPINION ON CONTENT

**From**

Ms. Katherina Rajan U,  
M.Sc. Nursing II Year, Dhanvantri college of Nursing,  
Ganapathypuram, No.1, Ranganoor Road,  
Muniyapan Kovil, Pallakkapalayam (po),  
Sankagiri West, Namakkal (Dist).

**To.**

Through,

The principal,  
Dhanvantri College of nursing,  
Namakkal (Dist).

**Respected sir/madam**

**Sub:** Request for the validation of the tool.

I Ms. Katherina Rajan U, II Year M.Sc.(Nursing) student of Dhanvantri college of nursing, Pallakkapalayam as a partial fulfillment of master of science in nursing. I have undertaken the following research study for my dissertation which has to be submitted to the DR.M.G.R Medical University, Chennai during December, 2011.

**Statement of the problem**

“Effectiveness of cinnamon chewing gum on memory and anxiety among adolescents at selected Seventh-Day Adventist High Schools, Andhra Pradesh.”

To achieve the objectives of the dissertation, I have prepared the following tools:

1. Demographic data.
2. P.G.I Memory Assessment scale.
3. Modified Max Hamilton's anxiety rating scale

With regard to this, I kindly request you to go through the tool and validate it against the given criteria and render your valuable suggestions.

Thanking you in anticipation.

Yours faithfully,

Enclosure:

1. Demographic data.
2. P.G.I Memory Assessment Scale,
3. Modified Max Hamilton's Anxiety Rating Scale,
4. Chapter I & III

## ANNEXURE IV

### CONTENT VALIDITY CERTIFICATE

I hereby certify that I have validated the tool of Ms. Katherina Rajan U. M.sc (Nursing), II year student, Dhanvantri College of nursing, who is under taking dissertation work on **“Effectiveness of Cinnamon Chewing Gum on memory and anxiety among adolescents at selected Seventh-Day Adventist High Schools, Andhra Pradesh”**

Signature of the Expert

Place:

Date:

Name and designation

## ANNEXURE V

### DATA COLLECTION TOOL

#### SECTION - A

#### DEMOGRAPHIC VARIABLES:

1. Age
  - a) 12 years
  - b) 13 years
  - c) 14 years
  
2. Gender
  - a) Male
  - b) Female
  
3. Standard
  - a) 8<sup>th</sup> standard
  - b) 9<sup>th</sup> standard
  - c) 10<sup>th</sup> standard
  
4. Scholastic performance
  - a) Good
  - b) Average
  - c) Poor

## SECTION - B

### MODIFIED P.G.I MEMORY ASSESSMENT SCALE

#### I. REMOTE MEMORY

Sr.no	Questions	Scoring		Possible score
		Within 15 sec	Longer than 15 sec	
1.	What is your age?	1	0	
2.	Where were you born?	1	0	
3.	When did you pass your primary school?	1	0	
4.	What is the age of your youngest brother or sister?	1	0	
5.	When did you first come to this school for your studies?	1	0	
6.	When did you last visit your principal?	1	0	
<b>Maximum Score</b>		<b>6</b>		

#### II. RECENT MEMORY

Sr.no	Questions	Scoring		Possible score
		Within 15 sec	Longer than 15 sec	
1.	What did you eat last night?	1	0	
2.	What did you eat for breakfast today?	1	0	
3.	What is the name of this month?	1	0	
4.	What is the date today?	1	0	
5.	What is the day today?	1	0	
<b>Maximum score</b>		<b>5</b>		

### III.MENTAL BALANCE

Sr.no	Questions	Scoring			Possible score
		Within 15 sec	Longer than 15 sec	One mistake or omission	
1.	Say the alphabet A,B,C (in telugu)	3	2	1	
2.	Count backwards from 20 to 0	3	2	1	
3.	Deduct 3's from 40 and come backwards	Within 30 sec	Longer than 30 sec	One mistake or omission	Possible score
		3	2	1	
<b>Maximum score</b>		<b>9</b>			

### IV.ATTENTION AND CONCENTRATION

1. I will be reading some digits. Listen to them carefully. When I finish reading the digits, you will repeat them

Sr.no	Questions	Scoring		Possible score
		Wrong response	Correct response	
1.	5 - 7 - 3	0	1	
2.	5 - 3 - 8 - 7	0	1	
3.	1 - 6 - 4 - 9 - 5	0	1	
4.	3 - 4 - 1 - 7 - 9 - 6	0	1	
5.	7 - 2 - 5 - 9 - 4 - 8 - 3	0	1	
6.	4 - 7 - 2 - 9 - 1 - 6 - 8 - 5	0	1	
<b>Maximum score</b>		<b>6</b>		

2. Now I am going to read some more digits, but you will have to repeat them backwards.

Sr.no	Questions	Scoring		Possible score
		Wrong response	Correct response	
1.	8 – 5	0	1	
2.	4 – 5 – 7	0	1	
3.	8 – 5 – 6 – 3	0	1	
4.	4 – 7 – 2 – 9 – 1	0	1	
5.	2 – 5 – 9 – 4 – 8 – 3	0	1	
6.	3 – 5 – 8 – 6 – 1 – 9 – 2	0	1	
7.	8 – 5 – 2 – 3 – 6 – 1 – 9 – 4	0	1	
<b>Maximum score</b>		<b>7</b>		

#### V. Immediate recall

One by one, I will be reading out some sentences. Listen to me carefully, for when I finish reading, you have to repeat the same sentence.

1. Rama got up from the chair, opened the door and went to the market.
2. The sick person, was made to lie down, prescribed drugs and was asked to come the next day.
3. There was no water in Mohan's house, he took a bucket, went to the tap in the market, filled water and returned home.

Correctly reproduced clause	Maximum score	Possible score
	12	

## VI. DELAYED RECALL

I will be reading out the names of some objects. Listen to me carefully and when I ask you to repeat the names of those objects, you repeat the names of the objects I read out.

Questions	Scoring		Possible score
	Wrong response	Correct response	
Umbrella	0	1	
Flower	0	1	
Watch	0	1	
Picture	0	1	
Pencil	0	1	
Fish	0	1	
Lamp	0	1	
Rupee	0	1	
Crown	0	1	
Joy	0	1	
<b>Maximum score</b>	<b>10</b>		

## VII. VERBAL RETENTION FOR SIMILAR PAIRS

I will be reading out pairs of words, listen to me carefully. From these pairs, when one word of the pair is called out, you have to say the other word of the pair, associated with it.(read at the rate of 2 sec. Per pair, keeping an interval of 5 sec between each pair and in interval of 10 sec.)

Questions	Scoring		Possible score
	Wrong response	Correct response	
Tree ..... Flower	0	1	
Sweet ..... Salty	0	1	
Man ..... Woman	0	1	
Day ..... Night	0	1	
Black ..... White	0	1	



### VIII. VERBAL RETENTION FOR DISSIMILAR PAIRS

Instruction and administration as above, but ask for the other word of the pair in the order given. If the subject is not able to answer satisfactorily, tell him the correct answer and then proceed with the first word of the next pair. In this manner, conduct 3 trials. If the subject gives all correct answers in the first trails, still it is essential to give the other two trials.

Questions	Scoring			Possible Score
	First trial	Second trial	Third trial	
Table	1	1	1	
Tree	1	1	1	
Lamp	1	1	1	
Baby	1	1	1	
Dream	1	1	1	
<b>Maximum Score</b>	<b>15</b>			

### IX. VISUAL RETENTION

One by one, I will be showing some cards, look at them carefully. After some time (15 sec), I will take back the card and when I tell you (30 sec), you will draw on paper the same figure which you have seen. (Provide the subject with a paper, pencil and eraser, but do not tell the subject whether he can use the eraser or not).

**Instruction:** One score for each type of geometrical figure correctly reproduced in sequence and number.

Questions	Scoring		Possible score
	Wrong response	Correct response	
Card 1	0	2	
Card 2	0	2	
Card 3	0	2	
Card 4	0	3	
Card 5	0	4	
<b>Maximum Score</b>	<b>13</b>		

## X. VISUAL RECOGNITION

I will be showing you a card, in which some objects have drawn. Look at them carefully (for 30 sec). After some time (2 min), I will show you a second card, from which you will have to recognize the objects seen first and identify them by name. (do not tell the subject the number of objects in the first card, or how many more he has to tell.

<b>Correctly identified objects</b>	<b>Maximum score</b>	<b>Possible score</b>
	<b>10</b>	

### Scoring Procedure

<b>Level of memory</b>	<b>Actual scores</b>	<b>Percentage</b>
Poor memory	0 – 24	0 – 25%
Average memory	25 – 48	26 – 49%
Good memory	49 – 72	50 – 73%
Excellent memory	73 - 98	74 – 100%

## SECTION – C

### MODIFIED MAX HAMILTON'S ANXIETY RATING SCALE

#### INSTRUCTIONS:

- For each item decide if it
  - \* **NEVER** applies to you (mark 0)
  - \* **OCCASSIONALLY** applies to you (mark 1 )
  - \* **SOMETIMES** applies to you ( mark 2 )
  - \* **FREQUENTLY** applies to you ( mark 3 )
  - \* **ALWAYS** applies to you ( mark 4 )
- When you are finished, add up your totals in all 5 columns to get your total score

SR.NO	CONTENT	0	1	2	3	4
1.	I am worried about what is going to happen					
2.	I feel that bad things might happen to me					
3.	I feel irritated for every activity					
4.	I am tensed and nervous					
5.	I am exhausted when I perform an activity					
6.	I experience inability to relax					
7.	I am moved to tears (cry) easily					
8.	My hands shake and tremble for every activity					
9.	I feel restless for my day-to-day activities					
10.	I am scared to meet strangers					
11.	I am happy to be left alone					
12.	I feel enthusiastic, when I have a role on the stage					
13.	I find difficulty in falling asleep					

14.	I have nightmares					
15.	I have disturbed sleep in the night					
16.	I am very energetic, when I wake up from sleep					
17.	I feel depressed when my goals are not achieved					
18.	I am interested to take initiative in work					
19.	I have sweating for every activity					
20.	I find pleasure in my hobbies					

**SCORING:** Total the number of points in each of the columns. Add all columns together to get your total score.

**POSITIVE SCORING:**

**Q. NO:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 17, 19

**NEGATIVE SCORING:**

**Q. NO:** 11, 12, 16, 18, 20

**Scoring Procedure**

<b>Level of anxiety</b>	<b>Actual scores</b>	<b>Percentage</b>
Mild anxiety	0 – 20	0 – 25%
Moderate anxiety	21 – 40	26 – 50%
Severe anxiety	41 - 60	51 – 75%
Very severe anxiety	61 – 80	76 – 100%

## ANNEXURE VI

### BLUE PRINT OF CINNAMON CHEWING GUM

#### INTRODUCTION:

**Cinnamon** is a spice obtained from the inner bark of several trees from the genus *Cinnamomum* that is used in both sweet and savoury foods. Cinnamon trees are native to South East Asia, and its origin was mysterious in Europe until the sixteenth century

The Hebrew Bible makes specific mention of the spice many times: first when Moses is commanded to use both sweet cinnamon and cassia in the holy anointing chewing gum; in Proverbs where the lover's bed is perfumed with myrrh, aloes, and cinnamon; and in Song of Solomon, a song describing the beauty of his beloved, cinnamon scents her garments like *the smell of Lebanon*. Cinnamon was a component of the Ketoret which is used when referring to the consecrated incense described in the Hebrew Bible and Talmud. It was offered on the specialized incense altar in the time when the Tabernacle was located in the First and Second Jerusalem Temples. The ketoret was an important component of the Temple service in Jerusalem.

#### THE HEALTH BENEFITS OF CINNAMON

- \* \* It boosts Brain Function by acting on the cerebral cortex and neurotransmitters of the brain.
- \* \* It relieves nervous tension,
- \* \* Anti-Clotting and Anti-Microbial actions,

- \*\* Blood Sugar Control,
- \*\* it's Calcium and Fiber protect against Heart Disease and
- \*\* improve Colon Health

### **ACTION OF CINNAMON CHEWING GUM**

It stimulates the nerves connecting to the brain. It acts on the cerebral cortex and neurotransmitters of the brain. It is a good tonic for the brain and helps relieve nervous tension and stress. This aromatic scent has the ability to strengthen the activities of the brain and increase memory power. Cinnamon essential chewing gum also has aphrodisiac properties.

### **PROCEDURE**

- ✍ Explain the study purpose to the sample and their part in the study.
- ✍ Take informed consent that they are willing to participate.
- ✍ Conduct pre test by using modified P.G.I Memory assessment scale for memory and modified Max Hamilton's Anxiety rating scale for anxiety in control and experimental group.
- ✍ Give Cinnamon chewing gum to the adolescents in experimental group twice a day for 15 days and withhold from control group.
- ✍ Instruct the samples to smell the aroma of cinnamon flavoured chewing gum for 5 minutes.
- ✍ Conduct post test for memory on every 7<sup>th</sup> day of intervention and on the last day for anxiety in experimental group. In control group, conduct post test on the last day for memory and anxiety.

## **ANNEXURE VII**

### **LIST OF EXPERTS**

**1. Mrs. R Mahalakshmi, (M.Sc N)**

Vice principal,

Annai Meenakshi College of Nursing,

Coimbatore – 21

**2. Mrs. Amudha M, (M.Sc N)**

Associate Professor,

Vinayaka Mission College of Nursing,

Salem.

**3. Dr. Arulamudhan, M.D,**

Siddha department,

Maniphal,

Mangalore.

**4. Mrs. Pratibha, M.A, M.S, M.Phil,**

Psychologist,

Thindal.

**5. Mr. Senthil Kumar,**  
Clinical psychologist,  
Government Hospital Head Quarters,  
Erode.

**6. Mr. Dhanapal,**  
Bio-statistician,  
Dhanvantri college of nursing,  
Erode.



## ANNEXURE VIII

### PHOTOGRAPHS



**Cinnamon Chewing gum**



**Researcher conducting pre test in control group**



**Researcher giving cinnamon chewing gum to adolescents**



**Researcher conducting post test in experimental group**