EFFECTIVENESS OF A NURSE LED EDUCATIONAL PACKAGE REGARDING SMART PHONE ADDICTION AND ASSOCIATED HEALTH PROBLEMS AMONG ADOLESCENTS IN SELECTED SCHOOLS AT PATIALA, PUNJAB.

[1]Name of 1st Author
Mrs. Bimla Devi
Lecturer, Govt. College Of Nursing, Patiala, Punjab. India
Name of 2nd Author
Dr. Prabhjot Singh   ,
Professor, Nursing Faculty Desh hBagat University, Mandi Gobindgarh
Punjab. India,

Abstract
Research problem: effectiveness of a nurse led educational package regarding smart phone addiction and associated health problems among adolescents in selected schools at patiala, punjab.
Background of the study: it is often stated that children are the world's most valuable resources and assets, but their rights throughout the world are largely ignored often resulting into tragic outcomes.
Aim of the study: to assess the effectiveness of a nurse led educational package regarding smart phone addiction and associated health problems among adolescents in selected schools at patiala, punjab.
Methodology: a quantitative approach with two group experimental research design was used for this study. A sample size of 560 adolescents 280 in each, from experimental and control group at selected schools of patiala punjab was selected using probability stratified   sampling technique. Structured questionnaire and sas scale was administered to assess knowledge regarding smartphone addiction and the prevalence of smartphone addiction among adolescents at selected schools of patiala, punjab.
Results: as the result of analysis of section a in this study among 560 subjects the pre- test knowledge score was only 2 (0.37%) had adequate knowledge followed by 165(29.23%) had moderate knowledge score with the remained 293 (70.50%) had shown the inadequate   knowledge score regarding smartphone addiction . The mean knowledge score of pre-test of the experimental group was 9.37(31.23%) and the mean knowledge score of the pre-test of the control group was 9.40 (31.35%). After intervention there was a substantial gain in knowledge compared to the pre-test scores   was seen with the significant difference in the adequate knowledge score of experimental group) that mean score was 21.91(73.5%) but the post test knowledge score in the control group was almost the same as pre- test with mean score of 9.55 (3.31.85%). As reported in the post test knowledge score of experimental group 189 (67.5 %) subjects have adequate knowledge score, followed by 89 (31.8%) shown moderate knowledge score, where only 2 (0.7%) subjects had reported the inadequate knowledge score. On the other hand reported in the post- test knowledge score, the subjects of the control group shown the score almost same with pre test effect that is 5(1.8%) subjects had adequate knowledge , followed by 87(31.1%) had moderate and 188(67.1%) had shown the inadequate knowledge score .
Conclusion:
It was concluded in this study, that there is a noticeable effectiveness of the intervention 'a nurse led educational package regarding smartphone addiction among adolescents at selected schools of patiala, punjab, which had shown a substantial gain in knowledge compared to the pre-test scores as a significance difference in the pre-test and post test knowledge score among adolescents of experimental group.
Key words: knowledge, effectiveness, smartphone, smartphone addiction, adolesce

Introduction

"We must protect families, we must protect children, who have inalienable rights and should be loved, should be taken care of physically and mentally, and should not be brought into the world only to suffer" Mrs. Indira Gandhi.

The 21st century is known as the era of information technology, when technology advancement hits civilization, parental care, and guidance slowly replaced by variety of technological innovations. The term "smartphone" was used in 1997 by Ericson. Smatphone is providing integrated services from communication, computing and mobile sectors such as voice communication, messaging, personal information management applications and wireless communication capability. The internet fuels the smartphone uses and is useful for a variety of purposes, such as convenient electronic commerce, rapid sharing of information, and contact with other cultures, emotional support and entertainment.

The portability and accessibility of a smartphone makes it possible to use it anywhere, for any duration because Smartphone's currently include all the features of a laptop, including web browsing, Wi-Fi, a bundle of apps. All over the world, adolescents are the more vulnerable group for the smartphone usages and abuse. According to WHO, Adolescents are defined as young people between the ages of 10 and 19 years. Today 20% of the world population is of adolescents, constituting 1.2 billion people worldwide. Nearly 243 million adolescents live in India.[4]

A UN report has raised concerns about the increased use of Smartphone in schools all over the world. This report shows the impact of technology shared objectives of on teaching and learning. And also abuse of technology for non-educational activities like entertainment and commercial use. UN also warned and suggested the whole countries to maintain the human –centered use of technology only to support the education, not to supplement the teachers led instructions. The Adolescents should know and use only the relevant content and ignore the unnecessary and irrelevant content. The use of technology should be only to enhance the knowledge not to replace the human relationship. [1]

COVID-19 outbreak was declared as the Public Health Emergency of International concern by WHO . So all of the educational institutions and companies were shut down, and people were forced to work from home. Various students were provided online-based. Apart from communication, smartphones were used to access social media platforms, for information, entertainment through movies and games, and educational purposes.[58]

This Pandemic period had also reduced opportunities for direct face to face interactions, and hence people started relying more on internet-based services. As a result to overcome boredom, seek information, and relieve anxiety related to the pandemic, people rely on unhealthy coping strategies like spending more time on the internet and social media through smartphones. Due to increased smartphone usage time after the outbreak of COVID-19, most of the adolescents suffered with the symptoms of Smartphone addiction like depression, self-control deficit and cyber bullying victimization. There is also a huge impact of smartphone abuse on economic status and academic performance among students.[2,56]

Smartphones were used by 1.85 billion people in 2014. And it has increased to 2.87 billion in 2020. This data jumped to 8 billion in 2023 after impact of COVID-19. All around the world, people almost spend an average of 5.4 hours per day on their smart phones. About 95% adolescents and graduates use smart phones all over the world. The dependency on smartphones is growing day by day in the adolescents, as a use of social media, violent online games etc. There is a strong relationship between smartphone usage and feeling of restlessness without phone .[3]

All over the world the prevalence of mobile phone addiction is varying from 2.4% to as high as 60.3% among adolescents and school-going children .India is one of the largest and fastest-growing markets for the digital consumers, with 560 million Internet subscribers about nearly 41% in 2018, second only to China. The average Indian social media user spends 17 hours on the screen each week, more than social media users in China and the United States. Half of India's entry-level users for smartphones are between 15 and 24 years old and mostly are the students .[33]

About 58% of school population gets mobile phone during 14–16 years of age. They use the smartphone for about 2-4 hours per day and maximum it is being used to look frequently at their phone about 1–50 times in a day. Majority of the students use mobile phone for communication/call/messages, photographs, entertainment, social media, education, games/sports, and reading newspapers/novels.[5]

Although many smart phone holders can regulate the duration they have to spend staring at their screen. Most of the smart phone users find it hard to interact with the world around them and they use more time on their smart phones even at social events than meeting with their real friends Smart phone addiction in Indian teens can not only damage interpersonal skills, but also it can lead to significant negative health and harmful psychological effects on adolescents.[6]

world health organization has issued recommendations even before this major issue of smartphone addiction1n 2019, regarding lifestyle ,sleep and screen time for children up to five years of age , that limit the daily screen time to one hour , and no screen time up to two years of age . They also recommended the sleep time minimum for 10 hours for children. But according to the data from the various studies, mostly children use their smartphones at late night for watching movies, playing games and for chatting and suffering with insomnia that is the main cause of depression.[38]

Mobile phones emit radiofrequency radiation, which connects them to cell towers that provide coverage. Smartphones emit electromagnetic radiation or EMF. This electromagnetic radiation like other types of heat and microwaves, which are emitted by mobile phones. When we place our mobile phone close to our ears, these radio waves are passed on directly into our brains. Research has shown that there are connections between EMR exposure and cancer and also that exposure to EMR may result in structural damage to neurons. The authors demonstrated the presence of strongly stained areas in the brains of rats that were exposed to mobile phone EMR. It was concluded that EMR have a negative impact on the subject's mood and ability to learn. EMR exposure may lead to abnormal brain functions.[9]

The light and heat also cause the various vision disorders. The blue light of smartphone screen causes degeneration of optical tissues as reported in 2014 by the BBC concerns from opticians regarding blue-violet light emitted by smartphone phone screens, may be potentially hazardous to the eye and long term it may possibly increase the risk of Macular Degeneration .According to the WHO, there is a strong link between mobile phone use and increased risk of cancer The major harmful effects of mobile phones on students are ; Poor vision, Lack of focus, Anxiety, Isolation, Poor academic performance, Accidents, Sleep loss, Bad posture, Immoral activities, and Cyber bullying. There is a significant increase in smart phone excessive and obsessive usage and increase in users' stress. The increased "techno stress" among smart phone users and obsessive usage are positively correlated with anxiety, social and interpersonal communication, loss of control, materialism, and a need for touch and feel.[10]

Most of the people, particularly adolescents use online communication and they prefer to be online for various consultations and meetings and avoid face to face interaction. Loneliness and isolation puts the user in depression, anxiety and restlessness. "FOMO" is one of the behaviour disorders , when a user get fear of missing mobile phone .most of the people check their phone within the half hour they awake , and frequently check their phone screen about 50-100 times a day thus they lose the social support and suffers with anxiety and other behaviour disorders.37

The very common and severe impact on physical health of a long-term use of smart phones are reported as upper limb muscle or joint damage, neck stiffness and back ,pain visual problems, tympanic membrane problems, cancer, immune system diseases and eating behaviour changes. These are accompanied with   psychological health problems like anxiety, depression, memory and concentration problems, sleep disorders; Depression is one of the most important problems associated with overuse of smart phones. There is a higher risk of Neurological disorders including brain tumor and virtual autism among prolonged use of smartphones due to its harmful emitted radiation and magnetism. 11

Physical disorder including Obesity and diabetes are very common to find in the students due to smartphone overuse. There is a reducing trend of walking and exercises due to smartphone overuse and addiction .Excessive use of smart phones interfere with physical activity of daily life. Smartphone Functions   such as sending and receiving text messages and browsing the Internet is responsible for a sedentary behaviour. This sedentary behaviour is associated with a variety of health problems, including obesity or metabolic syndrome. Because it leads to low energy expenditure, Cardiac problems, hypertension and heart attack among young adults has become a new challenge for health care system.12

A long term use and exposure to smart phone screens develops retinal detachment and myopia among younger users .Due to Heat and its light, dryness of eyes and vision disorders are very commonly seen in young population of smartphone users. There is about one in every four children suffers with the vision disorder, due to Smartphone overuse and/or its addiction, according to a study at AIIMS.13

Indian teens are driving Smartphone's market rapidly in India, where the age group of 16-18 years has shown a rapid rise in smartphone use from 5% in 2012 to 25% in early 2014.

Smart phone addiction in Indian teens can not only damage interpersonal skills, but also leads to significant negative health and harmful psychological effects on adolescents. Although, the physical consequences of the overuse of smart phones can be easily diagnosed and managed but mental health issues are statistically significant concerns with smartphones overuse. Like Withdrawal, preoccupation, tolerance, lack of control, mood modification, conflict, lies, and loss of interest are reported among students with smartphone addiction are more common .

Adolescents in the age group of 10-19 use their mobile phones for various tasks like alarm, camera, social media, accessing the internet for information, projects, gaming, etc. The rate of texting has also increased exponentially due to rise in social media. Adolescent feel it a "status quo" to keep a branded   smartphone Influenced with a lot of peer pressure involved on usage of this device.

Smartphone addiction badly affects the mental health of adolescents and they look anxious, depressed and angry and sometimes commit suicide. Mostly, adolescents use cell phones at night, which leads to insomnia. This prolonged Insomnia ultimately results in depression and anxiety, the suicidal rate in adolescents is increasing day by day. Smartphone addictives tend to feel depressed and isolated without their smartphones; besides, they can experience other symptoms of addiction such as preoccupation, tolerance, lack of control, withdrawal, mood modification, conflict, lies, excessive use and loss of interest. Depression and low self-esteem are general reflections of psychological well-being, which are believed to be highly correlated with smartphone addiction among adolescents .Various studies among adolescents' and teens have consistently shown that there is a significant relationship between high extroversion, high anxiety, low self-esteem, and mobile phone usage. High score of smartphone addiction means that individual have high mobile phone call time, receive excessive calls, and receive excessive text messages. People suffering from anxiety are more likely to perceive normal life events as pressure, and attempts to reduce this stress, are resulting in more addictive behaviours.

Mostly, adolescents use cell phones while driving, which lead to a high risk for road accidents. There is a trend to perform dual or multitasking function at a time. Adolescents use, Smartphone, especially texting and also due to distraction of notification pings constantly, while driving, risk of accidents has increased to the 4 times more among Smartphone users. According to data by Ministry of Roads ,Traffic and Highways (MoRTH), India -2021 there is over 1 k deaths and over 5000 injured in road accidents due to use of phones while driving.

As a result of a Cartoon Network study, in India; there are 73% of Indian kids are mobile phone users with its dual-effects, Personalized and Multi-functional. Personalized it is being used for individual's physical, cognitive, social and emotional needs at any time and place where the Multi- functional use is, it replace most other electronics like videogames, computers, TV, etc. and has applications for any other need.

Like the drug addiction or others Smartphone addictive also have the impulsivity and a deficit in planning their behavior .One of the related study, found that high users of smart phone practice with inter temporal choices and suffer with lower self control and cognition.

As a result concluded from various studies regarding smartphone addiction among adolescents, there is a need to create awareness among this population so that Smartphone addiction can be avoided at primordial level. To control and prevent the addiction among adolescents it is imperative to increase awareness among them and their parents about these ill-effects of overuse, the adolescents using smartphone should be taught about meditation, exercises, digital – fasting and outdoor games, it may help the effects of Smartphone addiction to be washed out. Relaxation and postural correction should also be advocated while using the smartphone.

Smartphone Addiction is defined by WHO (WHO Expert Committee - 1964) as dependence, as the continuous use of something for the sake of relief, comfort, or stimulation, which often causes cravings when it is absent. The two major categories of addiction involve either substance addiction, e.g. drugs or alcohol addiction or behavioral addiction such as mobile phone addiction .Smartphone addiction is considered as the lack of control to use the smartphone despite adverse effects including financial, psychological and physical, social harmful consequences on users. Smart phone addiction consists of four main

components: obsessive phone use, behaviors such as repetitive checking for messages or updates; tolerance or longer and more intense of use; withdrawal or feelings of agitation or suffering without the phone; and functional impairment or interference with other life activities and face to face social relationships. All these are very similar to the characteristics of drug addiction. Internet fuels smart phone addiction.

Smart phone users especially adolescents have also noted to suffer from low self-esteem and deficit in self control. Nurses in psychiatric department must recognize those students who suffer from severe psychological problems resulting from smart phone addiction. Emotional complaints, conflicts in group affairs, college complications including learning problem and deficiency of concentration on doing assignment, professional or interactive complications, seclusion and inattention of contacts and interpersonal or personal duties, and psychological or physical agitation. In cases when the individual does not continue a particular manner, extreme exhaustion, daily life fluctuations, considerably condensed somatic motion, lack and fluctuations in sleep arrangements, intolerance, sexual deviances, viciousness, eating complaint and withdrawal signs. Because of the increasing prevalence of using modern technology, there is a need to focus on the impact of smartphone on health among school children, quantify severity and develop proper coping methods to deal with the disorders like depression and emotions. It is found among adolescents that Smartphone usage is the social expectations and rewards of connecting with other people and seeking to learn from others that induce and sustain addictive relationships with smartphones.[27, 47]

Need of the study

The excessive usage of smartphones and social networking sites by students has resulted in serious stress disorders. Stress directly affects individual's daily life, such as difficulty in concentrating, making decisions, trusting others, and maintaining self-esteem and motivation. These psychological changes are also linked to various physical and behavioural disorders. So like this internet and smartphone usage has been linked to depression, anxiety, poor mental health, and academic performance. [53]

It had been found that after COVID 19 an average smartphone user spends around 20 hours a week. Studies had also shown that smartphone user spends an average of 6 hours and 42 minutes a day for internet-based activities, which projects to nearly 100 days in a year.[56]

The prevalence of smartphone addiction was found 53.3% (n = 312) in the overall sample of 600 comprises, 54.5% in males (n = 109), and 52.7% (n = 203) in females. While before COVID the smartphone addiction prevalence in adolescents in the Philippines (21%), Hong Kong (18%) and England (10%). This study had also showed higher addiction prevalence than that found in medical students in India (24.65%), Poland (37.02%), and Spain (14.9%). It was also revealed in this study that the prevalence of addiction in the categories of primary, middle and high school was respectively 63.2% (n = 115), 53.6% (n = 102) and 51.4% (n = 109).The top three reasons reported for smartphone use were social networking (77.9%), web searching (53.3%), and camera use (50.9%).From which the most of the prevalent regions of discomfort were the vision (39.7%) and neck pain. (39.1%).[65]

Smartphone addiction badly affects the mental health of adolescents and they look anxious, depressed and angry and sometimes commit suicide. Mostly, adolescents use cell phones at night, which leads to insomnia. This prolonged Insomnia ultimately results in depression and anxiety, the suicidal rate in adolescents is increasing day by day. Smartphone addictives tend to feel depressed and isolated without their smartphones; besides, they can experience other symptoms of addiction such as preoccupation, tolerance, lack of control, withdrawal, mood modification, conflict, lies, excessive use and loss of interest. Depression and low self-esteem are general reflections of psychological well-being, which are believed to be highly correlated with smartphone addiction among adolescents .[15]

Smartphone addiction is as the same as drug addiction and can be diagnosed by four properties: compulsion, functional impairment, tolerance, and withdrawal. Smartphone addiction is defined as the lack of control to use the smartphone despite adverse effects including financial, psychological and physical, social harmful consequences on users.[10,]

Smartphone addiction is one form of behavioral addiction. Many central components of addiction have been established by behavioral addictions, including salience, mood change, and preoccupation, and tolerance, lack of control, withdrawal symptoms, lies, excessive use and loss of interest, interpersonal and intrapersonal conflict and relapse. Behavioral addiction can be considered similar to substance addiction and many aspects such as functional impairment and tremendous difficulties in withdrawal [2]

Smartphone addiction is a significant public health concern with a significant impact on the mental and behavioral status of its users. Previous evidence has linked smart phone addiction to impaired behavioural attitude, low school/work performance, impaired social interaction and relationship difficulties. Physically, the overuse of smartphones was linked to higher risks of musculoskeletal pain, headache, blurred vision and hearing impairmen.[3]

Gaps in the Research

Adolescents are one of the most vulnerable groups for smart phone addiction regards to their better dealing with technological advances and more inadequate impulse control compared with adults. The physical consequences of the overuse of smartphones can be easily diagnosed and managed, mental health issues are statistically significant concerns with smart phones overuse. Withdrawal, preoccupation, tolerance, lack of control, mood modification, conflict, lies, excessive use and loss of interest are reported among students with smart phone addiction. Depression and low self-esteem can be devastating complications of smart phone addiction, especially among vulnerable groups. It is confirmed that school children and adolescent's mental health and physical health is associated with cell phone addiction. Cell phone usage badly affects mental health of adolescents and they look anxious, depressed and angry or sometimes commit suicide. The suicidal rate is now increasing day by day. The adolescents population is about 1.3 billion over the globe that is the 16% of the world population .There are 253 million (1/5th of total population) adolescents in age group 10-19 years in India, and, it is 15.10% of total 3.17 billion populations of adolescents in Punjab (India).

The adolescents' population is about one million of total 24 million population of District Patiala. The 14% of 14000 adolescents in Patiala were suffering with behavioral problems according to a study by times of India in April, 2019. In this study, The Adolescents population is 3250, students of grade 6th to 12th at selected schools of Patiala.

Researcher has found the gaps about knowledge and awareness regarding impact of smart phone on health among adolescents. There is enough literature regarding various impacts of Smartphone on health in all aspects, but only a short and a few studies are there to provide knowledge regarding smartphone addiction and associated health problems among children .So to improve the knowledge and aware the   adolescents , researcher has selected this study

Researcher has proposed that awareness about the dangers associated with excessive and addictive mobile use must be created among the society because a public health problem has appeared due to unwise usage of smartphone.

Therefore, it is necessary to equip the students for providing awareness   regarding using smart phone. So, the current study aimed to assess the effectiveness of a nurse led educational package regarding smart phone addiction and associated health problems among adolescents. Moreover, the results of this study will assist the adolescents in picking out the appropriate m measures and strategies to adopt and intervene effectively those are or are at risk of Smartphone addiction and associated health problems.

Objectives

1. To assess the pre-test knowledge score regarding smart phone addiction and associated health problems among adolescents of experimental and control group at selected schools of Patiala, Punjab.

3. To assess the post test knowledge score regarding smart phone addiction and associated health problems among adolescents of experimental and control group at selected schools of Patiala, Punjab.

4. To evaluate   the effectiveness of a nurse led educational package regarding smart phone addiction and associated health problems among adolescents at selected schools at Patiala, Punjab.

5. To find the association of pre -test knowledge score regarding smart phone addiction and associated health problems with the demographic variables among adolescent at selected schools of Patiala, Punjab.

Conceptual framework

The present study aimed at assessing the   knowledge of adolescents regarding smartphone addiction and associated health problems. The conceptual framework for the study was developed on the bases of Health Promotion Model. Health Promotion can be defined as behavior motivated by the desire to increase well being and actualize human health potential.

Health Promotion Model (revised 2002) proposed by Nola J.Pender, Murdagh C.L, Parsons M.A identifies factors that enhance or decrease health promotion behavior. It explains the likelihood that healthy life style patterns or healthy behavior will occur and it is useful to the nurse as a framework for client assessment. It states that individuals are likely to change their behavior to feel better physically, psychologically, socially and spiritually.

Individual characteristics and experiences

Behavior-specific Cognitions and effect

Personal factors

Age, class, Type of family, Occupation of mother and father Monthly income of family, qualification of mother and father use of smart phone

Prior related behavior

Previous knowledge regarding smart phone addiction and associated health problems among adolescents .

Perceived benefits of action: Improvement in the prevalence of addiction and knowledge regarding smartphone addiction and associated health problems among adolescents

Perceived barriers to action: Difficulty in practice and lack of social activities regarding smartphone addiction and associated health problems among adolescents.

Perceived self efficacy: Lack of practice and Compulsive behavior regarding smartphone addiction and associated health problems among adolescents

Interpersonal influences:. Includes family members/friends, health personals, mass-media and others which can enhance/ influence the knowledge of adolescents regarding smartphone addiction.

Situational influences: Availability and accessibility of resources of knowledge regarding smartphone addiction and associated health problems

Commitment to plan of action:

A nurse led educational package regarding smartphone addiction and associated health problems among adolescents

Scope of study

Mobile phones are one of the excellent gifts of technology in the 21st century, which is most popular among adolescents. Today's, mobile phones have infinite resources that have multiple benefits and applications. Its excessive use may impact the adolescents in the form of health problems, behavioral changes and diminish the academic performance. This study will explore the knowledge regarding smart phone addiction and its health problems among adolescents. This study will also assist the adolescents in picking out the appropriate methods to intervene effectively with students suffering with the Smartphone addiction.

Delimitations

This study was limited to adolescents of age group 10-19 years (6th to 12th grade students) only.

The study was limited to the selected schools of Patiala, Punjab.

Research Question;

What is the relative effectiveness of nurse led educational package about knowledge regarding Smartphone addiction and its health problems among adolescents at selected schools of Patiala, Punjab?

Research Hypothesis;

All hypotheses were tested at a 0.05 level of significance

H_1

1. There is a significant difference in the post-test knowledge score regarding smart phone addiction and associated health problems among adolescents of experimental and control group at selected schools of Patiala, Punjab.

2. There is a significant association of pre-test knowledge score regarding smart phone addiction and its health problems among adolescents with demographic variables of experimental and control group at selected schools of Patiala, Punjab

Research approach:

A quantitative approach was used to accomplish the objectives of present study.

Research Design;

An Experimental, pre-test, post-test, Research Design was used to accomplish the objectives of the study

Setting of the study:

The setting of research study; Study was conducted at Multipurpose Senior Secondary School Patiala and Govt. Senior Secondary school Civil lines Patiala of Patiala, Punjab, selected with the lottery system sampling technique among 12 senior secondary schools of Patiala.

Sample Adolescents in age group 10-19 years is the sample in this study

Sample Techniques;

Two stage Randomized sampling, lottery sampling and stratified sampling techniques has been used to select the schools of Patiala and to select the sample accordingly. .

Sample Size and calculation

Sample size was assessed with power analysis; $n= N/1+Ne^2$

Where; n=sample size, N = Population and e=chance of error.

N= 3250, e= 0.005

n=3250/1+ (3250x0.005)2

n=360

n= 396+10%=396

In this study the Sample size was 560, in which 280 for Experimental group and 280 for the Control group. Which was selected from the total number of students in each class divided by required sample and every k th was selected of both, girls and boys. (20 girls +20boys), 40 x 7 groups.

Research tool or instrument:.

Part. 1. The selected demographic profile of the respondents.

Part.2. Self -Structured multiple choice questionnaire, contains 30 questions regarding smartphone addiction and associated health problems,

For assessment of knowledge-

Maximum score= 30		Minimum score= 0
Level of knowledge	Score	Percentage
Good	>=19	60%
Average	10-18	31-59%
Poor	<9	<30%

Tools reliability was computed by split half method by using Karl Pearson correlation coefficient.

Karl Pearson's Co-efficient of correlation

$$r = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sqrt{\sum(x-\bar{x})2\sum(y-\bar{y})2}}$$

Reliability of this tool was ==0.73696507 (Split-Half, odd-even) Correlation.

Ethical consideration:

An Ethical clearance and permission had been obtained before conducting the study from Ethical committee at Desh Bhagat University, and permission has been taken from appropriate authority (DEO and principles of the selected schools).

A written consent was taken for the participation from the parents of participating adolescent and the participants prior to the study

A pilot study was conducted with 10% of sample population in the month of September, 2023, at Govt. Senior secondary school Model town, Patiala. The Pilot study results showed that the settings, samples and tool were feasible enough to conduct the main research study. The purpose of the study was explained and confidentiality of the responses was assured.

Method of data collection:

The purpose of this study is to evaluate the effectiveness of a nurse led educational package on the knowledge regarding smartphone addiction and associated health problems

In order to acquire the required information systematically questionnaire was thought to be most appropriate for the study. It was self-structured knowledge questionnaire and consisted of 30 multiple choice questions.

Data analysis & interpretation

In this study , analysis and interpretation of data collected from adolescents of experimental group =280 and of Control group =280 from the selected schools ,was organized, tabulated, analyzed and interpreted by using descriptive and inferential statistics. The analysis and interpretation was based on the data collected and the objectives of the study.

Data analysis:

Analysis of data was done in accordance with the objectives. The data analysis was done by using the descriptive statistics and inferential statistics i.e. calculating mean, median, standard difference and t-test.

Descriptive statistics:

Descriptive statistics was used to describe the basic features of data in study.

It provides simple summaries about sample and the measures.

Frequency, percentage distribution was used for describing socio demographic variables and level of knowledge.

Mean percentage and standard deviation was used to describe the knowledge.

T test was used to assess the knowledge of adolescents regarding smartphone addiction and associated health problems

Inferential statistics:

Inferential statistics is the practice of using sampled data to draw conclusions or make predictions about a larger sample data sample or population.

Non-parametric chi-square test was used to find out the association between demographic variables and knowledge of adolescents regarding smartphone addiction and associated health problems among adolescent at selected schools of Patiala, Punjab.

Organization and presentation of the data:

The collected data were edited, tabulated, interpreted and findings obtained were presented in the form of tables and diagrams represent under following headings.

Section A: Demographic variables of the 560 adolescents' participants at selected schools at Patiala, Punjab. (Experimental and control group).

1, Frequency and percentage distribution of level of knowledge regarding smart phone addiction and associated health problems of adolescents in Pre-test & Post- test (experimental and control group)

2.Description of mean, mean percentage and standard deviation of Pre-test & Post- test knowledge scores regarding smart phone addiction and associated health problems of adolescents (experimental and control group).

3. Assessment of effectiveness of a nurse led educational package, computer assisted teaching, lecture, PPT and discussion on knowledge regarding smart phone addiction and associated health problems among adolescents. (Experimental group)

Relevance of expected Results; The participants have exhibited improved knowledge regarding Smartphone addiction and associated health problems and modified their behaviour regarding Smartphone addiction.

Data analysis 3-1

TABLE: 1   shows homogeneity test of both groups

DEMOGRAPHIC VARIABLES		HOMOGENEITY TEST					
Variables	Opts	Experimental	Control	Chi Test	P Value	Df	Table Value	Result
Age	10-11 Years	40	40	0.000	1	6	12.592	Not Significant
	11-12 Years	40	40					
	12-13 Years	40	40					
	13-14 Years	40	40					
	15-16 Years	40	40					
	15-17 Years	40	40					
	17-19 Years	40	40					
Gender	Boy	140	140	0.000	1	1	3.841	Not Significant
	Girl	140	140					
Type of family	Joint	92	81	1.407	0.495	2	5.991	Not Significant
	Nuclear	134	136					
	Extended	54	63					
Class / Grade	6th	40	40	0.000	1	6	12.592	Not Significant
	7th	40	40					
	8th	40	40					
	9th	40	40					
	10th	40	40					
	11th	40	40					
	12th	40	40					
Family income monthly	Less than Rs.15000	107	104	0.099	0.992	3	7.815	Not Significant
	15001-20000	107	108					
	20001-30000	38	40					

	More than 30000	28	28				
Residential Area	Rural	64	72	0.631	0.729	2	5.991	Not Significant
	Urban	203	195				
	Other	13	13				
Qualification of mother	Matriculation	155	142	2.121	0.548	3	7.815	Not Significant
	Under graduation	99	103				
	Post graduation	23	32				
	Informal education	3	3				
Qualification of father	Matriculation	150	135	2.600	0.457	3	7.815	Not Significant
	Under graduation	87	89				
	Post graduation	28	38				
	Informal education	15	18				
Occupation of Father	Service	95	92	0.149	0.985	3	7.815	Not Significant
	Business	106	106				
	Agriculture	43	46				
	Other	36	36				
Occupation of Mother	Service	33	29	0.317	0.957	3	7.815	Not Significant
	Business	40	42				
	At home	202	204				
	Other	5	5				
Use of smartphone duration	<1 year	51	48	0.839	0.84	3	7.815	Not Significant
	1-2 years	40	42				
	2-3 years	39	46				
	3-4 years and above	150	144				

Age: Age groups (10-11 years to 17-19 years) seem to be evenly distributed between the two groups (p-value = non-significant for all).

Gender: The distribution of boys and girls is similar across both groups (p-value = non-significant).

Type of Family: The proportion of children from joint families (92), nuclear families (134), and extended families (54) is fairly similar in both groups (p-value = non-significant).

Class/Grade: The distribution of students across grades (6th to 12th) appears similar in both groups (p-value = non-significant for all).

Family Income: Monthly income distribution (less than 15000, 15001-20000, 20001-30000, more than 30000) shows no significant difference between the groups (p-value = non-significant).

Residential Area: The distribution of children living in rural, urban, and other areas is comparable across both groups (p-value = non-significant).

Qualification of Mother and Father: The distribution across education levels (matriculation, under graduation, post graduation, other) for both mothers and fathers is similar in the two groups (p-value = non-significant for all categories).

Occupation of Father and Mother: The distribution of fathers' occupations (service, business, agriculture, other) and mothers' occupations (service, business, at home, other) is comparable across the groups (p-value = non-significant for all categories).

Smartphone Usage Duration: The distribution of smartphone usage duration (1 year, 2 years, 3 years, 4 years) shows no significant difference between the groups (p-value = non-significant for all).

Overall: Based on the Chi-square test results for all demographic variables, there's no evidence to suggest statistically significant differences in the composition of the two groups. This suggests that the two groups might be comparable in terms of these demographic characteristics.

TABLE: 2; frequency distribution of socio demographic variables.

Section-1 response demographic Performa		Experimental (%)	Control (%)	Experimental (f)	Control (f)
Age	10-11 Years	14.29%	14.29%	40	40
	11-12 Years	14.29%	14.29%	40	40
	12-13 Years	14.29%	14.29%	40	40
	13-14 Years	14.29%	14.29%	40	40
	15-16 Years	14.29%	14.29%	40	40
	15-17 Years	14.29%	14.29%	40	40
	17-19 Years	14.29%	14.29%	40	40
Gender	Boy	50.00%	50.00%	140	140
	Girl	50.00%	50.00%	140	140
Type of family	Joint	32.86%	28.93%	92	81
	Nuclear	47.86%	48.57%	134	136
	Extended	19.29%	22.50%	54	63
Class / grade	6th	14.29%	14.29%	40	40
	7th	14.29%	14.29%	40	40
	8th	14.29%	14.29%	40	40
	9th	14.29%	14.29%	40	40
	10th	14.29%	14.29%	40	40
	11th	14.29%	14.29%	40	40
	12th	14.29%	14.29%	40	40
Family income monthly	Less than Rs.15000	38.21%	37.14%	107	104
	15001-20000	38.21%	38.57%	107	108
	20001-30000	13.57%	14.29%	38	40
	More than 30000	10.00%	10.00%	28	28
Residential area	Rural	22.86%	25.71%	64	72
	Urban	72.50%	69.64%	203	195
	Other	4.64%	4.64%	13	13

Qualification of mother	Matriculation	55.36%	50.71%	155	142
	Under graduation	35.36%	36.79%	99	103
	Post graduation	8.21%	11.43%	23	32
	Informal education	1.07%	1.07%	3	3
Qualification of father	Matriculation	53.57%	48.21%	150	135
	Under graduation	31.07%	31.79%	87	89
	Post graduation	10.00%	13.57%	28	38
	Informal educatio	5.36%	6.43%	15	18
Occupation of Father	Service	33.93%	32.86%	95	92
	Business	37.86%	37.86%	106	106
	Agriculture	15.36%	16.43%	43	46
	Other	12.86%	12.86%	36	36
Occupation of Mother	Service	11.79%	10.36%	33	29
	Business	14.29%	15.00%	40	42
	At home	72.14%	72.86%	202	204
	Other	1.79%	1.79%	5	5
Use of smartphone duration	< 1 year	18.21%	17.14%	51	48
	1-2 years	14.29%	15.00%	40	42
	2-3 years	13.93%	16.43%	39	46
	3-4 years and above	53.57%	51.43%	150	144

Age: The distribution of age is identical across the experimental and control groups, with each age category from 10-11 years to 17-19 years representing 14.29% of the total participants in both groups. This uniform distribution indicates an equal representation of various age groups in both the experimental and control groups.

Gender: Both groups consist of 50% boys and 50% girls, ensuring an equal gender distribution in the experimental and control groups.

Type of Family: The types of families represented differ slightly between the groups. In the experimental group, 32.86% of participants are from joint families, 47.86% are from nuclear families, and 19.29% are from extended families. In the control group, 28.93% are from joint families, 48.57% are from nuclear families, and 22.50% are from extended families.

Class/Grade: Each grade from 6th to 12th is represented equally in both groups, with 14.29% of participants in each grade. This indicates that the participants' educational levels are uniformly distributed across both groups.

Family Income (Monthly): The distribution of family income is similar between the groups. In the experimental group, 38.21% of families earn less than Rs. 15,000, 38.21% earn between Rs. 15,001 and Rs. 20,000, 13.57% earn between Rs. 20,001 and Rs. 30,000, and 10.00% earn more than Rs. 30,000. The control group has 37.14%, 38.57%, 14.29%, and 10.00% respectively in these income brackets.

Residential Area: A slightly higher percentage of participants in the control group (25.71%) live in rural areas compared to the experimental group (22.86%). Conversely, a higher percentage of participants in the experimental group (72.50%) live in urban areas compared to the control group (69.64%). The 'Other' category has the same representation in both groups at 4.64%.

Qualification of Mother: In the experimental group, 55.36% of mothers have matriculation, 35.36% have under graduation, 8.21% have post-graduation, and 1.07% falls under the 'Other' category. The control group has a slightly lower percentage of mothers with matriculation (50.71%) and slightly higher percentages in the other categories: under graduation (36.79%), post-graduation (11.43%), and 'Other' (1.07%).

Qualification of Father: Fathers' qualifications show similar distributions in both groups. In the experimental group, 53.57% have matriculation, 31.07% have under graduation, 10.00% have post-graduation, and 5.36% fall under the 'Other' category. The control group shows 48.21%, 31.79%, 13.57%, and 6.43% respectively.

Occupation of Father: Fathers' occupations in both groups are also comparable. In the experimental group, 33.93% are in service, 37.86% in business, 15.36% in agriculture, and 12.86% in 'Other' occupations. The control group has 32.86%, 37.86%, 16.43%, and 12.86% respectively.

Occupation of Mother: Most mothers in both groups are at home, with 72.14% in the experimental group and 72.86% in the control group. The percentages of mothers in service are 11.79% (experimental) and 10.36% (control), in business are 14.29% (experimental) and 15.00% (control), and in 'Other' occupations are 1.79% in both groups.

Use of Smartphone Duration: The duration of smartphone use is similarly distributed between the groups. In the experimental group, 18.21% have used smartphones for 1 year, 14.29% for 2 years, 13.93% for 3 years, and 53.57% for 4 years. The control group shows 17.14%, 15.00%, 16.43%, and 51.43% respectively for the same durations.
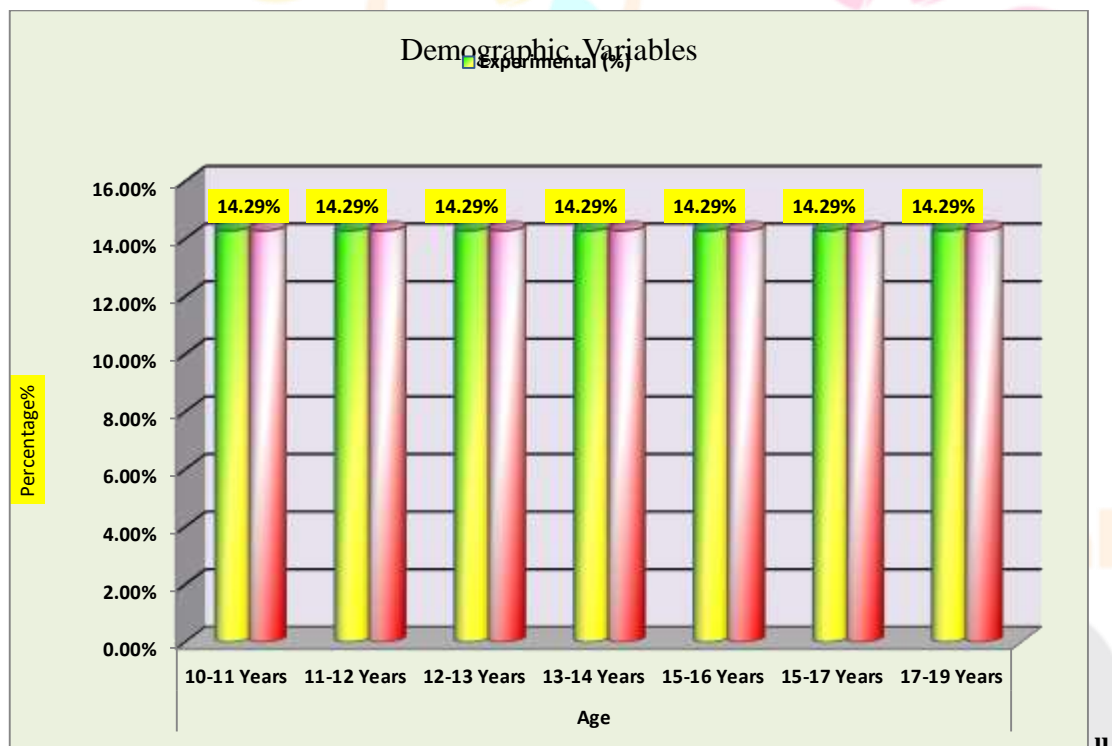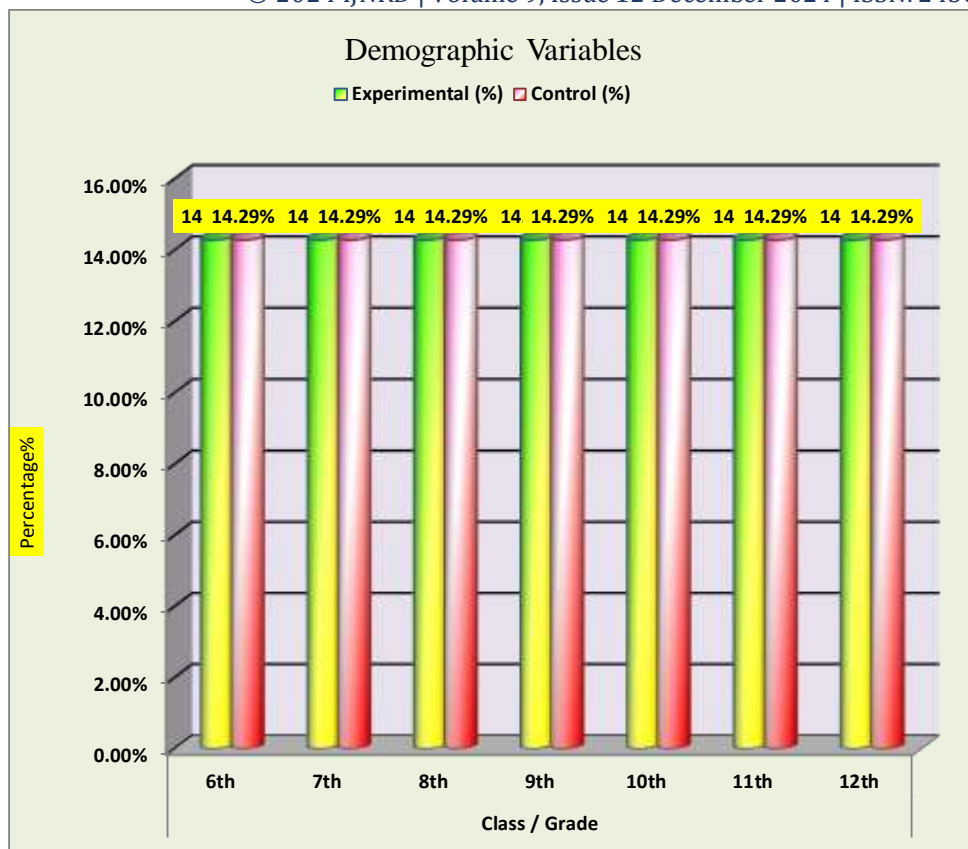

Figure No. 1: Diagram showing the percentage distribution according to their Age
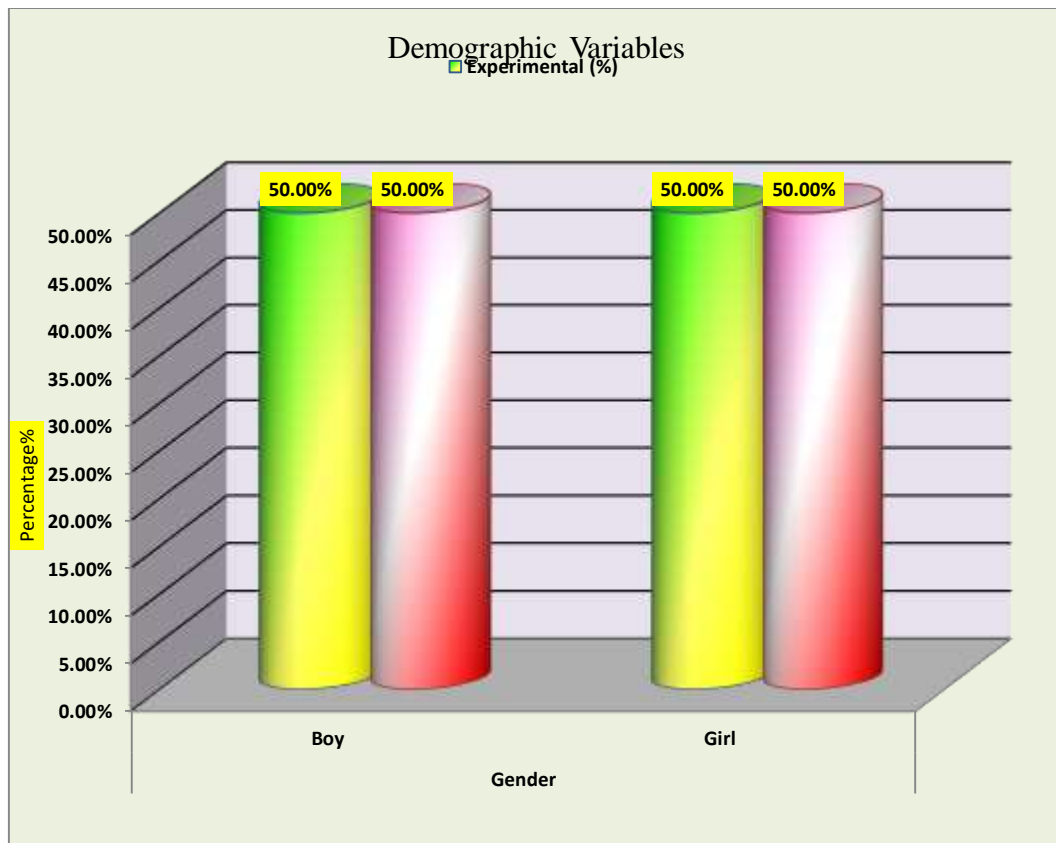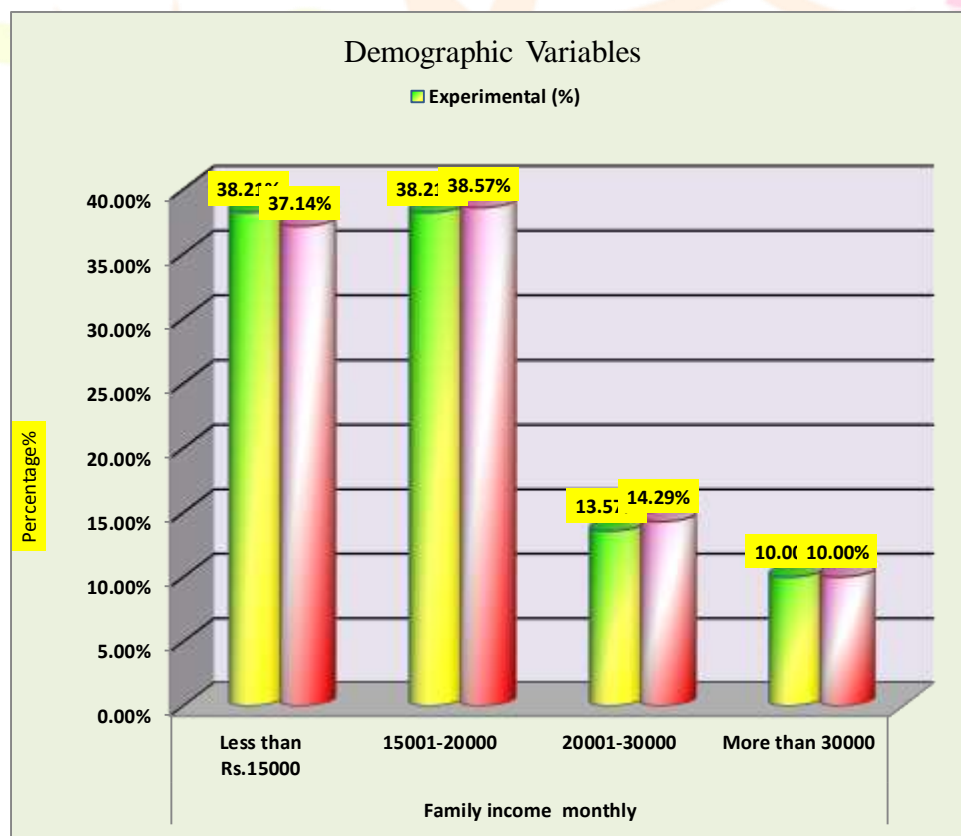
Figure No.2: Diagram showing the percentage distribution according to their Gender
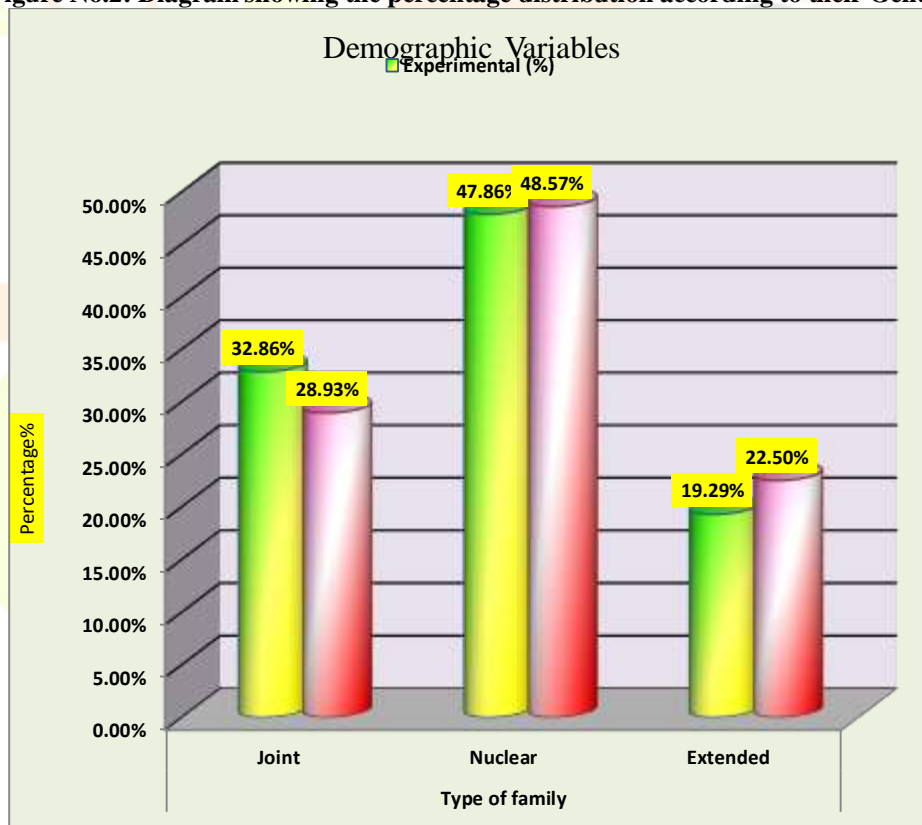
Figure No.3: Diagram showing the percentage distribution according to their Type of family
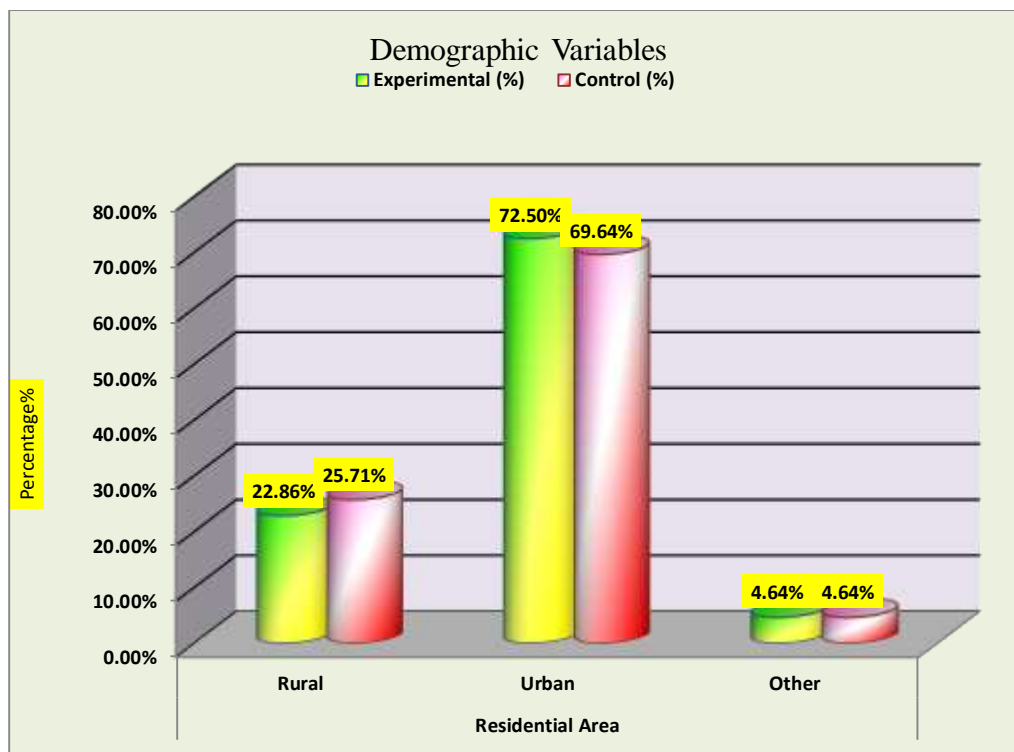
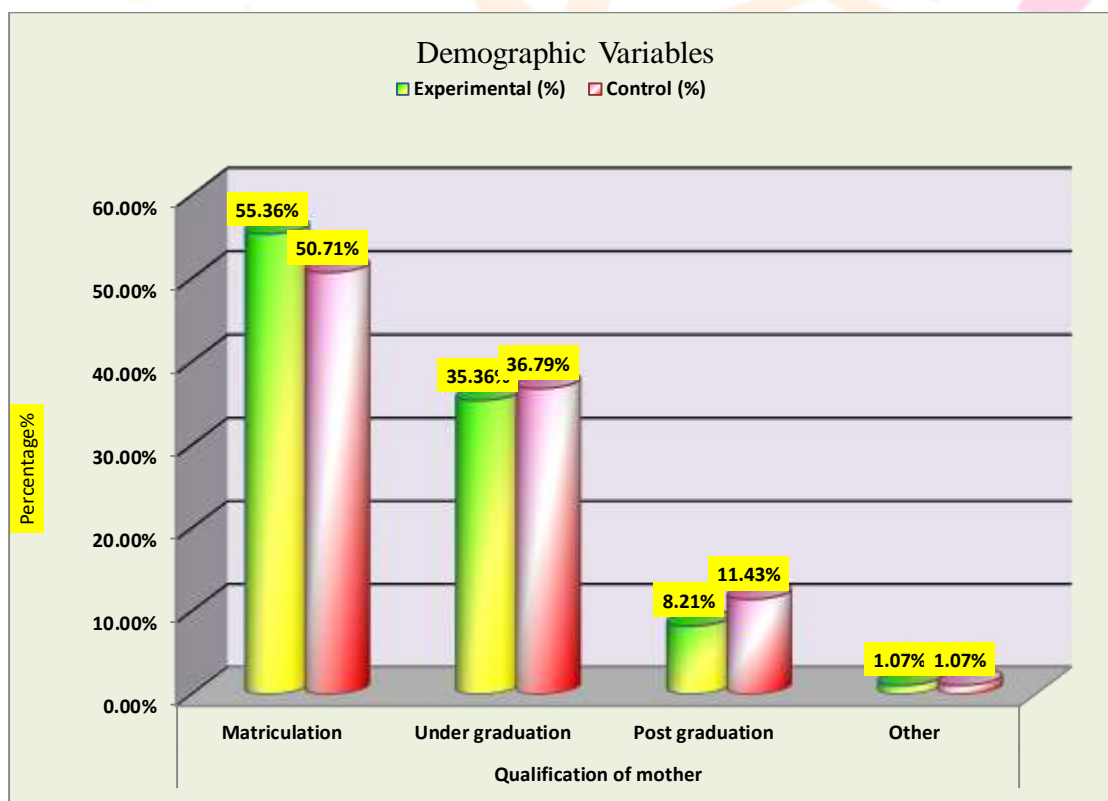**Figure No.4: Diagram showing the percentage distribution according to their Class / Grade**

Figure No.5: Diagram showing the percentage distribution according to their Family income monthly

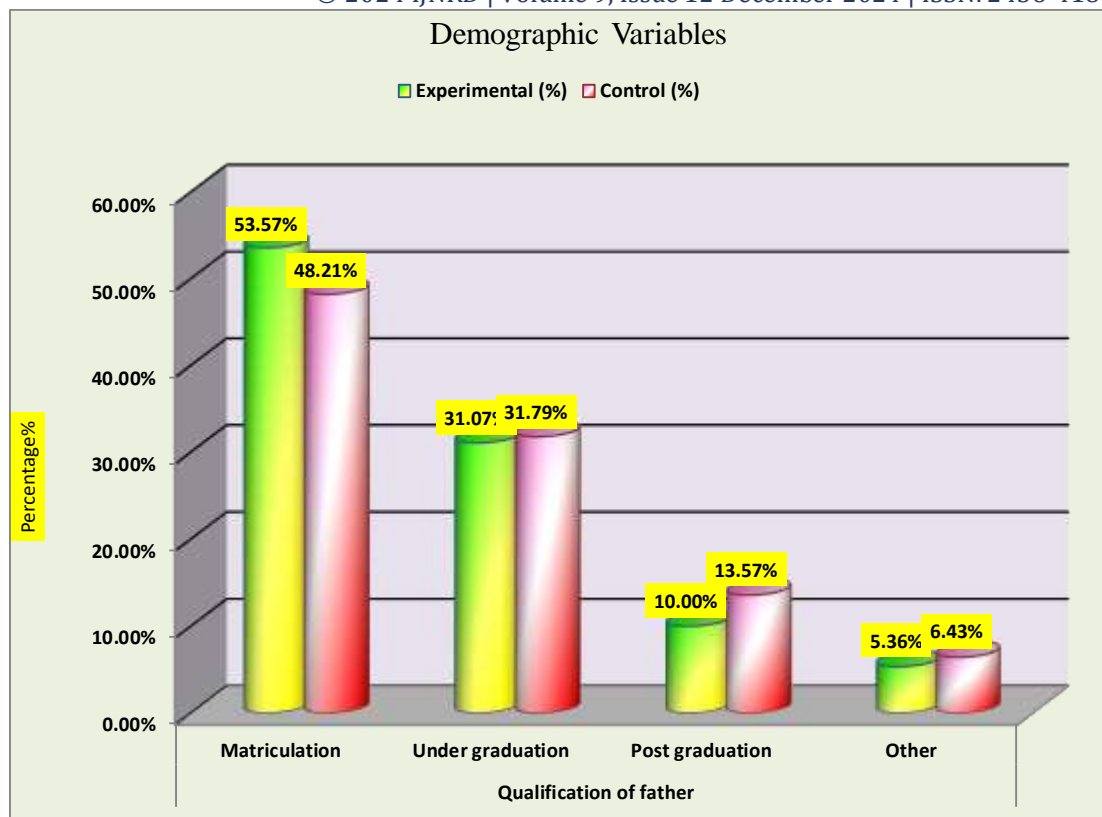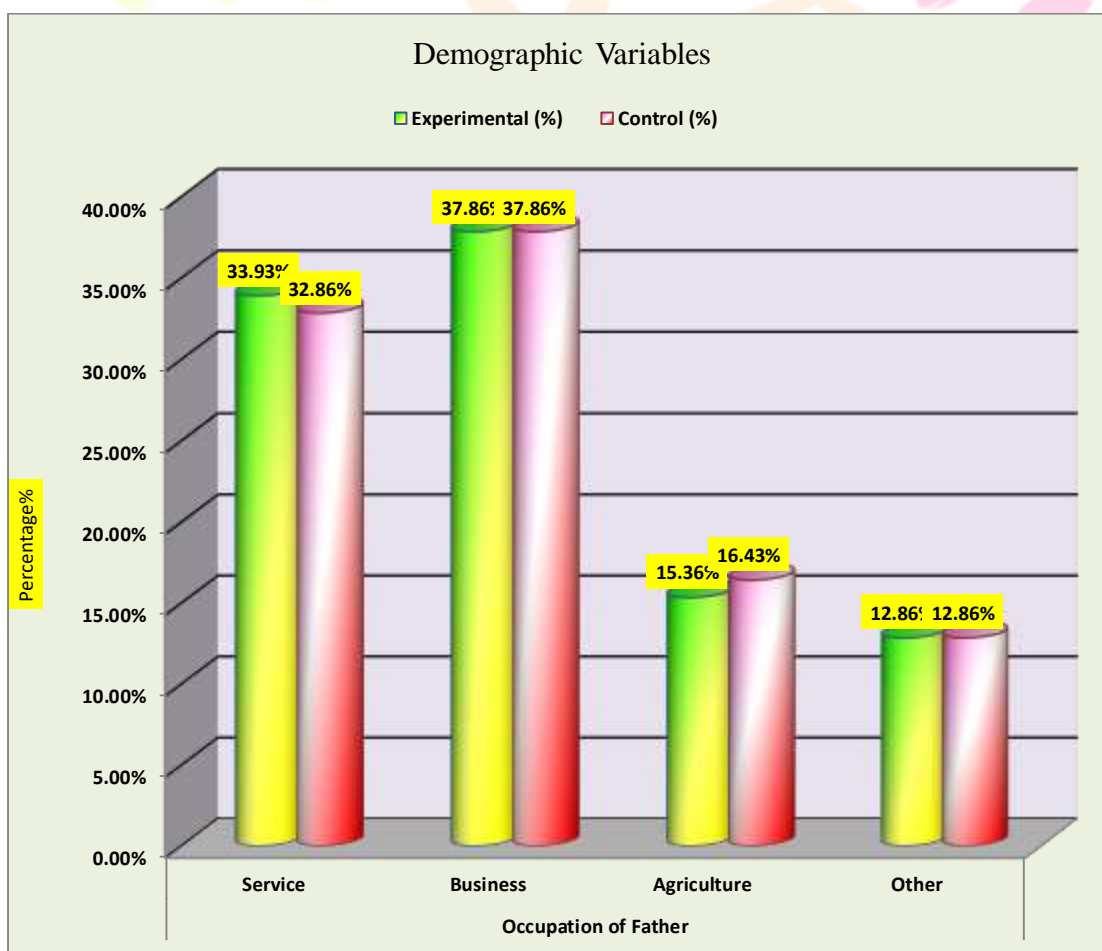**Figure No.6: Diagram showing the percentage distribution according to their Residential Area**

Figure No.7: Diagram showing the percentage distribution according to their Qualification of mother

Figure No.8: Diagram showing the percentage distribution according to their Qualification of father

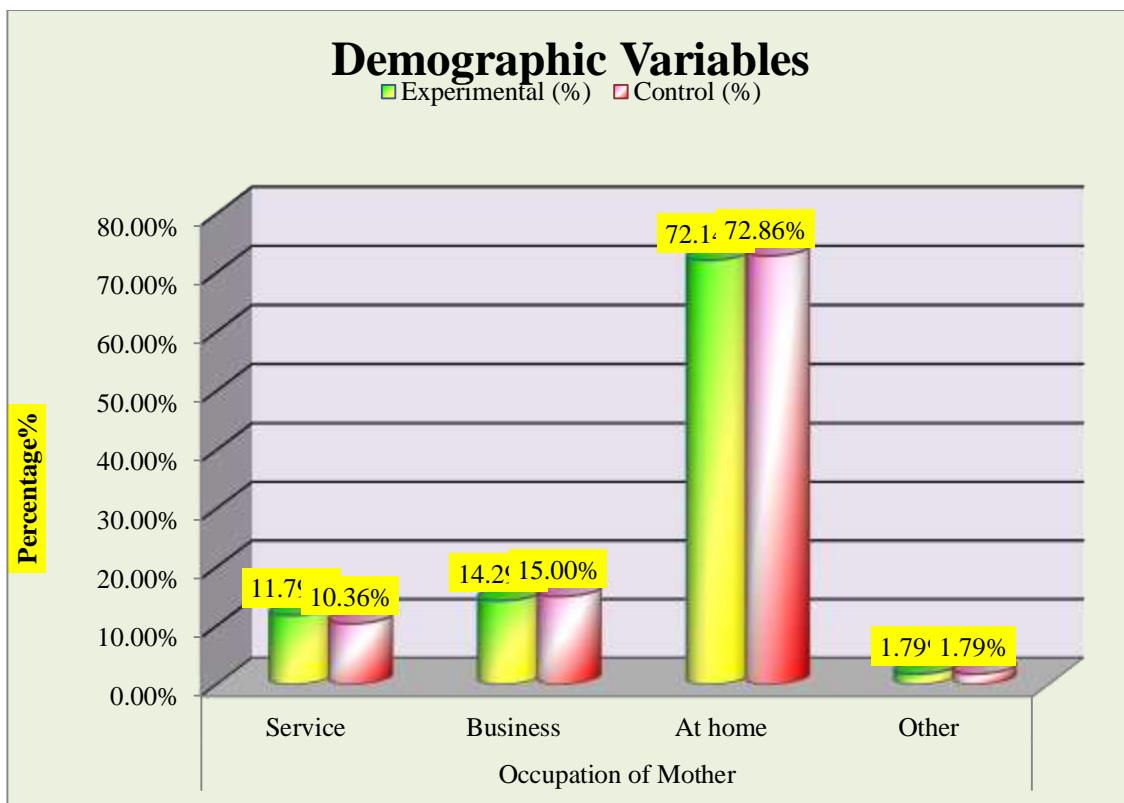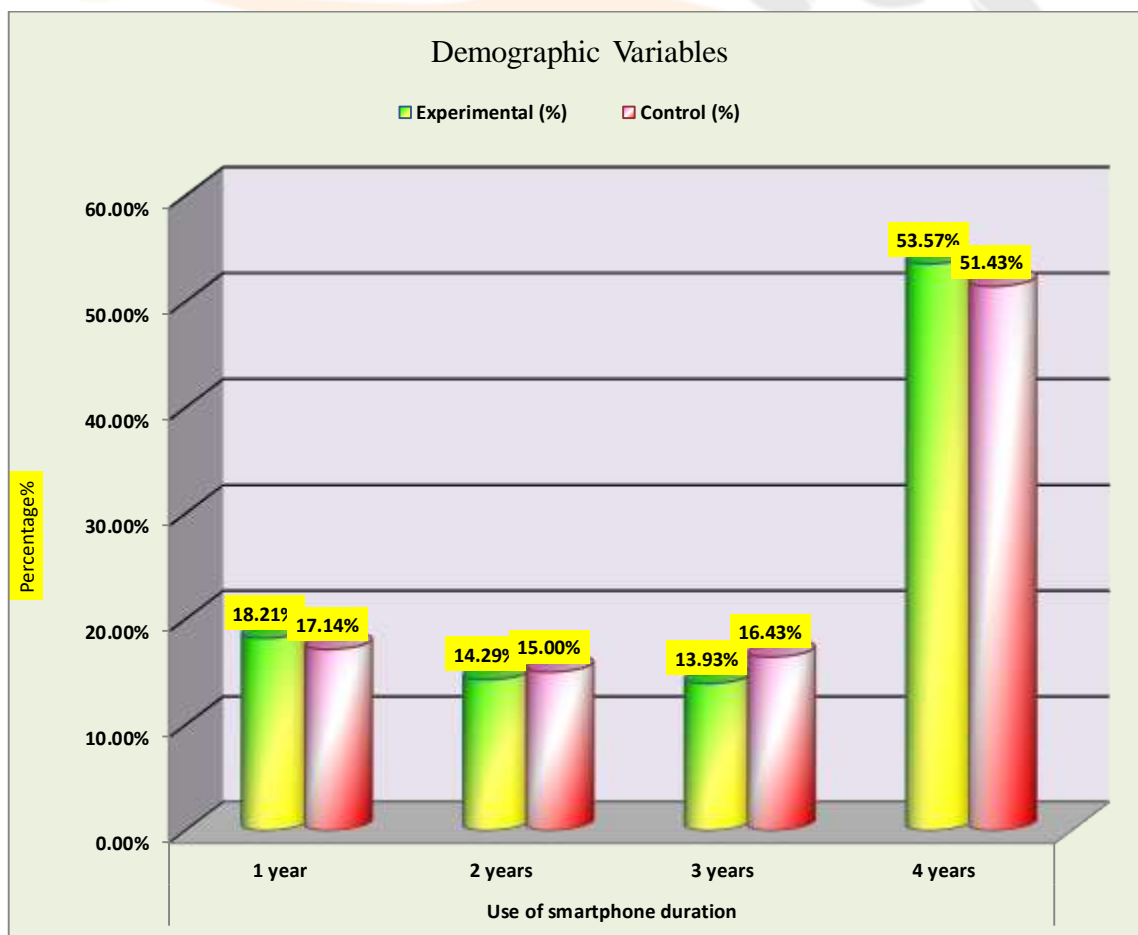**Figure No.9: Diagram showing the percentage distribution according to their Occupation of Father**

Figure No.10: Diagram showing the percentage distribution according to their Occupation of Mother

Figure No.11: Diagram showing the percentage distribution according to their Use of smartphone duration

3.2   Pre –Test knowledge Score

Table: 3. Showing Frequency & Percentage distribution of Pre-Experimental and Pre-Control Group of knowledge Scores.

Criteria measure of knowledge score		
Category score	**Pre -test -experimental**	**Pre -test Control**
Adequate (21-30)	0(0%)	2(0.7%)
Moderate (11-20)	83(29.6%)	82(29.3%)
Inadequate (0-10)	197(70.4%)	196(70%)

Maximum=30 Minimum =0

A large proportion of participants in both groups (70.4% pre-experimental, 70% pre-control) scored in the inadequate range (0-10) on the knowledge score. This suggests a potentially low baseline knowledge level in both groups before the experiment.

A moderate percentage of participants in both groups (29.6% pre-experimental, 29.3% pre-control) scored in the Moderate range (11-20).

Only a very small percentage of participants in both groups (0% pre-experimental, 0.7% pre-control) scored in the adequate range (21-30).

Group Comparison:

There seems to be a very slight difference in the distribution of scores between the two groups. The pre-experimental group has a slightly higher percentage (0.7%) in the adequate category compared to the pre-control group (0%). However, the difference is very small.

Both groups have nearly identical percentages in the Moderate category (29.6% vs. 29.3%).
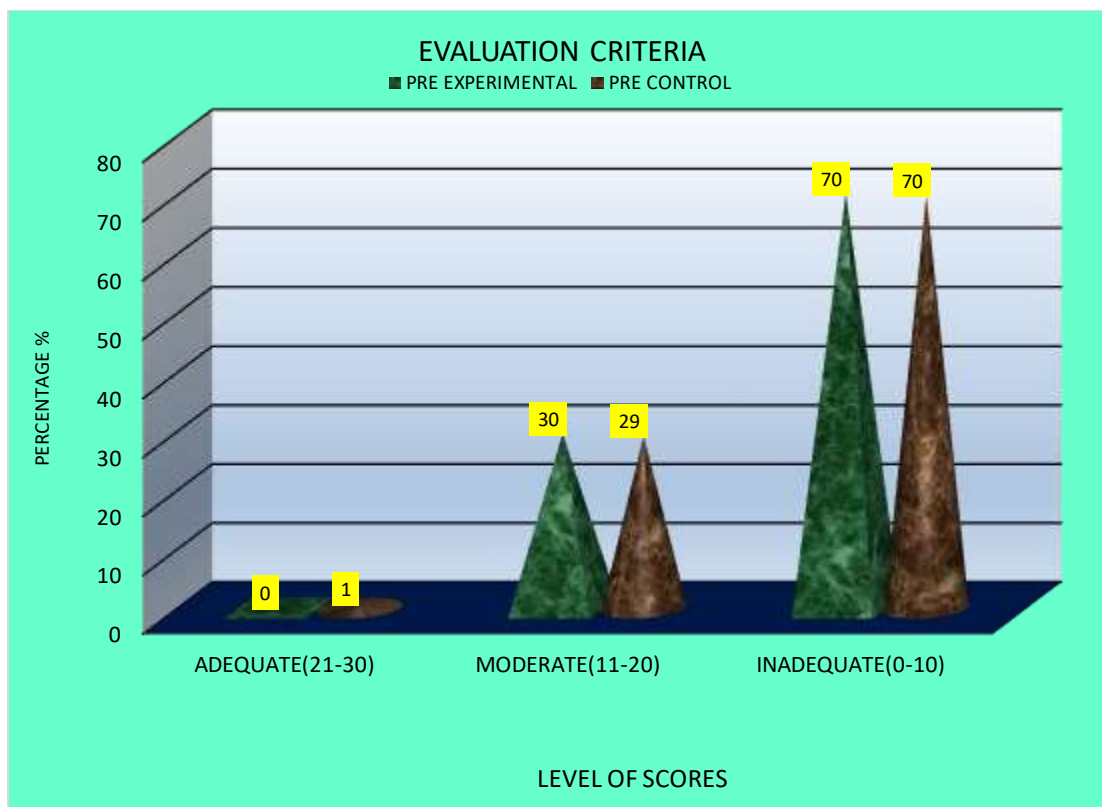
Figure No .12: Showing Knowledge Scores in Pre-Experimental and Pre-Control group.

Table No: 4; Comparison of descriptive statistics b/w Pre-Test Experimental & Pre-Test Control Group of knowledge score.

N= 280+280

	Descriptive Statistics	Mean Score	S.D.	Median Score	Maximum	Minimum	Range	Mean%
	Pre-Experimental	9.37	2.818	9.5	19	5	14	31.23
	Pre-Control	9.40	2.909	9	21	4	17	31.35

Central Tendency:

Mean Score: Both groups have very similar mean scores (around 9.4). This indicates that, on average, participants in both groups scored around the same on the knowledge test before the experiment.

Median Score: The median score is also similar for both groups (around 9), further suggesting that the centre of the data distribution is close for both groups.

Variability:

Standard Deviation (S.D.): The standard deviations (around 2.8-2.9) suggest some variability in the scores within each group. Scores are not all clustered around the mean, with some participants scoring higher and some lower.

Range: The range (14-17) indicates the difference between the highest and lowest scores in each group. While the ranges are slightly different, it suggests a similar spread of scores within each group.

Additional Information:

Mean% (31.23% and 31.35%): Without context about the maximum possible score (30), it's difficult to interpret the meaning of the Mean% exactly. It might represent the average percentage of questions answered correctly or a scaled score based on the total possible score.
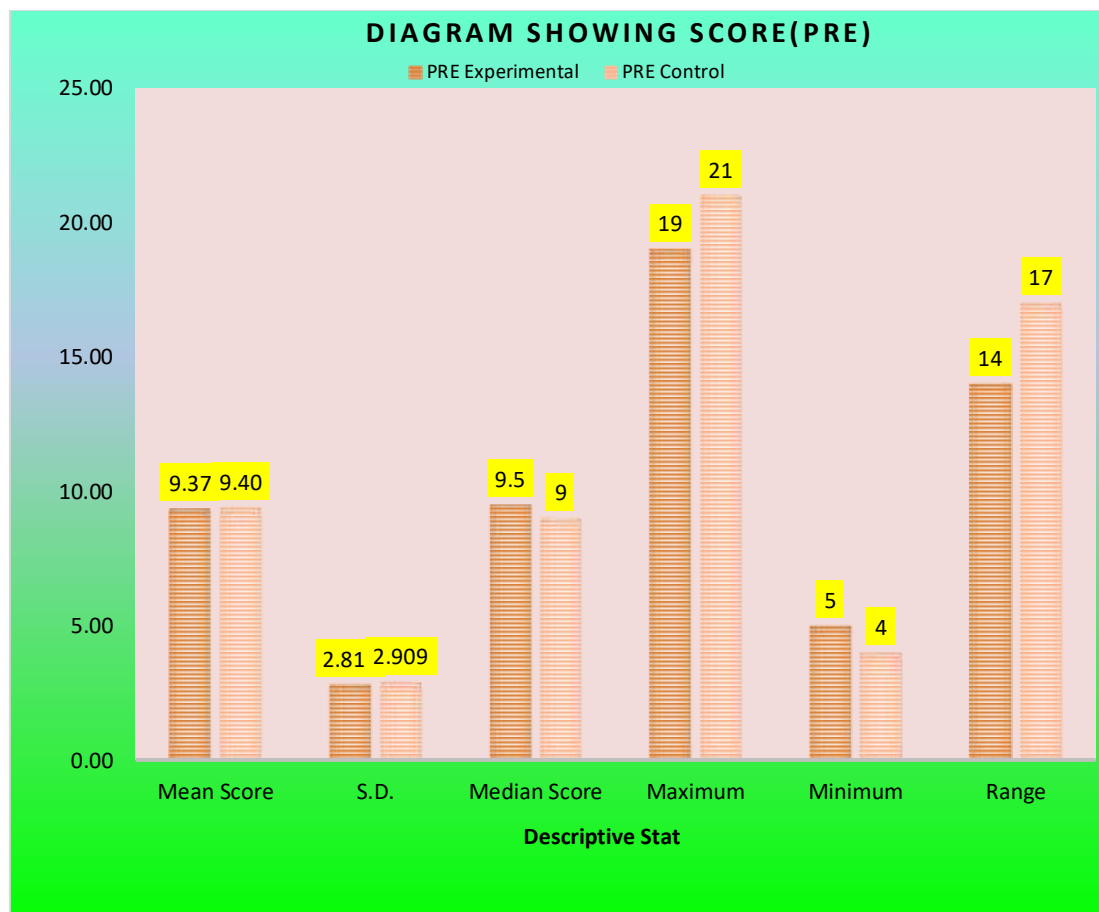
Figure no .13; Bar diagram representing comparison of descriptive statistics of Pre-Experimental and Pre-Control Knowledge Scores.

3.3   **Post –Test knowledge Score**

Table: 5; Showing Frequency & Percentage distribution of Post-Experimental and Post-Control Group of Knowledge Scores.

Criteria measure of knowledge score		
Category score	**Post experimental**	**Post control**
Adequate (21-30)	189(67.5%)	5(1.8%)
Moderate (11-20)	89(31.8%)	87(31.1%)
Inadequate (0-10)	2(0.7%)	188(67.1%)

Maximum=30

Minimum=0

Experimental Group: A large majority (67.5%) of participants in the experimental group scored in the adequate range (21-30) after the experiment. This suggests a substantial gain in knowledge compared to the pre-test scores (likely from the table in the previous prompt).

Control Group: The vast majority (67.1%) of participants in the control group remained in the inadequate range (0-10) after the experiment. This suggests minimal improvement compared to their pre-test scores.

Figure No 14: Showing comparison of Knowledge Scores in Post-Experimental and Post-Control group.

Table No: 6; Comparison of descriptive statistics b/w Post Experimental & Post Control Group of knowledge
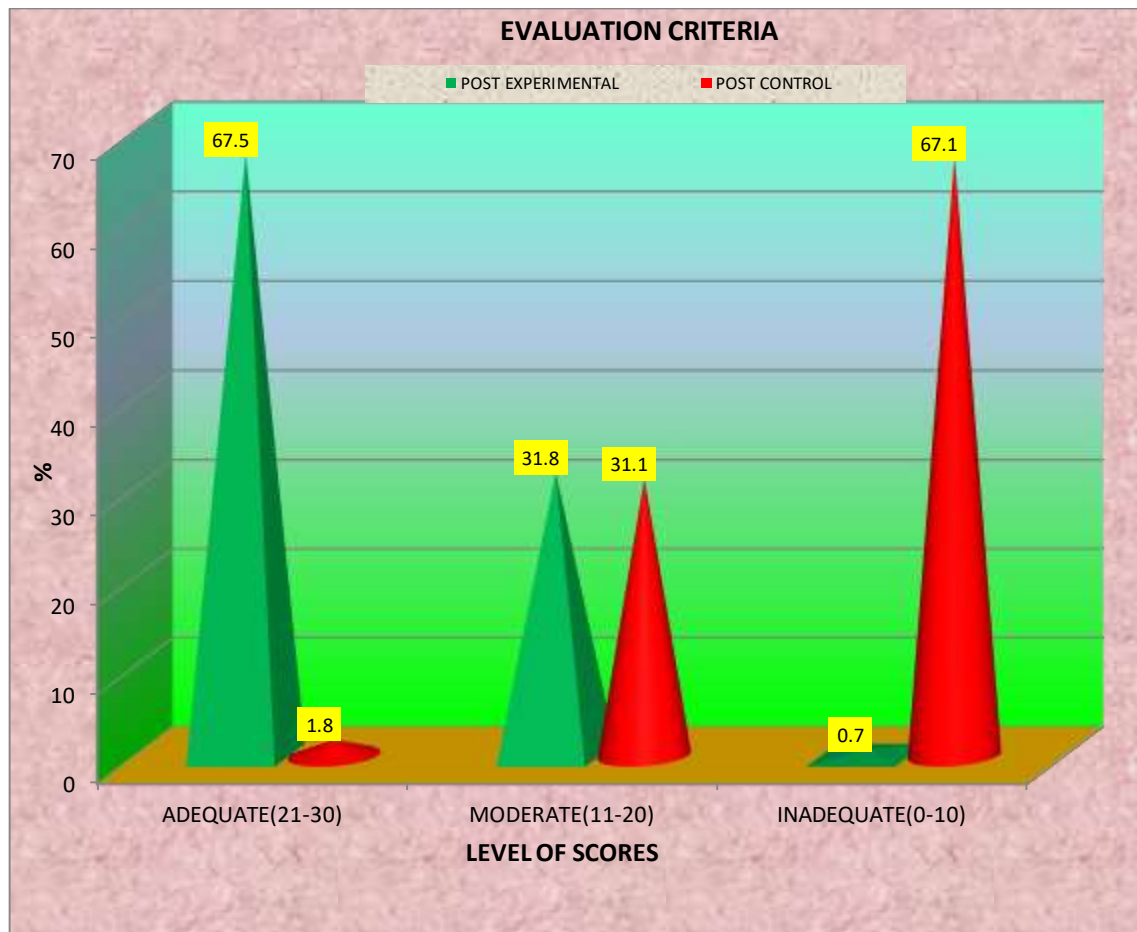
N= 280+280

Descriptive Statistics	Mean Score	S.D.	Median Score	Maximum	Minimum	Range	Mean%
Post-Experimental	21.91	4.616	24	28	10	18	73.05
Post-Control	9.55	3.621	10	26	3	23	31.85

Maximum= 30   Minimum =0

Central Tendency:

Mean Score: The mean score for the experimental group (21.91) is significantly higher compared to the control group (9.55). This suggests a substantial improvement in knowledge for the experimental group after the intervention.

Median Score: The median score also shows a similar trend, with the experimental group (24) scoring considerably higher than the control group (10). This reinforces the notion of a central shift towards higher knowledge scores in the experimental group.

Variability:

Standard Deviation (S.D.): The standard deviations (4.616 for experimental, 3.621 for control) suggest more variability in the scores of the experimental group compared to the control group. This could indicate that the intervention had varying effects on different participants in the experimental group.

Range: The range (18 for experimental, 23 for control) reflects the difference between the highest and lowest scores in each group. The wider range in the control group might suggest some participants improved slightly, while others remained at the lower end of the knowledge spectrum.

Additional Information:

Mean% (73.05% and 31.85%): Assuming the maximum possible score is 30 (consistent with previous information), the Mean% suggests a substantial improvement for the experimental group (73.05% - likely the average percentage of questions answered correctly or a scaled score). The control group's Mean% (31.85%) remains around the pre-test level, indicating minimal improvement.
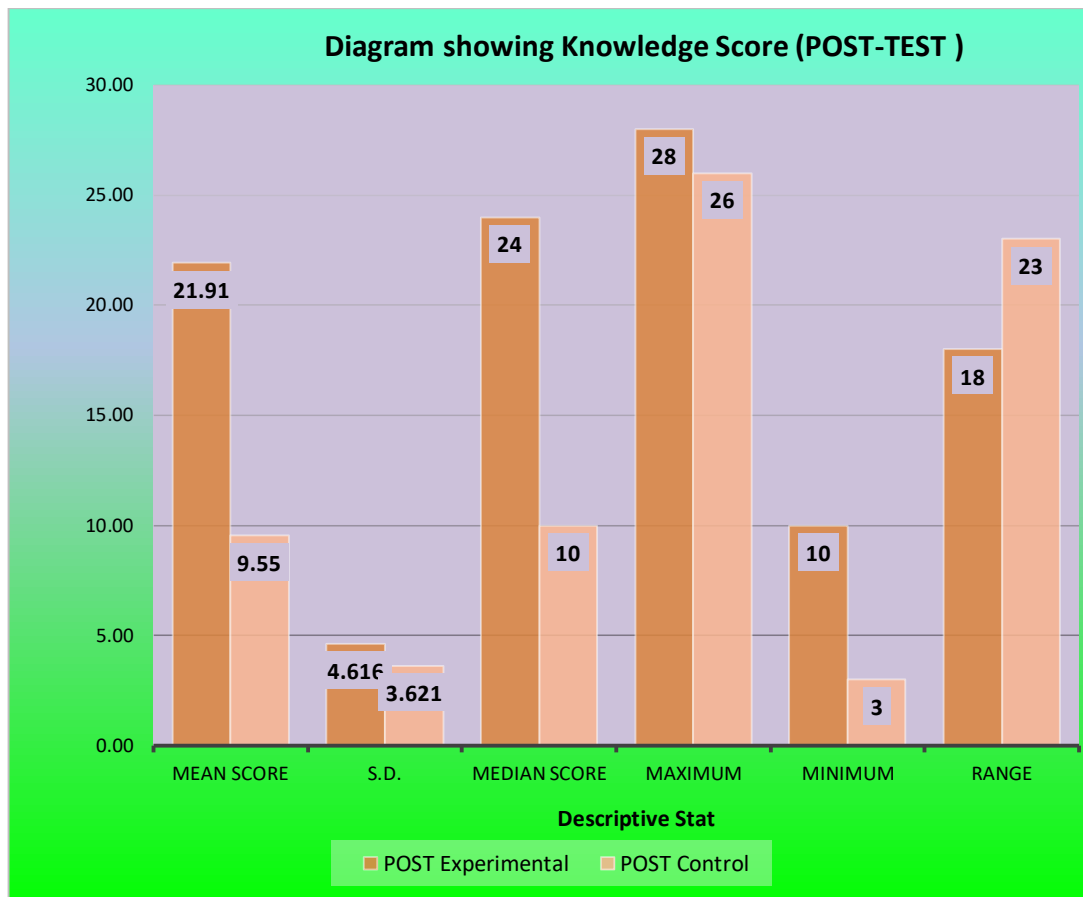
Figure no. 15: Bar diagram representing comparison of descriptive statistics of Post-Experimental and Post-Control Knowledge Scores.

3.4 PRE –TEST /POST-TEST

Table: 7.Comparison of frequency & percentage distribution of pre-test and post-test of both groups

Criteria measure of knowledge score				
Score level	**Pre experimental**	**Pre control**	**Post experimental**	**Post control**
Adequate (21-30)	0(0%)	2(0.7%)	189(67.5%)	5(1.8%)
Moderate (11-20)	83(29.6%)	82(29.3%)	89(31.8%)	87(31.1%)
Inadequate (0-10)	197(70.4%)	196(70%)	2(0.7%)	188(67.1%)
Maximum=30 minimum =0				

Central tendency of both groups of knowledge regarding Smartphone addiction and associated health problems.

Pre-Test: Both groups had a large proportion (around 70%) scoring in the Inadequate range (0-10), suggesting a low baseline knowledge level.

Post-Test: The experimental group experienced a substantial shift towards the adequate range (67.5%). This indicates a significant gain in knowledge compared to the pre-test scores.

Control Group: In contrast, the control group showed minimal improvement. The vast majority (around 67%) remained in the inadequate range after the experiment.

Group Performance:

Pre-Test Similarity: Both groups had very similar distributions of scores in the pre-test, with a large proportion in the inadequate category and a small percentage in the adequate category. This suggests they started at a comparable baseline.

Post-Test Disparity: The post-test results show a stark difference. The experimental group achieved a considerably higher percentage in the Adequate category (67.5%) compared to the control group (1.8%)
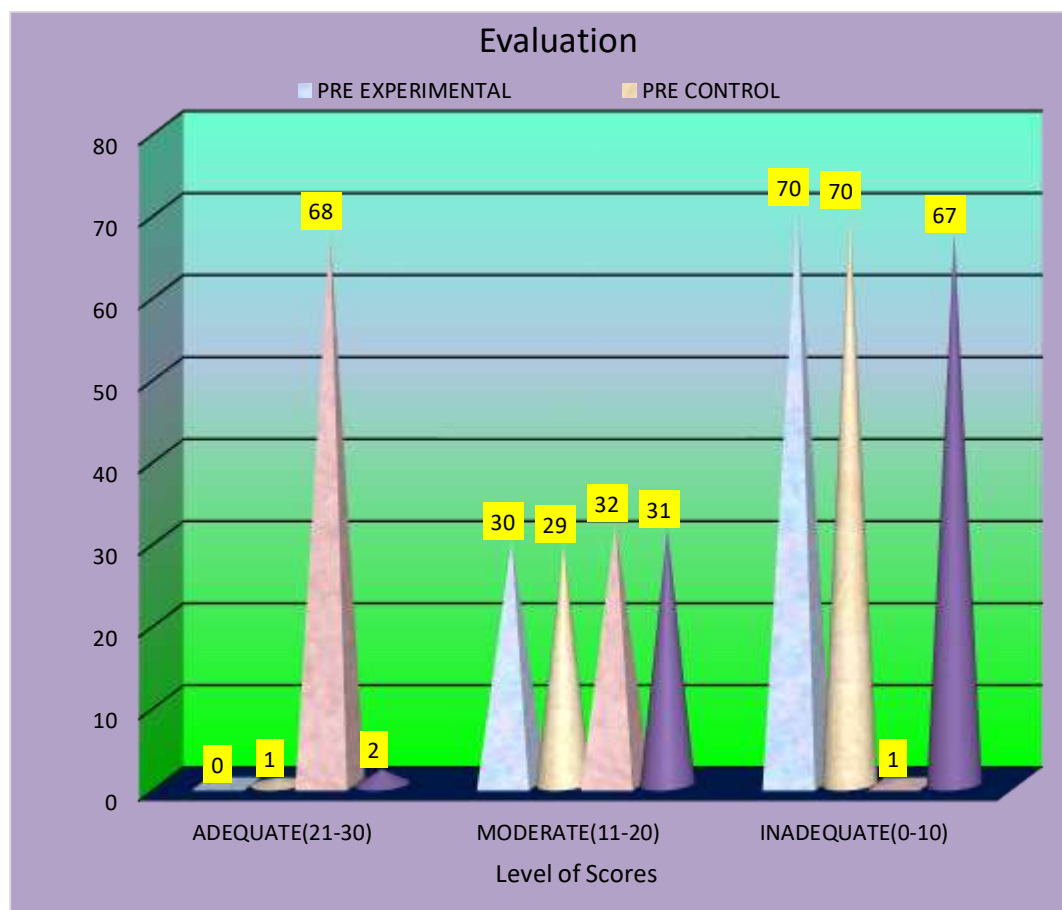

Figure No.16. Diagrams representing comparison of percentage distribution of pre-test and post-test of both groups of knowledge.

Table No: 8. showing comparison within the Group with Paired & Unpaired T Test of Knowledge Scores.

		Knowledge score				Paired T Test		
		Pre-test		Post-test				
Group	N	Mean	SD	Mean	SD	df	T	Result
Experimental Group	280	9.37	2.818	21.91	4.616	279	59.094	Pvalue= <0.001 Significant
Control Group	280	9.404	2.909	9.55	3.621	279	1.795	P value= 0.074 Non Significant
Unpaired T Test	df	558		df	558			
	T	0.148		T	35.255			
	Result	P value=0.883 Non Significant		Result	P value=<0.001 Significant			

Maximum = 30 Minimum = 0

Paired T-Test: Strong Evidence for Improvement within Groups

The paired t-test results convincingly demonstrate significant improvement within each group:

Experimental Group: The mean score jumped from 9.37 (pre-test) to 21.91 (post-test). The high t-value (59.094) and a p-value of 0 (less than 0.05) confirm this statistically significant difference. This indicates a substantial gain in knowledge for the participants who received the intervention.

Control Group: As expected, the control group's scores remained relatively unchanged, with a pre-test mean of 9.404 and a post-test mean of 9.55. The low t-value (1.795) and a p-value of 0.074 (greater than 0.05) reinforce this, suggesting no significant change within the control group.

Unpaired T-Test: Potential Masking Effect of Variability

The unpaired t-test, which compares the post-test scores between the groups, shows no statistically significant difference (t-value: 0.148, p-value: 0.883). This might seem contradictory to the clear improvement observed in the experimental group.

Within the Groups
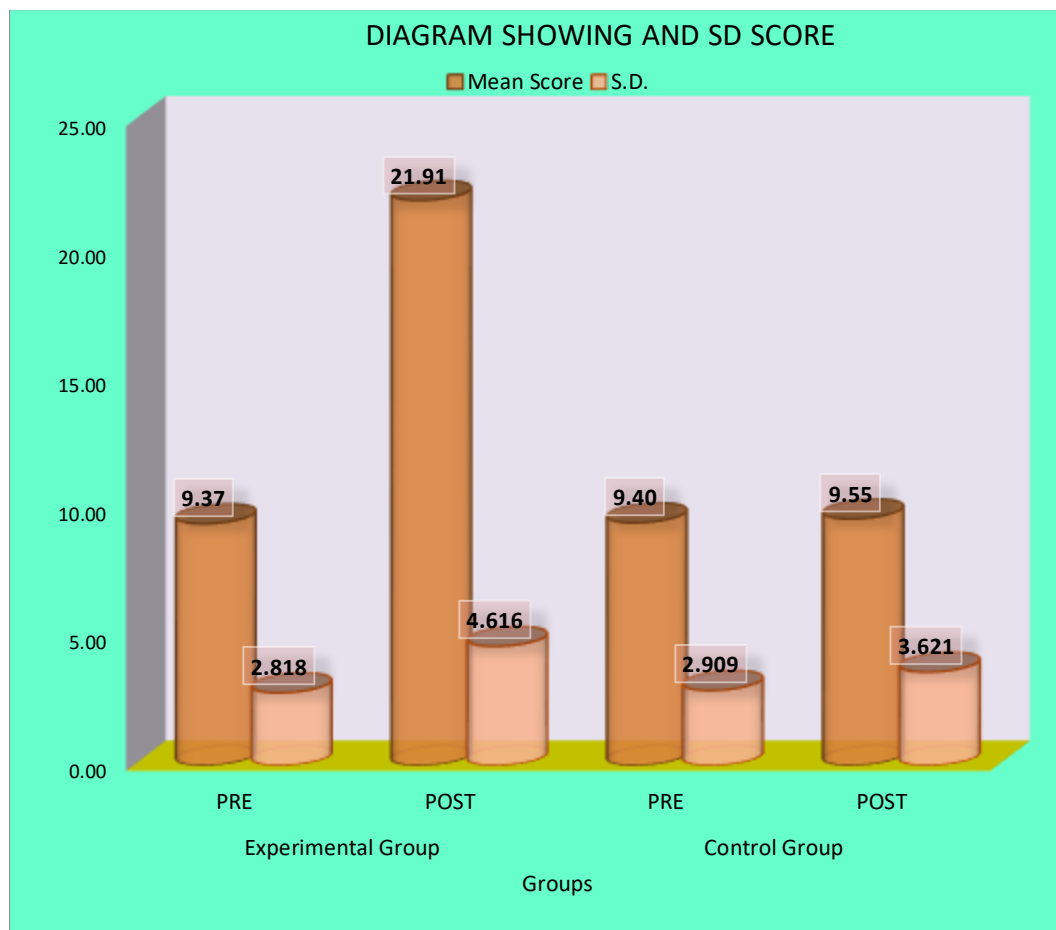
Figure no. 17: Bar diagram representing comparison Within the Groups level of knowledge representing effectiveness of intervention.
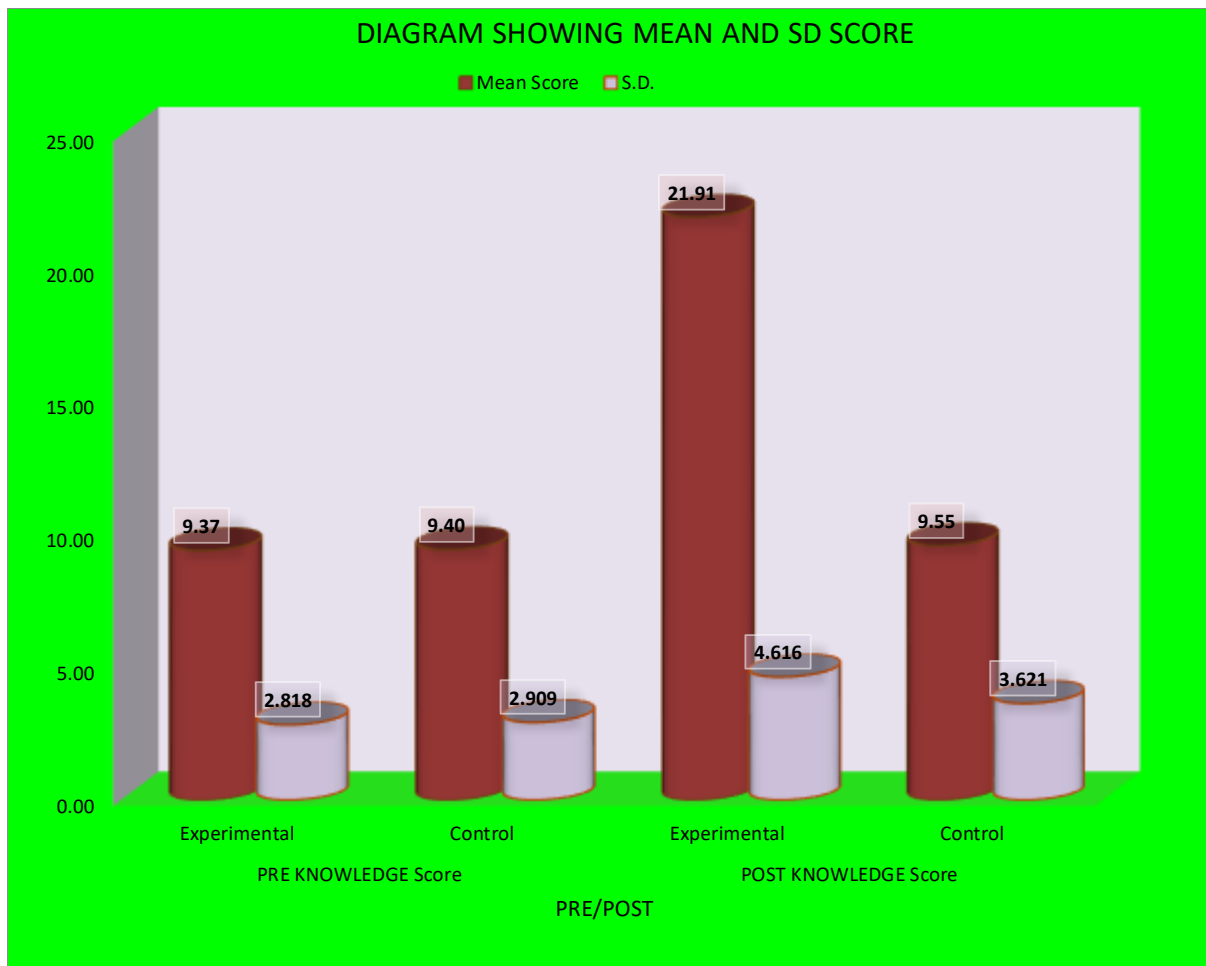
- **Figure no. 18: Bar diagram representing comparison Between the Groups level of knowledge representing effectiveness**

3.5 (Pre Experimental)

Table No: 9. Showing Association of knowledge Scores and Demographic Variables.

This section deals with the findings related to the association between score and selected demographic variables. The chi-square test was used to determine the association between the score levels and selected demographic variables.

Demographic variables		Association of knowledge score with demographic variables (pre knowledge) experimental group							
Variables	**Opts**	**Adequate**	**Moderate**	**Inadequate**	**Chi Test**	**P Value**	**df**	**Table Value**	**Result**
Age	10-11 Years	0	0	40	116.617	0.000	6	12.592	Significant
	11-12 Years	0	0	40					
	12-13 Years	0	0	40					
	13-14 Years	0	16	24					
	15-16 Years	0	17	23					
	15-17 Years	0	16	24					

	17-19 Years	0	34	6					
Gender	Boy	0	45	95	0.839	0.360	1	3.841	Not Significant
	Girl	0	38	102					
Type of family	Joint	0	19	73	18.741	0.000	2	5.991	Significant
	Nuclear	0	56	78					
	Extended	0	8	46					
Class / Grade	6th	0	0	40	116.617	0.000	6	12.592	Significant
	7th	0	0	40					
	8th	0	0	40					
	9th	0	16	24					
	10th	0	17	23					
	11th	0	16	24					
	12th	0	34	6					
Family income monthly	Less than Rs.15000	0	41	66	16.092	0.001	3	7.815	Significant
	15001-20000	0	35	72					
	20001-30000	0	5	33					
	More than 30000	0	2	26					
Residential Area	Rural	0	14	50	4.219	0.121	2	5.991	Not Significant
	Urban	0	67	136					
	Other	0	2	11					
Qualification of mother	Matriculation	0	48	107	1.540	0.673	3	7.815	Not Significant
	Under graduation	0	29	70					
	Post graduation	0	6	17					
	Informal Education	0	0	3					
Qualification of father	Matriculation	0	57	93	17.199	0.001	3	7.815	Significant
	Under graduation	0	13	74					
	Post graduation	0	11	17					
	Informal Education	0	2	13					
Occupation of Father	Service	0	40	55	12.092	0.007	3	7.815	Significant
	Business	0	24	82					
	Agriculture	0	8	35					
	Other	0	11	25					
Occupation of Mother	Service	0	7	26	1.928	0.588	3	7.815	Not Significant
	Business	0	14	26					
	At home	0	61	141					
	Other	0	1	4					
Use of	1 year	0	7	44	8.566	0.036	3	7.815	Significant

smartphone duration	2 years	0	12	28				
	3 years	0	11	28				
	4 years	0	53	97				

Age:

There's a significant association between age and pre-knowledge scores (Chi-Square = 116.617, p-value = 0.000). This suggests that age groups may have different baseline knowledge levels. However, without the table values, it's difficult to pinpoint exactly which age groups differ.

Gender:

No significant association exists between gender and pre-knowledge scores (Chi-Square = 0.703, p-value = 0.402). This indicates that boys and girls in the experimental group had similar baseline knowledge levels before the intervention

Type of Family:

A significant association is found between family type and pre-knowledge scores (Chi-Square = 18.741, p-value = 0.000). This suggests that pre-knowledge may vary depending on whether participants come from joint, nuclear, or extended families.

Class/Grade:

Similar to age, there's a significant association between class/grade and pre-knowledge scores (Chi-Square = 116.617, p-value = 0.000). This indicates that students in different grades likely had varying baseline knowledge levels.

Family Income:

A significant association exists between family income and pre-knowledge scores (Chi-Square = 16.092, p-value = 0.001). This suggests that pre-knowledge may vary depending on the family's monthly income level.

Residential Area

No significant association is found between residential area (rural, urban, other) and pre-knowledge scores (Chi-Square = 4.219, p-value = 0.121). This suggests that location may not have a significant impact on baseline knowledge in this study.

Mother's Qualification:

No significant association exists between mother's qualification and pre-knowledge scores (Chi-Square = 1.540, p-value = 0.673). This indicates that the mother's education level may not be a major factor influencing pre-knowledge in this experiment.

Father's Qualification:

A significant association is found between father's qualification and pre-knowledge scores (Chi-Square = 17.199, p-value = 0.001). This suggests that the father's education level may be linked to the pre-knowledge of participants in the experimental group.

Father's Occupation:

There's a significant association between father's occupation (service, business, agriculture, other) and pre-knowledge scores (Chi-Square = 12.092, p-value = 0.007). This suggests that the father's profession may be related to the baseline knowledge of participants.

Mother's Occupation:

No significant association exists between mother's occupation (service, business, at home, other) and pre-knowledge scores (Chi-Square = 1.928, p-value = 0.588). Similar to mother's qualification, her occupation may not be a major factor influencing pre-knowledge.

Smartphone Usage Duration:

A significant association is found between smartphone usage duration and pre-knowledge scores (Chi-Square = 8.566, p-value = 0.036). This suggests that the length of time participants use smartphones may be linked to their pre-existing knowledge.

3.6   (Post –Test Experimental Group)

Table No: 10; Table Showing Association of Scores and Demographic Variables

This section deals with the findings related to the association between score and selected demographic variables. The chi-square test was used to determine the association between the score levels and selected demographic variables.

Demographic variables		Association of knowledge score with demographic variables (post knowledge)experimental group						
Variables	Opts	Adequate	Moderate	Inadequate	Chi Test	P Value	df	Table Value	Result
Age	10-11 Years	3	36	1	202.877	0.000	12	21.026	Significant
	11-12 Years	5	34	1					
	12-13 Years	21	19	0					
	13-14 Years	40	0	0					
	15-16 Years	40	0	0					
	15-17 Years	40	0	0					
	17-19 Years	40	0	0					
Gender	Boy	91	47	2	2.540	0.281	2	5.991	Not Significant
	Girl	98	42	0					
Type of family	Joint	43	47	2	34.680	0.000	4	9.488	Significant
	Nuclear	111	23	0					
	Extended	35	19	0					
Class / Grade	6th	3	36	1	202.877	0.000	12	21.026	Significant
	7th	5	34	1					
	8th	21	19	0					
	9th	40	0	0					
	10th	40	0	0					
	11th	40	0	0					
	12th	40	0	0					
Family income monthly	Less than15000	74	32	1	3.589	0.732	6	12.592	Not Significant
	15001-20000	70	37	0					
	20001-30000	26	11	1					
	More than 30000	19	9	0					
Residential Area	Rural	40	23	1	1.635	0.803	4	9.488	Not Significant
	Urban	140	62	1					
	Other	9	4	0					
Qualification of mother	Under graduation	65	34	0					
	Post graduation	11	12	0					
	Informal Education	3	0	0					
Qualification of father	Matriculation	118	33	2	19.369	0.004	6	12.592	Significant
	Under graduation	45	42	0					

	Post graduation	20	8	0					
	Informal Education	9	6	0					
Occupation of Father	Service	80	14	1	24.586	0.000	6	12.592	Significant
	Business	56	49	1					
	Agriculture	27	16	0					
	Other	26	10	0					
Occupation of Mother	Service	18	14	1	7.255	0.298	6	12.592	Not Significant
	Business	28	12	0					
	At home	141	60	1					
	Other	2	3	0					
Use of smartphone duration	1 year	20	31	0	27.289	0.000	6	12.592	Significant
	2 years	28	12	0					
	3 years	27	11	1					
	4 years	114	35	1					

Age:

There's a significant association between age and post-knowledge scores (Chi-Square = 202.877, p-value = 0.000). This suggests that age groups may have achieved different levels of knowledge after the intervention.

Gender:

No significant association exists between gender and post-knowledge scores (Chi-Square = 2.399, p-value = 0.301). This indicates that boys and girls in the experimental group had similar knowledge levels after the intervention.

Type of Family:

A significant association is found between family type and post-knowledge scores (Chi-Square = 34.680, p-value = 0.000). This suggests that knowledge gain after the intervention may vary depending on whether participants come from joint, nuclear, or extended families.

Class/Grade:

Similar to age, there's a significant association between class/grade and post-knowledge scores (Chi-Square = 202.877, p-value = 0.000). This indicates that students in different grades likely achieved varying levels of knowledge from the intervention.

Family Income:

No significant association is found between family income and post-knowledge scores (Chi-Square = 3.589, p-value = 0.732). This suggests that the intervention's effectiveness may not be strongly influenced by family income in this study.

Residential Area:

No significant association exists between residential area (rural, urban, other) and post-knowledge scores (Chi-Square = 1.635, p-value = 0.803). This indicates that location may not have a significant impact on knowledge gain from the intervention.

Mother's Qualification:

No significant association is found between mother's qualification and post-knowledge scores (Chi-Square = 8.690, p-value = 0.192). Similar to pre-test scores, the mother's education level may not be a major factor influencing knowledge gain in this experiment.

Father's Qualification:

A significant association is found between father's qualification and post-knowledge scores (Chi-Square = 19.369, p-value = 0.004). This suggests that the father's education level may be linked to the knowledge gain of participants in the experimental group after the intervention.

Father's Occupation:

There's a significant association between father's occupation (service, business, agriculture, other) and post-knowledge scores (Chi-Square = 24.586, p-value = 0.000). This suggests that the father's profession may be related to the knowledge gain of participants.

Mother's Occupation:

No significant association exists between mother's occupation (service, business, at home, other) and post-knowledge scores (Chi-Square = 7.255, p-value = 0.298). Similar to pre-test scores and mother's qualification, her occupation may not be a major factor influencing knowledge gain.

Smartphone Usage Duration:

A significant association is found between smartphone usage duration and post-knowledge scores (Chi-Square = 27.289, p-value = 0.000). This suggests that the length of time participants use smartphones may be linked to their knowledge gain from the intervention

3.7 (Pre- test Control group)

Table No: 11; Table Showing Association of Scores and Demographic Variables of control group

This section deals with the findings related to the association between knowledge score and selected demographic variables. The chi-square test was used to determine the association between the knowledge score levels and selected demographic variables

Demographic variables		Association of knowledge score with demographic variables (pre knowledge) control group							
Variables	Opts	Adequate	Moderate	Inadequate	Chi Test	P Value	df	Table Value	Result
Age	10-11 Years	0	0	40	120.632	0.000	12	21.026	Significant
	11-12 Years	0	0	40					
	12-13 Years	0	0	40					
	13-14 Years	0	18	22					
	15-16 Years	0	18	22					
	15-17 Years	0	15	25					
	17-19 Years	2	31	7					
Gender	Boy	0	44	96	2.521	0.284	2	5.991	Not Significant
	Girl	2	38	100					
Type of family	Joint	0	18	63	22.484	0.000	4	9.488	Significant
	Nuclear	2	56	78					
	Extended	0	8	55					
Class / Grade	6th	0	0	40	120.632	0.000	12	21.026	Significant
	7th	0	0	40					
	8th	0	0	40					
	9th	0	18	22					
	10th	0	18	22					
	11th	0	15	25					
	12th	2	31	7					

Family income monthly	Less than Rs.15000	2	41	61	15.036	0.020	6	12.592	Significant
	15001-20000	0	30	78					
	20001-30000	0	7	33					
	More than Rs.30000	0	4	24					
Residential Area	Rural	0	16	56	5.219	0.266	4	9.488	Not Significant
	Urban	2	64	129					
	Other	0	2	11					
Qualification of mother	Matriculation	1	41	100	0.429	0.999	6	12.592	Not Significant
	Under graduation	1	30	72					
	Post graduation	0	10	22					
	Informal education	0	1	2					
Qualification of father	Matriculation	1	47	87	21.588	0.001	6	12.592	Significant
	Under graduation	0	14	75					
	Post graduation	0	17	21					
	Informal education	1	4	13					
Occupation of Father	Service	1	40	51	21.979	0.001	6	12.592	Significant
	Business	0	22	84					
	Agriculture	0	7	39					
	Other	1	13	22					
Occupation of Mother	Service	0	7	22	1.872	0.931	6	12.592	Not Significant
	Business	0	11	31					
	At home	2	63	139					
	Other	0	1	4					
Use of smartphone duration	<1 year	0	7	41	12.284	0.056	6	12.592	Not Significant
	1-2 years	0	12	30					
	2-3 years	1	10	35					
	3-4 and above	1	53	90					

Age

There's a significant association between age and pre-knowledge scores (Chi-Square = 120.632, p-value = 0.000). This suggests that age groups in the control group may have had different baseline knowledge levels.

Gender:

No significant association exists between gender and pre-knowledge scores (Chi-Square = 2.445, p-value = 0.294). This indicates that boys and girls in the control group likely had similar baseline knowledge levels before the experiment.

Type of Family:

A significant association is found between family type and pre-knowledge scores (Chi-Square = 22.484, p-value = 0.000). This suggests that pre-knowledge may vary depending on whether participants come from joint, nuclear, or extended families in the control group.

Class/Grade:

Similar to age, there's a significant association between class/grade and pre-knowledge scores (Chi-Square = 120.632, p-value = 0.000). This indicates that students in different grades within the control group likely had varying baseline knowledge levels.

Family Income:

A significant association exists between family income and pre-knowledge scores (Chi-Square = 15.036, p-value = 0.020). This suggests that pre-knowledge may vary depending on the family's monthly income level in the control group.

Residential Area:

No significant association is found between residential area (rural, urban, other) and pre-knowledge scores (Chi-Square = 5.219, p-value = 0.266). This suggests that location may not have a significant impact on baseline knowledge in the control group.

Mother's Qualification:

No significant association exists between mother's qualification and pre-knowledge scores (Chi-Square = 0.429, p-value = 0.999). Similar to the experimental group, the mother's education level may not be a major factor influencing pre-knowledge in the control group.

Father's Qualification:

A significant association is found between father's qualification and pre-knowledge scores (Chi-Square = 21.588, p-value = 0.001). This suggests that the father's education level may be linked to the pre-knowledge of participants in the control group.

Father's Occupation:

There's a significant association between father's occupation (service, business, agriculture, other) and pre-knowledge scores (Chi-Square = 21.979, p-value = 0.001). This suggests that the father's profession may be related to the baseline knowledge of participants in the control group.

Mother's Occupation:

No significant association exists between mother's occupation (service, business, at home, other) and pre-knowledge scores (Chi-Square = 1.872, p-value = 0.931). Similar to the experimental group and mother's qualification, her occupation may not be a major factor influencing pre-knowledge.

Smartphone Usage Duration:

The association between smartphone usage duration and pre-knowledge scores is marginally non-significant (Chi-Square = 12.284, p-value = 0.056). This suggests that the length of time participants use smartphones may be weakly linked to their pre-existing knowledge in the control group. However, with a slightly larger sample size or a stronger association, the result might be significant.

3.8   (Post- test Control group)

Table No: 12; Table Showing Association of Scores and Demographic Variables of post control

This section deals with the findings related to the association between knowledge score and selected demographic variables. The chi-square test was used to determine the association between the score levels and selected demographic variable.

Demographic variables		Association of knowledge score with demographic variables (post knowledge) control group							
Variables	Opts	Adequate	Moderate	Inadequate	Chi Test	P Value	df	Table Value	Result
Age	10-11 Years	0	0	40	148.782	0.000	12	21.026	Significant
	11-12 Years	0	0	40					
	12-13 Years	0	0	40					
	13-14 Years	0	18	22					
	15-16 Years	0	22	18					
	15-17 Years	0	16	24					
	17-19 Years	5	31	4					
Gender	Boy	0	47	93	5.584	0.061	2	5.991	Not Significant
	Girl	5	40	95					

Type of family	Joint	0	19	62					
	Nuclear	5	58	73	24.800	0.000	4	9.488	Significant
	Extended	0	10	53					
Class /Grade	6th	0	0	40					
	7th	0	0	40					
	8th	0	0	40					
	9th	0	18	22	148.782	0.000	12	21.026	Significant
	10th	0	22	18					
	11th	0	16	24					
	12th	5	31	4					
Family income monthly	Less than Rs.15000	3	42	59					
	15001-20000	2	35	71	15.798	0.015	6	12.592	Significant
	20001-30000	0	6	34					
	More than 30000	0	4	24					
Residential Area	Rural	0	20	52					
	Urban	5	65	125	4.918	0.296	4	9.488	Not Significant
	Other	0	2	11					
Qualification of mother	Matriculation	3	44	95					
	Under graduation	1	33	69					
	Post graduation	1	9	22	0.983	0.986	6	12.592	Not Significant
	Informal education	0	1	2					
Qualification of father	Matriculation	2	49	84					
	Under graduation	0	19	70					
	Post graduation	2	15	21	13.987	0.030	6	12.592	Significant
	Informal education	1	4	13					
Occupation of Father	Service	3	38	51					
	Business	0	25	81	15.885	0.014	6	12.592	Significant
	Agriculture	0	12	34					
	Other	2	12	22					
Occupation of Mother	Service	0	7	22					
	Business	0	13	29	3.206	0.783	6	12.592	Not Significant
	At home	5	66	133					
	Other	0	1	4					
Use of smartphone duration	<1 year	0	10	38					
	1-2 years	0	11	31	9.916	0.128	6	12.592	Not Significant
	2-3 years	2	12	32					
	3-4 years and	3	54	87					

	above										

Age:

There's a significant association between age and post-knowledge scores (Chi-Square = 148.782, p-value = 0.000). This suggests that age groups in the control group may have achieved different levels of knowledge after the intervention (even though they weren't part of the experimental group that received the intervention).

Gender:

No significant association exists between gender and post-knowledge scores (Chi-Square = 5.549, p-value = 0.062). This indicates that boys and girls in the control group likely had similar knowledge levels after a period with no intervention.

Type of Family:

A significant association is found between family type and post-knowledge scores (Chi-Square = 24.800, p-value = 0.000). This suggests that knowledge gain in the control group, even without an intervention, may vary depending on whether participants come from joint, nuclear, or extended families.

Class/Grade:

Similar to age, there's a significant association between class/grade and post-knowledge scores (Chi-Square = 148.782, p-value = 0.000). This indicates that students in different grades within the control group likely achieved varying levels of knowledge even without any intervention.

Family Income:

A significant association exists between family income and post-knowledge scores (Chi-Square = 15.798, p-value = 0.015). This suggests that knowledge gain in the control group may be influenced by the family's monthly income level.

Residential Area:

No significant association is found between residential area (rural, urban, other) and post-knowledge scores (Chi-Square = 4.918, p-value = 0.296). This suggests that location may not have a significant impact on knowledge gain in the control group, even without an intervention.

Mother's Qualification:

No significant association exists between mother's qualification and post-knowledge scores (Chi-Square = 0.983, p-value = 0.986). Similar to the experimental group, the mother's education level may not be a major factor influencing knowledge gain in the control group, even without a specific intervention.

Father's Qualification:

A significant association is found between father's qualification and post-knowledge scores (Chi-Square = 13.987, p-value = 0.030). This suggests that the father's education level may be linked to the knowledge gain of participants in the control group, even without an intervention.

Father's Occupation:

There's a significant association between father's occupation (service, business, agriculture, other) and post-knowledge scores (Chi-Square = 15.885, p-value = 0.014). This suggests that the father's profession may be related to the knowledge gain of participants in the control group, even without a dedicated intervention.

Mother's Occupation:

No significant association exists between mother's occupation (service, business, at home, other) and post-knowledge scores (Chi-Square = 3.206, p-value = 0.783). Similar to the experimental and pre-test control groups, her occupation may not be a major factor influencing knowledge gain.

Smartphone Usage Duration:

The association between smartphone usage duration and post-knowledge scores is not significant (Chi-Square = 9.916, p-value = 0.128). This suggests that the length of time participants use smartphones is unlikely to be linked to their knowledge gain in the control group, even without an intervention.

3.9   Association Within the gr0ups

Table No: 13; Table Showing Association Group Wise Item Wise Analysis of Knowledge Scores.

Questions	Pre Experimental Correct (%)	Pre-Control Correct (%)	PostExperimental Correct (%)	Post-Control Correct (%)
Qno.1	50	50	82	50
Qno.2	39	38	75	39
Qno.3	36	43	76	35
Qno.4	34	36	73	35
Qno.5	29	28	77	29
Qno.6	29	29	75	30
Qno.7	31	30	70	32
Qno.8	34	34	71	35
Qno.9	38	39	73	39
Qno.10	34	33	72	35
Qno.11	40	39	72	40
Qno.12	30	30	73	30
Qno.13	40	41	74	40
Qno.14	28	29	63	29
Qno.15	28	29	68	28
Qno.16	28	28	73	28
Qno.17	40	40	79	40
Qno.18	35	35	79	36
Qno.19	39	38	82	39
Qno.20	33	33	66	32
Qno.21	32	33	64	33
Qno.22	32	31	69	33
Qno.23	26	26	73	29
Qno.24	24	23	71	24
Qno.25	19	18	73	19
Qno.26	27	25	73	27
Qno.27	26	26	73	28
Qno.28	23	23	80	22

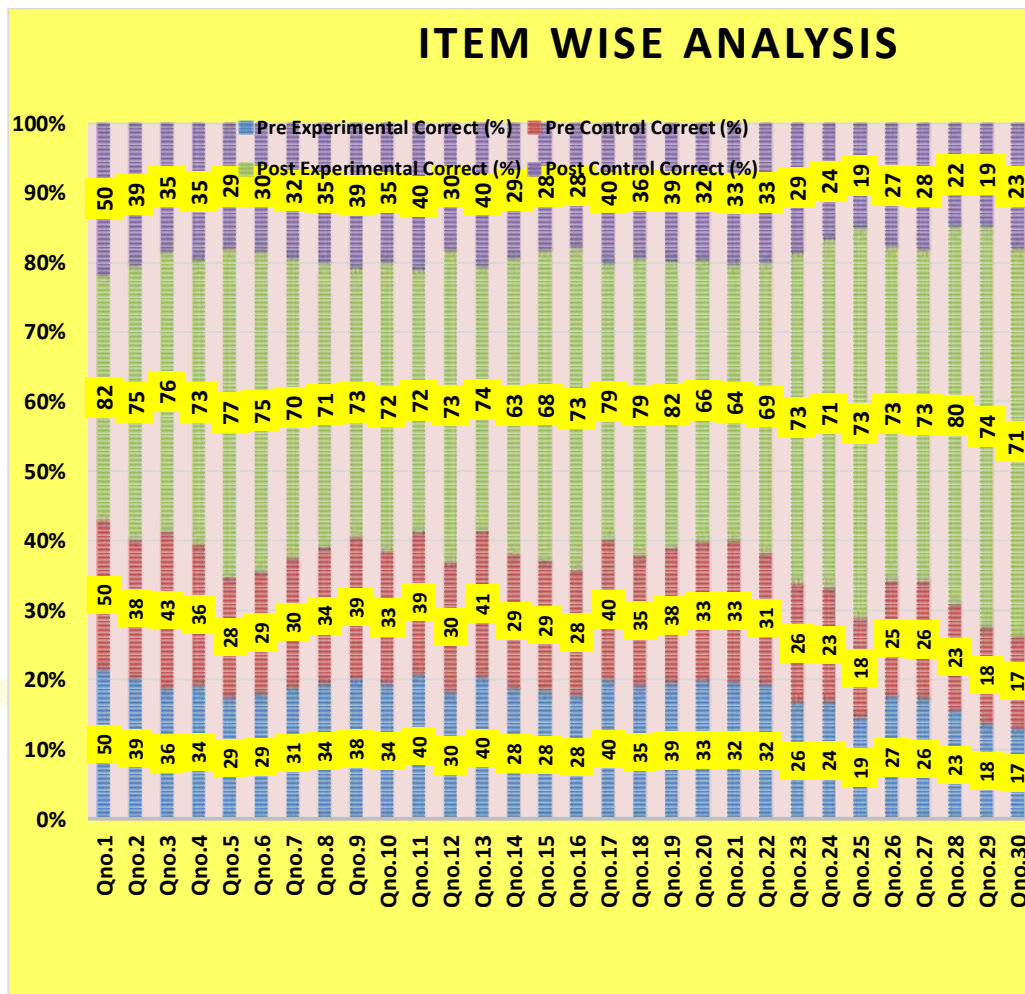|				
Qno.29	18	18	74	19
Qno.30	17	17	71	23

Figure no.19: Diagram representing comparison of Item-Wise Analysis Between the Pre Experimental & Pre Control groups.

Table No: 14. Descriptive score according to Demographic variables. (Pre -test score) Experimental group

Demographic variables		Knowledge score with demographic variables (pre knowledge) experimental group			
Variables	Opts	Mean%	Mean	SD	N
Age	10-11 Years	23.6%	7.08	1.00	40
	11-12 Years	21.3%	6.38	0.90	40

	12-13 Years	22.8%	6.83	1.11	40
	13-14 Years	35.3%	10.60	1.34	40
	15-16 Years	35.8%	10.75	1.28	40
	15-17 Years	35.3%	10.60	1.34	40
	17-19 Years	44.5%	13.35	2.46	40
Gender	Boy	31.5%	9.46	2.87	140
	Girl	30.9%	9.28	2.77	140
Type of family	Joint	28.2%	8.46	2.85	92
	Nuclear	34.2%	10.26	2.70	134
	Extended	29.0%	8.70	2.36	54
Class / Grade	6th	23.6%	7.08	1.00	40
	7th	21.3%	6.38	0.90	40
	8th	22.8%	6.83	1.11	40
	9th	35.3%	10.60	1.34	40
	10th	35.8%	10.75	1.28	40
	11th	35.3%	10.60	1.34	40
	12th	44.5%	13.35	2.46	40
Family income monthly	Less than Rs.15000	31.7%	9.51	3.08	107
	15001-20000	31.7%	9.52	2.76	107
	20001-30000	31.0%	9.29	2.69	38
	More than 30000	27.7%	8.32	1.94	28
Residential Area	Rural	29.6%	8.88	2.76	64
	Urban	31.8%	9.54	2.85	203
	Other	30.3%	9.08	2.53	13
Qualification of mother	Matriculation	31.4%	9.41	2.88	155
	Under graduation	31.5%	9.44	2.71	99
	Post graduation	29.0%	8.70	3.07	23
	Informal education	32.2%	9.67	0.58	3
Qualification of father	Matriculation	33.0%	9.89	2.89	150
	Under graduation	28.7%	8.62	2.39	87
	Post graduation	32.5%	9.75	3.22	28
	Informal education	26.0%	7.80	2.18	15
Occupation of Father	Service	34.0%	10.19	2.66	95
	Business	30.0%	9.00	2.80	106
	Agriculture	28.0%	8.40	2.76	43
	Other	31.5%	9.44	2.86	36
Occupation of Mother	Service	29.3%	8.79	2.41	33
	Business	31.4%	9.43	2.85	40
	At home	31.6%	9.47	2.88	202
	Other	29.3%	8.80	2.77	5

	<1 year	26.2%	7.86	2.33	51
Use of smartphone duration	1-2 years	30.9%	9.28	2.44	40
	2-3 years	31.9%	9.56	2.96	39
	3-4 years and above	32.8%	9.85	2.87	150

Age: Knowledge scores increase with age, with the 17-19 years group having the highest mean score (M = 13.35, SD = 2.46) and the 11-12 years group having the lowest (M = 6.38, SD = 0.90).

Gender: Boys and girls had similar knowledge scores, with boys having a slightly higher mean score (M = 9.46, SD = 2.87) compared to girls (M = 9.28, SD = 2.77).

Type of Family: Students from nuclear families had the highest mean knowledge score (M = 10.26, SD = 2.70), while those from joint families had the lowest (M = 8.46, SD = 2.85).

Class/Grade: Knowledge scores were highest among 12th-grade students (M = 13.35, SD = 2.46) and lowest among 7th-grade students (M = 6.38, SD = 0.90).

Family Income Monthly: Students from families earning between Rs. 15001-20000 had the highest mean knowledge score (M = 9.52, SD = 2.76), while those from families earning more than Rs. 30000 had the lowest (M = 8.32, SD = 1.94).

Residential Area: Urban students had a slightly higher mean score (M = 9.54, SD = 2.85) compared to rural students (M = 8.88, SD = 2.76).

Qualification of Mother: Students whose mothers had other qualifications (M = 9.67, SD = 0.58) had the highest mean score, while those with post-graduate mothers had the lowest (M = 8.70, SD = 3.07).

Qualification of Father: Students whose fathers had a matriculation qualification had the highest mean score (M = 9.89, SD = 2.89), while those with fathers having other qualifications had the lowest (M = 7.80, SD = 2.18).

Occupation of Father: Students with fathers in service had the highest mean score (M = 10.19, SD = 2.66), while those with fathers in agriculture had the lowest (M = 8.40, SD = 2.76).

Occupation of Mother: Knowledge scores were highest among students whose mothers were at home (M = 9.47, SD = 2.88) and lowest among those whose mothers were in service (M = 8.79, SD = 2.41).

Use of Smartphone Duration: Students using smartphones for four years had the highest mean score (M = 9.85, SD = 2.87), while those using smartphones for one year had the lowest (M = 7.86, SD = 2.33).

Table No: 15; Descriptive score according to Demographic variables. (PRE -TEST SCORE) Control group

Demographic variables		Knowledge score with demographic variables (pre knowledge) control group			
Variables	**Opts**	**Mean%**	**Mean**	**SD**	**N**
Age	10-11 Years	23.9%	7.18	0.96	40
	11-12 Years	21.6%	6.48	1.01	40
	12-13 Years	22.9%	6.88	1.18	40
	13-14 Years	35.3%	10.60	1.28	40
	15-16 Years	35.5%	10.65	1.29	40
	15-17 Years	34.9%	10.48	1.40	40

	17-19 Years	45.3%	13.58	3.07	40
Gender	Boy	31.3%	9.39	2.76	140
	Girl	31.4%	9.41	3.06	140
Type of family	Joint	28.6%	8.59	2.56	81
	Nuclear	34.7%	10.41	3.11	136
	Extended	27.6%	8.27	2.03	63
Class / Grade	6th	23.9%	7.18	0.96	40
	7th	21.6%	6.48	1.01	40
	8th	22.9%	6.88	1.18	40
	9th	35.3%	10.60	1.28	40
	10th	35.5%	10.65	1.29	40
	11th	34.9%	10.48	1.40	40
	12th	45.3%	13.58	3.07	40
Family income monthly	Less than Rs.15000	32.7%	9.80	3.43	104
	15001-20000	31.5%	9.44	2.71	108
	20001-30000	29.8%	8.93	2.23	40
	More than 30000	28.3%	8.50	2.08	28
Residential Area	Rural	29.7%	8.90	2.50	72
	Urban	32.0%	9.59	3.06	195
	Other	31.0%	9.31	2.56	13
Qualification of mother	Matriculation	31.1%	9.32	2.75	142
	Under graduation	31.6%	9.48	2.95	103
	Post graduation	31.7%	9.50	3.59	32
	Informal education	33.3%	10.00	1.00	3
Qualification of father	Matriculation	32.6%	9.79	2.92	135
	Under graduation	28.7%	8.60	2.42	89
	Post graduation	33.0%	9.89	2.92	38
	Informal education	31.5%	9.44	4.19	18
Occupation of Father	Service	34.3%	10.30	2.89	92
	Business	29.4%	8.81	2.44	106
	Agriculture	28.7%	8.61	2.84	46
	Other	32.9%	9.86	3.65	36
Occupation of Mother	Service	30.8%	9.24	2.61	29
	Business	30.5%	9.14	2.52	42
	At home	31.7%	9.50	3.04	204
	Other	29.3%	8.80	2.77	5
Use of smartphone duration	<1 year	26.9%	8.06	2.18	48
	1-2 years	29.7%	8.90	2.37	42
	2-3 years	31.7%	9.52	3.51	46
	3-4 years and above	33.2%	9.96	2.91	144

Age: Knowledge scores increase with age, with the 17-19 years group having the highest mean score (M = 13.58, SD = 3.07) and the 11-12 years group having the lowest (M = 6.48, SD = 1.01).

Gender: Boys and girls had almost identical knowledge scores, with boys having a mean score of 9.39 (SD = 2.76) and girls a mean score of 9.41 (SD = 3.06).

Type of Family: Students from nuclear families had the highest mean knowledge score (M = 10.41, SD = 3.11), while those from extended families had the lowest (M = 8.27, SD = 2.03).

Class/Grade: Knowledge scores were highest among 12th-grade students (M = 13.58, SD = 3.07) and lowest among 7th-grade students (M = 6.48, SD = 1.01).

Family Income Monthly: Students from families earning less than Rs. 15000 had the highest mean knowledge score (M = 9.80, SD = 3.43), while those from families earning more than Rs. 30000 had the lowest (M = 8.50, SD = 2.08).

Residential Area: Urban students had a slightly higher mean score (M = 9.59, SD = 3.06) compared to rural students (M = 8.90, SD = 2.50).

Qualification of Mother: Students whose mothers had other qualifications (M = 10.00, SD = 1.00) had the highest mean score, while those with post-graduate mothers had the lowest (M = 9.50, SD = 3.59).

Qualification of Father: Students whose fathers had a post-graduate qualification had the highest mean score (M = 9.89, SD = 2.92), while those with fathers having an undergraduate qualification had the lowest (M = 8.60, SD = 2.42).

Occupation of Father: Students with fathers in service had the highest mean score (M = 10.30, SD = 2.89), while those with fathers in agriculture had the lowest (M = 8.61, SD = 2.84).

Occupation of Mother: Knowledge scores were highest among students whose mothers were at home (M = 9.50, SD = 3.04) and lowest among those whose mothers were in business (M = 9.14, SD = 2.52).

Use of Smartphone Duration: Students using smartphones for four years had the highest mean score (M = 9.96, SD = 2.91), while those using smartphones for one year had the lowest (M = 8.06, SD = 2.18)

Table No: 16; Descriptive score according to Demographic variables. (POST-TEST SCORE) Experimental Group.

Demographic variables		Knowledge score with demographic variables of post experimental group			
Variables	**Opts**	**Mean%**	**Mean**	**SD**	**N**
Age	10-11 Years	48.5%	14.55	3.39	40
	11-12 Years	57.1%	17.13	2.85	40
	12-13 Years	71.3%	21.38	1.89	40
	13-14 Years	80.0%	24.00	0.72	40
	15-16 Years	83.4%	25.03	1.58	40
	15-17 Years	85.2%	25.55	1.47	40
	17-19 Years	85.9%	25.78	1.21	40
Gender	Boy	72.6%	21.79	4.73	140
	Girl	73.5%	22.04	4.52	140
Type of family	Joint	65.4%	19.62	5.07	92
	Nuclear	78.3%	23.49	3.84	134
	Extended	73.1%	21.93	3.95	54
Class / Grade	6th	48.5%	14.55	3.39	40
	7th	57.1%	17.13	2.85	40
	8th	71.3%	21.38	1.89	40
	9th	80.0%	24.00	0.72	40

	10th	83.4%	25.03	1.58	40
	11th	85.2%	25.55	1.47	40
	12th	85.9%	25.78	1.21	40
Family income monthly	Less than Rs.15000	73.9%	22.16	4.30	107
	15001-20000	73.2%	21.97	4.66	107
	20001-30000	71.8%	21.55	5.58	38
	More than 30000	70.8%	21.25	4.32	28
Residential Area	Rural	70.2%	21.06	4.90	64
	Urban	74.1%	22.22	4.49	203
	Other	71.0%	21.31	4.89	13
Qualification of mother	Matriculation	73.9%	22.17	4.36	155
	Under graduation	72.4%	21.71	5.06	99
	Post graduation	68.6%	20.57	4.22	23
	Informal Education	86.7%	26.00	1.00	3
Qualification of father	Matriculation	76.2%	22.85	4.13	150
	Under graduation	67.7%	20.32	5.05	87
	Post graduation	74.4%	22.32	4.34	28
	Informal Education	70.0%	21.00	4.86	15
Occupation of Father	Service	79.2%	23.75	3.42	95
	Business	67.8%	20.35	5.24	106
	Agriculture	71.2%	21.35	4.13	43
	Other	74.5%	22.36	4.28	36
Occupation of Mother	Service	65.8%	19.73	4.88	33
	Business	73.3%	22.00	4.91	40
	At home	74.4%	22.31	4.43	202
	Other	65.3%	19.60	4.62	5
Use of smartphone duration	1 year	63.8%	19.14	4.49	51
	2 years	71.1%	21.33	4.49	40
	3 years	75.6%	22.67	4.47	39
	4 years	76.1%	22.82	4.37	150

Age: Knowledge scores increased with age, with the 17-19 years group having the highest mean score (M = 25.78, SD = 1.21) and the 10-11 years group having the lowest (M = 14.55, SD = 3.39).

Gender: Girls had a slightly higher mean score (M = 22.04, SD = 4.52) compared to boys (M = 21.79, SD = 4.73).

Type of Family: Students from nuclear families had the highest mean score (M = 23.49, SD = 3.84), while those from joint families had the lowest (M = 19.62, SD = 5.07).

Class/Grade: Knowledge scores were highest among 12th-grade students (M = 25.78, SD = 1.21) and lowest among 6th-grade students (M = 14.55, SD = 3.39).

Family Income Monthly: Students from families earning less than Rs. 15000 had the highest mean score (M = 22.16, SD = 4.30), while those from families earning more than Rs. 30000 had the lowest (M = 21.25, SD = 4.32).

Residential Area: Urban students had a slightly higher mean score (M = 22.22, SD = 4.49) compared to rural students (M = 21.06, SD = 4.90).

Qualification of Mother: Students whose mothers had other qualifications had the highest mean score (M = 26.00, SD = 1.00), while those with post-graduate mothers had the lowest (M = 20.57, SD = 4.22).

Qualification of Father: Students whose fathers had matriculation qualifications had the highest mean score (M = 22.85, SD = 4.13), while those with undergraduate fathers had the lowest (M = 20.32, SD = 5.05)

Occupation of Father: Students with fathers in service had the highest mean score (M = 23.75, SD = 3.42), while those with fathers in business had the lowest (M = 20.35, SD = 5.24).

Occupation of Mother: Students whose mothers were at home had the highest mean score (M = 22.31, SD = 4.43), while those with mothers in service had the lowest (M = 19.73, SD = 4.88).

Use of Smartphone Duration: Students using smartphones for four years had the highest mean score (M = 22.82, SD = 4.37), while those using smartphones for one year had the lowest (M = 19.14, SD = 4.49).

Table No: 17; Descriptive score according to Demographic variables. (POST-TEST SCORE) Control Group;

Demographic variables		Knowledge score with demographic variables (post knowledge) control group			
Variables	**Opts**	**Mean%**	**Mean**	**SD**	**N**
Age	10-11 Years	21.7%	6.50	1.40	40
	11-12 Years	20.4%	6.13	1.24	40
	12-13 Years	23.2%	6.95	1.22	40
	13-14 Years	35.8%	10.73	1.30	40
	15-16 Years	36.5%	10.95	1.34	40
	15-17 Years	35.7%	10.70	1.49	40
	17-19 Years	49.8%	14.93	4.49	40
Gender	Boy	31.6%	9.47	3.12	140
	Girl	32.1%	9.64	4.07	140
Type of family	Joint	28.3%	8.49	3.14	81
	Nuclear	36.1%	10.82	3.95	136
	Extended	27.2%	8.17	2.30	63
Class / Grade	6th	21.7%	6.50	1.40	40
	7th	20.4%	6.13	1.24	40
	8th	23.2%	6.95	1.22	40
	9th	35.8%	10.73	1.30	40
	10th	36.5%	10.95	1.34	40
	11th	35.7%	10.70	1.49	40
	12th	49.8%	14.93	4.49	40
Family income monthly	Less than Rs.15000	33.3%	9.98	4.26	104
	15001-20000	32.1%	9.64	3.51	108
	20001-30000	29.4%	8.83	2.47	40
	More than 30000	28.9%	8.68	2.51	28
Residential Area	Rural	29.8%	8.94	2.97	72
	Urban	32.6%	9.78	3.84	195

	Other	31.8%	9.54	3.38	13
Qualification of mother	Matriculation	31.9%	9.58	3.69	142
	Under graduation	31.7%	9.50	3.38	103
	Post graduation	31.9%	9.56	4.29	32
	Informal education	33.3%	10.00	1.00	3
Qualification of father	Matriculation	33.1%	9.94	3.48	135
	Under graduation	28.6%	8.58	2.93	89
	Post graduation	34.5%	10.34	4.37	38
	Informal education	32.6%	9.78	5.13	18
Occupation of Father	Service	35.4%	10.63	3.93	92
	Business	29.2%	8.75	2.99	106
	Agriculture	29.2%	8.76	3.09	46
	Other	33.9%	10.17	4.37	36
Occupation of Mother	Service	30.5%	9.14	3.08	29
	Business	30.2%	9.05	2.86	42
	At home	32.4%	9.73	3.85	204
	Other	30.0%	9.00	2.55	5
Use of smartphone duration	<1 year	26.5%	7.96	2.49	48
	1-2 years	28.7%	8.62	2.86	42
	2-3 years	32.9%	9.87	4.71	46
	3-4 years and above	34.2%	10.26	3.54	144

Age: There is a clear trend of increasing knowledge scores with age. Students aged 17-19 years had the highest mean score (M = 14.93, SD = 4.49), while those aged 11-12 years had the lowest (M = 6.13, SD = 1.24).

Gender: Both boys and girls showed similar mean knowledge scores, with girls slightly higher (M = 9.64, SD = 4.07) compared to boys (M = 9.47, SD = 3.12).

Type of Family: Students from nuclear families had notably higher knowledge scores (M = 10.82, SD = 3.95) compared to those from joint (M = 8.49, SD = 3.14) or extended families (M = 8.17, SD = 2.30).

Class/Grade: Knowledge scores increased with higher grades, with 12th-grade students showing the highest mean score (M = 14.93, SD = 4.49) and 7th-grade students the lowest (M = 6.13, SD = 1.24).

Family Income Monthly: There is a slight decrease in mean knowledge scores as family income increases. For instance, students from families earning less than Rs. 15,000 monthly had higher scores (M = 9.98, SD = 4.26) compared to those from higher income brackets. **Residential Area**: There is minimal variation in knowledge scores across different residential areas (rural, urban, other), with urban areas showing slightly higher mean scores (M = 9.78, SD = 3.84).

Qualification of Parents: Generally, higher parental education levels (matriculation, under graduation, post graduation) correspond to higher knowledge scores. For example, students with fathers who had post graduation showed higher scores (M = 10.34, SD = 4.37) compared to those with lower educational qualifications.

Occupation of Parents: Students whose fathers were in service had higher knowledge scores (M = 10.63, SD = 3.93) compared to those in business (M = 8.75, SD = 2.99) or agriculture (M = 8.76, SD = 3.09). Similarly, mothers who were employed showed slightly higher scores (M = 9.14, SD = 3.08) compared to those at home (M = 9.73, SD = 3.85).

Use of Smartphone Duration: There is a trend of increasing knowledge scores with longer durations of smartphone use. Students who used smartphones for 4 years had the highest mean score (M = 10.26, SD = 3.54), while those using them for 1 year had the lowest (M = 7.96, SD = 2.49).

Acknowledgement

Discussion. and summary

In this study among 560 subjects , the pre- test knowledge score was only 2 (0.37%) had adequate knowledge followed by 165(29.23%) had moderate knowledge score with the remained 293 (70.50%) had shown the inadequate knowledge score regarding smartphone addiction . The Mean knowledge score of pre-test of the experimental group was 9.37(31.23%) and the Mean knowledge score of the pre-test of the control group was 9.40 (31.35%). After intervention there was a substantial gain in knowledge compared to the pre-test scores   was seen with the significant difference in the adequate knowledge score of experimental group) that mean score was 21.91(73.5%) but the post test knowledge score in the control group was almost the same as pre- test with mean score of 9.55 (3.31.85%). As reported in the post test knowledge score of experimental group 189 (67.5 %) subjects have adequate knowledge score, followed by 89 (31.8%) shown moderate knowledge score, where only 2 (0.7%) subjects had reported the inadequate knowledge score. It is here to discused that in previous study, that was conducted by Mohender singh yadav ,(2021) among 285 adolescents at selected schools that 156 (54.70%) participants had a low mobile dependency and 191 (67%) participants had negative behavioural changes while 125 (43.90%) participants had shown decreased academic performance due to overuse of the mobile phone of selected schools of

Rishikesh, Uttarakhand, India. This study also described a significant relationship between mobile phone dependency with behavioural changes and academic achievement among adolescents. One of the other previous study had described the prevalence of smartphone addiction that was found 53.3% (n = 312) in the overall sample of 600 comprises, 54.5% in males (n = 109), and 52.7% (n = 203) in females. While before COVID the smartphone addiction prevalence in adolescents in the Philippines (21%), Hong Kong (18%) and England (10%). This study had also showed higher addiction prevalence that found in medical students in India (24.65%), Poland (37.02%), and Spain (14.9%)

Findings related to knowledge score regarding smartphone addiction and associated health problems among adolescents;

In this study among 560 subjects , the pre- test knowledge score was only 2 (0.37%) had adequate knowledge followed by 165(29.23%) had moderate knowledge score with the remained 293 (70.50%) had shown the inadequate knowledge score regarding smartphone addiction . The mean knowledge score of pre-test of the experimental group was 9.37(31.23%) and the mean knowledge score of the pre-test of the control group was 9.40 (31.35%). After intervention there was a substantial gain in knowledge compared to the pre-test scores was seen with the significant difference in the adequate knowledge score of experimental group) that mean score was 21.91(73.5%) but the post test knowledge score in the control group was almost the same as pre- test with mean score of 9.55 (3.31.85%). As reported in the post test knowledge score of experimental group 189 (67.5 %) subjects have adequate knowledge score, followed by 89 (31.8%) shown moderate knowledge score, where only 2 (0.7%) subjects had reported the inadequate knowledge score. On the other hand reported in the post- test knowledge score, the subjects of the control group shown the score almost same with pre test effect that is 5 (1.8%) subjects had adequate knowledge , followed by 87 (31.1%) had moderate and 188 (67.1%) had shown the inadequate knowledge score .

REFERENCES:

1. Https://news.un.org/en/story/2023/07/1139122, Manos Antoninis ; 26 July 2023Culture and Education.

2.Jongserl Chun,Hae Kook Lee,hyesook Jeon,Jinyung Kim &Serim Lee;Impact of COVID-19 on Adolescents' Smartphone Addiction in South Korea Pages 268-280 | Published ;https://doi.org/10.1080/19371918.2022.2134252.

3. Kamran Qureshi*, Pooja Thore, Sneha Rajan. International Journal of Community Medicine and Public Health| May2022| Vol 9| Issue 5Page 2208-2213.

4. WHO maternal, new-born, child and adolescent health. Adolescent development:

Acritical-transition.Available http://www.who.int/maternal_child_adolescent/topics/adolescence/dev/en.

5. Mahender Yadav (2021) Impact of mobile phone dependence on behaviour and academic performance of adolescents in selected schools of Uttarakhand, India.Journal of Education and Health Promotion 10(1):1-7DOI:10.4103/jehp.jehp-915.

6. Digital Eye Strain Report 2015.Health Risks of Using Mobile Phones. From http://source.southuniversity.edu/health-risks-of-using-mobile-phones-137310.aspx.

7. www.helpguide.org; HelpGuide.org.7. Smetaniuk P. A preliminary investigation into the prevalence and prediction of problematic cell phone use. J Behav Addict 2014 Mar;3(1):41–53. https://doi.org/10.1556/JBA.3.2014.004 8. Mohammad Asad Bin Yousuf Impact of Internet and Smartphone Usage Among Children In Bangladesh. International Journal for Multidisciplinary Research (IJFMR) E-ISSN: 2582-2160 .IJFMR23044196 Volume 5, Issue 4, July-August 2023 1.

9. Ruchi Soni, Ritesh Upadhyay,(2017).Prevalence of smart phone addiction, sleep quality and associated behaviour problems in adolescents. International Journal of Research in Medical Sciences 5(2):515.

10. World Health Organization [Online] Available from:URL:http://www.who.int/features/qa/30/en

11. Babadi-Akashe Z, Zamani BE, Abedini Y, Akbari H, Hedayati N. The Relationship between Mental Health and Addiction to Mobile Phones among University Students of Shahrekord, Iran. Addict Health. 2014; 6:93 -9.

12. Kim SE, Kim JW, Jee YS. Relationship between smartphone addiction and physical activity in Chinese international students in Korea. J Behav Addict. 2015;4:200-5

13. Mccrann S, Loughman J, Butler JS, Paudel N, Flitcroft DI. Smartphone use as a possible risk factor for myopia. Clin Exp Optom. 2021;104:35-41.

14. Hassan Hosseinzadeh ,Zubair Ahmed Ratan, Anne-Maree Parrish, Sojib Bin Zaman,and Mohammad Saud Alotaibi, Int J Environ Res Public Health. 2021 Nov; 18(22): 12257. Published online doi: 10.3390/ijerph182212257PMCID: PMC8622754 PMID: 34832011

15. Patel, R. (2015, June 17). Cell Phone use before bedtime might impact sleep, and daytime tiredness. Retrieved November 30, 2015, from https://u.osu.edu/emotionalfitness/2015/06/17/cell-phone-use-before-bedtime-might-impact-sleep-and-daytime-tiredness/

16. Shinde, M., & Patel, S. (2014). Co-Relation between"Problematic Internet Use" And Mental Health in Professional Education Students. International Journal of Science and Research (IJSR), 3(2), 194-202. Available at http://www.ijsr.net/archive/v3i2/MDIwMTM5MzE=.pdf

17. Dangers of Texting Whilst Driving. Retrieved November 30, 2015, from http://www.trl.co.uk/case-studies/behaviour-dangers-of-texting-whilst-driving.

18. Lee H, Ahn H, Nguyen TG, Choi SW, Kim DJ. Comparing the Self-Report and Measured SmartphoneUsage of CollegeStudents: A Pilot Study. Psychiatry Investig, 14 (2),2017, 198-204.

19. Yan Z. Child and Adolescent Use of Mobile Phones: An Unparalleled Complex Developmental Phenomenon.Child Development, 89(1),2017, 1-12.

20. Sanjeev Davey and Anuradha Davey; Int J Prev Med. 2014 Dec; 5(12): 1500–1511.Assessment of Smartphone Addiction in Indian Adolescents: A Mixed Method Study by Systematic-review and Meta-analysis Approach. PMCID: PMC4336980PMID: 25709785.

21. Kwon, M., Lee, J. Y., Won, W. Y., Park, J. W., Min, J. A., Hahn, C., & Kim, D. J. (2013). Development and validation of a smartphone addiction scale (SAS). PloS one, 8(2), e56936.

22: Mukherjee S. & Dasgupta S. (2020). Development and validation of the smartphone use scale. International Journal of Indian Psychology, 8(4), 494-499. DIP:18.01.061/20200804, 23.Hsien-Yuan Lane,1,2,3,† Chin-Jui Chang,4,† Chieh-Liang Huang,5 and Yun-Hsuan Chang3,6,7,8,9,Paul B. Tchounwou, Academic Editor; An Investigation into Smartphone Addiction with Personality and Sleep Quality among University Students. 24.Ayar,DijlephD,RN;Gurkan,KubraPinar.PhD,RN,CIN;Computers,Informatics,Nursing40(4);p230-235,April2022.DOI;10.1097/CIN0000000000000834

25. Tang Z, Zhang H, Yan A, Qu C. Time Is Money: The Decision Making of Smartphone High Users in Gain and Loss Intertemporal Choice. Front Psychol, 8, 2017, 363.

26. Davey S, Davey A. Assessment of SmartphoneAddiction in IndianAdolescents: A Mixed Method Study by Systematic-review and Meta-analysis Approach. Int J Prev Med., 5(12),2014, 1500-11. .

27. ElhaiJD, Dvorak RD, Levine JC, Hall BJ. Problematicsmartphone use: A conceptualoverview and systematicreview of relations with anxiety and depressionpsychopathology. J Affect Disord, 207, 2017, :251-259.

28. Yang SY, Chen MD, Huang YC, Lin CY, Chang JH. Association between Smartphone use and Musculoskeletal Discomfort in Adolescent Students.J Community Health, 42(3), 2017, 423 .

29. Hetal Shah1, Anjali Puntambekar and, K.J.Somaiya College of Physiotherapy, Everard Nagar, Sion, India.Awareness of Smartphone Addiction inUrban Teenagers. International Journal of Humanities and Social S cience Invention (IJHSSI) ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714 www.ijhssi.org ||Volume 7 Issue 06 Ver. I ||Jun. 2018 || PP.84-86.

30. WHO.   Management   of   substance   abuse: Dependence Syndrome.from: http://www.who.int/substance_abuse/terminology/definition1/en .

31. Prekshaa Jain,Sachin Ratan Gedam, Sevagram Wardha,Pradeep Patil,Datta Meghe Institute of Medical Sciences (Deemed University; June , 2019.Open Journal of Psychiatry & Allied Sciences.A study of smartphone addiction: prevalence, pattern of use, and personality dimensions among medical students from rural region of central India. 10(2):132,DOI:10.5958/2394-2061.2019.00029.

32. Aljohara A. Alhassan, Ethar M. Alqadhib,Adel F. Almutairi .BMC Psychiatry volume 18, Article number: 148 (2018) Cite this article hhindwara institute of medical sciences Chhindwara Madhya Pradesh India.

33. Navya Gangadharan, Anmol L Bole and Saurav Basu. Mobile Phone Addiction as an Emerging Behavioral Form of Addiction Among Adolescents in India. Cureus 2022,Apr; 14(4): e23798. PMID: 35518537

34. Kumar AK, Sherkhane MS.Assessment of gadgets addiction and its impact on health among undergraduates. Int J Community Med,Public Health 2018;5:3624-8.

35. Mamatha SL, Hanakeri PA, Aminabhavi VA. Impact of gadgets on emotional maturity, reasoning ability of college students. Int J Applied Res.2016;2(3):749-55.

36. *Rubio, Gabriel; Rodríguez de Fonseca, Fernando; De-Sola Gutiérrez, José (2016).* "Cell-Phone Addiction: A Review". *Frontiers in Psychiatry. 7: 175*.doi:10.3389/fpsyt.2016.00175 ISSN 1664,0640. PMC 5076301. PMID 27822187

37. *Elhai, Jon D.; Dvorak, Robert D.; Levine, Jason C.; Hall, Brian J. (January 2017). "Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology". Journal of Affective Disorders. 207: 251–259.* doi:10.1016/j.jad.2016.08.030. PMID 27736736. S2CID 205642153.

38. "WHO guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age" (PDF). *World Health Organization.* Archived (PDF) *from the original on 8 May 2019.*

39. *Sela, A.; Rozenboim, N.; Chalutz Ben-Gal, Hila (2022).* "Smartphone use behavior and quality of life: What is the role of awareness?". *PLOS ONE. 17 (3): e0260637.* Bibcode:2022PLoSO..1760637S. doi:1 0.1371/journal.pone.0260637. PMC 8916658. PMID 35275929.

40.*Andreassen, Cecilie Schou; Pallesen, Ståle; Griffiths, Mark D. (1 January 2017).* "The relationship between addictive use of social media, narcissism, and self-esteem: Findings from a large national   survey".*Addictive   Behaviors. 64: 287– 293.* doi:10.1016/j.addbeh.2016.03.006. ISSN 0306-4603. PMID 27072491.

41. Signs and Symptoms of Cell Phone Addiction. *PsychGuides.com.* Archived *from the original on 10 November 2019.*

42. *Andreassen, Cecilie Schou; Pallesen, Ståle; Griffiths, Mark D. (1 January 2017).* "The relationship between addictive use of social   media,   narcissism,   and   self-esteem: Findings   from   a   large   national   survey". *Addictive   Behaviors. 64:287- 293.* Doi:10.1016/j.addbeh.2016.03.006. ISSN 0306-4603. PMID 27072491. Archived *from the original on 19January 2018.*

43. Andreassen, C. (2015). Online Social Network Site Addiction: A Comprehensive Review. Current Addiction Reports, 2015(2), 175-184. Doi:10.1007/s40429-015-0056-9

44. Sayeda Mohamed Mohamed, Mona Hamdy Mostafa.Impact of smartphone addiction on depression and self-esteem among nursing students. https://doi.org/10.1002/nop2.506First published: 19 May 2020.

45. Ms. Shankhabela Mukherjee1*, Dr. Subrata Dasgupta 2 . Development and validation of the smartphone use scale. The International Journal of Indian   Psychology ISSN 2348-5396 (Online) | ISSN: 2349-3429 (Print) Volume 8, Issue 4, Oct- Dec, 2020 DIP: 18.01.061/20200804, DOI: 10.25215/0804.061 http://www.ijip.in

46. Zixuan Tang,1 Huijun Zhang,1,2,3 An Yan,1 and Chen Qu .Time Is Money: The Decision Making of Smartphone High Users in   Gain   and   Loss   Intertemporal   Choice.   Psychol.   2017;   8:   363.   Published   online   2017 Mar10.doi: 10.3389/fpsyg.2017.00363PMCID: PMC5344 929PMID: 28344568.

47.https://www.statista.com/statistics/467163/forecast-of-smartphone-users-in-india/#:~:text=Technology%20%26%20Telecommunications%E2%80%BA,Imprint

48. Kamran Qureshi*, Pooja Thore, Sneha Rajan . A Cross-sectional study to analyze the pattern of smartphone usage among adolescents in urban slum of a metropolitan city.International Journal of Community Medicine and Public Health. 2022 May;9 (5):2208-2213 http://www.ijcmph.com p ISSN 2394-6032 | e ISSN 2394-6040 DOI:.

49. Smartphone users around the World Statistics and Facts. Available at: http://www.go-gulf.com/blog/ smartphone. Accessed on 20November 2021.

50. Hassaan M, Jareebi M A, AlKaabi H A, et al. (January 25, 2024) Prevalence of Thumb and Wrist Pain among Smartphone Users in the SaudiArabian General Population: A Cross-Sectional Study. Cureus 16(1): e52922. DOI 10.7759/cureus.52922

51. Noor-i-Kiran Naeem .Smartphone usage and its associated behaviors

Among undergraduate medical students in Pakistan. Research square , april 2024 . DOI: https://doi.org/10.21203/rs.3.rs-3928350/v1

52 .Mathew K V and Walarine, 1Department of Physiotherapy, Composite Regional Centre for Persons with Disabilities-Kozhikode, Medical College P.O, Kozhikode, Kerala, India. 2 Department of Medical-Surgical Nursing, MIMS College of Nursing, Malappuram, India. Journal of Ideas in Health (2020); 3(Special 1):201-204 International License (http://creativecommons.org/licenses/by/4.0/), e ISSN: 2645-9248

53. Alotaibi, M. S., Fox, M., Coman, R., Ratan, Z. A., & Hosseinzadeh, H. (2022). Perspectives and Experiences of Smartphone Overuse among University Students in Umm Al-Qura University (UQU), Saudi Arabia: A Qualitative Analysis. International Journal of Environmental Research and Public Health, 19(7). https://doi.org/10.3390/ijerph19074397

54.Toh SH, Coenen P, Howie EK, Smith AJ, Mukherjee S, Mackey DA, et al. A prospective longitudinal study of mobile touch screen device use and musculoskeletal symptoms and visual health in adolescents. Appl Ergon. 2020; 85:103028. https://doi.org/10.1016/j.apergo.2019.103028

55. Zhuang L, Wang L, Xu D, Wang Z, Liang R. Association between excessive smartphone use and cervical disc degeneration in young patients suffering from chronic neck pain. J Orthop Sci. 2020; https://doi.org/10.1016/j.jos.2020.02.009

56. Sun Y, Li Y, Bao Y, Meng S, Sun Y, Schumann G, et al. Brief Report: Increased Addictive Internet and Substance Use Behavior During the COVID-19 Pandemic in China. Am J Addict 2020 ;29 (4):268–70. https://doi.org/10.1111/ajad.13066

57. Ella Thorburn*, Rodney Pope and Shaoyu Wang.Musculoskeletal symptoms among adult smartphone and tablet device users: a retrospective study .Archives of Physiotherapy (2021) 11:1

58. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, et al. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). Int J Surg 2020; 76: 71–6. https://doi.org/10.1016/j.ijsu.2020.02.034

59. Ahmad Osailan. The relationship between smartphone usage duration (using smartphone's ability monitor to screen time) with hand-grip and pinch-grip strength among young people:an observational study. Osailan BMC Musculoskeletal Disorders (2021) 22:186 .https://doi.org/10.1186/s12891-021-04054-6

60 .Panida Hanphitakphong, PT1, Orawan Keeratisiroj, PT, PhD2,Nuanlaor Thawinchai, PT, PhD3,Smartphone addiction and its association with upper body musculoskeletal symptoms among university students classified by age and gender. Journal of Physical Therapy science , 33: 394–400, 2021(by-nc-nd) License. (CC-BY-NC-ND 4.0:

61.Zhuang L, Wang L, Xu D, Wang Z, Liang R. Association between excessive smartphone use and cervical disc degeneration in young patients suffering from chronic neck pain. J Orthop Sci. 2020; https://doi.org/10.1016/j.jos.2020.02.009 .

62. Mohani M R, Phansopkar P, Seth N H, et al. (March 27, 2024) .The Prevalence of Nomophobia in Medical Undergraduate Students of Central India. Cureus 16(3): e57056. DOI 10.7759/cureus. 57056.

63.Alotaibi, M.S.; Fox, M.;Coman, R.; Ratan, Z.A.; Hosseinzadeh, H. Smartphone .Addiction Prevalence and Its Association on Academic Performance, Physical Health, and MentalWell-Being among University Students in Umm Al-Qura University (UQU), Saudi Arabia. Int. J. Environ.Res. Public Health 2022, 19, 3710.https://doi.org/10.3390/ ijerph19063710.

64. Özden Yaşarer1,2*, Emel Mete3, Reyhan Kaygusuz Benli4, Berivan Beril Kılıç2, Halis Doğan5 and Zübeyir Sarı. Association between smartphone addiction and myofascial trigger points. Research, BMC Musculoskeletal Disorders (2024) 25:254 https://doi.org/10.1186/s12891-024-07383-4.

65. Lee S, Kang H, Shin G. Head flexion angle while using a smartphone. Ergonomics. 2015 Feb 17;58(2):220–6. https://doi.org/10.1080/00140139.2014.967311 .Mathew K V and Walarine, Journal of Ideas in Health (2020); 3(Special 1):201-204 204.

66 . Chen, L., Liu, R., Zeng, H., Xu, X., Zhu, R., Sharma, M., & Zhao, Y. (2018). Predicting the time spent playing computer and mobile games among medical undergraduate students using interpersonal relations and social cognitive theory: A cross-sectional survey in Chongqing, China. International Journal of Environmental Research and Public Health, 15(8). https://doi.org/10.3390/ijerph15081664

67. Xie, X, Zhao, F, Xie, J.   & Lei, L. (2016). Symbolization of mobile phone and life satisfaction among adolescents in rural areas of China: Mediating of school-related relationships. Computers in Human Behavior, 64, 694–702. doi:10.1016/j.chb.2016.07.053

68. Jahagirdar, V., Rama, K., Soppari, P., & Kumar, M. V. (2021). Mobile Phones: Vital Addiction or Lethal Addiction? Mobile Phone Usage Patterns and Assessment of Mobile Addiction amongUndergraduate Medical Students in Telangana, India. Journal of Addiction, 2021 . **https://doi.org/10.1155/2021/8750650**.

69. Kamal, S., Kamal, S., Mubeen, S. M., Shah, A. M., Samar, S. S., Zehra, R., Khalid, H., & Naeem, R.(2022). Smartphone addiction and its associated behaviors among medical and dental students in Pakistan: A cross-sectional survey. Journal of Education and Health Promotion, https://doi.org/10.4103/jehp.jehp-494-21

70. Kaysi, F., Yavuz, M., & Aydemir, E. (2021). Investigation of university students' smartphone usage levels and effects. International Journal of Technology in Education and Science (IJTES), 5(3), 411-426. https://doi.org/10.46328/ijtes.235

71.Leonard Yik-Chuan Lei, Muhd Al-Aarifin Ismail, Jamilah Al-Muhammady Mohammad and Muhamad Saiful Bahri Yusoff (2020)..The relationship of smartphone addiction with psychological distress and neuroticism among university medical students. https://doi.org/10.1186/s40359-020-00466-6.Citation:BMC Psychology 2020 8:97

72. Nowreen N, Ahad F. Effect of smartphone usage on quality of sleep in medical students. Natl J Physiol Pharm Pharmacol. (2018), [cited March 14, 2024]; 8(10): 1366-1370. doi:10.5455/njppp.2018.8.0620009062018

73. Shakoor, F., Fakhar, A., & Abbas, J. (2021). Impact of Smartphones Usage on the Learning Behaviour and Academic Performance of Students: Empirical Evidence from Pakistan. International Journal of Academic Research in Business and Social Sciences, 11(2). https://doi.org/10.6007/ijarbss/v11-i2/8902.

74. Sharma, N., Advani, U., Sharma, L., Jain, M., Sharma, K., & Dixit, A. (2019). Pattern of mobile phoneusage among medical students. International Journal of Academic Medicine, 5(2).https://doi.org/10.4103/IJAM.IJAM-61-18

75. https://en.wikipedia.org/wiki/Problematic_smartphone_use

76. Setiadi, R., Tini, T., Sukamto, E., & Kalsum, U. (2019). The risk of smartphone addiction to emotional mental disorders among junior high school students. Belitung Nursing Journal, 5(5), 197–203. Https://doi.org/10.33546/bnj.841

77. Zhong, Y., Ma, H., Liang, Y. F., Liao, C. J., Zhang, C. C., & Jiang, W. J. (2022). Prevalence of smartphone addiction among Asian medical students: A meta-analysis of multinational observational studies. International Journal of Social Psychiatry (Vol. 68, Issue 6). https://doi.org/10.1177/00207640221089535

78. Vengadessin N, Ramasubramani P, Saya GK (2024). Anxiety and depression during post covid-19 lockdown period among medical students, and it's relation with stress and smartphone addiction in India. Int J Adolesc Med Health. 2024 Apr 2; 36(2):195-201. doi: 10.1515/ijamh-2023-0180. eCollection 2024 Apr 1.PMID: 38557447

79. Gangadharan Navya, L Borle Amod and Saurav Basu, April 2022 Mobile Phone Addiction as an Emerging Behavioral Form of Addiction among Adolescents in India."HomeMedicineAddiction MedicineAddiction Public Health Foundation of India,Cureus 14(4),DOI:10.7759/cureus.23798.

80. Jain Prekshaa, Sachin Ratan Gedam, Wardha Sevagram and Patil Pradeep .Study of smartphone addiction: prevalence, pattern of use, and personality dimensions among medical students from rural region of central India. June 2019 .Open Journal of Psychiatry & Allied Sciences 10(2):132, DOI:10.5958/2394-2061.2019.00029.6.