EFFECTIVENESS OF OPHTHALMIC EXERCISES UPON COMPUTER VISION SYNDROME AMONG INFORMATION TECHNOLOGY (IT) PROFESSIONALS

By

MS. REVATHY.C

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

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DECLARATION

I hereby declare that the present dissertation titled **"Effectiveness of ophthalmic exercises upon computer vision syndrome among Information Technology (IT) professionals''** is the outcome of the original research work undertaken and carried out by me, under the guidance of **Dr.Latha Venkatesan M.Sc(N)., M.Phil (N)., Ph.D(N).,** Principal and Professor in Obstetric and Gynecological Nursing, Apollo College of Nursing and **Mrs. Senbahavalli .V., M.Sc.(N), Lecturer.,** Community Health Nursing, Apollo College of Nursing, Chennai. I also declare that the material of this has not formed in anyway, the basis for the award of any other degree or diploma in this university or any other universities.

M.Sc., (N) II Year

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SYNOPSIS

An Experimental Study was Conducted to Assess the Effectiveness of Ophthalmic Exercises Upon Computer Vision Syndrome among Information Technology (IT) professionals in selected IT industries at Chennai.

Objectives of the Study

1. To assess the symptoms of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.
2. To determine the effectiveness of ophthalmic exercises before and after demonstration by comparing the visual disturbance in control and experimental group of IT professionals.
3. To identify the level of satisfaction regarding ophthalmic exercises upon computer vision syndrome in experimental group of IT professionals.
4. To find out the association between selected demographic variables and the level of visual disturbance before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.
5. To find out the association between selected clinical variables and the level of visual disturbance before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.

The conceptual framework of the study was developed on the basis of King's Goal Attainment theory, which is based on the concepts of personal, interpersonal, and social systems including perception, judgement, action, reaction, interaction and transaction.An intensive review of literature and guidance by experts laid foundation for the study. A quasi experimental research approach was used to achieve objectives of the study which was conducted in HOV services as experimental group and Skyline solutions as control, with the sample size of 30 each, selected through purposive sampling technique.

The researcher used validated tools like demographic variable proforma, clinical variable proforma and visual disturbance symptom questionnaire and rating scale to assess the level of satisfaction to collect data from the participants. The data collection tools were validated and reliability was established. The data collection for the main study was done after determining the feasibility and practicability through pilot study. Ophthalmic exercises (blinking, palming and scanning) was demonstrated to the participants and they performed those exercises daily for 15 days. The collected data were tabulated and analyzed using descriptive and inferential statistics.

The Major Findings of the Study

- Majority of the participants of the study were between 21-30 years (67%, 77%) male (77%,73%) undergraduates (90%,86%) works with computers for 6-9 hours (77%,67%) and spends about two hours with computers at home (71%,40%) and most of them were unmarried (63%,67%) has 2.1 - 4years experience (67%,56%) and significant

percentage of participants had monthly income of 30,000-40,000 (43%,37%) in control and experimental groups respectively.

- Majority of IT professionals had not used antiglare screens (100%, 100%) were working in good air conditioning (100%, 100%) had never practiced yoga (77%,60%) and most of them had previous history of visual disturbance (57%, 43%) had taken medical treatment (57%, 43%) had withdrawal of wearing spectacles (64%,40%) taken treatment of dry eye sometimes (53%, 63%) had blink status 8 per minute (57%, 53%) and significant percentage of participants had never used break time to refresh eyes (60%) in control group of IT professionals and sometimes used break time in experimental group (50%) and works at a distance of 15-20 inches (50%) in control group and 10-15 inches (47%) in experimental group and works with font size of 12 and above (50%, 60%) in control and experimental group and respectively.
- In the control group there was no significant difference in the visual disturbance level before (M=11.4; SD=2.7) & after (M=11.8; SD=2.5) ophthalmic exercises. In contrast in the experimental group the visual disturbance level (M=7.96; SD=1.51) after ophthalmic exercises was low, compared to those before ophthalmic exercises (M=10.6; SD= 2.35) respectively. The difference was found to be statistically significant at $p<0.01$, which attributes to the effectiveness of ophthalmic exercises.
- Majority of the IT professionals (100%) were highly satisfied regarding various aspects of demonstration of ophthalmic exercises**.**

- There was significant association between marital status($\chi 2=8.4, df=1$) and visual disturbance level in the control group and between monthly income($\chi 2=11.83, df=3$) and visual disturbance level in the experimental group and there was no significant association with the other selected demographic variables hence the null hypotheses $Ho_{2,}$ which states that there is no significant association between selected demographic variables and level of visual disturbance was partially rejected.
- There was significant association between blinking status($\chi 2=15.8, df=3$), sleeping hours($\chi 2=6.7, df=2$) and visual disturbance level in the control group and between distance between the seat and screen($\chi 2=9.9, df=3$) and visual disturbance level in the experimental group and there was no significant association with the other selected clinical variables hence the null hypotheses $Ho_{3,}$ which states that there is no significant association between selected clinical variables and level of visual disturbance was partially rejected.

Recommendations

- A study can be conducted on larger sample to generalize the results.
- A study can be conducted in BPO centers among different people working in computers.
- A comparative study can be conducted to evaluate the effectiveness of various other intervention to help the IT professionals in reducing their visual disturbance.

- A longitudinal study with time series design can be conducted with the post test at an interval of 2, 4, 6 months to assess the effectiveness of the intervention.

- A comparative study can be conducted to assess the level of visual disturbance with ophthalmic exercises and other intervention.

- A study can be conducted on adolescents using computers for longer period.

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CHAPTER I

INTRODUCTION

“Vision is the art of seeing the invisible”

-Jonathan swift.

Background and Significance of the Study

The way we use our eyes in our daily routine has changed dramatically over the past number of years. More and more tasks are done at a close viewing distance and we are working under a variety of workplace conditions. Lighting is one of the most overlooked and under-emphasized components of our workplace. Whether working at the computer or in a warehouse arena, our field of vision needs to be free of reflections and sources of glare. Our lighting needs to prevent problems not cause them. Lighting and vision are interdependent factors and must both be considered when designing a working environment for maximum efficiency.

Computer use is not restricted to adults. A recent investigation of over 2000 American children between 8 and 18 years of age reported that in an average day they spend approximately 7.5 hours using entertainment media, 4.5 hours watching TV, 1.5 hours on a computer and over an hour playing video games. Some screen sizes may necessitate very small text which the observer frequently positions at a closer viewing distance than had previously been adopted for hard copy printed materials.

Since the advent of video display terminals and personal computers, a condition Known as Computer Vision Syndrome (CVS) has been on the rise. Millions of computer users commonly complain of eyestrain, headaches, double vision, dry and irritated eyes, photophobia, and neck and/or back pain. CVS symptoms can arise from a combination of visual problems, poor computer workstation conditions and improper computer user habits. One of the most significant problems is the reduction in a patient's blink rate. Studies show that individuals blink approximately 66 percent less when using a computer. Possible explanations for the decreased blink rate include concentration on the task or a relatively limited range of eye movement. Consequently, the tear film gets replenished less frequently and evaporates more quickly, causing ocular discomfort.

Recent studies show that 70% of the computer workers worldwide report having visual problems. Nearly, 80% of computer users will develop computer vision syndrome at sometime in their lives, National Institute of Occupational Safety and Health (2011).Currently, Indian Information Technology (IT) Sector is growing rapidly with 2,236,614 working in it. Over 75% of young software professionals and college students in Chennai are facing the vision disorder Computer Vision Syndrome.

Computer stress is caused by an increase in the number and complexity of necessary eye movements and focusing skills, poor lighting conditions, glare and distracting reflections, lack of blinking when on the computer, increased hours on the computer.

Symptoms of computer vision syndrome can also increase the number of errors made during a computer task as well as necessitating more frequent breaks.

Musculoskeletal injuries associated with computer use may account for at least half of all reported work-related injuries in the USA. Indeed, Spekle noted that conservative estimates of the cost of musculoskeletal disorders to the United States economy as reported in 2001, when measured by compensation costs, lost wages and reduced productivity were between 45 and 54 billion dollars annually or 0.8% of gross domestic product. Further, the prevalence of neck, shoulder and arm symptoms in computer workers may be as high as 62%.

It's reasonable to believe that as our society's dependence on computers, on-line services and the Internet increases, so too will the frequency and severity of CVS. What we need is prevention, not a short-term remedy. We need a global treatment plan encompassing not only ocular agents but also patient education and 'user friendly' workstations.

Need for the Study

Humans born with hunters' eyes for distance gazing - but we are no longer hunters. The focus of our vision has shifted in the last 50 years so that, except for driving or hiking, our focus has shifted to reading close and arm's length viewing our computers. The consequences are nearsightedness, poor eye teaming and reduced vision efficiency in our waking life.

Worldwide, approximately 90 million adults use computers regularly. With online training, trading and office work, the use of personal computers (PCs) is growing

exponentially. In almost all offices, colleges, universities and homes today, the computers are becoming common place items. Computer related job opportunities are offering colorful salary and the wide nature of scope for this profession attracts many people into this field. There is a growing body of evidence that use of computers can adversely affect the visual health.

The Computer population in India is 20 Million plus and 80% of them (16 Million) have discomfort due to computer vision syndrome. Considering the rising number of computer users in India, computer related visual problems take an epidemic form. Lack of knowledge about eye health and eye exercises may worsen the severity of the problem. It is the proven fact that eye exercises can reduce the computer vision syndrome. The lack of knowledge about healthy computer use may cause computer related health problems. Hence it is important to train the computer users regarding the eye exercises as it is a critical pre requisite for motivating behaviors and accessing appropriate care.

According to Thompson, the prevalence of ocular symptoms in computer users, as part of the computer vision syndrome, ranges from 25-93%.Studies by Sheedy and co-workers suggest that 1 out of 6 patients requiring eye examinations have a computer-related eye problem. Hales and co-workers reported that approximately 22% of computer workers have musculoskeletal problems, such as neck problems, back problems, shoulder problems, and/or carpal tunnel syndrome. According to the National Institute of Occupational Safety and Health, computer vision syndrome affects some 90% of the people who spend three hours or more a day at a computer.

Given the remarkably high number of hours per day that many individuals now spend viewing small text on electronic screens at close working distances and varying gaze angles, it is incumbent upon all eye care practitioners to have a good understanding of the symptoms associated with, and the physiology underlying Computer Vision Syndrome. As modern society continues to move towards greater use of electronic devices for both work and leisure activities, it seems likely that the visual demands that these places upon our patients will only continue to increase. An inability to satisfy these visual requirements could present significant lifestyle difficulties for patients.

By understanding the connection among comfort, health, and productivity and knowing the many options for effective ergonomic workplace lighting, the nurse can be sensitive to potential visual stress that can affect all areas of performance. The Nurse has great role to play to prevent and to reduce the incidences of computer vision syndrome. It is the extended role of the nurse to reduce the occurrence of computer related occupational hazards as an occupational nurse/industrial nurse.

Statement of the Problem

A Quasi Experimental Study to Assess the Effectiveness of Ophthalmic Exercises upon Computer Vision Syndrome among Information Technology (IT) Professionals in selected IT industries, Chennai.

Objectives of the Study

1. To assess the symptoms of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.
2. To determine the effectiveness of ophthalmic exercises before and after demonstration by comparing the visual disturbance in control and experimental group of IT professionals.
3. To identify the level of satisfaction regarding ophthalmic exercises upon computer vision syndrome in experimental group of IT professionals.
4. To find out the association between selected demographic variables and the level of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.
5. To find out the association between selected clinical variables and the level of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.

Operational Definitions

Effectiveness

In this study, effectiveness refers to determining the extent to which the ophthalmic exercises has achieved the desired effect in alleviating the visual disturbance.

Ophthalmic exercises

In this study, ophthalmic exercise refers to measures like blinking, palming and scanning adopted to relieve symptoms of computer vision syndrome.

Blinking

Typical eye exercises include blinking more frequently. People who work on computers blink about five time less than normal. Because tears evaporate more quickly when people don't blink, dry eye commonly occurs. Blinking slowly 10 times every 20 minutes helps to re-moisturize the eyes.

Palming

First, rub hands together for about 20 seconds. Place the hands over the closed eyes. Take care not to touch the eyelids with the palms, which will protect the eyes from the heat. Rest the elbows on a table to keep the arms from getting tired. Sit this way for a few minutes. The more the person relaxes, the darker the blackness becomes with the eyes closed. Once this occurs the exercise can be concluded.

Scanning

Scanning helps to increase the flexibility of the eyes. While sitting or standing in one end of the room, scan the edges of particular items in the room such as a chair, computer screen, a potted plant, couch or door. This action encourages eye movement in a

natural way. 20-20-20 rule: Looking away from the screen at an object at least 20 feet away every 20 minutes for 20 seconds.

Computer vision syndrome

In this study, computer vision syndrome refers to a condition resulting from focusing eyes in computer display units for uninterrupted periods of time with symptoms like redness, slow refocusing, sensitivity to light, fatigue, dry and irritated eyes, colour distortion, burning eyes, blurred vision, itching eyes and double vision.

IT professionals

In this study, IT professionals refers to persons who has been using computer for more than three hours per day and at least for six months.

Satisfaction

In this study, satisfaction refers to feeling of gratification attained by IT professionals with ophthalmic exercises as measured by self rating scale on ophthalmic exercises.

Assumptions

The study assumes that

- IT professionals develop visual disturbances like redness, slow refocusing, sensitivity to light, fatigue, dry and irritated eyes, burning eyes, blurred vision, itching eyes and double vision.

- Ophthalmic exercises are effective for visual disturbance among long term computer users.

Null Hypotheses

H_{01} There will be no significant difference in visual disturbance level before and after ophthalmic exercises in control and experimental group of IT professionals.

H_{02} There will be no significant association between the selected demographic variables and the level of visual disturbances in control and experimental group of IT professionals.

H_{03} There will be no significant association between the selected clinical variables and the level of visual disturbances in control and experimental group of IT professionals.

Delimitations

The study is delimited to

- study period was limited to 4 weeks only.
- study participants were confined to IT professionals.

Conceptual Framework of the Study

In a study that has its roots in conceptual model, the framework is often called the conceptual framework. The conceptual model deals with the interrelated concepts that are

accessible together in some rational scheme by virtue of their relevance to a common theme (Polit and Beck, 2010).

Conceptual framework of present study is based on King's Goal Attainment Theory**.** According to Imogene King, Nursing is defined as the process of action, reaction, interaction whereby nurses and clients share the information about their perception .Through perception and communication they identified the problem through which they set goals and take necessary action.

King 's Goal Attainment Theory is based on the concepts of personal, interpersonal and social systems including perception, judgement, action, reaction, interaction and transaction.

Perception

A person imports energy from the environment and transforms, processes and stores it. The study assumes that there is interaction between the researcher and participants. In this study researcher perceives that the participants have symptoms of computer vision syndrome which needs to be alleviated .This imposes the need for ophthalmic exercises.

Judgement

Analyze the areas of action to be carried out. In this study researcher analyze the IT professionals for symptoms of computer vision syndrome. Thus the researcher takes decision to carry out the ophthalmic exercises. IT professionals also analyze the need for ophthalmic exercises to relieve symptoms of computer vision syndrome.

Action

Individual experts perceived energy to demonstrate by observable behaviours by taking physical activity. In this study the researcher as well as the participants takes steps to perform ophthalmic exercises. The IT professionals in the control group has no symptom reduction strategy, whereas the experimental group performs ophthalmic exercises.

Reaction

Reaction means developing action and acting on perceived choices for goal attainment. Ophthalmic exercises makes and feels better by the experimental group participants. This makes the researcher to make necessary arrangement to perform ophthalmic exercises.

Interaction

Refers to verbal and nonverbal behaviours between the individual and the environment or among one or two individuals. In this study ophthalmic exercise prevents eye strain. No interaction to the control group and they carry out routine activities.

Transaction

Transaction is the mutually defined goals of two or more individuals and the means to achieve them. They reach an arrangement about how to attain their goals and then set about to realize them. Thus the researcher and participants mutually set the goals. In this study the experimental group shows either satisfactory relief of symptoms or unsatisfactory symptom relief which helps both the researcher and the participants to set goals to alleviate

the future symptoms. The same level of symptoms are maintained in the control group. Results are measured by visual disturbance symptom questionnaires.

Feedback

Outcome may be satisfactory or unsatisfactory. If satisfactory it shows the effect of ophthalmic exercises. If participants feel unsatisfactory plan the activity again. In this study the researcher appraise the level of satisfaction on ophthalmic exercises through rating scale. If the outcome is satisfactory, the ophthalmic exercises can be taught to the control group too in the future. If it is unsatisfactory plan could be modified.

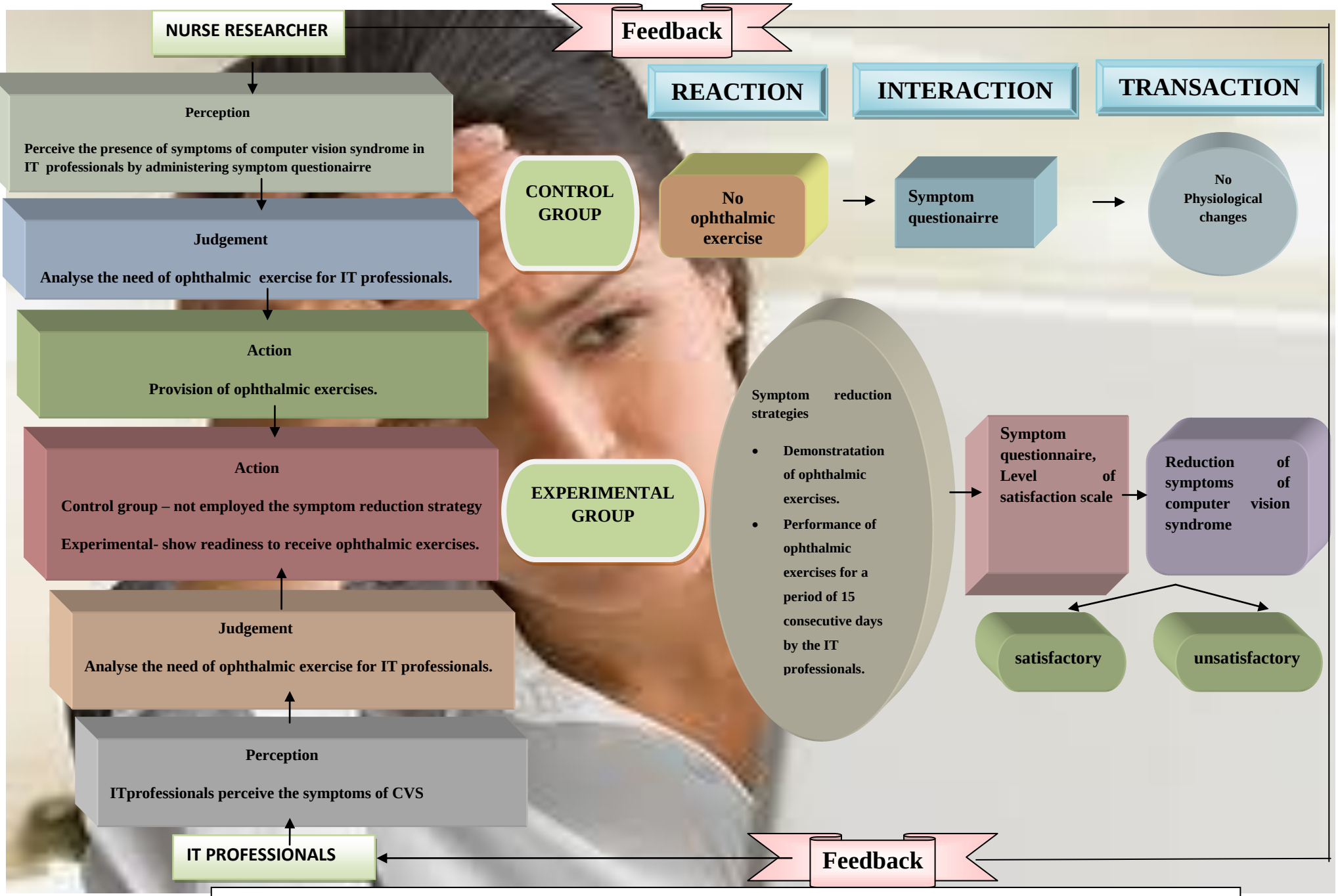

Fig.1.Conceptual Framework based on King's Goal Attainment Model to assess the effectiveness of Ophthalmic Exercises upon Computer Vision Syndrome

Projected Outcome of the Study

The projected outcome of the study will be improvement in the visual disturbance level in the experimental group.

Summary

This chapter dealt with the background of the study, need for the study, statement of the problem, objectives, operational definitions, hypothesis, assumptions, delimitations and conceptual framework.

Organization of the Report

Further aspects of the study are presented in the following chapters,

In Chapter II - Review of literature

In Chapter III - Research methodology

In Chapter IV - Analysis and interpretation of the data

In Chapter V - Discussion

In Chapter VI - Summary, conclusion, implications and recommendations.

CHAPTER II

REVIEW OF LITERATURE

Reviewing the existing literature related to the study is a critical step in the research process. According to Polit & Beck (2010), review of literature is a critical summary of research on a topic of interest, often prepared to put a research problem in context.

This chapter deals with a review of published and unpublished research studies and thus forms related material for the present study. The review helped the researcher to develop an insight into the problem area. This helped the researcher in building foundation of the study.

The review of literature related to the present study is organized under the following headings.

- computer vision syndrome
- ophthalmic exercises
- effectiveness of ophthalmic exercises upon computer vision syndrome

Computer Vision Syndrome

Kaamil (2009) has considered that computers have become ubiquitous in the workplace offices and since computerized jobs are more sedentary, requiring more cognitive processing, mental attention and less physical expenditure of energy, many jobs that require heavy computer use have been found to be stressful. He has selected three hundred and sixty

two clerks of national statistics centre of Iran as participants in his analytic cross-sectional study. All the employees that had worked with computer during the previous three months were enrolled. The subjects with diseases affecting the patient's sleep were excluded. In addition to demographic variables, for assessment of insomnia, he designed a questionnaire consisting of 20 items. He concludes that an association was observed between the duration of daily visual display terminal work and each of the eight sleep-related symptoms, such as difficulty in falling asleep and early awakening.

Jatinder Bali, & Neeraj Navin, (2008) carried out a random KAP survey on 300 Indian ophthalmologists using a 34-point spot-questionnaire to assess whether computer use by practitioners had any bearing on the knowledge and practices in computer vision syndrome (CVS) in Mumbai. The chief presenting symptoms were eyestrain (97.8%), headache (82.1%), tiredness and burning sensation (79.1%), watering (66.4%) and redness (61.2%). Computer-users were more likely to prescribe sedatives/ anxiolytics ($P = 0.04$, χ^2 test), spectacles ($P = 0.02$, χ^2 test) and conscious frequent blinking ($P = 0.003$, χ^2 test) than the non-computer-users.

Richa Talwar (2008) conducted a cross sectional study to assess the prevalence of visual disorders among 200 computer professionals from Delhi which included software developers, call centre workers, and data entry workers. The prevalence of visual problems in the study group was found to be 76% .It was found that there was a gradual increase in visual complaints as the number of hours spent for working on computers daily increased. Visual

problems were less in persons using antiglare screen, and those with adequate lighting in the room.

According to the Ohio State University College of Optometry, Columbus (2007) the effects of computer use has reported visual and physical symptoms and also upon quality of life measures. A survey of 1000 university employees (70.5% adjusted response rate) assessed visual and physical symptoms, job, physical and mental demands, ability to control/influence work, amount of work at a computer, computer work environment, relations with others at work, life and job satisfaction, and quality of life. Data were analyzed to determine whether self-reported eye symptoms are associated with perceived quality of life. The study also explored the factors that are associated with eye symptoms. Seventy percent of the employees used some form of vision correction during computer use, 2.9% used glasses specifically prescribed for computer use, and 8% had refractive surgery.

In Hong Kong, a study was conducted by Szeto (2006) where computers are fast catching up with day to day activities, amongst high school students, about 11% used computer for 8-14 hours at home per week and 6% for 15-28 hours per week. The estimated incidence of eyestrain or other visual problems attributable to computer use is between 70 and 88%.

In Iran (2006), a cross sectional descriptive case control study was undertaken by Helland to detect the prevalence of ocular symptoms and signs among professional computer users and non users. Fifty seven computer professionals were selected among employers

working with computer as experimental group. Fifty six control group members were selected from among employers not working with computer. In experimental group 45 cases (79%) had burning eyes and tearing, 38 cases (66%) had dry eye, 37 cases (65%)had asthenopia, and 47 cases (82.5%) had musculoskeletal pain but these values for the control group were 24 (42.8%), 18 (32.2%), 22(39.3%) and 15 (26.8%) respectively and the difference was statistically significant ($p = 0.037$, $p = 0.023$, $p = 0.044$, $p = 0.013$).

In 2005, Thomas & Seena carried out a descriptive study to assess computer vision syndrome and its preventive measures among computer professionals working In F.C.G. Software Solutions Bangalore. They found that 48.33% of the computer professionals had high incidence, 30% had moderate incidence and only 21.67% computer professionals had low incidence.15% of the computer professionals were adequately practicing the preventive measures,11.67% were moderately and 73.33% of the computer professionals were inadequately practicing the measures. The study revealed that the incidence of computer vision syndrome among the computer professionals was high and the preventive measures adopted by them were not adequate.

Ophthalmic Exercises

Wold (2008) reported on 100 children who had undergone accommodative vision therapy procedures (ophthalmic exercises like palming, blinking, scanning and postural changes) in Australia. These clinically selected cases showed an 80% rate of improvement in accommodative amplitude and 76% in accommodative facility using a pre and post treatment ordinal criterion referenced scaling method.

Haynes and McWilliams (2006) investigated the effects of training the near-far response on school age and college students of Ohio University, Columbus. Their results indicate that the near-far response ability is trainable and can be improved with vision therapy.

Dr Chao - Chayun Lin et al (2004) carried out a study to assess the effect of targeted divergence exercise on eye strain and relax of accommodation in China. All subjects wore a vision training device containing convex prism lenses (test) or plano lenses (control) and watched television at a three meter distance for ten sessions lasting one hour each over a three week period. Their refractive error and pupil size were measured before and after each session. After the tenth session, the test group showed a mean reduction in measured refractive error of 0.28±0.03D, while the Controls showed a mean reduction of 0.06±0.03D. They found a statistically significant reduction in measured refractive error, likely due to the relax of accommodation or the reversal of over accommodation (e.g. pseudo myopia), when test subjects performed ocular divergence exercise using the ocular training device.

In (2003), a systematic review of the literature used a best evidence synthesis approach to address the general question "Do office interventions among computer users have an effect on musculoskeletal or visual health?" This was followed by an evaluation of specific interventions. The initial search identified 7313 articles which were reduced to 31 studies based on content and quality. Overall, a mixed level of evidence was observed for the general question. Moderate evidence was observed for: (1) no effect of workstation adjustment, (2) no effect of rest breaks and exercise and (3) positive effect of alternative

pointing devices. For all other interventions mixed or insufficient evidence of effect was observed, Shelley.

Effectiveness of Ophthalmic Exercises upon Computer Vision Syndrome

A controlled study of pursuit eye exercises was conducted by Busby (2010) in an enhancement program for special education students in Mumbai. The subjects were rated on their ability to maintain fixation on a moving target. The rating procedure was shown to have a high interrater reliability. The results showed statistically significant improvement by the experimental group in pursuit eye movement and persistence of the therapeutic effect on retesting at a 3-month interval after conclusion of the vision therapy.

In 2008 an experimental study was conducted by Robin R Dunkin regarding computer vision syndrome: recognition and control in software professionals in Udaipur, Rajasthan. A fitness program was designed to reduce the symptoms of computer vision syndrome (CVS) in software professionals. Set of eye exercises (blinking, palming and scanning) that could be performed on the job was designed. Each exercise was of about 10-20 seconds duration. A questionnaire was developed and pre test and post test conducted. The experimental groups of 30 subjects were exposed to the fitness program while the control group was not offered training. Study reveals that the mean for the symptoms of CVS decreased from 45.1 in the pre test to 25.4 in the post test. The *t* value reveals that there was a significant difference between the symptoms of CVS in the pre test and post test of the experimental group. The study proved that there is a significant improvement after the fitness program given regarding eye exercises.

In Gujarat, Dinesh Bhandari (2008) has conducted a study to find out the magnitude of asthenopia in computer operators and its relationship with various personal and workplace factors. Among the 419 subjects studied, 194 (46.3%) suffered from asthenopia during or after work on computer. Marginally higher proportion of asthenopia was noted in females compared to males. Occurrence of asthenopia was significantly associated with age of starting use of computer, presence of refractive error, viewing distance, and level of top of the computer screen with respect to eyes, use of antiglare screen and adjustment of contrast and brightness of monitor screen.

The department of yoga research, Mitra, Thane (2007) aimed to find out whether regular performance of yogic eye practices improved tear break up time and the symptoms of computer vision syndrome. The yogic eye exercises included palming, eye movement, cleansing practices of eye with water, up and down, horizontal movements and rotational movements of eye. A non-invasive tear break up time test (TBUT test) to test the dryness was carried out on each participant and the control group at the beginning of the project and again at the end. Out of fourteen participants, the tear break up time test results showed an average improvement of 4 seconds (± 2) in the right eye of 10 participants, and an average improvement of 5 seconds (± 2) in the left eye of 10 participants. The control group showed no improvement. This was statistically significant after applying a paired t test.

Bedesford and Steven (2007) have proposed an invention which comprises a method that enables a computer user to relieve or avoid computer vision syndrome by means of eye exercises and stress reduction techniques. One aspect of the invention consists of a computer

program that displays eye exercises on the computer screen after a predetermined time interval or after a predetermined number of keystrokes. Another aspect of the invention is a computer program that displays information on the computer screen about computer ergonomics, the visual system, near point stress, and computer vision syndrome, which proves to relieve the symptoms of computer vision syndrome, in United States.

Ram Sheety (2005) conducted a study on effect of yoga on self rated visual discomfort in computer users was conducted in K.G Nagar, Bangalore. The study planned to evaluate the effect of combination of eye exercises on self rated symptoms of visual discomfort in professional computer users. Two ninety one computer users were randomly selected to two groups, experimental and control group. *A*ssessments with multiple comparisons of mean values showed a significant decrease in scores of self-rated visual discomfort for the experiment group compared to baseline ($P < .001$). In contrast, there was a significant increase in scores of self rated visual discomfort for the control group compared to baseline ($P < .001$).The results of the study suggest that a combination of eye exercises improves self-rated visual discomfort in computer professionals.

Punnett and Steinhauer (2006) conducted a controlled study investigating the effects of eye movement training with and without feedback and reinforcement. There were clear post-training differences between the eye movement skills of the control and experimental group of reading disabled students. This demonstrated that the use of reinforcement in training oculomotor facility could improve those skills. There was an improvement in reading performance following the oculomotor training as well. Similar results demonstrating the

trainability of eye movements have been obtained in studies employing behavior modification and reinforcement.

Summary

This chapter has dealt with review of literatures related to the problem stated. The literature presented was extracted from 16 primary and 2 secondary sources. It has helped the researcher to design the study, develop the tool and plan for data collection procedure and to analyze the data.

CHAPTER III

RESEARCH METHODOLOGY

The methodology of the research study is defined as the way the data are gathered in order to answer the questions to analyze the research problem. It enables the researcher to project a blue print for the research undertaken. The research methodology involves a systematic procedure by which the researcher had a start from the initial identification of the problem to its final conclusion.

This chapter deals with a brief description of different steps undertaken by the researcher for the study. It involves research approach, research design, setting, population, sample and sampling technique, sampling criteria, selection and development of the instruments, validity and reliability of the instruments, pilot study, data collection procedure and plan for data analysis. The present study was conducted to assess the effectiveness of ophthalmic exercises upon computer vision syndrome among IT professionals.

Research Approach

According to Polit & Beck (2010), an experimental research is an extremely applied form of research and involves finding out how well a programme, product, practice or policy is working. Its goal is to assess or evaluate the success of the program. An experimental research is generally applied where the primary objective is to determine the extent to which a given measures meets the desired results.

The researcher found that evaluative approach is the scientific investigation in which observations are made data is collected according to a set of defined criteria of the study. The

observable changes are that which takes place under controlled conditions. In this study the researcher wants to assess the effectiveness of ophthalmic exercises upon computer vision syndrome among IT professionals.

Research Design

A research design is one that incorporates the most important methodological design that a researcher works in conducting a research study (Polit & Beck 2010). It helps the researcher in the selection of the subjects, manipulation of the independent variables and observation of the type of statistical method to be used to interpret the data.

Non-equivalent control group pretest posttest design, which is quasi experimental in nature, is adopted to conduct the study. In this study, the researcher has done pre test among selected IT professionals and manipulated the independent variable, i.e. ophthalmic exercises which were demonstrated and performed daily by the same group and then the post test was conducted. Finally the effect of the ophthalmic exercises on dependable variables, i.e. visual disturbance were computed.

The research design is represented diagrammatically as follows

Quasi experimental research design

O1 - O2

O1 X O2

O1 - pretest level

O2 – posttest level

X – demonstration of ophthalmic exercises.

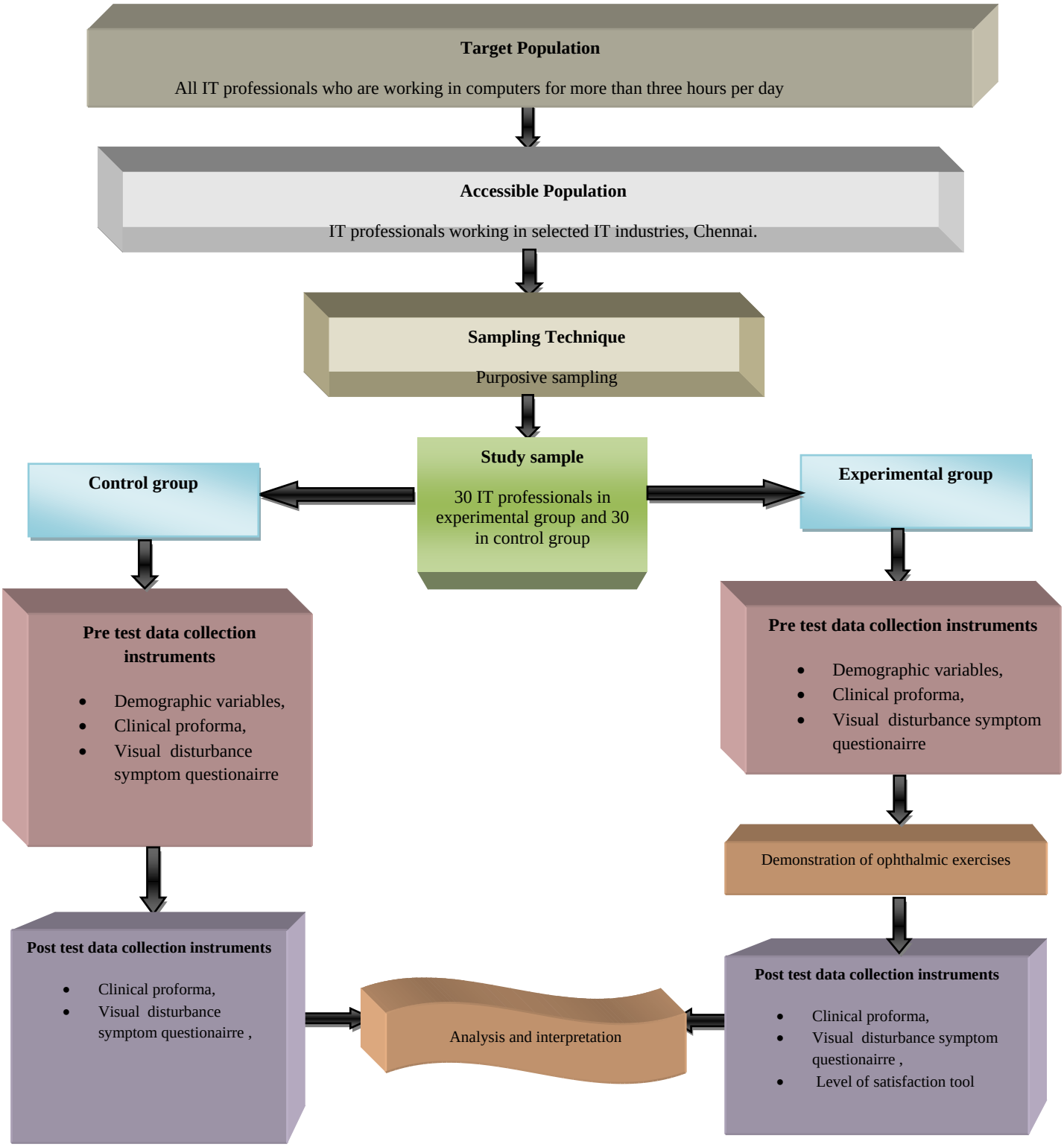

Fig.2.Schematic presentation of the research design

Variables

An abstract concept when defined in terms that can be measured is called a variable. Variables are characteristics that vary among the subjects being studied.

Independent variable

The independent variable of the study was ophthalmic exercises which was demonstrated by the researcher and performed by the IT professionals for 15 consecutive days.

Dependent variable

It was the level of visual disturbance among the IT professionals before and after the demonstration of the ophthalmic exercises.

Attribute variable

It included the demographic variables and selected clinical variables which influence computer vision syndrome**.**

Setting

The physical location and condition in which data collection takes place in a study is the research setting (Polit, 2010). The present study was conducted in 2 selected IT industries namely HOV services and Skyline solutions, Chennai.

Population

According to Polit (2010) a population is an aggregate of totality of all subjects who possess some common characteristics. The target population is the group of population that the researcher aims to study in which findings will be generalized. The target population of the present study was all IT professionals who are working in computer for more than three hours per day. Accessible population is the population that the researcher aims to study and about whom the study findings will be generalized. In this study, the accessible population compromise of IT professionals who are working in computer for more than three hours per day in selected IT industries (HOV services and Skyline solutions) Chennai.

Sample

According to Polit & Beck (2010), sample is a subset of population, selected to participate in the study. A sample of 60 IT professionals who are working in computer for more than three hours per day and meeting the inclusion criteria were selected for the study. Among them 30 were selected for control group and 30 for experimental group.

Sampling Technique

Sampling is the process of selecting a portion of the population to represent the entire population (Polit, 2010). The subjects of the present study were selected by non - probability purposive sampling technique in which the samples were selected by criterion sampling. In non probability purposive sampling technique the researcher selected participants who fulfilled the sampling criteria.

Sampling Criteria

Inclusion criteria

IT professionals who are

- working in computers for more than three hours per day and for last six months.
- present at the time of the study.

Exclusion criteria

IT professionals who

- are detected to have eye disorders such as cataract, glaucoma etc
- have already undergone any interventional program on ophthalmic exercises.
- not willing to participate in the study.

Selection and Development of Tools

As the study aimed to evaluate the effectiveness of ophthalmic exercises upon computer vision syndrome, the data collection tool was prepared by the researcher after a thorough review of literature and experts suggestion. The instruments used in this study were Demographic Variable Proforma, Clinical Variable Proforma, Visual disturbance symptom questionnaire, Satisfaction rating scale of the IT professionals regarding the intervention that was done by the researcher.

Demographic variable proforma

Demographic variable proforma consists of age in years, sex, educational status, marital status, working hours in computers per day, years of experience, monthly income and duration of usage of computers at home.

Clinical variable proforma

Clinical variable proforma consists of history, treatment, measures taken to prevent eye strain, withdrawal of any treatment and details regarding the working environment which influence the computer vision syndrome.

Level of satisfaction

This rating scale was designed by the researcher to assess the level of satisfaction of the participants regarding the demonstration of ophthalmic exercises.

Psychometric Properties of the Instruments

Validity of the study instrument

Content validity is the degree to which an instrument measures what it is supposed to measure. Content validity is the sampling adequacy of the content being measured (Polit 2010). Content validity of the tool was obtained by getting opinion from experts in the field of nursing. Based on their suggestions, the researcher modified the item and finalized the tool for the study.

Reliability of the instrument

Reliability of an instrument refers to the accuracy and consistency of the measuring tool. It refers to the extent to which the same results are obtained on repeated administration of the instrument. The reliability of the tool was elicited by using split – half technique and the score was found to be 0.9. The result showed that the tool was highly reliable.

Pilot Study

According to Polit (2010) stated that, Pilot study is the miniature of the actual study, in which the instruments are administered to the subjects drawn from the same population. The purpose is to find out the feasibility and practicability of the study and to finalize the tools. Tools will be modified if required. Pilot study was conducted with 10% of the sample size taken for main study.

A pilot study was conducted on six IT professionals after obtaining permission from the authorities of Tata Consultancy Services, Chennai. The samples were chosen by purposive sampling technique. A pre test was followed by demonstration of ophthalmic exercises and performance of it for 7 consecutive days. Analysis of the data was done and the results revealed that the study was feasible to conduct.

Intervention protocol

- Demonstration of ophthalmic exercises by the researcher.
- Performance of the ophthalmic exercises by the participants for 15 consecutive days.

Protection of Human Rights

The study was conducted after the approval of ethical committee of Apollo Hospitals, Chennai. Permission from Principal, Head of the department of community health nursing, Apollo College of nursing and Clinical guide was obtained before conducting the study. Informed consent was obtained from the participants. Adequate measures to maintain confidentiality throughout the study was ensured.

Data Collection Procedure

Data collection procedure is gathering of information needed to address a research problem. Prior to data collection permission was obtained from the concerned authority to conduct the study. Pre test was conducted on the first day to assess the symptoms of visual disturbances among IT professionals followed by demonstration of ophthalmic exercises by the researcher. Subsequent days the participants performed the ophthalmic exercises in the presence of the researcher. Post test was conducted on the 15th day by using the same questionnaire.

Problems faced during Data Collection

- Obtaining permission was a tedious process.
- Shift timings varied which was difficult to adapt.

Plan for Data Analysis

Data analysis is the systemic organization and synthesis of research data and testing of research hypotheses by using obtained data (Polit, 2010). The data was analyzed with the help of descriptive statistics like mean, percentage, standard deviation and inferential statistics like paired “t” test and chi-square. The association between the demographic variables and other variables were analyzed with the help of chi-square test.

Summary

This chapter has dealt with the selection of research approach, research design, setting, population, sample and sampling technique, selection and development of instruments, validity and reliability of the instruments, pilot study, intervention protocol, data collection and plan for the data analysis.

CHAPTER IV

ANALYSIS AND INTERPRETATION

The analysis is defined as the method of organizing data in such a way that the research question can be answered. Interpretation is the process of making sense of results and examining the simplification of the findings within a broader context.

This chapter includes both descriptive and inferential statistics. Statistics is a field of study concerned with techniques or methods of collection of data, classification, summarizing, interpretation, drawing inferences, testing of hypotheses etc.

The data was collected from 30 IT professionals in HOV services, Chennai and 30 IT professionals in Skyline solutions, Chennai to determine the effectiveness of ophthalmic exercises upon computer vision syndrome.

The data was analyzed according to the objectives and hypotheses of the study. The data analysis was completed after transferring all the data to the master coding sheet. Data was analyzed, tabulated and interpreted using descriptive and inferential statistics.

Organization of Findings

The analysis of the data was organized and presented under the following headings,

- Frequency and percentage distribution of demographic variables of control and experimental group of IT professionals.

- Frequency and percentage distribution of clinical variables of control and experimental group of IT professionals.
- Frequency and percentage distribution of pre-test and post-test level of visual disturbance scores in control and experimental group of IT professionals.
- Frequency and percentage distribution of level of satisfaction regarding ophthalmic exercises among experimental group of IT professionals.
- Comparison of mean and standard deviation of pre-test and post-test level of visual disturbance among control and experimental group of IT professionals.
- Association between selected demographic variables and pre-test level of visual disturbance scores among control group of IT professionals.
- Association between selected demographic variables and post-test level of visual disturbance scores among experimental group of IT professionals.
- Association between selected clinical variables and pre-test level of visual disturbance scores among control group of IT professionals.
- Association between selected clinical variables and post-test level of visual disturbance scores among experimental group of IT professionals.

Table.1

Frequency and Percentage distribution of demographic variables of Experimental and Control group of IT professionals.

Demographic variables	Control group (n=30)		Experimental group (n=30)	
	n	p	n	p
Age in years				
21-30	20	67	23	77
31-40	09	30	07	23
41-50	01	03	-	-
>50	-	-	-	-
Educational status				
Diploma	-	-	02	07
Undergraduate	27	90	26	86
Postgraduate	03	10	02	07
Others	-	-	-	-
Marital status				
Married	11	37	20	67
Unmarried	19	63	10	33
Years of experience				
0-2 years	4	13	06	20
2.1-4 years	20	67	17	56
4.1-6 years	06	20	05	17
>6 years	-	-	02	07

Monthly income				
<20,000	-	-	01	03
20,000-30,000	08	27	07	23
Above 30,000-40,000	13	43	11	37
>40,0000	09	30	11	37
Duration of usage of computers at home				
One hour	02	06	12	40
Two hours	21	71	10	33
Three hours	05	17	06	20
More than three hours	02	06	02	07

Table1 shows that majority of the participants of the study were between the age of 21 to 30 years (67%, 77%) undergraduates (90%,86%) works with computers for 6-9 hours (77%,67%) and spends about two hours with computers at home (71%,40%) and most of them were unmarried (63%,67%) had 2.1-4years experience (67%,56%) and significant percentage of participants had monthly income of 30,000-40,000 (43%,37%) in control and experimental groups respectively.

Fig 3. shows the percentage distribution of sex in control and experimental group of IT professionals which shows that majority of IT professionals were male (77%, 73%) in control and experimental group respectively.

Fig 4. shows the percentage distribution of working hours in computers per day in which majority of IT professionals works for 6-9 hours (77%,67%) in control and experimental group respectively.

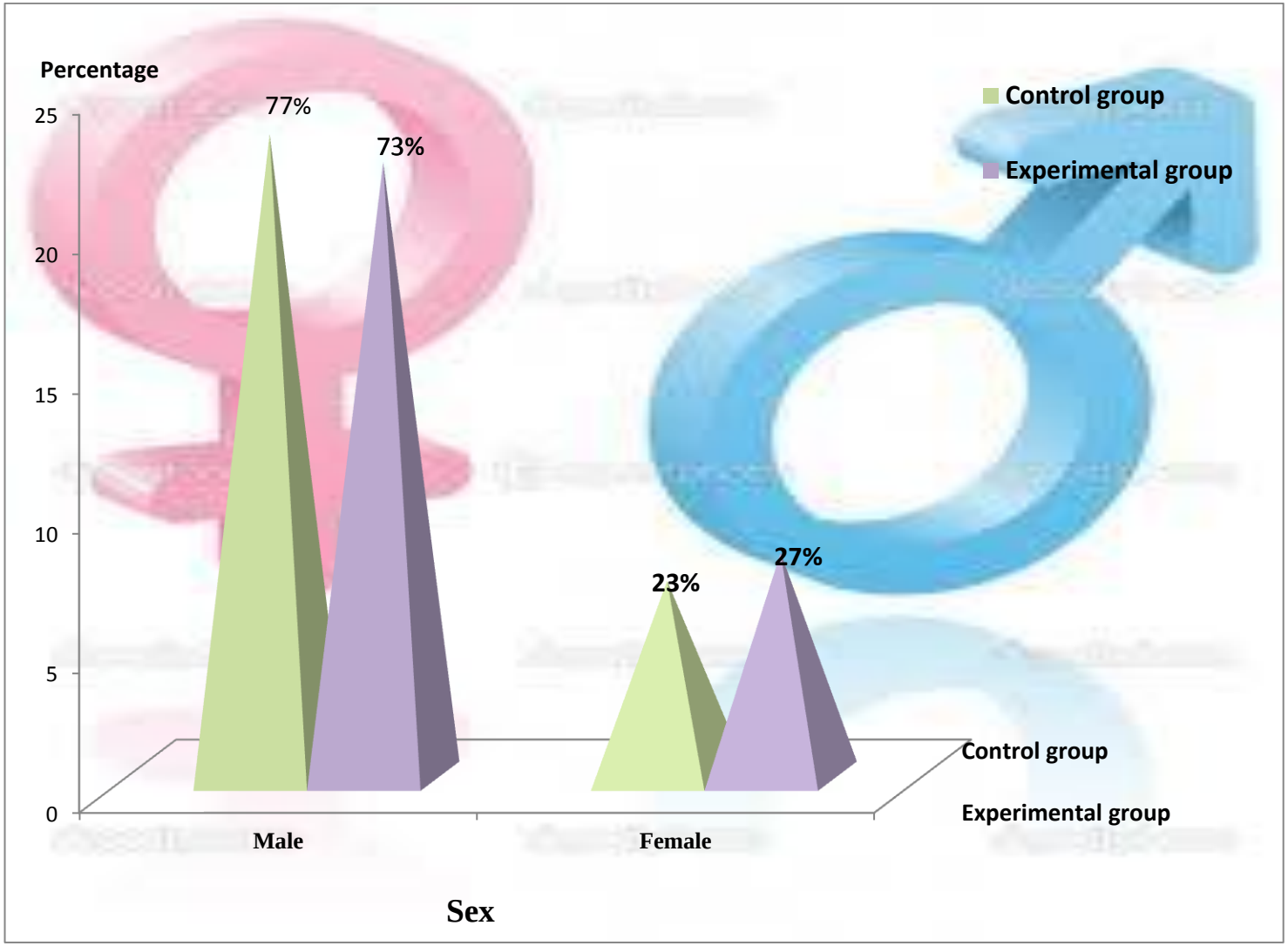

Fig.3. Percentage distribution of sex in control and experimental group of IT professionals.

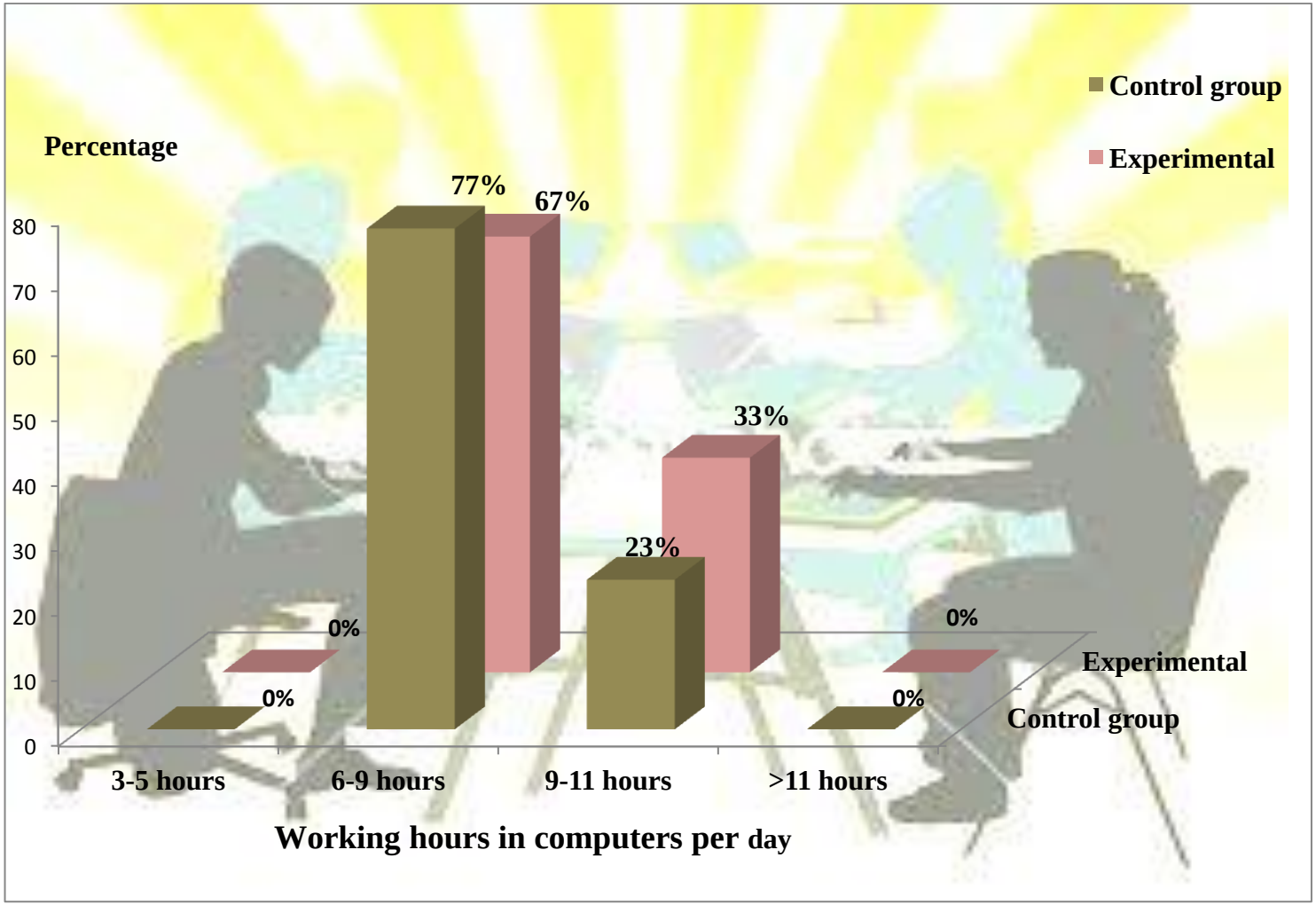

Fig.4. Percentage distribution of working hours in computers per day Control and Experimental group of IT professionals.

Table. 2

Frequency and Percentage distribution of Clinical Variables of Control and Experimental group of IT professionals.

Demographic variables	Control group (n=30)		Experimental group (n=30)	
	n	p	n	p
Previous history of visual disturbance				
Yes	17	57	13	43
No	13	43	17	57
Previous history of treatment taken				
Medical treatment	17	57	13	43
Surgical treatment	-	-	-	-
Both	-	-	-	-
None	13	43	17	57
History of withdrawal of any treatment				
Withdrawal of wearing spectacles	19	64	12	40
Discontinued using eye lubricants	01	03	-	-
Discontinued yoga	07	23	11	37
None	03	10	07	23

Treatment of dry eye				
Often	-	-	-	-
Sometimes	16	53	11	37
Never	14	47	19	63
Use of antiglare screens				
Often	-	-	-	-
Sometimes	-	-	-	-
Never	30	100	30	100
Practice yoga				
Often	01	03	-	-
Sometimes	06	20	12	40
Never	23	77	18	60
Use of break time to refresh the eyes				
Often	-	-	03	10
Sometimes	12	40	15	50
Never	18	60	12	40
Blink status while on work				
10 per minute	06	20	04	13
12 per minute	04	13	08	27
8 per minute	17	57	16	53
16 per minute	03	10	02	07

Distance between the screen and the seat during work time				
5-10 inches	12	40	14	47
10-15 inches	15	50	11	37
15-20 inches	03	10	04	13
20-26 inches	-	-	01	03
Level of air and central heating of workplace				
Poor air conditioning	-	-	-	-
Air conditioning upto the mark	30	100	30	100

It could be inferred that from the table 2. majority of IT professionals had not used antiglare screens (100%, 100%) were working in good air conditioning (100%, 100%) had never practiced yoga (77%,60%) and most of them had previous history of visual disturbance (57%, 43%) had taken medical treatment (57%, 43%) had withdrawal of wearing spectacles (64%,40%) taken treatment of dry eye sometimes (53%, 63%) had blink status 8 per minute (57%, 53%) and significant percentage of participants had never used break time to refresh eyes (60%) in control group of IT professionals and sometimes used break time in experimental group (50%) and works at a distance of 15-20 inches (50%) in control group

and 10-15 inches (47%) in experimental group and works with font size of 12 and above (50%, 60%) in control and experimental group and respectively.

Fig 5. shows the percentage distribution of corrective spectacles which shows that majority of the IT professionals were wearing spectacles (73%, 63%) in control and experimental group of IT professionals.

Fig 6**.** shows the percentage distribution of sleeping hours which shows that significant percentage of participants sleeps for six hours (43%, 50%) in control and experimental group of IT professionals.

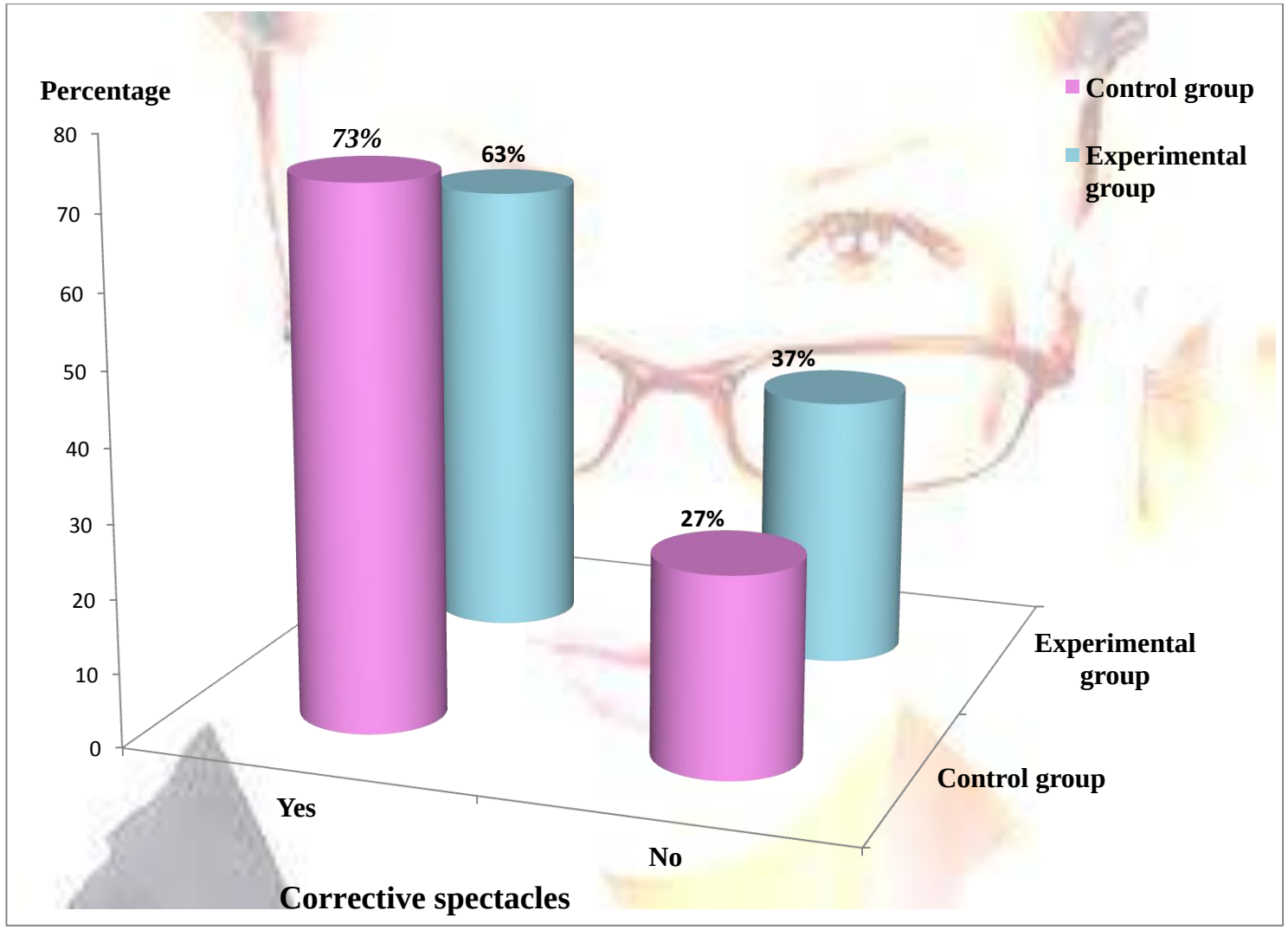

Fig.5.Percentage distribution of Corrective Spectacles in Control and Experimental group of IT professionals.

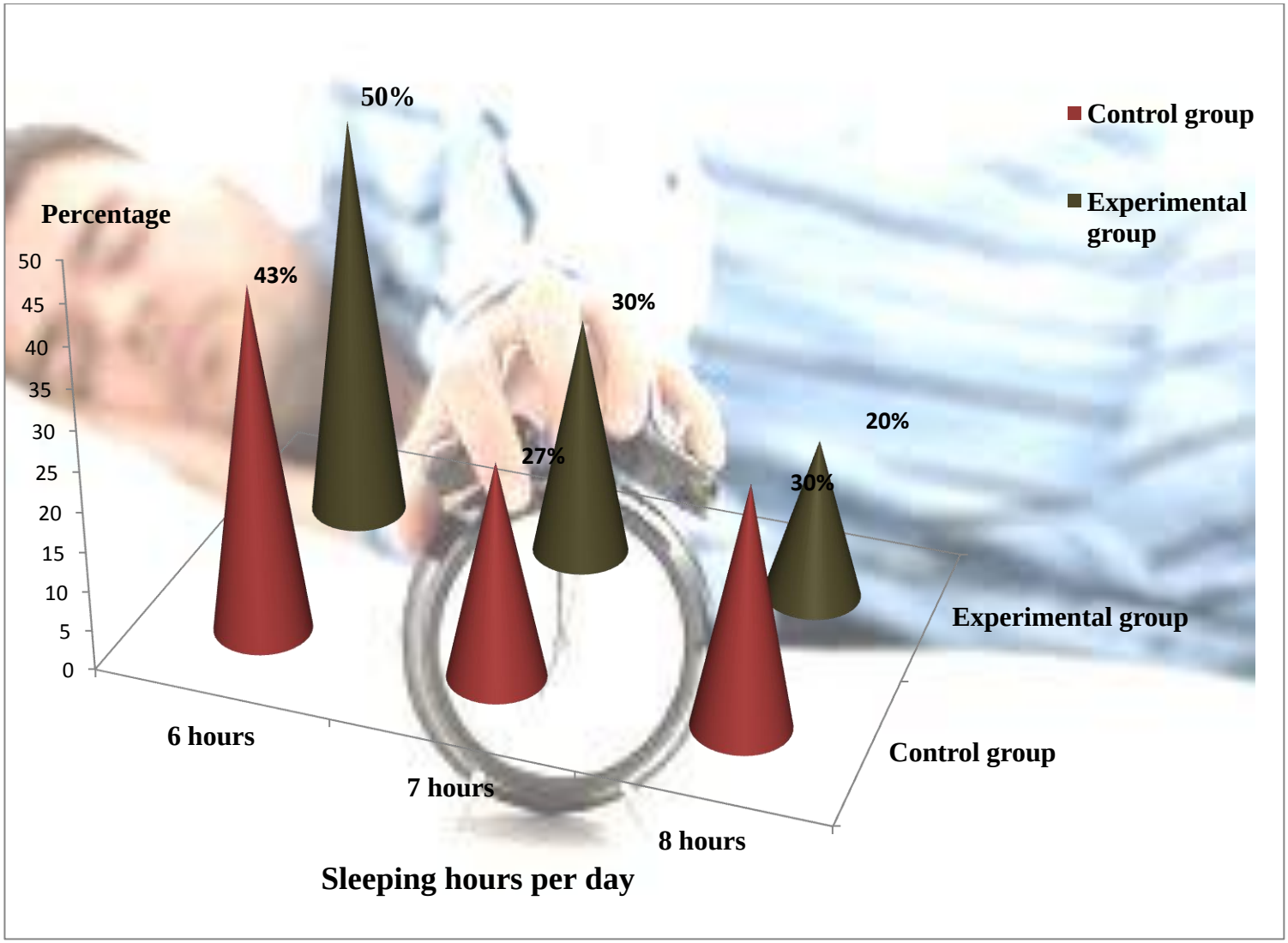

Fig.6.Percentage distribution of Sleeping hours per day in Control and Experimental group of IT professionals.

Table. 3

Frequency and Percentage distribution of pre-test and post-test level of Visual Disturbance scores in control and experimental group of IT professionals.

Level of visual disturbance score	Control group (n=30)		Experimental Group (n=30)	
	n	p	n	p
Above mean				
Pre test	13	43%	12	40%
Post test	15	50%	19	63%
Below mean				
Pre test	17	77%	18	60%
Post test	15	50%	11	37%

Table.3. shows that in the control group there was no significant difference in the visual disturbance level before (M=11.4; SD=2.7) & after (M=11.8; SD=2.5) ophthalmic exercises. In contrast in the experimental group the visual disturbance level (M=7.96; SD=1.51) after ophthalmic exercises was low, compared to those before ophthalmic exercises (M=10.6; SD= 2.35) respectively. The difference was found to be statistically significant at $p<0.01$, which attributes to the effectiveness of ophthalmic exercises.

Table.4

Frequency and Percentage Distribution of Level of Satisfaction regarding ophthalmic exercises among IT professionals. (N=30)

Level of satisfaction	N	P
Highly satisfied	30	100
Satisfied	-	-
Dissatisfied	-	-
Highly dissatisfied	-	-

The data from above table 4 shows that (100%) of IT professionals in the experimental group were highly satisfied on demonstration of ophthalmic exercises.

Table.5

Frequency and percentage distribution of various dimensions of level of satisfaction in experimental group of IT professionals.

(N=30)

Various Dimensions	Level of Satisfaction							
	Highly Satisfied		Satisfied		Dissatisfied		Highly dissatisfied	
	N	P	n	P	n	P	n	p
Method of ophthalmic exercises	30	100	-	-	-	-	-	-
Communication, interpersonal relationship	28	93.33	2	6.6	-	-	-	-
Relief of symptoms	30	100	-	-	-	-	-	-

Table. 5. reveals that majority of the IT professionals were highly satisfied (100%) with the method of ophthalmic exercises and relief of symptoms. About (6.6%) of the IT professionals were satisfied with the communication and interpersonal relationship of the researcher.

Table: 6

Comparison of Mean and Standard Deviation Of pre-test and post-test Level Of Visual Disturbance among IT professionals with computer vision syndrome.

	Control group(n=30)		**Experimental group(n=30)**	
	M/SD	**'t'value**	**M/SD**	**'t'value**
Pre-test	11.4/2.7	1.25	10.6/2.35	7.68***
Post-test	11.8/2.5		7.96/1.51	

***p<0.001**

The data from table. 6. shows that mean value was around (11.4, 11.8) in pretest and posttest in the control group and there was statistically significant in the mean posttest level of visual disturbance (7.96) in the experimental group when compared with the mean pretest level of visual disturbance (11.4). Hence null hypotheses Ho1 was rejected.

Table. 7

Association between the selected Demographic variables and level of visual disturbance scores in pretest and post test among Control group of IT professionals.

Demographic variables	Pre test level of visual Disturbance score (n=30)			Post test level of visual Disturbance score (n=30)		
	Upto mean	Above mean	$\chi 2$	Upto mean	Above mean	$\chi 2$
Age in years						
21-30	10	10	3.44	10	10	1.1
31-40	02	07	(df=3)	04	05	(df=3)
41-50	01	-		01	-	
>50	-	-		-	-	
Sex						
Male	11	12	0.73	13	10	1.6
Female	02	05	(df=1)	02	05	(df=1)
Educational status						
Diploma	-	-	0.002	-	-	0.44
Undergraduate	12	15	(df=3)	14	13	(df=3)
Postgraduate	01	02		01	02	
Others	-	-		-	-	
Marital status						
Married	01	10	8.4**	04	07	1.2
Unmarried	12	07	(df=1)	11	08	(df=1)

Working hours with computers per day						
3-5 hours per day	-	-	0.03	-	-	1.6
6-9 hours per day	09	14	(df=3)	13	10	(df=3)
9-11 hours per day	03	04		02	05	
More than 11 hours per day	-	-		-	-	
Years of experience						
0-2 years	02	02	0.3	03	01	2.1
2.1-4 years	09	11	(df=3)	08	12	(df=3)
4.1-6 years	02	04		04	02	
>6 years	-	-		-	-	
Monthly income						
<20,000	-	-	2.2	-	-	0.64
20,000-30,000	03	05	(df=3)	04	04	(df=3)
Above 30,000-40,000	07	06		08	05	
>40,0000	02	07		04	05	
Duration of usage of computers at home						
One hour	-	02	1.8	-	02	2.24
Two hours	10	11	(df=3)	11	10	(df=3)
Three hours	02	03		03	02	
More than three hours	01	01		01	01	

Table. 7 suggests that there was significant association between marital status($\chi 2=8.4$,df=1) and visual disturbance level in the control group and there was no

significant association with other selected demographic variables hence the null hypothesis Ho_2, which states that there is no significant association between selected demographic variables and level of visual disturbance was partially rejected.

Table. 8

Association between the selected Demographic variables and level of visual disturbance scores in pretest and post test among Experimental group of IT professionals.

Demographic variables	Pre test level of visual Disturbance score (n=30)			Post test level of visual Disturbance score (n=30)		
	Upto mean	Above mean	$\chi 2$	Upto mean	Above mean	$\chi 2$
Age in years						
21-30	08	15	1.1	14	09	1.4
31-40	04	03	(df=3)	06	01	(df=3)
41-50	-	-		-	-	
>50	-	-		-	-	
Sex						
Male	09	13	0.03	16	06	1.2
Female	03	05	(df=1)	04	04	(df=1)
Educational status						
Diploma	01	01	1.46	01	01	0.48
Undergraduate	11	15	(df=3)	18	08	(df=3)
Postgraduate	-	02		01	01	
Others	-	-		-	-	

Marital status						
Married	09	11	0.6	12	08	0.32
Unmarried	03	07	(df=1)	07	03	(df=1)
Working hours with computers per day						
3-5 hours per day	-	-	0.06	-	-	2.9
6-9 hours per day	07	13	(df=3)	16	04	(df=3)
9-11 hours per day	04	06		05	05	
More than 11 hours per day	-	-		-	-	
Years of experience						
0-2 years	02	04	2.5	05	01	1.93
2.1-4 years	09	08	(df=3)	10	07	(df=3)
4.1-6 years	02	03		03	02	
>6 years	-	02		02	-	
Monthly income						
<20,000	-	01	3.33	01	-	11.83**
20,000-30,000	04	03	(df=3)	03	04	(df=3)
Above 30,000-40,000	05	06		07	04	
>40,0000	03	08		09	02	
Duration of usage of computers at home						
One hour	06	06	1.93	09	03	3.6
Two hours	04	06	(df=3)	05	05	(df=3)
Three hours	02	04		05	01	
More than three hours	-	02		01	01	

**p<0.01

Table. 8. suggests that there was significant association between monthly income($\chi 2$=11.83,df=3) and visual disturbance level in the experimental group and there is no significant association with other selected demographic variables hence the null hypothesis Ho_2, which states that there is no significant association between selected demographic variables and level of visual disturbance was partially rejected.

Table. 9

Association between the selected Clinical variables and level of visual disturbance scores among Control group of IT professionals.

Clinical variables	Pre test level of visual Disturbance score (n=30)			Post test level of visual Disturbance score (n=30)		
	Upto mean	Above mean	$\chi 2$	Upto mean	Above mean	$\chi 2$
Previous history of visual disturbance						
Yes	07	10	0.09	08	09	0.01
No	06	07	(df=1)	06	07	(df=1)
Previous history of treatment taken						
Medical treatment	07	10	0.08	08	09	0.1
Surgical treatment	-	-	(df=3)	-	-	(df=3)
Both	-	-		-	-	
None	06	07		07	06	
History of withdrawal of any treatment						
Withdrawal of wearing spectacles	07	12	4.11 (df=3)	08	11	3.0 (df=3)
Discontinued using eye lubricants	-	01		-	01	

Discontinued yoga	05	02		05	02	
None	01	02		02	01	
Treatment of dry eye						
Often	-	-	2.4	-	-	4.8
Sometimes	09	07	(df=2)	11	05	(df=2)
Never	04	10		04	10	
Using of antiglare screens						
Often	-	-	-	-	-	-
Sometimes	-	-	(df=2)	-	-	(df=2)
Never	13	17		12	18	
Practice yoga						
Often	01	-	1.84	01	-	2.0
Sometimes	03	03	(df=2)	04	02	(df=2)
Never	09	14		10	13	
Use of break time to refresh the eyes						
Often	-	-	0.02	-	-	1.1
Sometimes	05	07	(df=2)	05	07	(df=2)
Never	08	10		11	07	
Wearing of corrective spectacles						
Yes	08	14	1.4	09	13	2.8
No	05	03	(df=1)	06	02	(df=1)
Blink status while on work						
10 per minute	06	-	15.8**	04	02	1.6
12 per minute	02	02	(df=3)	02	02	(df=3)

8 per minute	03	14		07	10	
16 per minute	03	-		02	01	
Distance between the screen and the seat during work time						
5-10 inches	03	09	5.56	05	07	0.86
10-15 inches	07	08	(df=3)	08	07	(df=3)
15-20 inches	03	-		02	01	
20-26 inches	-	-		-	-	
Level of air and central heating of workplace						
Poor air conditioning	-	-	-	-	-	-
Air conditioning upto the mark	13	17	(df=1)	13	17	(df=1)
Sleeping hours per day						
Less than six hours	03	10	6.7*	04	09	4.9
Six to eight hours	03	05	(df=2)	05	03	(df=2)
Above eight hours	07	02		07	02	
Usual font size while working in computer						
12 and above	09	07	2.4	09	07	0.4
Below 12	04	10	(df=1)	06	08	(df=1)

**p<0.01

*p<0.05

Table.9.suggests that there was significant association between blinking status($\chi 2=15.8$,df=3), sleeping hours($\chi 2=6.7$,df=2) and visual disturbance level in the control group and there was no significant association with other selected clinical variables

hence the null hypothesis Ho_3, which states that there is no significant association between selected clinical variables and level of visual disturbance was partially rejected.

Table. 10

Association between the selected Clinical variables and level of visual disturbance scores in pre test and post test among Experimental group of IT professionals.

Clinical variables	Pre test level of visual Disturbance score (n=30)			Post test level of visual Disturbance score (n=30)		
	Upto mean	Above mean	$\chi 2$	Upto mean	Above mean	$\chi 2$
Previous history of visual disturbance						
Yes	03	10	1.9	08	09	0.1
No	08	09	(df=1)	07	06	(df=1)
Previous history of treatment taken						
Medical treatment	04	09	0.8	08	09	0.14
Surgical treatment	-	-	(df=3)	-	-	(df=3)
Both	-	-		-	-	
None	08	09		07	06	
History of withdrawal of any treatment						
Withdrawal of wearing spectacles	05	07	0.52 (df=3)	08	11	3.0 (df=3)
Discontinued using eye lubricants	-	-		-	01	

Discontinued yoga	05	06		05	02	
None	02	05		02	01	
Treatment of dry eye						
Often	-	-	1.17	-	-	4.8
Sometimes	03	08	(df=2)	11	05	(df=2)
Never	09	10		04	10	
Using of antiglare screens						
Often	-	-	-	-	-	-
Sometimes	-	-	(df=2)	-	-	(df=2)
Never	12	18		13	17	
Practice yoga						
Often	07	-	4.0	01	-	1.6
Sometimes	07	05	(df=2)	04	02	(df=2)
Never	04	14		11	12	
Use of break time to refresh the eyes						
Often	02	01	1.2	-	-	1.1
Sometimes	05	10	(df=2)	05	07	(df=2)
Never	05	07		11	07	
Wearing of corrective spectacles						
Yes	06	13	1.5	11	11	3.5
No	06	05	(df=1)	07	01	(df=1)
Blink status while on work						
10 per minute	02	02	3.26	05	01	5.0

12 per minute	03	05	(df=3)	03	01	(df=3)
8 per minute	05	11		08	09	
16 per minute	02	-		03	-	
Distance between the screen and the seat during work time						
5-10 inches	09	05	9.9*	07	05	0.7
10-15 inches	02	09	(df=3)	11	04	(df=3)
15-20 inches	-	04		02	01	
20-26 inches	01	-		-	-	
Level of air and central heating of workplace						
Poor air conditioning	-	-	-	-	-	-
Air conditioning upto the mark	12	18	(df=1)	13	17	(df=1)
Sleeping hours per day						
Less than six hours	05	10	2.3	06	07	4.8
Six to eight hours	03	06	(df=2)	06	02	(df=2)
Above eight hours	04	02		08	01	
Usual font size while working in computer						
12 and above	08	10	0.4	11	07	0.6
Below 12	04	08	(df=1)	09	03	(df=1)

*p<0.05

Table. 10. suggests that there was significant association between distance between the seat and screen($\chi 2=9.9,df=3$) and visual disturbance level in the experimental group and there was no significant association with other selected clinical variables hence the null hypothesis Ho_3, which states that there is no significant association between selected clinical variables and level of visual disturbance was partially rejected.

Summary

This chapter dealt with the analysis and interpretation of the data regarding the demographic variables and clinical variables obtained by the researcher. The analysis showed that ophthalmic exercises has improved the level of visual disturbance in the IT professionals.

CHAPTER – V

DISCUSSION

Statement of the Problem

A Quasi Experimental Study to Assess the Effectiveness of Ophthalmic Exercises upon Computer Vision Syndrome among Information Technology (IT) professionals in selected IT industries, Chennai.

Objectives of the Study

1. To assess the symptoms of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.
2. To determine the effectiveness of ophthalmic exercises before and after demonstration by comparing the visual disturbance in control and experimental group of IT professionals.
3. To identify the level of satisfaction regarding ophthalmic exercises upon computer vision syndrome in experimental group of IT professionals.
4. To find out the association between selected demographic variables and the level of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.

5. To find out the association between selected clinical variables and the level of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.

The study was carried out among IT professionals 30 each in control and experimental group, working at Skyline solutions and HOV services, Chennai. The level of visual disturbance experienced by IT professionals was assessed. Ophthalmic exercises were administered after which the level of visual disturbance experienced by IT professionals was assessed again. Level of satisfaction regarding the ophthalmic exercises was also assessed in experimental group of IT professionals.

The discussion is presented as follows

- Demographic variables in control and experimental group of IT professionals.
- Clinical variables in control and experimental group of IT professionals.
- Level of visual disturbance in control and experimental group of IT professionals.
- Level of satisfaction among experimental group of IT professionals regarding ophthalmic exercises.

- Association between selected demographic variables and level of visual disturbance in control group of IT professionals before and after administration of ophthalmic exercises.

- Association between selected clinical variables and level of visual disturbance in experimental group of IT professionals before and after administration of ophthalmic exercises.

Demographic variables of IT professionals in control and experimental group of IT professionals

Majority of the participants of the study were between 21-30 years (67%, 77%) male (77%,73%) undergraduates (90%,86%) works with computers for 6-9 hours (77%,67%) and spends about two hours with computers at home (71%,40%) and most of them were unmarried (63%,67%) has 2.1-4years experience (67%,56%) and significant percentage of participants had monthly income of 30,000-40,000 (43%,37%) in control and experimental groups respectively.

Eye is the most important organ and vision is our most precious sense. Our eyes are in constant use every waking minute of every day. Vision disturbance is a silent enemy that only appears after a long period of continued stress. Computer has been occupying more and more time in many people present days. The rapid developing computer industry enables people in nearly all fields to finish some of their tasks on a computer. In addition, the increasing number of laptops is offering more convenience.

Moreover, the IT professionals are forced to sit in front of computers irrespective of the time and this continuous monitoring causes visual stress which is realized by them only at the end. The IT professionals forget everything while they are in front of computer including the blinking. So the IT professionals are supposed to be affected with visual disturbances since they are not giving attention to their vision while working in computer which can be easily relieved by simple yogic exercises and relaxation techniques.

Clinical variables in control and experimental group of IT professionals.

Majority of IT professionals had not used antiglare screens (100%, 100%) were working in good air conditioning (100%, 100%) had never practiced yoga (77%,60%) and most of them had previous history of visual disturbance (57%, 43%) had taken medical treatment (57%, 43%) had withdrawal of wearing spectacles (64%,40%) taken treatment of dry eye sometimes (53%, 63%) had blink status 8 per minute (57%, 53%) and significant percentage of participants had never used break time to refresh eyes (60%) in control group of IT professionals and sometimes used break time in experimental group (50%) and works at a distance of 15-20 inches (50%) in control group and 10-15 inches (47%) in experimental group and works with font size of 12 and above (50%, 60%) in control and experimental group and respectively.

Working at a computer is more visually demanding than doing other standard office work such as reading printed documents. Aspects of the design of

the computer video display such as screen resolution and contrast, image refresh rates and screen glare, as well as working distances and angles all may contribute to worker symptoms.

This is supported by a study conducted by Richa Talwar which shows that there was a gradual increase in visual complaints as the number of hours spent for working on computers daily increased and visual problems were less in persons using antiglare screen, and those with adequate lighting in the room.

Thus the researcher as a field of concern in occupational health emphasizes the importance of taking care of occupational health of the people working in the computer field.

Level of visual disturbance in control and experimental group of IT professionals.

In the control group there was no significant difference in the visual disturbance level before (M=11.4; SD=2.7) & after (M=11.8; SD=2.5) ophthalmic exercises. In contrast in the experimental group the visual disturbance level (M=7.96; SD=1.51) after ophthalmic exercises was low, compared to those before ophthalmic exercises (M=10.6; SD= 2.35) respectively. The difference was found to be statistically significant at $p<0.01$, which attributes to the effectiveness of ophthalmic exercises.

Hence null hypotheses Ho_1 stated earlier as "There will be no significant difference in visual disturbance level before and after ophthalmic exercises in control and experimental group of IT professionals" was rejected.

Employees using video display units a large part of their working days frequently report their eyesight is quite badly affected at work and for some time afterwards. Daum (2002) strongly suggests that improving the visual status of workers using computers results in greater productivity in the workplace, as well as improved visual comfort. The visual symptoms can largely be resolved with proper management of the environment and by providing proper visual care for the employees.

The study results inferred that there is drastic reduction in visual disturbance symptoms after demonstration and performance of ophthalmic exercises among IT professionals .Thus the occupational health nurse plays a vital role in imparting the knowledge among IT professionals and in bringing a desirable attitude in practicing the ophthalmic exercises.

Level of satisfaction among experimental group of IT professionals regarding demonstration and performance of ophthalmic exercises

The present study reveals that all the IT professionals (100%) were highly satisfied towards various aspects of demonstration of ophthalmic exercises. All the study participants reported that they felt at ease and comfortable after performing ophthalmic exercises, it was easy to practice, efficient and can be practiced

continuously to overcome eyestrain. They expressed the interest to perform ophthalmic exercises regularly to improve their health and protect them from harmful effects of eye strain caused from working conditions.

Association between selected demographic variables and level of visual disturbance in control and experimental group of IT professionals

There was significant association between marital status($\chi 2=8.4$,df=1) and visual disturbance level in the control group and between monthly income($\chi 2=11.83$,df=3) and visual disturbance level in the experimental group and there was no significant association with the other selected demographic variables hence the null hypotheses $Ho_{2,}$ which states that there is no significant association between selected demographic variables and level of visual disturbance was partially rejected. This was due to the small sample size in the present study. Irrespective of demographic variables all IT professionals working in the IT industries experience visual disturbances. So relieving measures like ophthalmic exercises can be applicable in all IT professionals working in IT industries.

Association between selected clinical variables and the level of visual disturbance in experimental group of IT professionals before and after administration of ophthalmic exercises.

The researcher had found that there was significant association between selected clinical variables and computer vision syndrome before and after

performance of ophthalmic exercises in the control and experimental group. Hence the null hypotheses Ho_3 was partially rejected.

This shows that clinical variables like previous history, use of antiglare screens, using of break time, wearing spectacles, sleeping hours and font size have no impact on computer vision syndrome. Further studies can be conducted to generalize the findings.

The present study was supported by the study done by the department of yoga research, Mitra, Thane which aimed to find out whether regular performance of yogic eye practices improved tear break up time and the symptoms of computer vision syndrome. The yogic eye exercises included palming, eye movement, cleansing practices of eye with water, up and down, horizontal movements and rotational movements of eye. A non-invasive tear break up time test (TBUT test) to test the dryness was carried out on each participant and the control group at the beginning of the project and again at the end. Out of fourteen participants, the tear break up time test results showed an average improvement of 4 seconds (± 2) in the right eye of 10 participants, and an average improvement of 5 seconds (± 2) in the left eye of 10 participants. The control group showed no improvement. This was statistically significant after applying a paired 't' test.

Summary

This chapter had dealt with the discussion of findings in the present study which includes demographic variables of IT professionals in control and experimental group, level of visual disturbance among IT professionals in control and experimental group, association between selected demographic variables and level of visual disturbance, level of satisfaction of ophthalmic exercises among IT professionals.

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

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

Summary

The aim of the study was to assess the effectiveness of ophthalmic exercises upon computer vision syndrome among IT professionals at selective IT industries, Chennai.

Objectives of the Study

1. To assess the symptoms of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.
2. To determine the effectiveness of ophthalmic exercises before and after demonstration by comparing the visual disturbance in control and experimental group of IT professionals.
3. To identify the level of satisfaction regarding ophthalmic exercises upon computer vision syndrome in experimental group of IT professionals.

4. To find out the association between selected demographic variables and the level of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.
5. To find out the association between selected clinical variables and the level of visual disturbances before and after demonstration of ophthalmic exercises in control and experimental group of IT professionals.

Null Hypotheses

H_{01} There will be no significant difference in visual disturbance level before and after ophthalmic exercises in control and experimental group of IT professionals.

H_{02} There will be no significant association between the selected demographic variables and the level of visual disturbances in control and experimental group of IT professionals.

H_{03} There will be no significant association between the selected clinical variables and the level of visual disturbances in control and experimental group of IT professionals.

The conceptual framework of the study was developed on the basis of King's Goal Attainment theory, which is based on the concepts of personal, interpersonal, and social systems including perception, judgement, action, reaction, interaction, and transaction.

The study variables were the ophthalmic exercises and the visual disturbance among IT professionals. Hypotheses were formulated. The level of significance at $p<0.001$ level, was considered as significant.

An extensive review of literature and guidance by experts formed the foundation to the development of the study instruments. A quasi experimental research was used to achieve the objectives of the study. The present study was conducted in two IT industries, HOV services, Chennai and Skyline solutions, Chennai. The sample size was 30 IT professionals (Both in experimental and control group).They were selected by purposive sampling technique, according to the availability of IT professionals who fulfilled the eligibility criteria.

The researcher used a demographic variable proforma, clinical variable proforma, visual disturbance symptoms questionairre and rating scale on level of satisfaction regarding the ophthalmic exercises for collecting data. After the pilot study the data for the main study was collected. The collected data was tabulated and analyzed using descriptive and inferential statistics.

The Major Findings of the Study

- Majority of the participants of the study were between 21-30 years (67%, 77%) male (77%,73%) undergraduates (90%,86%) works with computers for 6-9 hours (77%,67%) and spends about two hours with computers at home (71%,40%) and most of them were unmarried (63%,67%) has 2.1 -

4years experience (67%,56%) and significant percentage of participants had monthly income of 30,000-40,000 (43%,37%) in control and experimental groups respectively.

- Majority of IT professionals had not used antiglare screens (100%, 100%) were working in good air conditioning (100%, 100%) had never practiced yoga (77%,60%) and most of them had previous history of visual disturbance (57%, 43%) had taken medical treatment (57%, 43%) had withdrawal of wearing spectacles (64%,40%) taken treatment of dry eye sometimes (53%, 63%) had blink status 8 per minute (57%, 53%) and significant percentage of participants had never used break time to refresh eyes (60%) in control group of IT professionals and sometimes used break time in experimental group (50%) and works at a distance of 15-20 inches (50%) in control group and 10-15 inches (47%) in experimental group and works with font size of 12 and above (50%, 60%) in control and experimental group and respectively.
- In the control group there was no significant difference in the visual disturbance level before (M=11.4; SD=2.7) & after (M=11.8; SD=2.5) ophthalmic exercises. In contrast in the experimental group the visual disturbance level (M=7.96; SD=1.51) after ophthalmic exercises was low, compared to those before ophthalmic exercises (M=10.6; SD= 2.35) respectively. The difference was found to be statistically significant at $p<0.01$, which attributes to the effectiveness of ophthalmic exercises.

- Majority of the IT professionals (100%) were highly satisfied regarding various aspects of demonstration of ophthalmic exercises**.**
- There was significant association between marital status($\chi 2$=8.4,df=1) and visual disturbance level in the control group and between monthly income($\chi 2$=11.83,df=3) and visual disturbance level in the experimental group and there is no significant association with the other selected demographic variables hence the null hypotheses $Ho_{2,}$ which states that there is no significant association between selected demographic variables and level of visual disturbance was partially rejected.
- There is significant association between blinking status($\chi 2$=15.8,df=3), sleeping hours($\chi 2$=6.7,df=2) and visual disturbance level in the control group and between distance between the seat and screen($\chi 2$=9.9,df=3) and visual disturbance level in the experimental group and there is no significant association with the other selected clinical variables hence the null hypotheses $Ho_{3,}$ which states that there is no significant association between selected clinical variables and level of visual disturbance was partially rejected.

Conclusion

Visual disturbance is very common among IT professionals working in IT industries. The findings of the study indicated that visual disturbance can be reduced by

effective ophthalmic exercises to increase the flexibility of the eyes and to relieve symptoms of computer vision syndrome among IT professionals.

Implications

Implications for nursing practice, nursing education, nursing administration and nursing research are recommended based on the findings of the study.

Nursing practice

Occupational health nurses act as change agents in creating awareness regarding the effects of prolonged computer use. The study findings show that the health care providers play an important role in educating IT professionals about computer vision syndrome and its impact on physical and mental health. With emerging health care facilities nurse need to know about the occupational hazards and the modes to prevent them. This helps the occupational nurses to recommend the use of ophthalmic exercises in order to prevent computer vision syndrome.

Nursing education

Integration of theory and practice is important in nursing education. With the emerging health care trends, nursing education must focus on innovation to enhance nursing care. The study findings suggest that ophthalmic exercises reduce the occurrence of computer vision syndrome among IT professionals leading to the conclusion that ophthalmic exercises should be practiced daily with the help of occupational health department. Nursing education curriculum specialty community health nursing curriculum

should lay more emphasis on practice of occupational health. Occupational health nursing could be considered as a sub specialty in community health nursing in the near future.

Nursing administration

Nurse administrators can organize periodic formal training program for nurses to teach ophthalmic exercises to the IT professionals. Nurse administrators can arrange conferences, in service education and workshop to encourage IT professionals to practice ophthalmic exercises.

Nursing research

In India, evidence based clinical strategies are not sufficient to address barriers to reduce the computer vision syndrome. Staff nurses to be encouraged to undertake research studies in the areas of computer vision syndrome among computer users and also to focus on quality, cost effective interventions so as to generate more scientific data based on which new strategies for reducing computer vision syndrome could be developed.

Recommendations

- A study can be conducted on larger sample to generalize the results.
- A study can be conducted in BPO centers among different people working in computers.

- A comparative study can be conducted to evaluate the effectiveness of various other intervention to help the IT professionals in reducing their visual disturbance.

- A longitudinal study with time series design can be conducted with the post test at an interval of 2, 4, 6 months to assess the effectiveness of the intervention.

- A comparative study can be conducted to assess the level of visual disturbance with ophthalmic exercises and other intervention.

- A study can be conducted on adolescents using computers for longer period.

REFERENCES

Agarwal,K. (2012). Managing computer related health problems. **Health Action.** 25(2), 25-27.

Blehm, C. (2006). A community – based study of asthenopia in computer operators. **Indian Journal of Ophthalmology.** 56(1), 51-55.

Bedesford, J.V. & Steven, G.(2007). Study of computer stress among computer professionals: special reference to dry eye. Retrived on 16 july 2012 from http://openmed.nic.in/view/year/html.

Basavanthappa, B.T. (2005).**Community Health Nursing**. 3rd edition. New Delhi: Jaypee Brothers.

Black,J.M., & Jacks,E.M. (1998). **Medical and Surgical Nursing**. Clinical management and continuity of care.(5th edition).Philadelphia: W.B.Saunders.

Burns.N., & Grove,S. (2001).**The practice of Nursing Research**. 4th edition. Philadelphia: W.B.Saunders Company.

Campbell, F.W., & Durden, K.(2004). The visual display terminal use: A consideration of its physiological, psychological and clinical background. **Ophthalmic Physiolology.**34(3), 175–92.

Chistopher Edwin,R., & Nicholas,R.(2002).**Principles and practice of Medical and Surgical Nursing**.(19 th edition). Philadelphia: Churchill Livingston publications.

Choudry, R.(2006). Computer Vision Syndrome. **The New Indian Express Health**. 22 (2), 23-27.

Dinesh Bhandari, J. (2008). Occupational health problems and role of ergonomics in information technology professionals in national capital region. **Indian Journal of Community Medicine**. 31(2), 36–38.

Duke.Elder, S. The foundation of ophthalmology: hereditary, pathology, diagnosis and therapeutics. **System of ophthalmology**. volume 7. Philadelphia: Mosby publications.

Jose, P.H., & Bastin Jerome, V. (2007). Computer and Health –Computer Vision Syndrome. **Health Action.** 17(2),28-30.

Jatinder,B., Neeraj Navin, et al. (2008). Computer Vision Syndrome**. Official Journal of TNAI Kerala Branch**. 2(1), 46-50.

Kaamil.(2009). Symptoms of computer vision syndrome. **Arch ophthalmology.** Retrived on 28 august 2012 from http://www.aao.org/aao/member/policy/driving.cfm.

Lewis,S.M., Heitkemper, M. M., & Dirkren, S.R.(2000). **Medical and Surgical Nursing: Assessment and Management of clinical problems.** (6^{th}edition). USA: Mosby publications.

Mahajan, B.K. (2010). **Methods in Biostatistics**. 7th edition. New Delhi: Jaypee Brothers Medical Publishers.

Mandal, G.M. (2006). Computer Vision Syndrome and the Effects of Yoga practice. **Ophthalmology.** 2^{nd} edition. Newyork: Lippincott publishers.

Ohio state university of optometry. (2007). Effects of computer use. Retrived on 22 june 2012 from http://www.vision.org.

Park, K. (2010).**Textbook of Preventive and Social Medicine**, 21st edition.Jabalpur: Banarsidas publishers.

Petrisia, J. (2011). Effectiveness of ophthalmic exercises on visual discomfort among computer workers. **The Nurse Journal.** 3 (3), 12-14.

Polit, F.D., & Beck,C.T. (2010). **Nursing Research**. 9th edition. Newyork: Lippincott & Co publishers.

Raja Raja Madhan, (2007). Computer Vision Syndrome and Ophthalmic Exercises. **The Nursing Journal of India.** 31(5), 27-30.

Rao, K.S. (1997). **Introduction to community health Nursing.** 3rd edition. Hyderabad: PT Publications.

Richa T., Rohit,K., & Karan, P.(2009). Study of visual and musculoskeletal disorders among computer professionals. **Indian Journal Community Medicine**. 34(4), 326–328.

Robin, R. (2008). Computer vision syndrome: recognition and control in software professionals. **The Nursing Journal of India.**27(2), 56-61.

Smeltzer,S.C., & Brenda, G.B.(1992). Brunner and Suddarth Textbook of **Medical and Surgical Nursing.** (8 th edition). Philadelphia: Lippincotts publications.

Staples, J.V.(2006). Computer Science: prevent computer related injury. Retrived on 26 june 2012 from www.firststoponlinedegree.com.

Shirole, T. (2008), Ophthalmologists recommend 20x20x20 Exercise for Computer Vision Syndrome. **Indian Health News**. 12(3), 21-26.

Sundar Rao,R. (2009). **Introduction to Biostatistics and Research Methods**. 4th edition. New Delhi: PHI learning private limited.

Szeto, H. (2006). Incidence of computer use among school students. **American Journal of ophthalmology.** Retrived on 22 june 2012 from http://www.allabout vision.html.

Thomas, K. & Seena, J.E. (2005). How do eye problems rank with other VDU disorders? Work with display units. **Fourth International Scientific Conference Book of Short Papers.** 12(2), Italy: Milan publications.

Telles,S. (2006). Effect of Yoga on self rated visual discomfort in computer users. **Head and Face Medicine.**16(2),46-49.

Tsubota, K. & Nakamori, K. (2008). Dry eyes and video display terminals. **England Journal of Medicine.** Retrieved on 16 march 2012 from http//564 naturaleyecare.html**.**

Wolkoff, P., Nojgaard, J.K. & Troiano, P.(2009). Eye complaints in the office environment: precorneal tear film integrity influenced by eye blinking efficiency. **Occupational Environmental Medicine**. Retrived on 28 august from http://3654 ophthal.html.

Wold, A. (2008). Accomodative vision therapy. **American Journal of ophthalmology.** Retrived on 10 july 2012 from www.firststoponlinedegree.com.

Verma, S.B.(2002). Computers and vision. **Journal of ophthalmic medicine**. 47(3),119-122.

APPENDIX –I

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

Apollo College of Nursing

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

CO/0314/12 ***4.06.12***

To

The HR Manager,
HOV Services,
106 - 109, Anna Salai
Next to Chellammal College
Chennai – 600 032.

Respected Sir / Madam,

Sub.: *To request permission for research study – Reg.*

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

"An quasi experimental study to assess the effectiveness of ophthalmic exercises upon computer vision syndrome among Information Technology (IT)professionals at selected IT industries, Chennai."

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

Thanking You,

Dr. LATHA VENKATESAN
PRINCIPAL

IS/ISO 9001:2000

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

APPENDIX –II

LETTER GRANTING PERMISSION TO CONDUCT THE STUDY

SOURCEHOV
Results that Exceed Expectations

July 16, 2012

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. C. Revathy, doing IInd year MSC (Nursing) of Apollo College of Nursinghas Successfully completed the assigned Project in our organization.

Topic : Effectiveness of Ophthalmic Exercises upon Computer Vision Syndrome in IT Professionals

During her Project Training Period, we found her to be exemplary and industrious.

We wish her success in all her new assignments.

For SourceHOV

M.G.S

Srivathsan MG
Deputy Senior Manager – Human Resource

LASON INDIA PRIVATE LIMITED
A SourceHOV Company
Regd. Off. : 3rd Floor, Sharda Arcade, Pune - Satara Road, Bibwewadi, Pune - 411 037.
Head. Off. : Dowlath Towers, 8 to 12 Floors, No. 59, 61 & 63, Taylors Road, Kilpauk, Chennai - 600 010.
Phone : 91 44 42203120 / 42203125 Fax : 91 44 4285 8528

APPENDIX III

ETHICAL COMMITEE LETTER

Ethics Committee

Apollo HOSPITALS
TOUCHING LIVES

30th August 2012

To,

Ms. Revathy,
2nd Year M.SC (Nursing),
Department of Community Health Nursing,
Apollo College of Nursing,
Chennai.

Ref: Effectiveness of Ophthalmic Exercises upon computer Vision syndrome among information technology (IT) professionals.

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

Dear Ms. Revathy,

Ethics Committee-Apollo Hospitals has received the following document submitted by you related to the conduct of the above-referenced study.

- Project proposal.
- Participant Consent Form.

The Ethics Committee-Apollo Hospitals reviewed and discussed the study proposal documents submitted by you related to the conduct of the above referenced study at its meeting held on 29th August 2012.

The following Ethics Committee Members were present at the meeting held on 29th August 2012.

Name	Profession	Position in the committee
Mr. S. S. Narayanan	Ethicist	Chairman
Dr. Rema Menon	Clinician	Member Secretary
Dr. Radha Rajagopalan	Clinician	EC-Member
Dr. Krishnakumar	Clinician	EC-Member

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E - Mail : ecapollochennai@gmail.com

Ethics Committee

Apollo HOSPITALS
TOUCHING LIVES

Dr. Vijaya Kumar	Clinician	EC-Member
Dr. Clive Fernandes	Consultant Clinical Pharmacologist	Basic Medical Scientist
Dr. Nalini Roa	Social Worker	EC-Member
Ms. N. Suseela	Retired English Teacher	Layperson
Ms. Maimoona Badsha	Lawyer	Lawyer
Dr. Paul Dilipkumar	Clinician	EC-Member
Dr. V. Balaji	Clinician	EC-Member
Dr. M. A. Raja	Consultant Medical Oncologist	EC-Member

After due ethical and scientific consideration, the Ethics Committee has approved the above presentation submitted by you.

The EC review and approval of the report is only to meet their academic requirement and will not amount to any approval of their conclusions/recommendations as conclusive, deserving adoption and implementation, in any form, in any health care institution.

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

With Regards,

Rema Menon

30/8/12
Date:

Dr. Rema Menon,
Ethics Committee-Member Secretary,
Apollo Hospitals, Chennai,
Tamil Nadu, India.

Dr. REMA MENON
MEMBER SECRETARY
ETHICS COMMITTEE, APOLLO HOSPITALS
APOLLO HOSPITALS ENTERPRISE LIMITED
CHENNAI-600 006, TAMILNADU

Apollo Hospitals Enterprise Limited
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E - Mail : ecapollochennai@gmail.com

APPENDIX IV

PLAGIARISM ORIGINALITY REPORT

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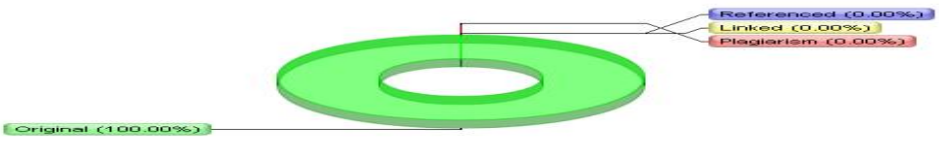

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APPENDIX V

RESEARCH PARTICIPANTS CONSENT FORM

Dear participants,

I am a M.Sc., Nursing Student of Apollo college of Nursing, Chennai. As a part of my study a research on effectiveness of ophthalmic exercises upon computer vision syndrome is selected to be conducted. The findings of the study will be helpful in improving the vision level of IT professionals.

I hereby seek your consent and cooperation to participate in the study. Please be frank and honest in your response. The information collected will be kept confidential and anonymity will be maintained.

Signature of the Researcher

I ……., hereby consent to participate and undergo the study.

Signature of the Participant

APPENDIX VI

LETTER REQUESTING OPINIONS AND SUGGESTIONS OF EXPERTS

FOR ESTABLISHING CONTENT VALIDITY OF RESEARCH TOOL

From

MS. C.Revathy
M.Sc., (Nursing) Second Year,
Apollo College of Nursing,
Chennai - 600095.

To

Forwarded Through:
Dr. Latha Venkatesan,
Principal,
Apollo College of Nursing.

Sub: **Requesting for opinions and suggestions of experts for establishing content validity for Research tool**.

Respected Madam,

I am a postgraduate student of the Apollo College of Nursing. I have selected the below mentioned topic for research project to be submitted to The Tamil Nadu Dr. M.G.R Medical University, Chennai as a partial fulfillment of Masters of Nursing Degree.

TITLE OF THE TOPIC:

A quasi experimental study to assess the effectiveness of ophthalmic exercises upon computer vision syndrome among IT professionals in selected IT industries at Chennai.

With regards may I kindly request you to validate my tool for its appropriateness and relevancy. I am enclosing the Background, Need for the study, Statement of the problem, Objectives of the study, Demographic Variable Proforma, Clinical Variable Proforma, Visual Disturbance Symptoms questionnaire, and Level of Satisfaction rating scale. I would be highly obliged and remain thankful for your great help if you could validate and send it as soon as possible.

Thanking you,

Yours sincerely,

(C.REVATHY)

APPENDIX VII

LIST OF EXPERTS FOR CONTENT VALIDITY OF THE TOOL

1. **Dr. Latha Venkatesan, M.Sc(N)., M.Phil(N)., Ph.D(N).,**
   Principal,
   Apollo College of Nursing,
   Chennai – 95.

2. **Prof. Mrs. Lizy Sonia.A. M.Sc (N).,**
   Vice Principal,
   Apollo College of Nursing,
   Chennai – 95.

3. **Ms. Nesa Sathya Satchi M.Sc (N).,**
   Reader,
   Apollo College of Nursing,
   Chennai - 600095.

4. **Ms. Shobana Gangadaran M.Sc(N).,**
   Professor,
   Apollo College of Nursing,
   Chennai - 95.

5. **Ms. Jaslina, M.Sc (N).,**
   Reader,
   Apollo college of Nursing,
   Chennai - 95.

7. **Ms. Helen, M.Sc (N).,**
   Reader,
   Apollo College of Nursing,
   Chennai - 95.

APPENDIX VIII

CERTIFICATE FOR CONTENT VALIDITY TO WHOM EVER IT MAY CONCERN

This is to certify that tools and content for the research study developed by

———————————— , II year M.Sc Nursing student of Apollo College of Nursing for her dissertation, **"An experimental study to assess the effectiveness of ophthalmic exercises upon computer vision syndrome among IT professionals in selected IT industries at Chennai"** was validated for the content.

Signature of the Expert

APPENDIX IX

ENGLISH EDITING LETTER

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation "**An experimental study to assess the effectiveness of ophthalmic exercises upon computer vision syndrome among IT professionals in selected IT industries Chennai"** by Ms.C.Revathy II year Msc (N), Apollo College of nursing was edited for English language appropriateness by MRS. TAMIZHARASI.

Signature

M. TAMIZHARASI, M.A.,B.Ed
B.T ASST.
G.H.SCHOOL
NEMMELI - 603 104.

APPENDIX X

DEMOGRAPHIC VARIABLE PROFORMA

Purpose

This proforma is used by the researcher to collect the information on demographic variables of IT professionals such as age, sex, educational status, marital status, working hours in computer per day and years of experience with computers.

Instructions

Please answer the following questions. This information will be filled by the researcher. Please be frank and free in answering these questions. The collected information will be kept confidential and anonymity maintained.

Sample number ☐

1. Age in years

1.1. 21-30 ☐

1.2. 31-40 ☐

1.3. 41-50 ☐

1.4. >50 ☐

2. Sex

2.1. Male ☐

2.2. Female ☐

3. Educational status

3.1. Diploma ☐

3.2. Undergraduate ☐

3.3. Postgraduate ☐

3.4. Others ☐

4. Marital status

4.1. Married ☐

4.2. Unmarried ☐

5. Working hours with computers per day

5.1. 3-5 hours per day ☐

5.2. 6-9 hours per day ☐

5.3. 9-11 hours per day ☐

5.4. More than 11 hours per day ☐

6. Years of experience

6.1. 0-2 years ☐

6.2. 2.1-4 years ☐

6.3. 4.1-6 years ☐

6.4. > 6 years ☐

7. Monthly income

7.1. Below 20,000 ☐

7.2. 20,000-30,000 ☐

7.3. Above 30,000-40,000 ☐

7.4. Above 40,000 ☐

8. Duration of usage of computers at home

8.1. One hour ☐

8.2. Two hours ☐

8.3. Three hours ☐

8.4. More than three hours ☐

APPENDIX XI

CLINICAL VARIABLE PROFORMA

Purpose

This proforma is used to assess the clinical variables such as history, treatment, measures taken, background factors and withdrawal of any treatment.

Instructions to the participants

The researcher collects the following information with the help of a self administered questionnaire. Please be frank and free in answering. It will be kept confidential and anonymity will be maintained.

1. Previous history of visual disturbance

1.1. Yes ☐

1.2. No ☐

2. Previous history of treatment taken for visual disturbance

2.1. Medical treatment ☐

2.2. Surgical treatment ☐

2.3. Both medical treatment and surgical treatment ☐

2.4. None ☐

3. History of withdrawal of any treatment

4.1. Withdrawal of wearing spectacles ☐

4.2. Discontinued using eye lubricants ☐

4.3. Discontinued yoga ☐

4.4. None ☐

4. Treatment of dry eye

4.1. Often ☐

4.2. Sometimes ☐

4.3. Never ☐

5. Use of antiglare computer screens

6.1. Often ☐

6.2. Sometimes ☐

6.3. Never ☐

6. Practice yoga

7.1. Often ☐

7.2. Sometimes ☐

7.3. Never ☐

8. Use of break time to refresh the eyes

8.1. Often ☐

8.2. Sometimes ☐

8.3. Never ☐

9. Wearing of corrective spectacles

9.1. Yes ☐

9.2. No ☐

10. Blink status while on work

10.1. 10 per minute ☐

10.2. 12 per minute ☐

10.3. 8 per minute ☐

10.4. 16 per minute ☐

11. Distance between screen and seat during work time

11.1. 10 to 15 inches ☐

11.2. 15 to 20 inches ☐

11.3. 20 to 26 inches ☐

11.4. 5 to 10 inches ☐

12. Level of air and central heating of workplace

12.1. Poor air conditioning ☐

12.2. Air conditioning up to the mark ☐

13. Sleeping hours per day

13.1. Less than six hours ☐

13.2. Six to eight hours ☐

13.3. Above eight hours ☐

14. Usual font size while working in computer

14.1. Twelve and above ☐

14.2. Below twelve ☐

APPENDIX XII

BLUEPRINT FOR RATING SCALE OF VISUAL DISTURBANCE SYMPTOMS

Items	**Item numbers**	**Total numbers of Items**	**Percentage%**
General symptoms	1,2,3	3	25
Visual activity symptoms	4,5,6	3	25
Visual sensitivity symptoms	7,8,9,10	4	33
Retinal problem	11,12	2	17
TOTAL		12	100

RATING SCALE OF VISUAL DISTURBANCE SYMPTOMS

Purpose

This rating scale is used to assess the visual disturbance variables such as redness, slow refocusing, sensitivity to light, fatigue, dry and irritated eyes, colour distortion, burning eyes, blurred vision, itchy eyes and double vision.

Instructions to the participants

There are twelve items given below. Kindly go through and give your response. Feel free to answer. Each item has three options ranging from never to constantly. The responses will be kept confidential. Please put a tick (√) mark in the appropriate column.

Have you ever experienced any of the following symptoms?

S .No	Symptoms	Never	Occasionally	Constantly
		0	1	2
	General symptoms			
1.	Headache			
2.	Neck pain			
3.	Fatigue			
	Visual activity symptoms			
4.	Blurred vision			
5.	Slow refocusing			
6.	Double vision			
	Visual sensitivity symptoms			
7.	Redness of eyes			
8.	Irritated eyes			
9.	Dry eyes			
10	Burning eyes			
	Retinal problems			
11.	Sensitivity to light			
12.	Colour distortion			
	TOTAL			

Scoring interpretations

Score	Visual disturbances symptoms
0-12	Mild symptoms
13-24	Moderate symptoms
25-36	Severe symptoms

APPENDIX XIII

BLUE PRINT FOR LEVEL OF SATISFACTION OF OPHTHALMIC EXERCISES

S. No	Items	Item number	Total number of items	Percentage%
1.	Method of ophthalmic exercises	1,2,3,4,5	5	50
2.	Communication, interpersonal relationship	6,7,8	3	30
3.	Relief of symptoms	9,10	2	20
Total			10	100

LEVEL OF SATISFACTION RATING SCALE

Purpose

This rating scale is used to determine the level of satisfaction of the participants regarding ophthalmic exercises.

Instructions to the participants

There are ten items given below, kindly read the items. Responses extent from highly satisfied to highly dissatisfied. Describe your satisfaction regarding ophthalmic exercises. Give your responses freely and frankly. The responses will be kept confidential and anonymity will be maintained.

S. No	Items	Highly satisfied	Satisfied	Dissatisfied	Highly dissatisfied
		4	3	2	1
1.	Frequency of ophthalmic exercises				
2.	Duration of ophthalmic exercises				
3.	Timing of ophthalmic exercises				
4.	Comfort you have experienced				
5.	Types of ophthalmic exercises				
6.	Demonstration of ophthalmic exercises				
7.	Approach of the researcher before ophthalmic exercises				
8.	Explanation of researcher regarding ophthalmic exercises				
9.	Relief of symptoms after ophthalmic exercises				
10.	Support given by the researcher during ophthalmic exercises				

Score interpretations

Score	Satisfaction level
01-10	Highly dissatisfied
11 -20	Dissatisfied
21-30	Satisfied
31-40	Highly satisfied

APPENDIX-XIV

DATA CODE SHEET

SN **Sample number**

AGE **Age**
2.1.17-18
2.2.19-21

SEX **Sex**
3.1.Male
3.2.Female

EDU **Education**
4.1.Diploma
4.2.Undergraduate
4.3.Postgraduate
4.4.Others

MS **Marital status**
5.1.Marrried
5.2.Unmarried

WHC **Working hours with computers**
6.1.3-5 hours per day
6.2.6-9 hours per day
6.3.9-11 hours per day
6.4.More than 11 hours per day

YOE **Year of experience**
7.1.0-2 years
7.2.2.1-4 years
7.3.4.1-6 years
7.4.>6 years

Clinical Variables

PHVD **Previous history of visual disturbance**
1.1.yes
1.2.no

PHT **Previous history of treatment**
2.1.medical treatment
2.2.surgical treatment
2.3.both
2.4.none

HWT **History of withdrawal of treatment**
3.1.withdrawal of wearing spectacles
3.2.discontinued using eye lubricants
3.3.discontinued yoga
3.4.none

Treatment of dry eye
TDE
5.1.often
5.2.sometimes
5.3.never

UACS **Use of antiglare screens**
6.1.often
6.2.sometimes
6.3.never

PY **Practice yoga**
7.1.often
7.2.sometimes

MI **Monthly income**
8.1.below 20,000
8.2.20,000-30,000
8.3.30,000-40,000
8.4.above 40,000

DCH **Duration of computer usage at home**
9.1.one hour
9.2.two hours
9.3.three hours
9.4.more than three hours

7.3. never

UBR **Use of break time**
8.1.often
8.2.sometimes
8.3.never

WCS **Wearing of corrective spectacles**
9.1.yes
9.2.no

BS **Blink status**
10.1.10 per minute
10.2.12 per minute
10.3.8 per minute
10.4.16 per minute

DBS **Distance between screen and seat**
11.1.10 to 15 inches
11.2.15 to 20 inches
11.3.20 to 26 inches
11.4.5 to 10 inches

LHW **Level of air and central heating of work place**
12.1.poor air conditioning
12.2.air conditioning upto the mark

SH **Sleeping hours per day**
13.1.less than six hours
13.2.six to eight hours
13.3.above eight hours

FS **Usual font size**
14.1.twelve and above
14.2.below twelve

APPENDIX XV

MASTER CODE SHEET- CONTROL GROUP

SN	DEMOGRAPHIC VARIABLES								CLINICAL VARIABLE												V.D SCORE	
	AGE	SEX	EDU	MS	WHC	YOE	MI	DCH	PHVD	PHT	HWT	TDE	UACS	PY	UBT	WCS	BS	DBS	LHW	SH	FS	PRE TEST	POST TEST
1	2.1	3.1	4.2	5.1	6.3	7.2	8.4	9.1	2.1	3.1	4.1	5.3	6.3	7.3	8.3	9.1	10.3	11.1	12.2	13.1	14.1	10	11
2	2.1	3.1	4.2	5.1	6.3	7.2	8.4	9.1	2.2	3.4	4.1	5.2	6.3	7.3	8.2	9.1	10.3	11.1	12.2	13.2	14.2	11	11
3	2.1	3.2	4.2	5.1	6.2	7.1	8.2	9.2	2.2	3.4	4.2	5.3	6.3	7.3	8.2	9.1	10.3	11.2	12.2	13.3	14.2	11	11
4	2.1	3.1	4.2	5.2	6.2	7.2	8.3	9.2	2.1	3.1	4.3	5.3	6.3	7.2	8.3	9.1	10.3	11.2	12.2	13.3	14.2	13	14
5	2.1	3.1	4.2	5.2	6.2	7.2	8.3	9.2	2.2	3.4	4.3	5.3	6.3	7.2	8.3	9.1	10.4	11.1	12.2	13.3	14.1	14	15
6	2.1	3.1	4.2	5.2	6.2	7.3	8.4	9.2	2.2	3.4	4.3	5.2	6.3	7.1	8.3	9.2	10.2	11.2	12.2	13.3	14.2	14	16
7	2.1	3.1	4.2	5.2	6.2	7.2	8.3	9.3	2.1	3.1	4.1	5.2	6.3	7.3	8.2	9.1	10.1	11.3	12.2	13.2	14.1	16	16
8	2.1	3.1	4.2	5.2	6.2	7.2	8.2	9.2	2.1	3.1	4.4	5.2	6.3	7.3	8.2	9.1	10.1	11.3	12.2	13.1	14.1	13	13
9	2.2	3.2	4.2	5.2	6.2	7.2	8.3	9.2	2.1	3.1	4.1	5.2	6.3	7.3	8.2	9.1	10.2	11.2	12.2	13.1	14.2	11	10
10	2.2	3.1	4.2	5.2	6.3	7.2	8.4	9.2	2.2	3.4	4.1	5.2	6.3	7.3	8.2	9.1	10.3	11.2	12.2	13.1	14.2	09	09
11	2.1	3.1	4.3	5.2	6.2	7.2	8.3	9.2	2.1	3.1	4.3	5.3	6.3	7.2	8.2	9.1	10.3	11.1	12.2	13.1	14.2	07	09
12	2.1	3.2	4.2	5.2	6.2	7.2	8.2	9.2	2.1	3.1	4.1	5.3	6.3	7.3	8.3	9.1	10.3	11.1	12.2	13.2	14.1	08	09
13	2.2	3.1	4.2	5.2	6.2	7.3	8.3	9.2	2.1	3.1	4.4	5.3	6.3	7.3	8.3	9.2	10.3	11.1	12.2	13.2	14.1	11	12
14	2.2	3.1	4.2	5.2	6.2	7.1	8.3	9.2	2.2	3.4	4.1	5.2	6.3	7.3	8.3	9.2	10.3	11.2	12.2	13.3	14.1	12	13
15	2.2	3.1	4.2	5.2	6.2	7.2	8.2	9.4	2.2	3.4	4.1	5.2	6.3	7.3	8.3	9.2	10.3	11.2	12.2	13.3	14.2	13	14
16	2.1	3.1	4.2	5.2	6.3	7.2	8.3	9.3	2.1	3.1	4.1	5.2	6.3	7.3	8.2	9.1	10.4	11.2	12.2	13.3	14.1	14	15
17	2.1	3.2	4.2	5.2	6.2	7.2	8.3	9.2	2.1	3.1	4.1	5.3	6.3	7.2	8.3	9.2	10.4	11.2	12.2	3.2	14.1	14	11
18	2.1	3.1	4.3	5.2	6.2	7.2	8.2	9.2	2.1	3.1	4.3	5.3	6.3	7.3	8.3	9.1	10.1	11.3	12.2	13.1	14.2	16	11
19	2.3	3.1	4.2	5.1	6.2	7.3	8.4	9.2	2.1	3.1	4.3	5.2	6.3	7.3	8.2	9.1	10.1	11.2	12.2	13.2	14.1	18	14
20	2.1	3.1	4.2	5.2	6.2	7.2	8.3	9.2	2.2	3.4	4.1	5.2	6.3	7.3	8.3	9.1	10.1	11.1	12.2	13.3	14.1	13	11
21	2.1	3.2	4.2	5.2	6.3	7.1	8.2	9.2	2.2	3.4	4.1	5.2	6.3	7.3	8.2	9.2	10.1	11.1	12.2	13.1	14.1	12	13
22	2.1	3.1	4.2	5.1	6.3	7.2	8.3	9.2	2.2	3.4	4.1	5.3	6.3	7.3	8.3	9.1	10.2	11.1	12.2	13.1	14.2	\10	13
23	2.1	3.1	4.2	5.1	6.2	7.3	8.4	9.4	2.1	3.1	4.4	5.3	6.3	7.3	8.3	9.1	10.2	11.2	12.2	13.1	14.1	09	07
24	2.2	3.2	4.2	5.1	6.2	7.2	8.2	9.3	2.2	3.4	4.1	5.3	6.3	7.3	8.2	9.2	10.3	11.2	12.2	13.1	14.2	09	07
25	2.1	3.1	4.2	5.1	6.2	7.2	8.3	9.2	2.2	3.4	4.1	5.2	6.3	7.3	8.3	9.1	10.3	11.1	12.2	13.1	14.1	08	10
26	2.1	3.1	4.2	5.2	6.2	7.1	8.3	9.2	2.2	3.4	4.1	5.2	6.3	7.2	8.3	9.1	10.3	11.1	12.2	13.2	14.2	08	13
27	2.2	3.1	4.3	5.1	6.2	7.3	8.2	9.3	2.1	3.1	4.1	5.2	6.3	7.2	8.3	9.1	10.3	11.2	12.2	13.2	14.1	09	14
28	2.1	3.2	4.2	5.1	6.2	7.2	8.4	9.2	2.1	3.1	4.3	5.2	6.3	7.3	8.3	9.2	10.3	11.2	12.2	13.3	14.2	09	14
29	2.2	3.1	4.2	5.2	6.2	7.2	8.3	9.2	2.1	3.1	4.1	5.3	6.3	7.3	8.3	9.1	10.3	11.2	12.2	13.1	14.1	10	09
30	2.2	3.1	4.2	5.1	6.3	7.3	8.4	9.3	2.1	3.1	4.1	5.3	6.3	7.3	8.2	9.1	10.3	11.1	12.2	13.1	14.2	10	09

MASTER CODE SHEET- EXPERIMENTAL GROUP

SN	DEMOGRAPHIC VARIABLES								CLINICAL VARIABLE													V.D SCORE	
	AGE	EX	EDU	MS	WHC	YOE	MI	DCH	PHVD	PHT	HWT	TDE	UACS	PY	UBT	WCS	BS	DBS	LHW	SH	FS	PRE TEST	POST TEST
1	2.1	3.2	4.2	5.1	6.2	7.1	8.1	9.1	2.1	3.1	4.1	5.3	6.3	7.2	8.2	9.1	10.1	11.1	12.1	13.1	14.2	08	09
2	2.1	3.1	4.3	5.1	6.3	7.2	8.2	9.4	2.2	3.4	4.3	5.3	6.3	7.2	8.3	9.1	10.2	11.2	12.1	13.1	14.1	10	07
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4	2.1	3.1	4.2	5.1	6.3	7.3	8.4	9.3	2.2	3.4	4.1	5.3	6.3	7.1	8.2	9.1	10.3	11.2	12.1	13.1	14.2	14	08
5	2.1	3.1	4.2	5.1	6.2	7.3	8.4	9.2	2.2	3.4	4.1	5.3	6.3	7.2	8.2	9.2	10.1	11.4	12.1	13.3	14.1	12	10
6	2.1	3.1	4.2	5.2	6.2	7.3	8.4	9.2	2.1	3.1	4.3	5.3	6.3	7.2	8.1	9.2	10.3	11.3	12.1	13.2	14.1	07	08
7	2.1	3.1	4.2	5.1	6.3	7.2	8.4	9.1	2.2	3.4	4.4	5.2	6.3	7.2	8.3	9.2	10.3	11.3	12.1	13.2	14.2	09	08
8	2.2	3.2	4.2	5.1	6.3	7.2	8.4	9.1	2.2	3.4	4.1	5.2	6.3	7.1	8.3	9.1	10.2	11.3	12.1	13.3	14.1	10	09
9	2.1	3.1	4.3	5.2	6.3	7.4	8.4	9.2	2.1	3.1	4.1	5.2	6.3	7.1	8.2	9.1	10.3	11.2	12.1	13.1	14.1	08	09
10	2.2	3.1	4.2	5.2	6.2	7.2	8.3	9.1	2.2	3.4	4.1	5.3	6.3	7.1	8.2	9.2	10.3	11.2	12.1	13.1	14.2	15	10
11	21	3.1	4.2	5.2	6.2	7.2	8.2	9.1	2.1	3.1	4.3	5.3	6.3	7.2	8.3	9.1	10.1	11.1	12.1	13.3	14.1	16	10
12	2.1	3.2	4.2	5.1	6.2	7.2	8.2	9.1	2.2	3.4	4.4	5.3	6.3	7.2	8.3	9.1	10.2	11.1	12.1	13.2	14.1	14	07
13	2.1	3.2	4.1	5.1	6.2	7.2	8.2	9.2	2.2	3.4	4.3	5.2	6.3	7.1	8.1	9.1	10.3	11.1	12.1	13.2	14.1	13	07
14	2.1	3.2	4.2	5.1	6.2	7.2	8.3	9.3	2.2	3.4	4.1	5.3	6.3	7.2	8.2	9.1	10.1	11.2	12.1	13.2	14.2	10	09
15	2.1	3.1	4.2	5.2	6.2	7.4	8.3	9.2	2.1	3.1	4.3	5.3	6.3	7.1	8.2	9.1	10.1	11.1	12.1	13.1	14.1	09	08
16	2.1	3.1	4.2	5.1	6.2	7.2	8.3	9.1	2.2	3.4	4.3	5.3	6.3	7.2	8.2	9.2	10.3	11.2	12.1	13.1	14.1	08	08
17	2.2	3.1	4.2	5.1	6.2	7.2	8.4	9.1	2.2	3.4	4.4	5.2	6.3	7.2	8.3	9.1	10.2	11.3	12.1	13.1	14.2	08	09
18	2.2	3.1	4.2	5.1	6.2	7.1	8.3	9.1	2.1	3.1	4.3	5.2	6.3	7.1	8.3	9.1	10.3	11.4	12.1	13.1	14.1	11	09
19	2.2	3.1	4.2	5.2	6.3	7.2	8.3	9.1	2.2	3.4	4.3	5.3	6.3	7.2	8.1	9.2	10.3	11.1	12.1	13.1	14.2	14	09
20	2.1	3.1	4.2	5.2	6.2	7.3	8.3	9.1	2.2	3.4	4.1	5.3	6.3	7.1	8.2	9.2	10.4	11.1	12.1	13.3	14.1	14	06
21	2.1	3.1	4.2	5.1	6.2	7.3	8.4	9.2	2.1	3.1	4.1	5.3	6.3	7.2	8.2	9.1	10.2	11.1	12.1	13.2	14.1	07	07
22	2.1	3.1	4.2	5.1	6.2	7.2	8.4	9.3	2.2	3.4	4.4	5.3	6.3	7.1	8.2	9.2	10.3	11.2	12.1	13.1	14.1	09	04
23	2.1	3.1	4.2	5.1	6.2	7.1	8.4	9.3	2.1	3.1	4.3	5.2	6.3	7.2	8.2	9.2	10.4	11.2	12.1	13.1	14.1	11	08
24	2.1	3.2	4.2	5.1	6.3	7.2	8.2	9.2	2.2	3.4	4.1	5.3	6.3	7.1	8.3	9.2	10.1	11.3	12.1	13.2	14.2	13	06
25	2.2	3.1	4.2	5.1	6.3	7.2	8.3	9.2	2.1	3.1	4.3	5.3	6.3	7.2	8.3	9.1	10.3	11.1	12.1	13.3	14.1	14	07
26	2.1	3.1	4.2	5.1	6.3	7.2	8.3	9.1	2.1	3.1	4.1	5.3	6.3	7.1	8.3	9.1	10.3	11.1	12.1	13.2	14.2	08	07
27	2.1	3.2	4.2	5.2	6.2	7.1	8.3	9.2	2.2	3.4	4.3	5.3	6.3	7.1	8.2	9.1	10.3	11.2	12.1	13.1	14.1	09	04
28	2.1	3.1	4.2	5.2	6.2	7.2	8.3	9.3	2.1	3.1	4.3	5.2	6.3	7.2	8.2	9.1	10.2	11.1	12.1	13.1	14.1	10	09
29	2.2	3.1	4.2	5.1	6.2	7.1	8.2	9.3	2.2	3.4	4.3	5.2	6.3	7.2	8.2	9.1	10.3	11.1	12.1	13.2	14.1	10	09
30	2.1	3.2	4.1	5.2	6.2	7.1	8.2	9.2	2.1	3.1	4.1	5.3	6.2	7.2	8.3	9.1	10.3	11.2	12.1	13.3	14.2	09	09