*Original Research Article*

# An Evaluation of Knowledge and Attitude amongst Adolescents of Ahmedabad towards Computer Vision Syndrome and Effectiveness of Structured Teaching Programme

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## ABSTRACT

**Background:** Computer vision syndrome is a condition resulting from focusing the eyes on a computer display for protracted, uninterrupted periods of time. The main aim of this study was to assess the knowledge and attitude regarding computer vision syndrome among students studying in higher secondary schools before and after the administration of a structured teaching programme in selected schools of Ahmedabad city.
**Materials and Methods:** Sample consisted of 180 students who met the eligibility criteria were selected. The tools used for generating necessary data were structured knowledge questionnaires and likert attitude rating scale for computer Vision Syndrome. Structured Teaching Programme was developed by reviewing literature on Computer Vision Syndrome to evaluate the influence on knowledge and attitude among students.
**Results:** The mean post-test knowledge and attitude score was higher than mean pretest knowledge and attitude score. Paired 't' test with a 'P' value of <0.05 depicted that there was a significant difference in the pretest and post-test scores at 5% level of significance. Chi-square test revealed that there was no significant association between all demographic variables and knowledge and attitude of the samples.
**Conclusion:** The findings indicate that the Structured Teaching Programme was a suitable and effective method of instruction for updating and enhancing the knowledge as well as attitude of higher secondary students. Resting eyes in between continuous computer work will be helpful to reduce possibility to get Computer Vision Syndrome.

*Key words:* Computer Vision Syndrome, Knowledge, Attitude, Structured Teaching Programme

## INTRODUCTION

Computers are everywhere from kitchen to concrete mixers, from planes to pockets. It has become backbone of today's occupational settings and heartbeats of the modern world. It has created a brand new environment. Life in 21st century has become easier and more comfortable as compared to olden times; a major contributor to this development is the use of modern technologies. We cannot imagine today's life without computers. Nowadays,

computers have become a part of education, business, e-trading, socializing, chatting and recreation. More and more people today are spending a major share of their day playing with the keyboard and mouse. [1] According to the United States Bureau of Labor Statistics, computers are used in the United States, by 100 million people at their jobs daily. Further, according to the National Center for Education Statistics, 95% of schools and 62% of all classrooms in the United States have had computers since 1999. [2] According to the 2003 U.S. Census data, 64% of adults and 86% of children use computers at school, at work, or at home. Computer Vision Syndrome affects the majority of computer users. About 88% of people who use computers everyday suffer from eyestrain, and children are no exception. [3] With this increase in the use of computer, certain health problems are also on rise. Extensive viewing of the computer screen can lead to eye discomfort, fatigue, blurred vision and headache, dry eyes and other symptoms of eye strain, computer vision syndrome, carpel tunnel syndrome, repetitive strain injury, backache etc. Among these, the commonest is the computer vision syndrome. [4,5] Computer vision syndrome is a condition resulting from focusing the eyes on a computer display for protracted, uninterrupted periods of time. [6] Symptoms of Computer Vision Syndrome include headaches, blurred vision, neck pain, redness in the eyes, fatigue, eye strain, dry, irritated eyes, double vision, polyopia, and difficulty refocusing the eyes. These symptoms can be further aggravated by improper lighting conditions or air moving past the eyes. [6-8] For computer vision syndrome, treatment requires multidirectional approach combining ocular therapy with adjustment of the work station, proper lighting, anti-glare filters, and ergonomic positioning of computer monitor and regular work breaks may help improve

visual comfort. Lubricating eye drops and special computer glasses help relieve ocular surface related symptoms. [9] According to Dr. Jeevan Ladi, the chairman of Maharastra Ophthalmological Society, five years ago the rate of computer vision syndrome was 8%, there has been a 15% rise in cases of computer vision syndrome in the past two years. Today almost 25% of the total cases in outpatient departments are of computer vision syndrome. The computer vision syndrome cases have been witnessed among children playing video games for longer hours, info-tech professionals and citizens. [10]

*Aim:* The main aim of this study was to assess the effectiveness of Structured Teaching Programme on knowledge and attitude among students studying in higher secondary school on computer vision syndrome and to find out the association between knowledge and attitude with demographic variables.

### MATERIALS AND METHODS

The present study was carried out during October 2012 to January 2013.

*Study Approach and Study Design:*
Research approach selected for the present study was pre experimental research approach and Research design selected for the present study was one group pre-test post-test design.

*Study Location:*
Out of the six zones of Ahmedabad city the west zone was selected by lottery method. The schools of the west zone were listed out and from 57 schools three schools selected were A.G. High School and G & D. Parikh Higher Secondary School, Navrang Higher Secondary School, Mirambica High School.

*Study Population and Eligibility Criteria:*
The sample consisted of 180 students, 60 students from each school studying in selected schools of Ahmedabad city. Multistage simple random sampling

technique was adopted for the selection of samples. Criteria for the selection of samples were students studying in standard XI and XII, willing to participate in the study, present at the time of data collection.

**Study Tools:**

Structured questionnaire and summative likert scale were considered the most appropriate tools for the collection of data regarding knowledge and attitude for the present study. Structured Teaching Programme was developed to provide knowledge and favorable attitude towards Computer Vision Syndrome. The contents of the structured questionnaire, summative likert scale [11] and Structured Teaching Programme were divided into six areas such as General aspects, causes, risk factors, sign and symptoms, management and complications which lead to computer vision syndrome.

**Development of Structured Teaching Programme:**

The method of instruction adopted was lecture cum discussion. Many relevant pictures were used as visual aids. The visual aids were prepared in using LCD projector, hand out and chart. The prepared Structured Teaching Programme was edited by the language teacher. The final draft of the teaching plan was ascertained in consultation with experts in related fields.

**Development and Description of Tools:**

1) *Section I*

Consists of five items on personal data such as age, standard of samples, gender, family income, parents' occupation.

2) *Section II:* Structured knowledge questionnaire

Structured knowledge questionnaire was prepared to elicit the knowledge on computer vision syndrome. There were total 30 multiple choice items having one correct answer. Total items were 30 and maximum score was 30. Every correct answer was given a score of one and wrong answer was given zero score. The answer key for structured knowledge questionnaire was prepared.

3) *Section III:* Structured summative likert scale [11]

It consisted of 20 statements in attitude measurement tool for measuring the attitude. A five point likert scale is constructed to assess the attitude of higher secondary students on computer vision syndrome. It comprises 20 items in six areas. Items were structured statements. There were 10 positive and 10 negative statements of a five point scale as Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree. The total score ranged between 20-100. The ranking system of positive statements on the basis of Strongly Agree-5, Agree-4, Neutral-3, Disagree-2, Strongly Disagree-1 and ranking system of negative statements on the basis of Strongly Agree-1, Agree-2, Neutral-3, Disagree-4, Strongly Disagree-5. The overall minimum score for the test is 20 and maximum score is 100.

**Validity:**

The content validity of the tool was done by 11 experts. Experts were Masters of Child Health nursing, PG Faculties, Guides, Doctors of Pediatric Department, and Bio-statistician. The experts were selected on basis of their clinical, teaching experience and interest, the problem being studied. They were requested to give their opinions and suggestions for the items of the tool. Out of the items most of the items were accepted. Some of the items were modified.

**Reliability:**

The reliability of structured knowledge questionnaire was determined by test retest method using Spearman Brown Formula. The reliability coefficient of the questionnaire was 0.8 which is more than 0.5; hence the structured knowledge questionnaire was found reliable.

The reliability of structured summative likert scale was determined by Crohn back's

Alpha method. The reliability of structured summative likert scale was 0.74 which is more than 0.5. Hence the attitude likert scale was found to be reliable.

### Procedure for Data Collection:

Formal permission was taken from concerned authorities, the District Education Officer of Ahmedabad city and Principal of respected school. An informed written consent from all the participants was taken before starting the study. The sample was approached individually and the aim of the study was discussed. The pretest was administered on 1st day and then Structured Teaching Programme was administered on the same day. The post test was taken after seven days.

### Statistical Analysis:

Data was analyzed using GraphPad Prism Version 5.0. Demographic Data of samples were analyzed using frequency and percentage. The scored data from the structured knowledge questionnaire and structured summative likert attitude scale before and after administration of Structured Teaching Programme were analyzed using mean, standard deviation (SD), 't' test. A two tailed P value <0.05 was considered statistically significant. Chi-square test was used to find out the association between knowledge and attitude with demographic variables.

### RESULTS

The participants in this study were 180 students. Frequency and percentage wise distribution of personal data of the samples are shown in Table 1. According to this table age group of the highest samples were of 16 years 66(36.67%) and the lowest samples were belonged to the age group of 18 years 22(12.22%). Equal distribution of the samples were seen in case of standard, 90(50%) samples were of standard 11th and 90(50%) samples were of standard 12th. Gender wise distribution of the samples

were also equal for male 90(50%) and female 90(50%). Regarding to the family income, 82(45.56%) samples belonged between 10001-15000 INR (Indian Rupees), while 15(8.33%) samples belonged to less than 5000 INR. Regarding to the parents occupation, 100(55.56%) samples parents occupation were service, while 80(44.44%) samples parents occupation were business and other.

Table 1: Distribution of personal data of the samples.

n = 180

| S.No. | Demographic Variables | Frequency | Percentage |
|---|---|---|---|
| 1 | Age in years | | |
| | 15 year | 48 | 26.67 |
| | 16 year | 66 | 36.67 |
| | 17 year | 44 | 24.44 |
| | 18 year | 22 | 12.22 |
| 2 | Standard | | |
| | 11th | 90 | 50 |
| | 12th | 90 | 50 |
| 3 | Gender | | |
| | Male | 90 | 50 |
| | Female | 90 | 50 |
| 4 | Family income | | |
| | INR Less than 5,000 | 15 | 8.33 |
| | INR 5,001 to 10,000 | 24 | 13.33 |
| | INR 10,001 to 15,000 | 82 | 45.56 |
| | INR More than 15,001 | 59 | 32.78 |
| 5 | Parents occupation | | |
| | Service | 100 | 55.56 |
| | Business and Other | 80 | 44.44 |

Study shows that pretest scores of students on Computer Vision Syndrome was inadequate knowledge 165(91.67%) and moderate knowledge 15(8.33%) whereas post-test knowledge scores was about 171(95%) adequate knowledge whereas 9(5%) had moderate knowledge (Table 2).

Table 2 : Assessment of knowledge scores before and after STP

n=180

| Level of knowledge | pretest | | Post-test | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |
| Adequate (>75% of scores) | 00 | 0 % | 171 | 95 % |
| Moderate (51-75% of scores) | 15 | 8.33 % | 09 | 05 % |
| Inadequate (<50% of scores) | 165 | 91.67 % | 00 | 00 % |
| Total | 180 | 100 % | 180 | 100 % |

STP = Structured Teaching Programme

Study reveals that the mean post-test knowledge score was significantly higher than the mean pretest knowledge score (Table 3). The mean post-test attitude score was significantly higher than the mean pretest attitude score (Table 5). Significance in the pretest post-test mean value of knowledge and attitude scores was statistically proved by paired 't' test ($p<0.05$).

Table 3 : Mean, Mean Difference, Standard Deviation (SD) and 't' test value of the Pretest and Post-test Knowledge scores of samples.

| Knowledge test | Mean | Mean difference | SD | Calculated t value | P value (2 tailed) | Level of significance |
|---|---|---|---|---|---|---|
| Pretest | 11.08 | | 2.05 | | | |
| Post-test | 24.80 | 13.75 | 1.03 | 74.49 | <0.05 | 0.05 |

Study shows 165(91.67%) samples had positive attitude in pretest and 168(93.33 %) samples had positive attitude in post-test whereas 15(8.33%) samples had negative attitude in pretest and in post-test 12(6.67%) samples had negative attitude on Computer Vision Syndrome (Table 4).

According to Chi-square test, it can be inferred that all demographic variables had no significant effect on the knowledge and attitude of samples regarding Computer vision syndrome ($p>0.05$) (Table 6) and (Table 7).

Table 4 : Assessment of attitude scores before and after STP.

n = 180

| Sr No. | Attitude | Classification | Pretest | | Post-test | |
|---|---|---|---|---|---|---|
| | | | Frequency | % | Frequency | % |
| 1 | 61 to 100 | Favorable[#] | 165 | 91.67 | 168 | 93.33 |
| 2 | 20 to 60 | Unfavorable[##] | 15 | 8.33 | 12 | 6.67 |
| | Total | | 180 | 100 | 180 | 100 |

[#] = Positive attitude and [##] = Negative attitude

Table 5 : Mean, Mean Difference, Standard Deviation (SD) and 't' value of the Pretest and Post-test Attitude scores of samples.

| Attitude test | Mean | Mean difference | SD | Calculated t value | P value (2 tailed) | Level of significance |
|---|---|---|---|---|---|---|
| Pretest | 69.72 | | 6.03 | | | |
| Post-test | 75.10 | 5.38 | 7.84 | 8.65 | <0.05 | 0.05 |

Table 6 : Chi-square association of Pretest Knowledge scores of samples with the demographic variables.

n=180

| Sr No | Demographic variables | Moderate | Inadequate | $x^2$ value | df | P Value (2 sided) | Inference |
|---|---|---|---|---|---|---|---|
| 1 | Age in years<br>1) 15-16 year<br>2) 17-18 year | 10<br>05 | 104<br>61 | 0.07829 | 1 | 0.7796 | NS |
| 2 | Standard<br>1) 11th<br>2) 12th | 06<br>09 | 84<br>81 | 0.6545 | 1 | 0.4185 | NS |
| 3 | Gender<br>1) Male<br>2) Female | 09<br>06 | 81<br>84 | 0.6545 | 1 | 0.4185 | NS |
| 4 | Family income<br>1) INR <10000<br>2) INR >10001 | 05<br>10 | 34<br>131 | 1.312 | 1 | 0.2520 | NS |
| 5 | Parents occupation<br>1) Service<br>2) Business and other | 08<br>07 | 92<br>73 | 0.03273 | 1 | 0.8564 | NS |

NS = Non Significant

Table 7 : Chi-square association of Pretest Attitude scores of samples with the demographic variables.

n=180

| Sr No | Demographic variables | Unfavorable | Favorable | $x^2$ value | df | P Value (2 sided) | Inference |
|---|---|---|---|---|---|---|---|
| 1 | Age in years<br>1) 15-16 year<br>2) 17-18 year | 07<br>08 | 107<br>58 | 1.957 | 1 | 0.1618 | NS |
| 2 | Standard<br>1) 11th<br>2) 12th | 10<br>05 | 80<br>85 | 1.818 | 1 | 0.1775 | NS |
| 3 | Gender<br>1) Male<br>2) Female | 06<br>09 | 84<br>81 | 0.6545 | 1 | 0.4185 | NS |
| 4 | Family income<br>1) INR <10000<br>2) INR >10001 | 05<br>10 | 34<br>131 | 1.312 | 1 | 0.2520 | NS |
| 5 | Parents occupation<br>1) Service<br>2) Business and other | 09<br>06 | 91<br>74 | 0.1309 | 1 | 0.7175 | NS |

NS = Non Significant

## DISCUSSION

Our findings revealed that most of the adolescents were ignorant regarding to knowledge and attitude towards Computer Vision Syndrome and all the demographic variables had no significant association with the knowledge and attitude of the samples. This findings shows an agreement with the past study done by Devesh S and Al-Bimani N. [12] These lack of Computer Vision Syndrome's familiarity leads to the disorder and computer users inclines to have symptoms like Eyestrain, Headache, Dry Eye, Blurred Vision, Watery eye, Red eye, Double vision as indicated in the study of Reddy SC, Low CK et al. [13] and Eric Borsting, William H et al. [14] In another study done by Akinbinu T et al. and Bali J et al. shows that 75% of respondents were unknowingly having symptoms of computer vision syndrome. [15, 16] The result of our study shows that after the administration of the Structured Teaching Programme there was definite increase in both knowledge and attitude among the students. Similar result of effectiveness of Structured Teaching Programme were obtained by Devesh S and Al-Bimani N. [12]

## CONCLUSION

Unfortunately, a large amount of computer users are not aware of the problem and even those who are find it very difficult to take regular breaks when they concentrate on work. Computer users should reduce their time spend working on computer to less than 7 hours per day. Several software packages exist to help the users manage their rest brakes and exercise, but they all have serious limitations in detecting the user's activity level. This activity level is usually determined from keyboard or mouse use and doesn't correctly represent the behavior when user is statistically observing the screen (for example, during reading). The disorder was commonly suffered by majority of the computer users but rarely bring them to see doctors as the sign and symptoms may not be too burdening to them. From our present study, it can be concluded that Structured Teaching Programme was effective in improving the knowledge and attitude of the samples. Prevention of computer vision syndrome's symptoms by Structured Teaching Programme is useful strategy and these

would benefit the society of the world to understand the disease more precisely.

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