

# A Structured Educational Intervention to Enhance School Teachers' Knowledge of Refractive Errors: A Pre–Post Intervention Study of Effectiveness and Implications

Nikalaje Allchurch

M. Sc (N), Lecturer, Department of Community Health Nursing, Dr. J. J. Magdum Institute of Nursing, Jaysingpur, Dist - Kolhapur, Maharashtra, India  
 nikalaje2495@gmail.com

**Abstract:**Background: The effect of refractive errors is blurred vision, which can occasionally be so severe as to impair eyesight. The three most typical refractive errors are astigmatism, which causes distorted vision due to an irregularly shaped cornea, nearsightedness (myopia), farsightedness (hyperopia), and trouble seeing close objects (hyperopia). Nearsightedness (myopia) and hyperopia (farsightedness) are the two most prominent refractive defects. Objectives 1) To assess the mean pre-test knowledge score in control and experimental groups. 2. To evaluate the effectiveness of a structured teaching program in experimental groups. 3. To compare the post-test knowledge score in control and experimental groups. 4. To find out the association between pre-test knowledge scores with their selected socio-demographic variables in control and experimental groups. Method: A study was conducted in selected schools to assess the effectiveness of a structured teaching program on refractive error among school teachers. 60 samples were selected by using a non-probability purposive sampling technique. The sociodemographic was collected by using a questionnaire method on Age, Gender, Educational qualification, Year of experience, and knowledge regarding refractive errors. Knowledge regarding refractive errors was assessed by using structured knowledge questionnaires. A pre-test of the control group and an experimental group was conducted on the same day. A structured teaching program was given to only the experimental group. A post-test of both groups was conducted on the seventh day to assess improvement in the knowledge regarding Refractive errors. Collected data were analyzed using descriptive and inferential statistics. Result: In the experimental group mean pre-test score was 12.37 with a standard deviation of  $\pm 2.49$ , whereas the mean post-test score was 22.8 with a standard deviation of  $\pm 3.86$ . The test statistical value of the paired t-test was  $t_{cal} 4.034$  was greater than the tabulated value  $t_{tab} 2.05$  and the unpaired t-test reveals that  $t_{cal} 7.14$  showing that there was a significant difference in knowledge scores of the experimental group. This concludes that the STP was an effective intervention strategy for improving the knowledge regarding Refractive errors.

**Keywords:** Assess, Effectiveness, Refractive errors, STP

## 1. Introduction

Eyes play a vital role in our day-to-day lives and are perhaps the most precious gift we have. This world is visible to us because we are blessed with eyesight. Clear and bright eyesight makes this world a better place to live in.<sup>1</sup> Good vision is an important part of education. Many experts believe 80% of learning is done through a child's eyes. Reading, computer usage, and chalkboard work are all visual tasks students perform every day. A child's eyes are always in use in the classroom. Therefore, when a child's vision is not clear, learning and classroom participation suffer.<sup>2</sup>

Health is a concern for everyone. Children's health is the nation's Wealth, and Nation's Progress is determined by people's health. Health Information may have a great impact on health maintenance. Vision is a gift to be cherished.<sup>3</sup>

According to WHO, approximately 314 million people worldwide live with low vision and blindness. Of these, 45 million people are blind and 269 million have moderate or severe visual impairments. Around 145 million people's visual impairment is due to uncorrected refractive errors (nearsightedness, farsightedness or astigmatism).<sup>4</sup> In most of these cases, normal vision could be restored with eyeglasses. 80% of blindness is avoidable i.e., due to causes that are curable, treatable and/or preventable by cost-effective means.<sup>5</sup>

Refractive error is a prevalent eye disorder. It occurs when the eye cannot focus on the images from the outside world. The result of refractive errors is blurred vision, which is sometimes so severe that it causes visual impairment. The three most common refractive errors are: 1. Myopia (nearsightedness): Difficulty in seeing distant objects clearly, 2. Hyperopia (farsightedness): Difficulty in seeing close objects clearly, 3. Astigmatism: Distorted vision resulting from an irregularly curved cornea, the clear covering of the eyeball. Refractive errors cannot be prevented, but they can be diagnosed by an eye examination and treated with corrective glasses, contact lenses, or refractive surgery.<sup>6</sup>

## 2. Problem Statement

A Study to assess the effectiveness of STP on knowledge regarding refractive error among school teachers in selected rural areas, in Kolhapur

## 3. Objectives of the Study

- 1) To assess the mean pre-test knowledge score in control and experimental groups.
- 2) To evaluate the effectiveness of a structured teaching program in experimental groups.
- 3) To compare the post-test knowledge score in control and experimental groups

- 4) To find out the association between pre-test knowledge scores with their selected socio-demographic variables in control and experimental groups.

### Hypotheses

All hypotheses are tested at a 0.05 level of significance

H<sub>01</sub>- There is no difference between the mean pre-test and post-test knowledge score regarding refractive errors in the experimental group and control group

H<sub>1</sub>-There is a difference between the mean pre-test and post-test knowledge score regarding refractive errors in the experimental group and control group

H<sub>02</sub>- There is no association between the pre-test knowledge score of school teachers regarding refractive errors among school teachers with their selected socio-demographic variables of the experimental group

H<sub>2</sub>- There is an association between the pre-test knowledge score of school teachers regarding refractive errors among school teachers with their selected socio-demographic variables of the experimental group

## 4. Methodology

### Research Approach:

Quantitative Evaluative Research approach

### Research Design:

Quasi-experimental two-group Pre-test Post-test design

### The setting of the Study:

Selected rural school, Kolhapur district

### Research Variables

- Independent variables: In this study structured teaching program independent variable
- Dependent variable: In this study was structured knowledge questionnaire dependent variable

### Target Population:

The target population is an aggregate of cases about which the investigator would like to generalize.

### Accessible Population:

The aggregate of cases that conform to the designated criteria and which is accessible to the investigator as a pool of subjects for the study. In this study, the accessible population comprised post-knowledge score teachers from selected schools.

### Sample Size:

The study sample comprised 60 school teachers 30 in the control group and 30 in the experimental group.

### Sampling Technique:

In this study, a non-probability purposive sampling technique was adopted to select the subjects. Purposive sampling is based on the belief that the researcher's knowledge about the population is school teachers can be used to hand-pick sample members. This sampling technique

permits the researcher to decide purposively, to select subjects that are judged to be typical of the population.

### Criteria for Samples Selection

**Inclusion criteria:** School teachers who are,

- 1) Available at the time of data collection
- 2) Willing to participate in the study

### Exclusion criteria

School teachers who are, Not available at the time of data collection

### Description of tool

**Section I** - Socio-demographic variables (Age, Gender, educational qualification, year of experience, knowledge regarding refractive errors)

**Section II** – Structured knowledge questionnaire

**Section III** – Structured Teaching Program

### Validity and reliability

The content validity was obtained by consulting the experts from medical, ophthalmologist and nursing fields. The structured knowledge questionnaire and Structured Teaching Program tool were approved by the experts. The tool is standard and universally accepted.

### Ethical consideration

The study was approved by the research committee of the institution. Assurance was given to the subjects that the anonymity of each individual would be maintained.

### Data collection procedure

- 1) After securing written permission from the respective authorities, based on inclusion and exclusion criteria, the subjects were selected.
- 2) Informed and written consent was taken from the subjects after explaining the study.
- 3) 60 subjects were selected using a non-probability purposive sampling technique. (30 in the control group and 30 in the experimental group)
- 4) In the control group pre-test was done at 10am on 1<sup>st</sup> day taken using structured knowledge questionnaires
- 5) In the experimental group pre - test was done at 10 am on 1<sup>st</sup> day. The structured teaching program was administered for 45 minutes on given same day and the 7<sup>th</sup> day Post - test was conducted using the same scale
- 6) Data collected was analyzed and interpreted.

### Plan for data analysis

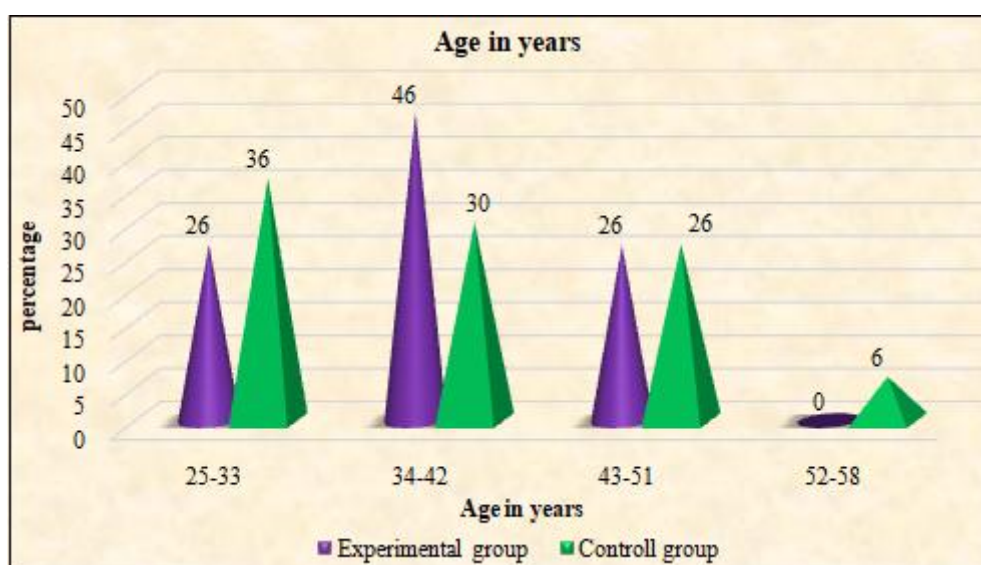
The data analysis is the systematic organization and synthesis of research data and the testing of the research Hypotheses using that data. The data obtained were analyzed using both descriptive and inferential statistics based on the objectives of the study.

## 5. Result

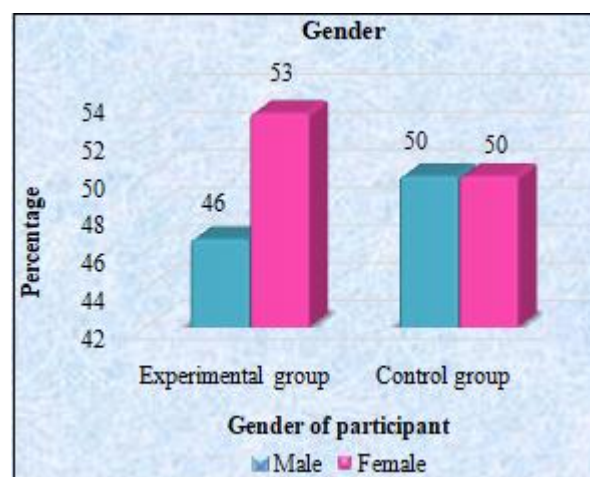
**Section I: Analysis of socio-demographic data of school teachers in selected rural schools.**

**Table 1:** Frequency and percentage distribution of subjects according to their selected socio-demographic variables in experimental and control group, n=60

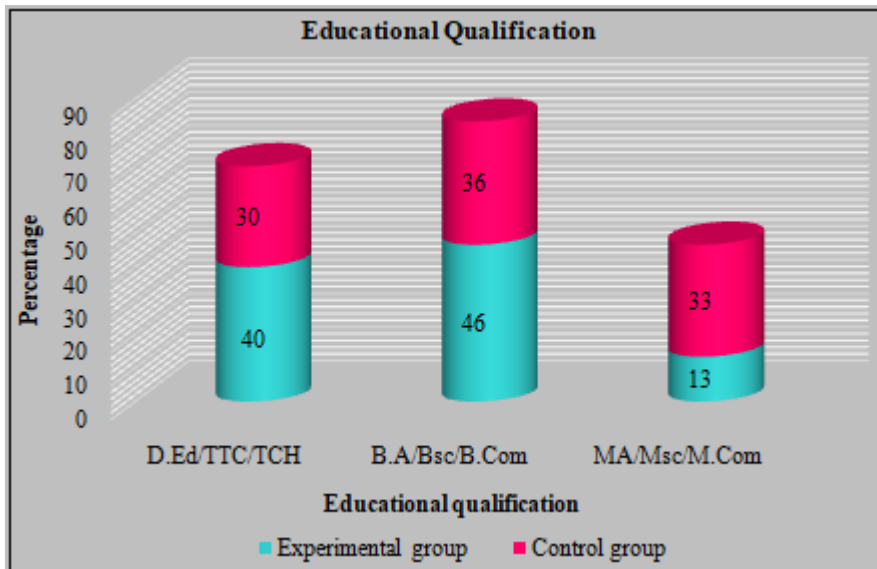
Sr. No.	Variable	Groups	Control		Experimental	
			Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1.	Age in years	25-33	11	36	08	26
		34-42	09	30	14	46
		43-51	08	26	08	26
		52-58	02	06	00	23
2.	Gender	Male	15	50	14	46
		Female	15	50	16	53
3.	Educational Qualification	DEd/TTC/TCH	09	30	12	40
		BA/ BSc/BCOM	11	36	14	33
		MA/MSc/MCOM/MEd	10	33	04	20
4.	Years of Experience	1-10	11	36	08	26
		11-20	09	30	12	40
		21-30	08	26	08	26
		31-40	02	06	02	06
5.	Knowledge regarding refractive errors	Yes	21	70	26	87
		No	09	30	04	13

**Graph 1:** Cone diagram showing the distribution of participants according to their Age in years

The above cone diagram (graph 1) depicts, the majority of subjects in experimental group 14 (46%) belonged to the age group of 34 – 42 years, while the minimum number 08 (23%) belonged to the age group of 25 – 33 years minimum subjects. The majority of subjects in the control group 09 (30%) belonged to the age group of 34 – 42 years, while the minimum of subjects 02 (6%) belonged to the age group of 52 – 58 years.

**Graph 2:** Column diagram showing the distribution of participants according to their gender

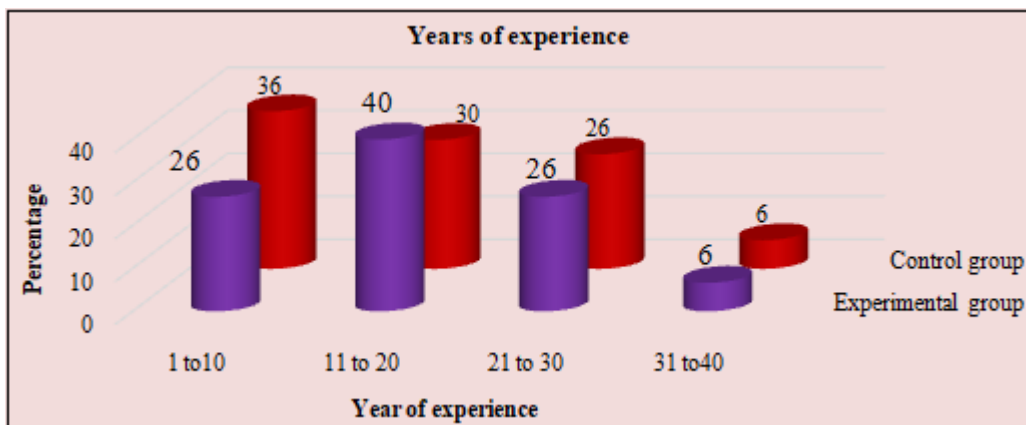
The above column diagram (Graph 2) depicts, the majority of subjects in the exp. group (53%) were female, while a minimum of subjects (46%) were male. In a control group, both subjects were equally distributed in the male and female categories.



**Graph 3:** Cylinder diagram showing the distribution of participant's educational qualification

The above cylinder diagram (Graph 3) displays that the majority of subjects in the experimental group 14 (46%) belonged to BA/Bsc/Bcom educational qualification while the minimum number 12 (40%) belonged to DEd/TTC/TCH

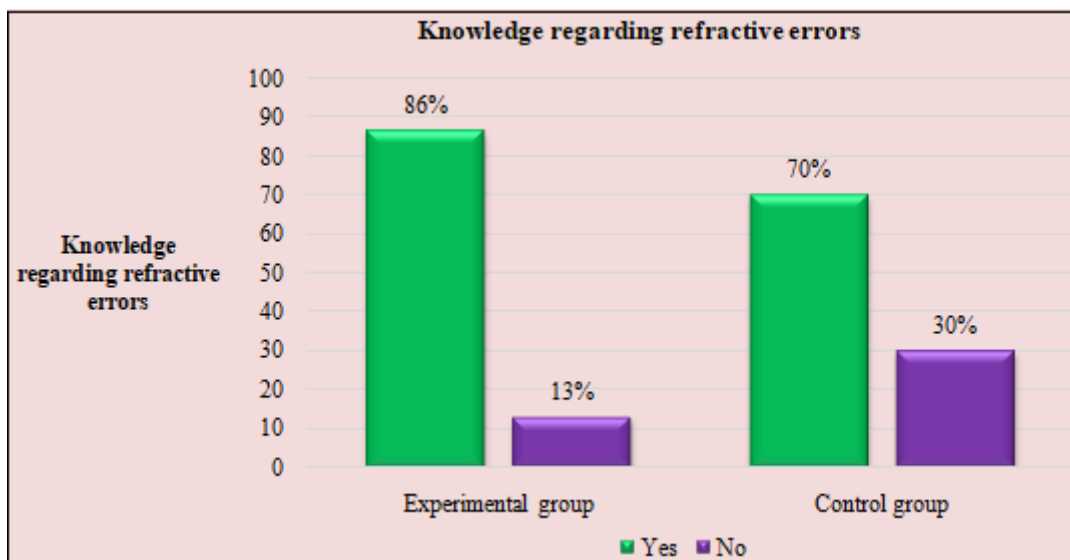
Maximum of subjects in the control group 11 (36%) belonged to BA/Bsc/B.Com educational qualification, while minimum number 09 (40%) belonged to DEd/TTC/TCH educational qualification.



**Graph 4:** Cylinder showing the Distribution of participants according to their year of experience

The above cylinder diagram depicts that the majority of subjects in experimental group 12 (40%) belonged to 11-20 years of experience while the minimum number 08(26%)

belonged to others. The majority of subjects in the control group 11(36%) belonged to 1-10 years of experience, while a minimum 02(6%) belonged to 31-40 years of experience



**Graph 5:** Column diagram showing the distribution of participant’s knowledge regarding refractive errors

The above column diagram displays the majority of subjects in experimental group 12 (40%) belonged to 11-20 years of experience while the minimum number 08(26%)

belonged to others. The majority of subjects in the control group 11(36%) belonged to 1-10 years of experience, while a minimum 02(6%) belonged to 31-40 years of experience.

**Section II**

**Findings related to mean, median, mode, range and standard deviation of pre-test and post-test knowledge score of subjects regarding refractive errors**

post-test mean was 22.8, the median 23.5, mode 27, SD 3.86 and the range was 14 of knowledge score in the experimental group.

**Table 4-** Mean, median, mode, standard deviation, range of knowledge scores of subjects in experimental group n = 30

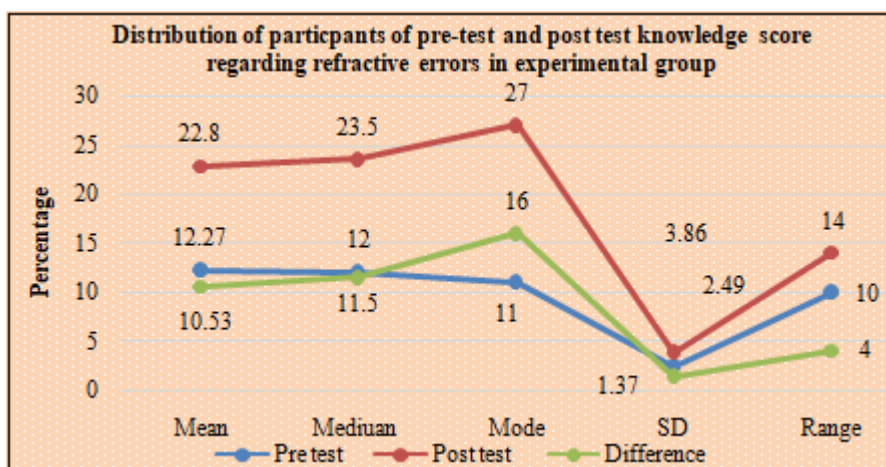
**Table 5-** Mean, median, mode, standard deviation, range values knowledge scores of subjects in control group. n = 30

Area of Analysis	Mean	Median	Mode	Standard Deviation	Range
Pre test	12.27	12	11	2.49	10
Post Test	22.8	23.5	27	3.86	14
Difference	10.53	11.5	16	1.37	04

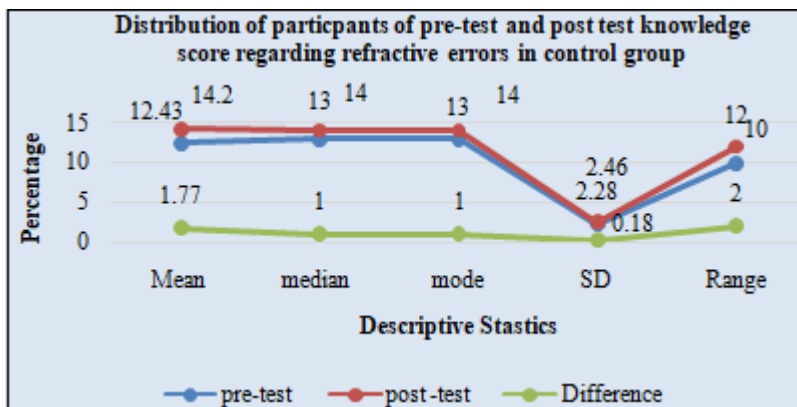
Area of Analysis	Mean	Median	Mode	Standard Deviation	Range
Pre test	12.43	13	13	2.28	10
Post Test	14.2	14	14	2.46	12
Difference	1.77	1	1	0.18	02

Table 4 and graph 6 indicate that, after the pre-test mean was 12.27, median 12, mode 11, standard deviation 2.49 and range was 10 of the knowledge score. Whereas, after the

Table 5 and graph 7 indicate that in the control group, the pre-test mean was 12.43, median 13, mode 13, standard deviation 2.28 and range was 10; whereas in the control group, post-test mean was 14.2, median 14, mode 14, SD 2.46 and range was 12 of knowledge score.



**Graph 6:** Line diagram showing the distribution of participants of pre-test and post-test knowledge score regarding refractive errors in the experimental group



**Graph 7:** Line diagram showing distribution of participants of pre-test and post-test knowledge score regarding refractive errors in control group

**Table 6:** Mean difference, standard error and paired 't' value of knowledge scores of subjects in the experimental group, n = 30

Mean Difference	Standard error	Paired 't' test		df
		Calculated value	Tabulated value	
10.53	2.61	4.03	2.05	29

Table 6 shows that the data presented in table 6 shows that; the obtained mean difference between the pre-test and post-test knowledge score in the experimental group was 10.53. The obtained calculated value (tcal- 4.034) was greater than the tabulated value (t tab-2.05). Therefore,  $H_{01}$  was rejected,  $H_{11}$  was accepted i.e.  $H_1: \mu \neq \mu_0$ . So, it is found that STP was effective in improving knowledge among school teachers.

**Table 7:** Mean difference, standard error and unpaired 't' value of subjects in experimental group and control group, n = 60

Mean Difference	Standard error	Unpaired 't' test		df
		Calculated value	Tabulated value	
8.6	0.7	7.14	2.00	58

Table 7 shows that the obtained mean difference between post-test knowledge scores in the experimental and control groups is 8.6. This indicates that there was an improvement in knowledge regarding refractive errors in the experimental group after administrating STP among school teachers. Reveals that the calculated 't' value (t cal- 7.14) was greater than the tabulated value ( $t_{tab}$ - 2.00). Hence;  $H_{02}$  was rejected,  $H_{2}$  was accepted. i.e.  $H_2: \mu \neq \mu_0$ . Thus, the STP was proved to be a very effective intervention strategy for improving the knowledge regarding refractive errors.

**Section- III**

**Table 8:** Association between Pre-test knowledge of subjects and selected demographic variables in the experimental group.

Sr. No	Variables	Groups	Good	Average	Poor	Calc. value	Tab. value	df
1.	Age in years	25-33	02	02	03	6.10	12.59	6
		34-42	06	06	01			
		43-51	04	02	03			
		52-58	00	01	00			
2.	Gender	Male	00	12	02	1.20	5.99	2
		Female	00	11	05			
3.	Educational Qualification	DEd/TTC/TCH	00	08	04	2.61	9.49	4
		BA/ BSc/BCOM	00	12	02			
		MA/MSc/MCOM/MEd	00	04	00			
4.	Years of Experience	1-10	00	11	03	1.68	12.59	6
		11-20	00	05	01			
		21-30	00	05	03			
		31-40	00	02	00			
5.	Knowledge regarding refractive errors	Yes	00	19	07	1.39	5.99	2
		No	00	04	00			

Table 9 indicated that reveals that the chi-square Test was applied to determine the association between the knowledge score and their socio-demographic variables. It is observed that there was no statistically significant association between Age, Gender, Educational qualification, Year of experience, knowledge regarding refractive errors, There is no statistically significant association between knowledge score Age, Gender, Educational qualification, Year of experience, knowledge regarding refractive errors, ( $p=0.03 < 0.05$ ).

Hence,  $H_{04}$  was accepted.  $H_4$  was rejected in the control group i.e.  $H_{04}: \mu_0 \neq \mu$ . This revealed that there was no significant association between the knowledge score of subjects with their selected socio-demographic variables control group.

**6. Nursing implication**

The findings of the study have implications for nursing

education, nursing practice, nursing administration, and nursing research.

### **Nursing Practice**

The health care delivery system at present gives more importance to the promotion of health and preventive aspects. Adequate Knowledge helps in the early identification and correction of refractive errors among children which in turn helps to reduce the burden of blindness due to avoidable causes. The school health nurse can educate the teachers regarding refractive errors and the related symptoms in identifying children with visual difficulties. The nurses can play an important role in the school eye screening programs participating teachers in identifying visual difficulties in children. The parents can also be made aware of the various symptoms of refractive errors in children to take timely action.

### **Nursing Education**

Children are the future of any nation. It is the responsibility of health care providers, especially nurses, to prevent children from avoidable blindness due to uncorrected refractive errors, which is an essential aspect of various programs at the national and international levels. Nurses need to update their Knowledge so that they in turn will be able to disseminate the Knowledge to teachers, parents, and even school children. The nursing curriculum should be such that it prepares the nursing students to assist the client and the community in all aspects of health care.

### **Nursing Administration**

Nurse administrators can organize school vision screening programs and various school health programs in educating teachers regarding refractive errors. They can also conduct training programs for teachers to test the vision using the Snellen chart. Various educational programs can be organized for teachers, parents, and school children regarding early identification of various visual problems, prevention of avoidable blindness, and various treatment modalities available.

### **Nursing Research**

One of the essential aims of nursing research is to contribute Knowledge to the body of the nursing profession and expand the scope of nursing. Nurses need to be engaged in multidisciplinary research to help them improve their Knowledge and skills in handling various problems related to health and illness. The present study can serve as baseline data for further nursing and other community-based research. It can also help nurses initiate various studies in school settings regarding various health problems of children and teachers' Knowledge and perceptions and their ability to identify the various health problems and thus improve the health status of children.

## **7. Conclusion**

The conclusion drawn from the findings of the study are as follows –

- 1) Review of the literature has helped the investigator to gain in-depth knowledge of the content, to develop a conceptual framework for the study and tool for data collection and analysis of data.

- 2) A study was conducted in selected rural areas school of Kolhapur knowledge regarding refractive errors among school teachers. The study concluded that the knowledge score was significant at a 0.05 level of significance. Therefore, it can be inferred that the mean post-test knowledge score of the subject in the experimental group was lower than the mean pre-test score that the structured teaching program was effective on Knowledge regarding the refractive error.

## **References**

- [1] T. Natung, T. Taye, L. A. Lyngdoh, B. Dkhar, R. Hajong, "Refractive errors among patients attending the ophthalmology department of a medical college in North-East India," *J Family Med Prim Care*, 6, 543-548, 2017.
- [2] K. S. Naidoo, J. Jaggernath, "Uncorrected refractive errors," *Indian J Ophthalmol.*, 60, 432-437, 2012.
- [3] T. R. Fricke, B. A. Holden, D. A. Wilson, G. Schlenker, K. S. Naidoo, S. Resnikoff, K. D. Frick, "Global cost of correcting vision impairment from uncorrected refractive error," *Bulletin of the World Health Organization*, 90, 728-738, 2012.
- [4] D. Pascolini, S. P. Mariotti, "Global estimates of visual impairment: 2010," *Br J Ophthalmol.*, 96, 614-618, 2012.
- [5] P. Raju, S. V. Ramesh, H. Arvind, R. George, M. Baskaran, P. G. Paul, G. Kumaramanickavel, C. McCarty, L. Vijaya, "Prevalence of refractive errors in a rural South Indian population," *Invest Ophthalmol Vis Sci.*, 45, 4268-4272, 2004.
- [6] L. Dandona, R. Dandona, T. J. Naduvilath, C. A. McCarty, M. Srinivas, P. Mandal, A. Nanda, G. N. Rao, "Burden of moderate visual impairment in an urban population in Southern India" *Ophthalmology*. 497, 497-504, 1999.