Effect of an Educational Program on Nurses' Performance toward Caring for ophthalmic patients Affected by Climate Changes

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ABSTRACT

Background: Global climate change and air pollution have a significant impact on population health. Studies have concentrated on how the environment's air pollution and temperature affect the eyes. The purpose of this study was to evaluate the effect of an educational program on nurses' performance toward caring for ophthalmic patients affected by climate changes. Methods: The current study was carried out in the ophthalmology department at Benha University Hospital using a quasi-experimental research methodology. To accomplish the goal of this study, a convenience sample of all available nurses (n=40) working in ophthalamic department, The care of patients with eye disorders caused by climate change was addressed using two tools the nurses' practise observational checklist and the nurses' knowledge assessment questionnaire. Results: According to this study, 37.5% of the nurses who were studied had satisfactory levels of overall eye care procedure practises prior to the programme, which increased to 87.5% after its implementation, and 22.5% of them had satisfactory levels of overall knowledge prior to the programme. Additionally, there were substantial and positive statistical correlations (p values = (0.003* & 0.001**, respectively) between the total knowledge and total practise scores of the examined nurses before and after the educational programmeConclusion: It can be said that putting an educational programme into place considerably improved the way nurses handled patients with eye conditions. Additionally, there was a statistically significant correlation between the pre-program personal data and the nurses' knowledge and practise levels. The study proposed creating guidelines and ongoing in-service training programmes to assist ophthalmology nurses in updating, acquiring, and developing their knowledge and skills in regard to treating

patients with eye conditions brought on by climatic changes. Analyse the impact that educational programmes for treating ophthalmic patients have on such patients' quality of life.

Key words: educational programme, nurses' performance, ophthalmic patients, and climate change

Introduction

Increased illness prevalence has already been linked to a rise in global temperatures. The danger of cardiovascular disease and respiratory issues have both increased with rising temperatures. The likelihood of contracting these ailments increases as the temperature rises. Ocular conditions are not immune to the effects of climate change. Numerous ophthalmologic conditions have been connected to the environmental effects of climate change through direct and indirect means **(Chang et al., 2022) and (Ray & Ming, 2020).**

It has long been understood that environmental variables contribute to visual deterioration. Every waking hour, the eye's cornea, sclera, lens, and eyelid are all exposed to the elements. However, for now, the specific impacts of climate change are Increased illness prevalence has already been linked to a rise in global temperatures. The danger of cardiovascular disease and respiratory issues have both increased with rising temperatures. As temperatures rise, environmental exposure-related eye health problems become worse **(Collins et al., 2022).** The incidence of cataracts, severe allergic ocular disease, glaucoma, age-related macular degeneration, trachoma infections, vitamin A insufficiency, and eye traumas is predicted to rise as a result of climate change. Extreme weather events are also more likely to occur more frequently, which will impair local operations and the supply chain **(Dzau, 2022).**

Inflammation, such as obtaining a tiny amount of a chemical in the eye, can lead to infection in the eye. A slight eye injury or a tiny corneal scratch might potentially result in infection. Some eye infections can harm the eye extremely fast if left untreated. People who use contact lenses may get more severe infections. In addition, Herpes zoster ophthalmicus (shingles) can result in symptoms of an eye infection, including swelling, discomfort, and discharge **(Anne & Christopher, 2022)**. Eye pain, a sensation of a foreign body in the eye, increased

sensitivity to light (photophobia), and yellow, green, crimson, or watery discharge from the eye are all indications of an infection.

Patient assessment, patient education, medication administration, and condition monitoring are the main nursing interventions for patients with eye issues. For comfort, use warm compresses to the troubled eye. The most common form of medication provided is an eye ointment or eye dropper. One may be put on a Keep-On-Person/Self-Administered Medication regimen or provided topical treatments to be applied up to four times per day. To check on the patient's progress, a follow-up appointment should be scheduled within two to three days **(Roscoe, 2023).**

Dry eyes have become much more common as a result of global warming and the accompanying dry weather, which also raises the risk of corneal and conjunctival infections in general. Keratoconjunctival diseases are additionally predisposed by chronic exposure to pollutants such nitrogen oxide and particulate matter (Miyazaki et al., 2019). A further risk factor for recurrent herpes zoster ophthalmicus, particularly in individuals who are immunosuppressed, is the increasing accumulation of UV radiation in our atmosphere **(Zak-Prelich et al., 2002).**

Aziz and Tawfik did a study in 2020 titled "Prevalence of dry eye disease among healthy Egyptian population" and calculated its prevalence to be 77.6%. All age groups had a statistically significant difference in DED prevalence (P0.0001), with the 41–50 age group having a greater frequency, although the trend across successive age groups was not statistically significant (P=0.4747). Additionally, 86.9% of female participants compared to 67.6% of male participants (P 0.0001) showed that DED was statistically more prevalent in women. Smoking was detected in 43.8% of cases and blepharitis in 81%. Additionally, dry mouth was present in 29.7% of cases of DED .

By the end of 2022, the admission rate to the ophthalmology unit was expected to be around 480 patients, according to the Benha statistical office. (Benha University Hospital's statistical office). This study set out to ascertain the needs of nurses in regards to treating patients with eye conditions brought on by climatic changes.

The study's objective

This study's particular goals were designed to assess how an educational programme affected nurses' ability to provide care for patients with eye disorders caused by climate change:

1- Evaluate nurses' expertise and practise in providing eye care to ophthalmology patients who are impacted by climate change.

2-Create a nursing programme for patients with ophthalmic conditions who are influenced by climate change in terms of eye care.

.3-Assess the nurses' performance in providing eye care for patients with ophthalmic conditions who are impacted by climate change

Research Suggestions

The following were the study's hypotheses

H1: Nurses' level of expertise in providing eye care for ophthalmic patients may have increased .

H2: The nursing practise score for providing eye care to ophthalmic patients may now be greater than it was previously .

H3: Following the implementation of the educational programme, there would be a strong association between the total nurses' knowledge score and the total nurses' practise score.

Subjects and procedures - Research Design: This study used a quasi-experimental research design. Establishing a cause-and-effect link between an independent and dependent variable is the goal of a quasi-experimental design. Additionally, it is a helpful tool when real experiments cannot be conducted due to moral or practical considerations. 2020 (Maciejewski

Environment: The study was conducted in the ophthalmology department of Benha University Hospital. It is situated on the second floor of the Benha Eye Hospital, which is a part of Benha University Hospital. It

comprises three rooms and four counters, each with two beds, and a nurse station in the centre. There are four other small rooms: a nursing room, a room for the nursing supervisor, a room for doctors, and a room for instruction .

Subjects: A convenient sample of all nurses (40) from both sexes who were working in the study setting at the time of data collection and who agreed to take part in the study was chosen.

Data collecting equipment:

Three methods were employed to fulfil the study's objectives: - Tool I, a quiz for evaluating nurses' knowledge :

The researchers created this tool after reading related papers like Abd Elhameed et al. (2019) and Liem. (2019). This questionnaire, which evaluated nurses' knowledge of eye care for ophthalmic patients, was presented in plain Arabic. It was divided into two sections :

Part one: Personal information about nurses, which included five questions about the nurses' age, gender, educational background, years of experience, and training programmes .

Part 2: A knowledge test for nurses that included 34 multiple-choice questions about

•Fundamentals of ocular anatomy and physiology (7 questions (

•Prevention of infections (3 questions(

•Eye examination (6 questions(

•Climate change-related eye issues (7 queries (

•Ocular problems prevention and management (11 questions (

grading scheme: - The grade was determined by converting the total score into a percentage and assigning one mark for each correct response and zero for each erroneous response. A grade of less than 75% indicates an inadequate level of expertise. (No more than 25 points(

-A grade of 75% and higher indicates a satisfied level of knowledge. (26 or more points.(

Tool II: An observational eye-care checklist

In order to evaluate nurses' practises regarding eye care, the researchers updated it after adapting Perry et al.'s (2021) work. It was composed grading scale: One mark was given for each step completed and zero for a step that was not completed. The final score was translated to a percentage and graded as follows: A practise level of less than 75% is considered to be poor. (No more than 17 points(

-Practise at a satisfactory level is assessed at 75% and higher. (17 points or more**(**

educational programme for nurses

The researchers built it based on relevant literature. It was given to nurses following a pretest, and its main goal was to help them provide better care for ophthalmic patients who were affected by climate change. To aid nurses in comprehending the instructional program's content, it was written in easy Arabic and reinforced by images and graphics. There were two components:

The theoretical portion of the exam covered topics such as the anatomy and physiology of the eye, ocular issues, eye difficulties brought on by climate change, signs of eye infection, eye examination, and measures to avoid and manage ocular complications.

b. The application of practical eye care techniques, such as washing the eye, using eye drops or ointment, rinsing the eye of any foreign objects, and ultimately covering the eye with an eye patch.

Content credibility

At the nursing faculty of Benha University, a group of five specialists from the field of medical surgical nursing evaluated the research tools and the educational programme. Three professors and two assistant professors served on the jury to evaluate the tools' relevancy, content

clarity, comprehension,
and, and the appropriate alteration was made as a result.

Reliability
The tools were administered to the same people under identical circumsta nces on two separate occasions in order to assess the internal consistency of the tools using test-retest methodologies.
The knowledge questionnaire's reliability was assessed using the 0.996 Cr onbach's alpha coefficient.
Reliability for the second tool (practise) was 1.000.
This just serves to demonstrate that this tool is a reliable instrument.

Ethics-related matters

•Before starting the investigation, the ethics committee of the nursing department at Benha University approved the research. Before collecting data, the researchers explained the study's goals and purpose to the participating nurses.

•The ophthalmology Unit director at Benha University Hospital gave official consent for data collection after being informed of the study's objectives, and verbal consent from nurses was gained after being informed of the study's objectives.

•The study's purpose and confidentiality of the data acquired were explained to the nurses. They received assurances that the collected data was used solely for research purposes. They are free to stop participating in the study at any moment and without providing a reason.

Pilot study: To assess the tools' clarity and applicability, a pilot study inc luding 10% of the total number of nurses engaged in the study (40 nurses) was carried out.
Due to minor changes in the study instruments, the four nurses who partic ipated in the pilot study were also included in the study.

Fieldwork: Data collection was carried out over a six-
month period in morning and afternoon shifts, beginning in October and December 2022 for the pretest and continuing through the start of the pro gram's implementation in January and the end of February 2023 for the p osttest. The researchers conducted it over the course of four phases:
Evaluation phase

First, use Tool II, an observational checklist, to evaluate the practical com petence of nurses.
Each nurse required between 10 and 15 minutes to finish the checklist.
Second: Each nurse was given a knowledge questionnaire (Tool I) to com plete in order to assess the nurses' knowledge.
The quiz could take anywhere between 20 and 30 minutes to complete.

As a result of this assessment, data were acquired that shed light on the ex isting knowledge and practise level and provided additional insight to aid in the identification of knowledge and practise inadequacies.
Organising stage:
Following data collection regarding the study setting, the researchers crea ted a plan for carrying out the educational programme.
According to the needs of nurses and performance gaps, researchers devis ed the educational programme.
In order to include both theoretical and practical information, teaching ma terials were produced, such as discussions, demonstrations, movies, photo graphs, and instructive booklets. -
The unit's head nurse planned the nurses' attendance with the researchers i n accordance with their respective daily responsibilities.
also assisted the researchers in setting up the classroom where the session s were held.

Phase of implementation: The educational programme is disseminated by: -
Immediately following the testing phase, the researchers provided the nu rses the instructive coloured booklet. -
There were 40 nurses total in the study, and they were split up into 8 grou ps. In every session, there were five nurses in each group.
The morning and afternoon shifts were visited by the researchers two day s per week. -
Each group had two meetings with the researchers: one for theory and on e for practise.
Each session lasted 30 to 45 minutes, including discussion times. -
Each session began with a quick recap of what had been covered in the pr evious session, followed by the goals of the new topics, taking into accou nt the use of straightforward language to meet the educational level of all nurses. - Conversation, inspiration, and

To improve learning, reinforcement was applied throughout the interventi on sessions.
The nurses questioned the participants to clear up any misunderstandings at the conclusion of each session.

The first session (the introductory session) covered orientation, an explanation of the goals and significance of the educational program's design, as well as information on eye care, including the basic anatomy and physiology of the eye, eye problems caused by climatic changes, symptoms of eye infection, eye assessments, and the precautions that must be taken to protect the eyes from infection .

The second session focused on practical aspects of eye care techniques, such as cleansing the eyes, using eye drops and ointments, irrigating the eyes, and covering them. According to the needs of nurses, the researcher carried out revision and reinforcement.

Evaluation phase: Following the implementation of the educational programme, a post-test was conducted to assess the program's effectiveness by assessing nurses' performance using the same instruments as the pre-test.

At the conclusion of the study, a comparison between the pre-test and post-test was made in order to ascertain how the educational programme influenced nurses' ability to provide care for ophthalmic patients who were impacted by climate change.

Statistical Analysis: Using an IBM computer and the statistical software for social science (SPSS) advanced statistics, version 25 (SPSS Inc., Chicago, IL), the gathered data were tabulated and statistically analysed. The Kolmogorov-Smirnov test was used to determine the normal distribution of quantitative variables. The mean and standard deviation were used to represent numerical data. Frequency and percentage were used to express qualitative data. To investigate the distinction between qualitative variables, McNemar was utilised. To analyse the relationship between qualitative variables, chi-square tests were performed. On smaller sample sizes, Fisher's exact test was applied as an alternative to the chi-square test when the frequency count was 5 for more than 20% of the cells. To examine the relationship between numerical variables, the

Spearman method was applied. p-values under 0.05 were regarded as significant, and <0.001 was considered highly significant.

Results:

Table (1): displays the distribution of the nurses who were the subject of the study in terms of their personal information. It shows that 50% of the nurses were between the ages of 20 and 30 years old, with a mean age of (29.70 0.79), and that 70% of them were married women.
Additionally, 40% of the nurses who were studied had less than five years of experience and were qualified by diploma.
Additionally, 50% of them attended training sessions on how to deal with ophthalmic patients.

Table (2):
Shows the distribution of studied nurses' knowledge about eye care for op hthalmic patients affected by climate changes before and after the educati onal programme. Before the programme, 30% and 45% of the nurses had a satisfactory level of knowledge about the basic anatomy and physiology of eye and ocular problems related to climate change, respectively. After the programme, the percentages of these nurses who had a satisfactory lev el of knowledge increased to 90% and 77.5%, respectively. This
Figure (1) shows the difference between the nurses' overall knowledge le vels regarding eye care for ophthalmic patients before and after the educa tional programme. Before the programme, only 22.5% of the nurses were at a satisfactory level; after it, that number rose to 80%.
has a statistical difference that is extremely significant (p= 0.001**).

Table (3): shows the distribution of the studied nurses' subtotal practises for eye care for ophthalmic patients affected by climate change before an d after the educational programme. During the preeducational programme , 37.5% of the studied nurses had satisfactory practises before the eye car e procedure, and this number increased to 87.5% during the eye care proc edure after the educational program difference that is highly significant (p = 0.001**).
Figure (2): shows the difference between the nurses' overall knowledge o f eye care for ophthalmic patients before and after the educational progra

mme. Before the programme, only 30% of the nurses had satisfactory pra ctises, but this number rose to 87.6% after it.

Table (4) illustrates the relationship between nurses' personal informatio n and their overall knowledge level before and after educational program mes. The relationship between total nurses knowledge level and pre-program personal information was statistically significant (p 0.05) in term s of age, years of experience, and attendance at prior training courses, wh ereas the relationship following educational programmes was significant i n terms of age, marital status, and educational level.

Table (5) illustrates the relationship between nurses' personal information and their overall practise level before and after educational programmes. This relationship included information on age, marital status, and educati onal level, and it was highly statistically significant.

Table (6): This table illustrates the relationship between total knowledge and practise among the examined nurses before and after the implementation of the educational programme. The correlations were statistically significant and positive, with p values of (0.003* & 0.001**, respectively), for both groups of nurses.

Table (1): Distribution of the 40 nurses who were the subject of the study in Data about individual nurses (n = 40)

Nurses' personal data	**(n = 40)**	
	No.	**%**
Age / years		
20 - <30	**20**	**50.0**
30 - < 40	12	30.0
≥ 40	8	20.0
Mean ± SD	**29.70 ± 0.79**	
Sex		
Male	12	30.0

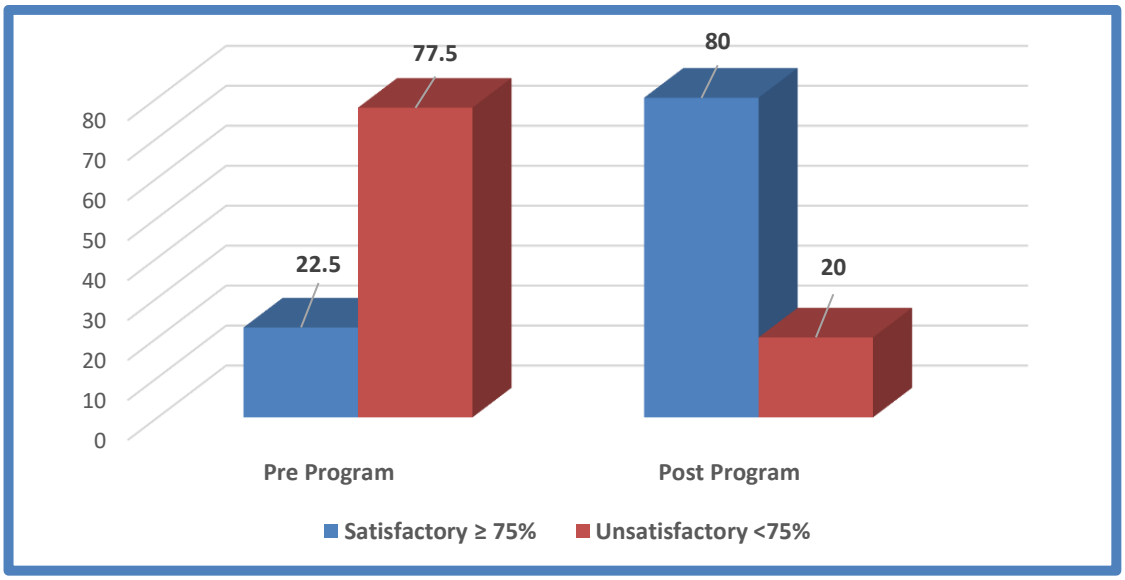
Female	**28**	**70.0**
Marital status		
Single	8	20.0
Married	**28**	**70.0**
Divorced	4	10.0
Educational level		
Nursing Diploma	**16**	**40.0**
Technical institute of Nursing	12	30.0
Bachelor degree of Nursing	12	30.0
Years of Experience		
< 5	**20**	**50.0**
5-< 10	16	40.0
≥ 10	4	10.0
Mean ± SD	**4.60 ± 0.67**	
Attending previous training courses related ophthalmic care		
Yes	**20**	**50.0**
No	20	50.0
Number of attended courses (n=20)		
One course	**8**	**40.0**
Two courses	4	20.0
Three courses	4	20.0
More than three courses	4	20.0
Mean ± SD	**2.20 ± 1.19**	

Table 2: Pre- and post-educational programme differences in the study (nurses' overall knowledge of eye care for ophthalmic patients (n=40

Knowledge of ophthalmic patients' eyes by nurses	**Knowledge level**	**Knowledge (pre educational program) (n= 40)**		**Knowledge (post_ educational program) (n= 40)**		**test X^2 P value**
		(No.)	**%**	**(No.)**	**%**	
basic physiology and anatomy of the eye	Satisfactory ≥ 75%	12	30.0	32	80.0	18.050 <0.001**
	Unsatisfactory < 75%	28	70.0	8	20.0	
infection prevention techniques	Satisfactory ≥ 75%	23	57.5	36	90.0	11.077 0.001**
	Unsatisfactory < 75%	17	42.5	4	10.0	
Ocular evaluation	Satisfactory ≥ 75%	13	32.5	34	85.0	19.048 <0.001**
	Unsatisfactory < 75%	27	67.5	6	15.0	
eye issues caused by climate change	Satisfactory ≥ 75%	18	45.0	31	77.5	11.077 0.001**
	Unsatisfact	22	55.0	9	22.5	

	ory < 75%					
Managing and preventing ocular problems	Satisfactory ≥ 75%	12	30.0	33	82.5	19.048 <0.001**
	Unsatisfactory < 75%	28	70.0	7	17.5	

Figure 1 compares the knowledge of eye care for ophthalmic patients across the examined nurses' pre- and post-educational programmes (n=40



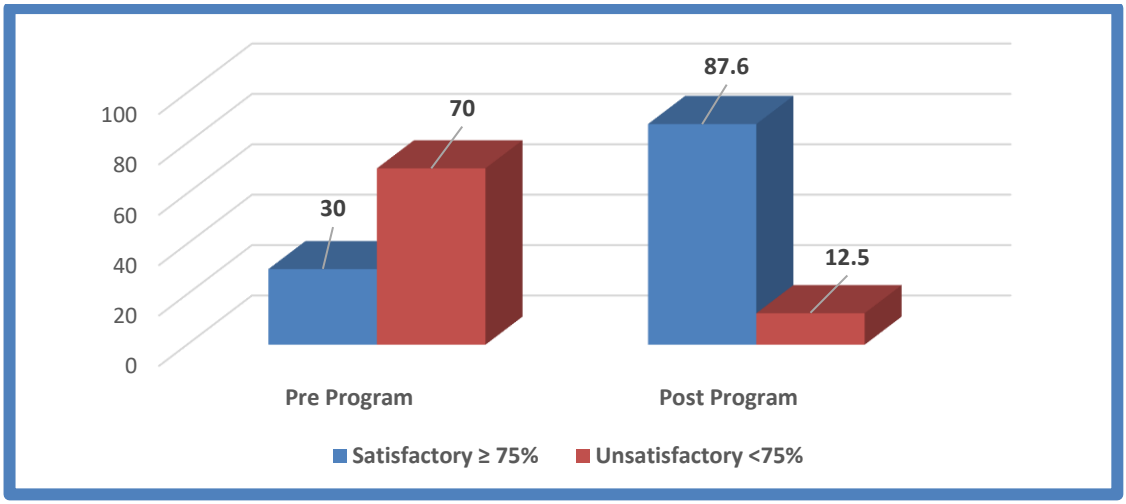
(X^2) Mc Nemar's chi square test (**) Highly statistically significant at ≤0.001

Table 3 compares the overall practise levels of the 40 nurses who participated in the study before, during, and after an eye care treatment

Nurses' practices regarding eye care	Practice level	Practice (pre educational program) (n= 40)		Practice (post educational program) (n= 40)		test X^2 P value
		(No.)	%	(No.)	%	
Practices before eye care procedure	Satisfactory ≥ 75%	15	37.5	29	72.5	12.071 0.001**
	Unsatisfactory < 75%	25	62.5	11	27.5	
Procedures for eye care practises	Satisfactory ≥ 75%	19	47.5	35	87.5	14.062 <0.001**
	Unsatisfactory < 75%	21	52.5	5	12.5	
after an eye-care surgery, practises	Satisfactory ≥ 75%	17	42.5	32	80.0	13.067 <0.001**
	Unsatisfactory < 75%	23	57.5	8	20.0	

(X^2) Mc Nemar's chi square test (**) Highly statistically significant at ≤0.001

Figure 2 compares the total level of practise among the 40 nurses who participated in the study on the care of ophthalmology patients' eyes before and after the educational programme



(X^2) Mc Nemar's chi square test **(****)** Highly statistically significant at ≤0.001

Relationship between nurses' personal information and overall knowledge level prior to and following educational programme (n = 40) is shown in Table 4

Nursing staff information	**Variables**	**Total knowledge level Pre program**		**X^2 Test P value**	**Total knowledge level Post program**		**X^2 Test P value**
		Satisfactory (n=9)	**Un Satisfactory (n=31)**		**Satisfactory (n=32)**	**Un Satisfactory (n=8)**	
		No. (%)	**No. (%)**		**No. (%)**	**No. (%)**	
Age	20 - <30	9(100.0)	11(35.5)	11.613	20(62.4)	0(0.0)	11.875
	30 - < 40	0(0.0)	12(38.7)	0.003*	6(18.8)	6(75.0)	0.003*
	≥ 40	0(0.0)	8(25.8)		6(18.8)	2(25.0)	
Sex	Male	3(33.3)	9(29.0)	0.061 FEp 1.000 n.s	12(37.5)	0(0.0)	4.286 FEp 0.079 n.s
	Female	6(66.7)	22(71.0)		20(62.5)	8(100.0)	
relational status	Single	0(0.0)	8(25.8)	4.977 0.083 n.s	4(12.5)	4(50.0)	9.643 0.008*
	Married	9(100.0)	19(61.3)		26(81.3)	2(25.0)	
	Divorced	0(0.0)	4(12.9)		2(6.2)	2(25.0)	
academic	Nursing Diploma	6(66.7)	10(32.3)	5.591	16(50.0)	0(0.0)	10.833

level	Technical institute of Nursing	3(33.3)	9(29.0)	0.061 n.s	10(31.2)	2(25.0)	0.004*
	Bachelor degree of Nursing	0(0.0)	12(38.7)		6(18.8)	6(75.0)	
Experience in years	< 5	9(100.0)	11(35.5)	11.613	20(62.5)	0(0.0)	10.312
	5-< 10	0(0.0)	16(51.6)	0.003*	10(31.3)	6(75.0)	0.006*
	≥ 10	0(0.0)	4(12.9)		2(6.2)	2(25.0)	
taking previous ophthalmic care training courses	Yes	9(100.0)	11(35.5)	11.613	20(62.5)	0(0.0)	10.000
	No	0(0.0)	20(64.5)	FEp 0.001**	12(37.5)	8(100.0)	FEp 0.003*

(FEp) p value for Fisher exact for chi square (n.s) Not Statistically Significant at >0.05 (*) . Statistically Significant at ≤0.05 **(**)** Highly statistically significant at ≤0.001

Table (5) shows the relationship between the personal information of nurses and their overall practise .(level before and after receiving education (n=40

Nurses' Personal data	**variables**	**Total practice level Pre program**		**X^2 Test P value**	**Total practice level Post program**		**X^2 Test P value**
		Satisfactory (n=12)	**Un Satisfactory (n=28)**		**Satisfactory (n=35)**	**Un Satisfactory (n=5)**	
		No. (%)	**No. (%)**		**No. (%)**	**No. (%)**	
Age	20 - <30	12(100.0)	8(28.6)	17.143	20(57.1)	0(0.0)	5.714
	30 - < 40	0(0.0)	12(42.8)	<0.001**	9(25.7)	3(60.0)	0.057 n.s
	≥ 40	0(0.0)	8(28.6)		6(17.2)	2(40.0)	
Sex	Male	6(50.0)	6(21.4)	3.265	12(34.3)	0(0.0)	2.449
	Female	6(50.0)	22(78.6)	FEp 0.130 n.s	23(65.7)	5(100.0)	FEp 0.298 n.s
Marital status	Single	0(0.0)	8(28.6)	7.347	6(17.2)	2(40.0)	8.327
	Married	12(100.0)	16(57.1)	0.025*	27(77.1)	1(20.0)	0.016*

	Divorced	0(0.0)	4(14.3)		2(5.7)	2(40.0)	
Educational level	Nursing Diploma	9(75.0)	7(25.0)	10.536	16(45.7)	0(0.0)	7.238
	Technical institute of Nursing	3(25.0)	9(32.1)	0.005*	11(31.4)	1(20.0)	0.027*
	Bachelor degree of Nursing	0(0.0)	12(42.9)		8(22.9)	4(80.0)	
Years of experience	< 5	12(100.0)	8(28.6)	17.143	20(57.1)	0(0.0)	8.571
	5-< 10	0(0.0)	16(57.1)	<0.001**	13(37.2)	3(60.0)	0.014*
	≥ 10	0(0.0)	4(14.3)		2(5.7)	2(40.0)	
Attending previous training courses related ophthalmic care	Yes	12(100.0)	8(28.6)	17.143	20(57.1)	0(0.0)	5.714
	No	0(0.0)	20(71.4)	FEp <0.001**	15(42.9)	5(100.0)	FEp 0.047*

(FEp) p value for Fisher exact for chi square (n.s) Not Statistically Significant at >0.05 (*) Statistically Significant at ≤0.05 **(**)** Highly statistically significant at ≤0.001

Table (6): Relationship between total knowledge and practise among the 40 nurses who participated in the study before and after the execution of the educational programme

r-\ p values / ***Variable***	Periods	***Total knowledge***	
		r	***p***
Total practice	*Pre program*	0.457	0.003*
	Post program	0.898	< 0.001**

(*) Statistically Significant at ≤0.05 (**) Highly statistically significant at ≤0.001

discussion

One of the biggest problems the world is currently experiencing is climat e change.Climate change's negative effects have the potential to be catastr ophic and endanger human existence.Therefore, it is crucial for everyone, especially those in the scientific community, to fully understand the issue as well as the potential solutions to the problem in order to start making t he necessary changes to economies, resource usage, behaviour, and overa ll approach to nature (Yang et al., 2018).

The purpose of this study was to assess how an educational programme affected nurses' ability to care for patients with eye conditions caused by climate change. The conclusion stated in the following sections aims to achieve this: (1) Individual nursing students' data (2) The expertise of nurses in providing eye care to ophthalmic patients who are impacted by climate change. (4) Relationship and Correlation between the entire knowledge of nurses and their practise before and after the execution of the educational programme. (4) Nurses' practises connected to eye care procedures for ophthalmic patients affected by climate changes

There is evidence that heat has an impact on the corneal cells' inflammatory response, which is relevant to eye health. Additionally, this has been linked to a tendency to infectious viral conditions including herpes and viral conjunctivitis, in addition to bacterial and fungal conditions, as well as allergies.As the temperature rises, an effective dose of ultraviolet radiation (UVR) could go up by 2%. This condition may potentially weaken cell defences and make people more susceptible to infections, allowing dormant viruses to reactivate. Along with an increase in ocular tumours and cataracts, higher UVR is also linked to the summer

thermal maximum and an increased risk of retinal detachment (Auger et al., 2017).

With a mean age of (29.70 0.79), the study's distribution of the nurses' personal information revealed that half of the nurses were between the ages of 20 and 30. Additionally, nearly three-quarters of the nurses were married women. According to the researchers, this discovery, which may be related to age, is linked to increased professional engagement across all sectors. It also reflects the general nursing situation in Egypt, where male nurses are still underrepresented at very low rates.

These results were in line with those of Sayed, et al. (2022), who conducted research on "The Effect of an Educational Programme Designed for Nursing Eye Care on Critical Care Nurses' Performance" and discovered that the majority of nurses were female and between the ages of 20 and 30. Regarding experience, more over half of them had a bachelor's degree and had taken training courses in eye care, while nearly half had between three and five years of experience

This is comparable to a study conducted by Ebadi et al. in Iran in 2021 titled "Evaluating Intensive Care Nurses' Clinical Competence in Eye Care; a Cross-Sectional Descriptive Study" in which the majority of the participating nurses were female and under 40 years old. Additionally, Abdullah's findings from his study "Educational Nursing Intervention: Its Effect on the Nurses' Performance, Patients' Daily Living Activities, Needs, and Selected Visual Problems of Cataract Surgery" in 2021, where he discovered that all of the nurses in the study sample were married females and that more than one third of them had diploma qualifications, were in agreement with the findings. Additionally, less than half of the study's nurses had 3-5 years of experience and had taken ophthalmology training classes.

This result conflicts with a study by Jaafar et al. (2020) on "Nurses' Knowledge based on Evidence Based Practise towards Eye Care for Intensive Care Units Patients," which found that the sample under study was well-educated and held a bachelor's degree in nursing. Additionally, the findings did not coincide with those of Guler et al. (2017), whose study, "Intensive care nurses' views and practises for eye care: An

international comparison," found that the majority of the ICU nurses under examination held bachelor degrees.

There was a highly significant difference (p= 0.001**) between the distribution of the nurses' knowledge of eye care for ophthalmic patients impacted by climate change before and after the educational programme. Pre-educational programme knowledge of the basic anatomy and physiology of the eye, as well as the prevention and management of ocular problems was at a satisfactory level for one-third of the study's nurses, and this level increased to a majority of them having a satisfactory level after the programme. According to the researchers, this may be because of the educational programme that was offered, which featured various sessions about eye care and ocular illnesses

The current study concurred with Sayed, et al. (2022) who showed that more than two thirds of nurses had inadequate levels of knowledge on the implementation of eye care pre-programs. More than 75% of the nurses in the study had adequate understanding of eye care when they left the .programme

The results supported Abdullah's assertion from 2021, according to which a nurse's lack of understanding about the anatomy of the eye is just as critical as their ignorance of their job in providing care

Additionally, the Guidelines for Undergraduate Nursing Education on Cli mate-Driven Vector-
Borne Diseases were published by the Canadian Association of Schools o f Nursing (CASN) (2020), in response to the growing threat that climate c hange poses to Canada's health.
These recommendations state that new nurses should be well-versed in the most recent, scientifically supported information on climate-driven vectorborne diseases so they can support those who are susceptible to and afflicted by these conditions.
The results were at odds with those of Taha and Abd Elaziz (2018), who claimed that nurses' understanding of the anatomy and physiology of the eye was subpar.

The current findings were in line with those of El Shafaey and Basal (2018), who investigated the "Effect of Implementing Teaching Programme on Knowledge and Practise of Nurses and Clinical Outcomes

of Patients Post Cataract Surgery" and found that all of the studied nurses had a high level of knowledge score right after the teaching program's implementation.

Furthermore, Leffers et al. (2017) reveal that nurses lack the necessary training for their roles in reducing and preventing the health effects of climate change as well as providing patient-centered nursing care to people who are impacted. While Kirk (2015) contends that nurses are ill-equipped to comprehend how climate change will affect health

The current study showed that there was improvement after implementing the programme in terms of the overall knowledge level among the studied nurses about eye care for ophthalmic patients. Less than one third of them were at a satisfactory level prior to the programme, which increased to be the majority post programme. The first hypothesis was backed by a statistical difference that was quite significant.

According to the study, which is in line with Ghazy's study from 2023 entitled "Effect of Awareness Programme Regarding Climate Change on Knowledge, Attitudes and Practises of University Students," university students' knowledge of climate change improved from pre- to post-program implementation, with a highly statistically significant difference (p 0.000).

Additionally, Abdullah (2021), who also found a highly statistically significant improvement in the mean scores of nurses' overall knowledge regarding the care of patients undergoing cataract surgery post-intervention after follow-up, agreed with the current finding. With a P value of 0.001, there was a very statistically significant difference in the nurses' knowledge of eye anatomy, cataract disease, the nursing function, and pre-discharge instructions for cataract surgery.

These findings were consistent with those of Almulhim, (2021), who repo rted that one-
third of the study participants had poor knowledge about the causes and i mpacts of climate change in a study titled "Knowledge and perception of climate change and global warming in the context of environmental chall enges and policies".
At the posttest, more than a quarter of the studied sample demonstrated st rong knowledge and awareness of climate change.

In addition, Tiitta et al. (2021) who studied "Finnish nurses' perceptions o f the health impacts of climate change and their preparation to address tho se impacts" noted that the nurses lacked the necessary knowledge to supp ort and participate in climate change and sustainability development

strategies. Additionally, this concurs with Cho et al,2017

Ayeni Morover, 2017. climate change knowledge among students This finding demonstrated that there was a very statistically significant difference between the pre- and post-awareness programmes on the .significance of climate change, with a p-value of 0.000

Future nursing professionals also acquire knowledge on health care trends and a global perspective to improve their capacity to inform the public and serve communities, according to National Institute of Environmental Health Sciences (2013). As the incidence and prevalence of non-communicable diseases (NCDs) rise globally, there will certainly be an increase in the demand for educated and experienced nurses. Climate change is projected to further raise the need for nurses who can provide care for growing populations of persons with debilitating and progressive NCDs when combined with the trend towards ageing populations. the demand.

Ayeni Morover, 2017. climate change knowledge among students This finding showed that, with regard to the significance of climate change, there was a highly statistically significant difference at p0.000 post awareness programme compared to preprogram. There will be a major demand for nurses to provide integrated models of care that cover promotion, prevention, management, and control of lifestyle factors to stop or slow the progression of morbidity from non-communicable illnesses.

Additionally, Anker et al.'s study from 2021, "Nursing students' perception of climate change and sustainability actions," which revealed that climate change and sustainability were difficult to apply, suggests that additional education is required in light of nursing students' awareness. The study added that the inability to link or balance the

numerous opinions on climate change and sustainability was another reason why these divergent points of view amounted to a disagreement

This conclusion is consistent with Abid's (2018) research on the "Effect . of Implementing Nursing Guidelines on Nurses' Performance regarding Patients Undergoing Cataract or Glaucoma Surgery." They demonstrated that improved knowledge and practise changes occurred after nurses .received training on eye problems

The current study shown that there was a highly significant statistical difference between the total practise level before and after the educational .(**programme among the studied nurses (p= 0.001

The study supports Lami, et al. (2023) disapproved of the study's findings and noted that fewer than one third of the nurses who were examined had ..bad practises

In a similar vein, Ibrahim et al.'s study from 2022, "The Effectiveness of Educational Interventions About Sustainability Development Among Nursing Students" in Egypt, supports the findings of the earlier study by finding that the majority of students lacked sufficient knowledge of climate change prior to educational intervention. Post-intervention research showed a significantly substantial improvement in knowledge of .sustainability and climate change developments

These findings were at odds with those of El Shafaey and Basal (2018), who similarly showed a serious shortcoming in nurses' ability to provide postoperative care for cataract patients before the guidelines were put into .place. The discovery that none of them could was startling

According to the current study, there was a highly statistically significant relationship between total nurses knowledge level and their pre-educational programme personal data regarding age, years of experience, and attending previous training courses observed as (p0.05). This relationship was seen both before and after the educational programme. According to the researcher, these findings could be explained by the fact that nurses who had previously taken eye care training courses knew more about the subject than nurses who hadn't, and that nurses with higher levels of education and more experience at the time of and after

programme implementation knew more about the subject than those with lower levels of education and fewer years of experience

These results concurred with those of Tork et al. (2022), who found a statistically significant relationship between nurses' overall knowledge scores and their ages, educational backgrounds, and years of experience before to and following the development of an eye care protocol. These findings contrasted with those of Alghamdi et al. (2018), who found no statistically significant relationship between nurses' overall knowledge ratings and perceptions of their age, years of experience, and educational backgrounds. The findings also differed from those of Jaafar, et al. (2020), who found no significant relationship between nurses' educational background and their degree of expertise on eye care for ICU patient

The current study demonstrated that there was a highly statistically significant relationship between total nurses practise level and their personal data pre and post educational programme regarding marital status, educational level, years of experience, and attendance of previous training courses with observed p value= (0.05). According to the researchers, these findings may be attributable to the fact that nursing education, training, and years of experience could raise the level of practical skills among the studied nurses, while sex and age have no statistically significant relationship with practical scores, which may be related to the fact that the majority of the studied nurses were females and older nurses

These results were in line with those of Gad et al. (2023), who investigated the "Effect of Intervention Guidelines on Nurses' Performance Regarding Patient's Outcome Post Glaucoma Surgery" and found a statistically significant relationship between competent nurses' practise and their credentials. This result was also consistent with that of Elkasby et al. (2021), who investigated the "Effect of Eye Care Learning Package for Mechanically Ventilated Patients on Critical Care Nurses' Performance" and discovered a positive statistically significant relationship between nurses' expertise and years of practise. This result, however, conflicts with a study by Vyas et al. (2018) entitled "Knowledge and Practise Patterns of Intensive Care Unit Nurses towards Eye Care in Chhattisgarh State" which found no connection between work experience and knowledge and practise about eye care

Regarding the relationship between the total knowledge and practise of the examined nurses before and after the implementation of the educational programme. The third research hypothesis is supported by the study's finding that there were positive and statistically significant correlations between the total knowledge and total practise scores of the examined nurses before and after the educational intervention, with p values of (0.003* & 0.001**, respectively). According to the researchers, this outcome may be attributable to the fact that knowledge is a strong positive predictor of practise and that the knowledge acquired by the investigated nurses enabled them to perform practical skills after comprehending the backdrop of scientific knowledge.

This conclusion was in agreement with Sayed's findings from the year 2022, which revealed a statistically significant positive association between the total score for nurses' knowledge and the overall practise score. This result was also in line with research by Ebadi et al. (2021), who examined "Evaluating intensive care nurses' clinical competence in eye care; a cross-sectional descriptive study" and discovered strong positive connections between knowledge and practise. Khalil et al. (2019), who conducted a study titled "Critical Care Nurses' Knowledge and Practises Regarding Eye Care of Patients at Two Teaching University Hospitals," disagreed with these findings, stating that there was no significant relationship between the studied nurses' overall knowledge score about eye care and their performance

Conclusion

The installation of an educational programme has greatly enhanced nurses' performance for ophthalmic patients, according to the research findings. Additionally, there was a statistically significant correlation between the investigated nurses' pre-educational programme personal data and the knowledge and practise levels of the nurses. Additionally, after completing an educational programme, there was a statistically significant beneficial link between nurses' overall practise scores and total .knowledge scores

A few suggestions are:

These suggestions can be made based on the findings of the current study:

1- Holding regular in-service training sessions for the nursing staff in 1 : the ophthalmology unit to help them perform at their best when it comes .to caring for ocular patients

2-Nursing educators should create and provide a manual procedure book with the standard techniques that must be used and followed to all nurses .working in the ophthalmology unit

3-A large probability sample from various geographic distributions .should be used to replicate the study in order to generalise the findings

4-More investigation is advised to see whether introducing educational programmes for treating ophthalmic patients improves their quality of .life

5-Holding training sessions on eye care for nurses as part of ongoing education to expand their expertise, which can improve patient safety and .the standard of care

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