An Educational Program to Improve Awareness of Nursing Students About Adverse Health Effects of Climate Change

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Abstract

Background: Climate change is one of the greatest threats facing humankind today and a great challenge for the health sector. Aim: This study aims to evaluate the effect of an educational program to improve awareness of nursing students about adverse health effects of climate change. Study Design: A quasi- experimental design (pre and post-test) was utilized in this study. Setting: This study conducted in Faculty of Nursing, Helwan University. Sample: A convenient sample of 200 nursing students from 4th year was used. Tools: One tool was used, a self-administered questionnaire sheet that consists of four parts: Demographic data, nursing students' knowledge, attitudes and reported practices regarding climate change. Results: There was an improvement of the studied nursing students' level of knowledge, attitudes and reported practices regarding climate change pre and post educational program with a highly statistically significant difference from (42 %, 37 %, and 60%) pre educational program, compared to (94.5%, 83.5%, and 93.5%) post educational program due to the effect of educational program implementation respectively.Conclusion: The educational program proved a significant positive impact on the nursing students' total knowledge level, attitudes and reported practices regarding climate change. Also there was a highly statistical significant correlation between nursing students' total level of knowledge, their attitudes & reported practices regarding climate change after implementing the program. Recommendations: Green educational programs about climate change including seminar, conference and workshop should be organized especially in universities to increase students' awareness level. Dissemination of health educational booklet about adverse health effect of climate change.

Keywords: Adverse health effects, an educational program, awareness of nursing students, climate change.

1. Introduction

Global climate change is the greatest health challenge of the 21st century. It is a process of changing the climate system over a long period and over a wide area due to natural processes or as a consequence of human activity has become a global issue. Natural processes have a small contribution to climate change, whereas human activity is the most significant contributor. Climate change impacts on human health, climate-health adaptation, and mitigation is critical for health and decision-makers to effectively understand, prepare for, and respond to climate change impacts on human health [1].

The major causes of climate change are either natural or human factors. The natural factors are the changes in the rotation of the earth's orbit and solar radiation quantity. The human factors in climate change are directly linked to man-environment transactions whose consequences result in the emission of large amount of greenhouse gases into the atmosphere that depletes the ozone layer or activities that reduce the amount of carbons absorbed from the atmosphere [2].

There are many health impacts of climate change, including increased morbidity and mortality from increasing extreme temperatures; temporary reductions in air quality from smog and smoke; increases in extreme weather and climatic events; and vector-borne diseases; increasing water-related illness; decreasing food safety, nutrition, and distribution; and mental health conditions including anxiety, depression, and substance use. While anyone's health can be harmed by climate change, some people are at greatly increased risk including young children, pregnant women, older adults, people with chronic illnesses and disabilities, outdoor workers, and people with fewer resources [3].

Awareness of nursing students related to the impact of climate change on health is a critical section for some reasons. First, it is important to have a better adaptive capacity for nursing students. As a simple

doi.org/10.31838/hiv23.03.113 Received: 04.11.22, Revised: 11.12.22, Accepted: 18.01.23.

example, if nursing students understand that sun exposure damages their skin, they will apply appropriate protection. Knowing the respondent's preference of climate change source information is an essential part to provide effective and efficient information. Second, a nursing student is a proper agent of change whose possible role is a climate change message carrier [4].

The educational program about climate change aims to help understanding its impact today and raising awareness about potential climate changes related to public health impacts and related outcomes. Providing proper information regarding climate change and health for nursing students is considered a valuable investment in disaster risk reduction [5].

Community health nurses play an essential role in educating and informing the public about critical climate change-related health issues that are occurring more and more each year. Nurses can increase awareness about climate change causes and can aid in understanding vulnerabilities to climate change through holding periodic climate change and health learning sessions, making an appointment or join a webinar to discuss climate change and its effects on human health and speaking about the importance of mental health in a climate-changing world [6].

1.1 Significance of the Study

Worldwide, between 2030 and 2050, climate change is expected to cause approximately 250.000 additional deaths per year, from malnutrition, malaria, diarrhea and heat stress alone. The direct damage costs to health are estimated to be 2-4 billion dollars per year by 2030 [7].

In Egypt, with its almost 100 million citizens, threats posed by extreme weather conditions are already a reality. In 2015, the Egyptian Ministry of Health registered more than 100 deaths due to extreme summer heat waves. In that same year, news reported that 11 citizens had lost their lives in the abnormal winter floods. Around 1.000 children are predicted to die annually from diarrhea related to infectious diseases from climate change by 2050. Between 2070 and 2100, floods are expected to affect 2.4 million Egyptian citizens [8].

Climate change has adverse health effects on human health in Egypt, which will be aggravated by high population densities and presence of many factories especially in Helwan district. These may include increases in severity of asthma, and infectious diseases, vector borne diseases, skin cancer, eye cataracts, and heat strokes. Extra deaths from cardiovascular, respiratory illness, dysenteric infections and mortality rate are expected to be more frequent. This may be due to decrease knowledge, practice and attitude to confront this problem and adverse health effect, so we need a study to improve awareness of nursing students about adverse health effects of climate change.

1.2 Aim of the study

The aim of this study is to evaluate the effect of educational program to improve awareness of nursing students about adverse health effects of climate change through:

1) Assessing nursing students' knowledge, attitude and reported practice about adverse health effects of climate change according to their needs.
2) Planning and implementing educational program about adverse health effects of climate change.
3) Evaluating the effect of educational program on nursing students' knowledge, attitude and reported practice about adverse health effects of climate change.

1.3 Research Hypothesis

After implementation of an educational program about adverse health effects of climate change, the nursing students will have an improvement in their knowledge, attitudes and reported practices.

2. Subjects and Methods

2.1 Research design

A quasi- experimental design (pre and post-test) was utilized in this study.

2.2 Research setting

The study was conducted in Faculty of Nursing, Helwan University.

2.3 Subjects

The subjects of the existing study were 200 nursing students who were selected by a convenient sample technique.

2.4 Sampling

A convenient sample of 200 nursing students from 4th year of the academic year 2021-2022, Helwan University was selected.

2.5 Tools of data collection

The following tool was used

A self-administered questionnaire sheet that consists of four parts as the following:

First part: Demographic data, which include data regarding age, sex, place of residence, father and mother education and source of information.

Second part: Nursing students' general knowledge about climate change, which includes 15 items as: The weather is changing, meaning of climate change, the community is in danger from any of the following natural disasters …. etc. And knowledge related to effect of climate change, which includes: Adverse health effects of climate change on adult health, effect on children's healthetc.

Scoring system of knowledge

The knowledge consisted of 15 items with a total 30 grades. Two grades were given for each complete correct answer, one grade was given for incomplete correct answer and zero grade was given for incorrect or don't know. The grades for each item were summed up and then converted into a percent score.

Satisfactory level ≥ 60% (≥ 18 point)
Un-satisfactory level was < 60% (< 18 point)

Third part: Nursing students' general attitudes toward climate change which includes 30 items: Concerning about climate change …etc. Attitudes toward effect of climate change, which include: Thinking that climate change could affect people in Egypt…..etc. Attitudes toward mitigation of climate change as environment which include: Willing to share in supporting health facilities to be more safer and environmentally friendly…etc. Attitudes toward water saving and sanitation which include: Able to collect and use rainwater…etc. Attitudes toward plants which include:Tend to keep plants and trees in the yard and garden…etc. Attitudes toward building which include: Can get home/property insurance…etc. Attitudes toward energy saving which include: Tend to use energy-efficient cars…etc.

Scoring system of attitude

The attitude consisted of 30 items with a total 60 grades. This instrument uses a 3-point Likert scale from 2 for agree, 1 for neutral and zero for disagree. The grades for each item were summed up and then converted into a percent score

Positive attitude ≥ 60% (≥ 36 point)
Negative attitude was < 60% (< 36 point)

Fourth part: Nursing students' reported practices about climate change which include data as: Practices to prevent the adverse effects of climate change: First: Prevention of heat stroke: Stay hydrated, drink water and fluids, take care to wear light and loose clothing…etc. Second: Prevention of dust storm hazards: Avoid leaving the house except in the most urgent cases, when having to go out, a medical mask or a tissue moistened with water must be weared and glasses to protect the eyes….etc. Third: Prevention of heavy rains hazards: Use emergency phone numbers in case of heavy rains and preparing first aid and emergency kits at home….etc.

Scoring system of practices

The practices consisted of 18 items with a total 36 grades. This instrument uses a 3-point Likert scale from 2 for always, 1 for sometimes and zero for never. The grades for each item were summed up and then converted into a percent score

Adequate practices ≥ 60% (≥ 22 point)
In-adequate practices was < 60% (< 22 point)

2.6 Validity

The tools validity was done by five of Faculty's staff nursing experts in the field of Community Health Nursing, Faculty of Nursing, Helwan University, specialties reviewed the tools for clarity, relevance, comprehensiveness, applicability, and reliability.

2.7 Reliability

To assess reliability, the study tools were tested by the pilot subjects at first session and retested after 2weeks as test-retest reliability for calculating Cronbach's Alpha coefficient test, which revealed that each of the two tools consisted of relatively homogenous items as indicated high reliability of each part of the tool. For knowledge was 0.925, attitudes was 0.990 and reported practices was 0.983.

2.8 Pilot study

A pilot study was carried out on 10% (20) nursing students to examine the clarity of questions and time needed to complete the study tools consumed about 10 to 15 minutes. Based on the results no modifications were done, so the pilot study sample was included in the total sample

2.9 Fieldwork

1- Official permission was obtained from the dean of Faculty of Nursing, Helwan University to conduct this study, the researcher met the nursing students.
2- An informal consent was obtained from students after the researcher introduced herself for them after explaining the purpose of the study.
3- Data was collected within two semesters of academic year (2021-2022) from beginning of November to end of May and the researcher was available two days per week (Tuesday and Wednesday) from 10am-2pm in the study setting till completion of the questionnaire.

The educational program was conducted in four phases

1st preparatory phase: Tools of data collection development: Review of the current and past, local and international related literature. This helped the researcher to be acquainted with the problem, and guided her in the process of tools' designing

2nd assessment phase: By using pre-testing to assess nursing students' knowledge, attitude and reported practice about climate change and its adverse health effect.

3rd planning and implementation phase: Developing the educational program contents. In this phase the researcher implemented the educational program sessions, with the clearance of general and specific objectives as follow:

General objective: By the end of the educational program, the nursing students of Nursing Faculty was able to have a satisfactory level of knowledge, gain a positive attitude and adequate reported practices regarding climate change.

The program was done through four theoretical and two practical sessions each session lasted 30-45 minutes and immediately did the post – test.

First session: At the beginning of the first session, the researcher welcomes and introduce herself to students, an orientation to the program was given, take written informed consent of students, set an agreement on the time and duration of sessions. The researcher provide a trust, warm and secure atmosphere between students group to relieve anxiety, tension, and increase the motivation to

participate in all sessions of the educational program. Begin with the content of the booklet, provide introduction about concept of climate change, its forms and causes, taking into consideration the use of clear and simple language. Discussion and reinforcement during session were used to enhance learning. Inform the students that each session started by summary about the previous session and objectives of new topics. The pretest was given to them (preprogram assessment).

Second session: Introduce nursing students to the gases that cause climate change and its impact on human health by presenting power point, brochure and colored photos to them. The students in this session encouraged to discuss some situations affected their health due to elevated temperature or extreme weather events especially in Winter.

Third session: Covered the effect of climate change on agriculture sector and food security, listed effect of climate change on water sources and air quality.

Fourth session: Include enumerating the necessary measures to combat climate change at the level of the government and community members by using the theoretical session, active discussion and brainstorming.

4th evaluation phase: This phase aims to evaluate the effect of the educational program to nursing students about improving their knowledge, attitude and reported practices regarding climate change by using the same questionnaire of pretest.

Teaching methods:

1. Lecture
2. Active group discussions
3. Brain storming
4. Role play

Media

1. Pictures and data show
2. Handout prepared by the researcher
3. Colored photos and videos
4. Sharing experiences

2.10 Ethical considerations

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee, Faculty of Nursing, Helwan University. Participation in the study is voluntary and subjects were given complete full information about the study and their role. The ethical considerations was include explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it will not be accessed by any other person without taking permission of the participants. Oral consent from students to conduct the study. Objectives, tools and study technique were illustrated to gain their cooperation. Ethics, values, culture and beliefs will be respected.

2.10 Statistical analysis

Data entry and analysis were performed using SPSS statistical package version 25. Categorical variables were expressed as number and percentage while continuous variables were expressed as (mean ±SD). Chi-Square (x2) was used to test the association between row and column variable of qualitative data. The fisher exact test was used with small, expected numbers. Comparison of quantitative variables between the study groups was carried out using the student t-test for independent samples to compare two groups when normally distributed. Pearson correlation was done to measure correlation between quantitative variables.

ANOVA test was used to compare mean in normally distributed quantitative variables in more than two groups. While T test used to compare mean in normally distributed quantitative variables between two groups. Pearson correlation was done to measure correlation between quantitative variables. For all tests, a two-tailed p-value ≤ 0.05 was considered statistically significant, P-value ≤ 0.01 was considered highly statistically significant. While p-value> 0.05 was considered not significant.

3. Results

Table 1: Shows that, 57% of nursing students age was 21 years old, with a mean age of 21.39 ± 0.670. Considering sex 59% of them were females. Regarding to place of residence 71% were from urban. Concerning parent's education (51% and 35%) respectively of parent (father and mother) of studied nursing student had university education and above.

Figure 1: Illustrates that, the source of information regarding climate change, (93% and 73%) respectively of the studied nursing students were from internet and television. While 3% and 6% of them considered libraries and academic journals/special publications respectively as a source of information regarding climate change.

Table 2: Clarifies that, there was a marked improvement in nursing students general and related effect knowledge regarding climate change pre and post educational program with highly statistically significant difference (P = 0.000). Moreover, 42% of nursing students had complete correct knowledge regarding meaning of climate change pre educational program, then improved to 79% post educational program. Also, 38% of them had complete correct knowledge regarding causes of climate change pre educational program, then improved to 77.5% post educational program. 22% of nursing students had complete correct knowledge regarding adverse health effects on adult pre educational program, this improved to 72.5 % post educational program. 42% of them had complete correct knowledge regarding adverse health effects on children pre educational program which enhanced to 78% post educational program.

Table 3: Reveals that, there were improvement in total level of knowledge regarding climate change pre and post educational program among the studied nursing students with a highly statistically

significant difference P=0.000. As evidence, 42% of the studied nursing students had satisfactory knowledge regarding climate pre educational program, this improved to 94.5% post educational program.

Table 4: Presents that, there was a marked improvement in all items of studied nursing students attitudes regarding effect of climate change pre and post educational program with a highly statistically significant difference P = 0.000. As evidence, 39% of studied nursing student agreed about attitude toward climate change could affect people in Egypt pre-program, this improved to 69.5% post-program. Also, 38.5% of them agreed about attitude toward climate change could affect public health pre-program, this improved to 70% post-program. 37% of them agreed about attitude toward climate change increase spread of infectious diseases, this enhanced to 64.5% post-program.

Figure 2:Illustrates that, there was an improvement in total level of attitude toward climate change climate change pre and post educational program among studied nursing students with a highly statistically significant difference P=0.000. As, 37% of studied nursing students gained a positive attitude toward climate change pre educational program, this improved to 83.5% post educational program. While, 63% of them gained a negative attitude toward climate change pre educational program, this decreased to 16.5% post educational program.

Table 5: Showed that, there were improvement in total level of reported practices regarding climate change pre and post educational program among the studied nursing students with a highly statistically significant difference P=0.000. As, 60% of studied nursing students had adequate reported practices regarding climate change pre educational program, this improved to 93.5% post educational program. While, 39.5% of them had inadequate reported practices regarding climate change pre educational program, this decreased to 6.5% post educational program.

Table 6: Illustrates that, there was a highly statistically significant positive correlation between total knowledge, attitudes and reported practices regarding climate change among studied nursing students P= 0.000.

Table (1): Frequency Distribution of Demographic Data among the Studied Nursing Student (n=200)

Demographic data	No	%
Age (year)		
19-≤20	8	4.0
21	114	57.0
≥ 22	78	39.0
Mean ± SD	21.39 ± 0.670	
Sex		
Male	82	41.0
Female	118	59.0
Place of residence		
Rural	46	23.0
Urban	142	71.0
Slum area	12	6.0
Father education		
No read and write	8	4.0
Read and write	18	9.0
Basic education	12	6.0
Secondary	30	15.0
Technical institute	30	15.0
University and above	102	51.0
Mother education		
No read and write	10	5.0
Read and write	18	9.0
Basic education	24	12.0
Secondary	44	22.0
Technical institute	34	17.0
University and above	70	35.0

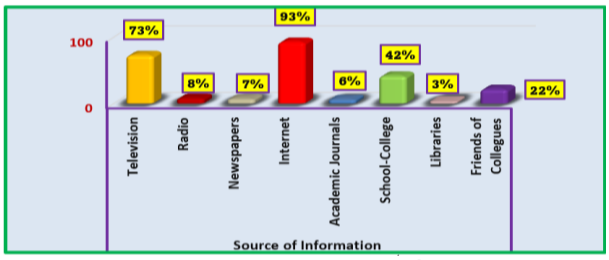

Figure (1): Percentage Distribution of Studied Nursing Student Source of Information regarding Climate Change (n=200).

Research Hypothesis

After implementation of an educational program about adverse health effects of climate change, the nursing students will have an improvement in their knowledge, attitudes and reported practices.

Table (2): Statistical Difference between Knowledge regarding Climate Change Pre and Post Educational Program among Studied Nursing Students (n=200).														
Knowledge items	Pre educational program						Post educational program						Chi square	
	Incorrect or don't know		Incomplete correct		Complete correct		Incorrect or don't know		Incomplete correct		Complete correct		χ2	P value
	No	%	No	%	No	%	No	%	No	%	No	%		
General knowledge														
Meaning of climate change	5	2.5	111	55.5	84	42.0	1	0.5	41	20.0	158	79.0	10.8	0.000**
Causes of climate change (Human activities)	11	5.5	113	56.5	76	38.0	3	1.5	42	21.0	155	77.5	11.1	0.000**
High risk people	3	1.5	108	54.0	89	44.5	1	0.5	49	24.5	150	75.0	9.1	0.000**
Knowledge related to effect of climate change														
Adverse health effects on adult	8	4.0	148	74.0	44	22.0	3	1.5	52	26.0	145	72.5	14.6	0.000**
Adverse health effects on children	4	2.0	112	56.0	84	42.0	1	0.5	43	21.5	156	78.0	9.1	0.000**
Measures to prevent adverse effect on human health	14	7.0	132	66.0	54	27.0	1	0.5	46	23.0	153	76.5	10.7	0.000**
Total ($\bar{x}$ ± SD)	8.32 ± 3.21						12.26 ± 2.27						25.8	0.000**

Table (3): Statistical Difference between Total level of Knowledge regarding Climate Change Pre and Post Educational Program among Studied Nursing Students (n=200).										
Items	Total of knowledge pre educational program				Total of knowledge post educational program				Chi square	
	Satisfactory		Un-Satisfactory		Satisfactory		Un-Satisfactory		χ2	P- value
	No	%	No	%	No	%	No	%		
General knowledge	84	42.0	116	58.0	181	90.0	19	9.5	104.2	0.000**
Knowledge related to effect	124	62.0	76	38.0	177	88.5	23	11.5	36.92	0.000**
Total	84	42.0	116	58.0	189	94.5	11	5.5	127.1	0.000**
**Highly significant p ≤ 0.01										

Table (4): Statistical Difference between Attitudes toward Effect of Climate Change Pre and Post Educational Program among Studied Nursing Students (n=200).														
Attitudes items	Pre educational program						Post educational program						Chi square	
	Disagree		Neutral		Agree		Disagree		Neutral		Agree		χ2	P- value
	No	%	No	%	No	%	No	%	No	%	No	%		
Attitudes regarding effect of climate change														
Climate change could affect people in Egypt	36	18.0	86	43.0	78	**39.0**	7	3.5	54	27.0	139	**69.5**	12.7	0.000**
Heavy rains and heat waves, can increase mortality	32	16.0	96	48.0	72	36.0	8	4.0	58	29.0	134	67.0	12.2	0.000**
Climate change could affect the daily life	35	17.5	95	47.5	70	35.0	3	1.5	60	30.0	137	68.5	13.9	0.000**
Climate change affect work	29	14.5	104	52.0	67	33.5	5	2.5	63	31.5	132	66.0	12.6	0.000**
Climate change could affect public health	31	15.5	92	46.0	77	**38.5**	7	3.5	53	26.5	140	**70.0**	12.3	0.000**
Climate change influences humans' mental health	35	17.5	96	48.0	69	34.5	9	4.5	56	28.0	135	67.5	13.0	0.000**
Climate change increase spread of infectious diseases	27	13.5	99	49.5	74	**37.0**	3	1.5	68	34.0	129	**64.5**	11.3	0.000**
Total ($\bar{x}$ ± SD)	**8.41 ± 4.77**						**11.52 ± 3.66**						**13.6**	**0.000****
**Highly significant p ≤ 0.01														

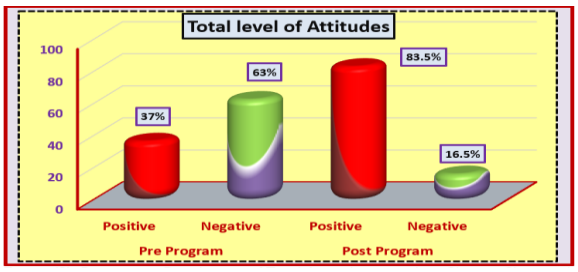

Figure (2): Percentage Distribution of Total Attitudes regarding Climate Change during

Pre program: Positive to negative ratio= 0.6:1
Post program: Positive to negative ratio= 5.1:1
χ2=90.2, P=0.000
Pre and Post Educational Program among the Studied Nursing Students (n=200)

Table (5): Statistical Difference between Total Level of Reported Practices regarding Climate Change Pre and Post Educational Program among Studied Nursing Students (n=200).										
Variables	Pre educational program				Post educational program				Chi square	
	Adequate		In-adequate		Adequate		In-adequate		χ2	P value
	No	%	No	%	No	%	No	%		
Prevention of heat stroke	117	58.5	83	41.5	187	93.5	13	6.5	67.67	0.000**
Prevention of dust storm hazards	120	60.0	80	40.0	183	91.5	17	8.5	54.47	0.000**
Prevention of heavy rains hazards	121	60.5	79	39.5	191	95.5	9	4.5	71.88	0.000**
Total	121	60.0	79	**39.5**	**187**	**93.5**	**13**	**6.5**	**61.96**	**0.000****
**Highly significant p ≤ 0.01										

Table (6): Correlation between Total Knowledge, Attitudes and Reported Practices regarding Climate Change among Studied Nursing Students (n=200)				
Items		Total knowledge	Total attitudes	Total reported practice
Total knowledge	r		0.927	0.903
	p-value		0.000**	0.000**
Total attitudes	r	0.927		0.984
	p-value	0.000**		0.000**
Total reported practices	r	0.903	0.984	
	p-value	0.000**	0.000**	
**Highly significant p < 0.01 r-Pearson Correlation Coefficient;				

4. Discussion

Climate change is impacting human lives and health in a variety of ways. It threatens the essential ingredients of good health (clean air, safe drinking water, nutritious food supply and safe shelter). Risks of climate change to health include air pollution, forced migration, and changing patterns of infectious disease, compromising physical health and mental wellbeing; effects that are more likely to impact on vulnerable populations [9].

According to demographic data of studied nursing students. The finding of the present study revealed that, the mean age was 21.39 ± 0.670. This result was supported by [10] in Egypt who conducted a study entitled "Impact of awareness program regarding health consequences of climate change on knowledge, perception and daily life practices among nursing students" found that the mean age of nursing students was 20.2±1.58. While, this finding in disagreement with [11] in Gambia, who studied "Awareness of the causes, impact and solutions to global warming among undergraduate students from different schools in the university" found that only 46% of the respondents in the study were between the ages of 21 and 25.This may be due to the sample of students had enrolled in the fourth academic year at Faculty of Nursing.

Related to sex, the current study showed that near three fifth of nursing students were females. This result was in agreement with [12] in Egypt, who conducted a study entitled "Effect of awareness program regarding climate change on knowledge, attitudes and practices of university students" and found that 59.5% of studied students were females. While, this result was in disagreement with [13] in Turkey, who conducted a study entitled "Public awareness and perceptions of climate change: Difference in concerns about climate change" and found that 36.7% of participants were women. From the researcher point of view, this result may be due to the number of students from girls is more than boys, as the parents point of view, the Faculty of Nursing provides a guaranteed job and a secure future for the girl. so the demand for college is large, especially among girls.

Related to place of residence the current study showed that near three quarters were from urban. This result was in disagreement with [10] who found that 50.7% were living in rural areas. From the researcher point of view, this result may be due to almost all nursing students were from Helwan City which is considered an urban area.

According to parent's education, the current study showed that more than half of father education were university education and above and more than one third of mother education were university education and above. Conversely, this result was in disagreement with [14] in Nigeria, who conducted a study entitled "Assessing the senior school students knowledge, attitude and practices related to climate change: Implications for curriculum preparation" and found that only 31.7% of participants' parents had a senior school certificate as the highest educational qualification held. From the researcher point of view, this result may be due to parent's awareness of the importance of higher education.

Related to source of information about climate change, the current study showed that majority of studied nursing students their source of information regarding climate change were from internet and near three quarters from television. While, minority of the studied nursing students their source of information regarding climate change were from academic journals/special publications respectively. This result was supported by [15] in Thailand who conducted a study entitled "Knowledge, attitudes,

and practices on climate change and dengue" and found that 74.4% of participants were using the internet as a main source of information. Also, this finding was supported by [16] in China who conducted a study entitled "Knowledge, attitude, risk perception and health related adaptive behavior of primary school children towards climate change: A cross-sectional study" and stated that 57% of the studied sample gets information from television.

Conversely, this result was in disagreement with [5] in Indonesia who conducted a study entitled "Assessment of knowledge regarding climate change and health among adolescents" and stated that the primary source of information about climate change participants is from family. Also, this result was in disagreement with [17] in India, who conducted a study entitled "Assessment of secondary school student's awareness of climate change: An empirical study" and found that the source of information among 95% of respondents was newspapers. This is because the internet and television have become available to everyone and are considered the fastest and easiest means of communication and main sources of information.

The current study revealed that, there was a marked improvement in nursing student's general and effect related knowledge regarding climate change pre and post educational program with highly statistically significant difference. Moreover, more than two fifths of nursing students had complete correct knowledge regarding meaning of climate change pre educational program, then improved to about four fifths post educational program. Also, less than one third of them had complete correct knowledge regarding causes of climate change pre educational program, then improved to four fifths post educational program. More than one fifth of nursing students had complete correct knowledge regarding adverse health effects on adult pre educational program, this improved to near three quarters post educational program.

This result was supported by [18] in Turkey, who conducted a study entitled "The effect of climate change education on the knowledge and awareness levels of Atatürk University student" and found that 23.4% of participants had correct knowledge regarding meaning of climate change pre program, then improved to 72.3% post program. Also, 77.3% of them had correct knowledge regarding causes of climate change pre educational program, then improved to 93.6 % post educational program. 65.2% of them had correct knowledge regarding adverse health effects on generations pre educational program, this improved to 78.7% post educational program.

The current study indicated that, there were improvement in total level of knowledge regarding climate change pre and post educational program among the studied nursing students with a highly statistically significant difference. As, more than two fifths of the studied nursing students had satisfactory total knowledge regarding climate pre educational program, this improved to majority had satisfactory total knowledge post educational program.

This result was in accordance with [19] in the United Kingdom, who conducted a study entitled "Informed-decision regarding global warming and climate change among high school students" and revealed that the main difference in participants had satisfactory knowledge related to climate change after the intervention.

Also, this result was supported by [18] in Turkey, who revealed that training had satisfactory knowledge development of students about climate change. It is seen that 23.4% before training program and enhanced to 72.3% after training program. This is because the content of the educational program on climate change includes the largest amount of information that a nursing student needs to understand everything related to what climate change is, its causes and adverse effects on human health, and how to prevent it.

The current study indicated that, there was an improvement in total level of attitude toward climate change pre and post educational program among the studied nursing students with a highly statistically significant difference. As, about two fifths of studied nursing students had positive attitude toward climate change pre educational program, this improved to more than four fifths post educational program. This result was supported by [20] in Nigeria, who conducted a study entitled "Impact of environmental education on the knowledge and attitude of students towards the environment" and said that the respondents gained positive attitude towards climate change and the environment after a full time of educational program. From the researcher point of views, the attitudes of nursing students are greatly affected by what they studied and what they received of information and knowledge regarding the issue of climate change, especially as it is a very important topic and is considered the talk of the hour these days and also affects people's lives on a daily basis.

Regarding statistical difference between total level of reported practices regarding climate change pre and post educational program, the current study indicated that, there was an improvement in all items of total reported practices level among studied nursing students regarding climate change pre and post educational program with a highly statistically significant difference. This result was supported by [21] in Germany who done a study entitled "The impact of climate change awareness on behavioral changes: Changing minds or changing behavior?" and found that there was a strongly enhancement and had adequate practices related to climate change.

The current study indicated that, there was a highly statistically significant positive correlation between total knowledge, attitudes and reported practices regarding climate change among studied nursing students P= 0.000. This result was in agreement with [12] who found that there was a highly statistically

positive correlation between post-program total nursing students' knowledge and total daily life practices & attitudes (r=.980 & r=.839) at p < 0.001, but there was no relation through the preprogram. Also, this result was in accordance with [22] in Japan who found that studied sample exhibited significantly higher levels of climate change knowledge, attitude and practices (in both pre-test and post-test).

Conversely, this result was in disagreement with [23] in Pakistan who conducted a study entitled "Impact of climate change awareness on climate change adaptions and climate change adaptation issues" and stated that the study also reflects negative relation between climate change awareness and climate change practices with r-value (-.564) and P-value (.000). Because participants think that without governmental, departmental and institutional support, climate change awareness alone without addressing related constraints cannot overcome the serious issues related to climate change behaviors and cannot make a difference. From the researcher point of view, this result may be due to the effect of educational program which increase the knowledge about climate change that affects positively the attitudes of students and thus makes them had adequate practices toward climate change to decrease the effect of climate change on their health. Finally, after implementation of the educational program and comparing the results, this correctly proved the research hypothesis.

5. Conclsion

Based on the results and hypothesis of the present study, it can be concluded that:

The educational program improved nursing students' total knowledge, attitudes and reported practices regarding climate change. Also there was a highly statistically significant correlation between nursing students' total knowledge, attitudes & their reported practices regarding climate change.

6. Recommendations

Based on the results of the present study, the recommendations have been considered the following:

1. It is recommended for university decision makers to add climate change course in the University of Helwan faculty curriculum to elevate student's climate change consciousness more academically rather than obtaining the awareness from other sources.
2. Green educational programs including seminars, conferences and workshops should be organized especially in universities to increase the student's awareness level.
3. The University can assign a specific day as "climate change day" so as to aware the students toward environmental protection from climate change.
4. Provide public education at schools, families, religious institutions, social groups, and media to promote people readiness for effects of climate change.

For further research

1. Ongoing researches were required for enhancing students' awareness about climate change, its mitigation and adaptation on a large scale for generalization.
2. Dissemination of health educational booklet about adverse health effect of climate change among university students.

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