

ORIGINAL ARTICLE

Enhancing Palliative Care Expertise among Nursing Students in Najran, Saudi Arabia: An Educational Intervention Study

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ABSTRACT

*This study aims to assess the impact of an educational program on nursing students' knowledge and attitudes pertaining to palliative care. Employing a quasi-experimental (pre-post) design, the study was conducted at the Faculty of Nursing, Najran University, Najran, Saudi Arabia, from February to May 2022. Participants, totaling 43 individuals, were recruited through non-probability convenience sampling. Data were collected via an electronic questionnaire, encompassing three sections: demographic information, the Palliative Care Quiz for Nursing, and an assessment of nursing students' attitudes. The sample (n=43) predominantly consisted of young individuals (21 to 23 years). Both male and female participants were divided between the seventh and eighth education levels. Furthermore, a considerable majority displayed a positive attitude toward end-of-life issues, had engaged in palliative care training, and exhibited notable professional experience and previous exposure to end-of-life care. The average total score for knowledge pre-test was 5.87 ± 1.16 and post-test was 17.69 ± 2.95 . The average total score for attitude pre-test was 20.59 ± 4.34 and post-test was 39.86 ± 5.14 . The intervention led to a substantial improvement in participants' knowledge and attitude of palliative care across all assessed items, the changes were highly significant ($p < 0.01^{**}$), highlighting the effectiveness of the intervention in enhancing participants' understanding of various aspects of palliative care. The study found a highly significant ($p < 0.01^{*}$) positive correlation between participants' total knowledge and total attitude scores both before and after the intervention. There was significant improvement in knowledge and attitude among students subsequent to the educational program. The outcomes underscore the pressing necessity for enhanced educational attention and further research to address the educational requirements of nurses. Consequently, it is imperative to integrate palliative care education into the nursing curriculum, thereby nurturing constructive attitudes and adeptness in delivering appropriate care to terminally ill patients.*

Keywords: Nursing, Students, Proficiency, Palliative Care, Knowledge, Attitude.

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INTRODUCTION

Within the medical profession, nurses hold indispensable roles within the palliative care team. However, a notable impediment to the advancement of palliative care is the absence of fundamental expertise in this domain. The global healthcare landscape is witnessing a growing emphasis on integrating palliative care, with the World Health Organization (WHO) emphasizing the necessity of a public health strategy, training, and education to effectively integrate palliative care into healthcare systems [1,2].

Central to the challenge of providing high-quality patient care is the insufficient knowledge about palliative care among nurses. This knowledge gap is often attributed to inadequate integration of palliative care into university nursing curricula. The deficiency is particularly glaring in undergraduate nursing programs, and even postgraduate nursing curricula frequently overlook palliative care education, thus leaving nurses ill-equipped to address palliative care needs [3].

In Saudi Arabia, a culturally distinct context from the Western origins of palliative care, the field's evolution has been gradual. The initiation of palliative care services at King Faisal Specialist Hospital and Research Center (KFSH & RC) in Riyadh marked a pivotal point two decades ago, yet the field's expansion has been relatively slow. The introduction of such programs in regions like Najran, for instance, is even more recent [2].

Defined by the WHO as an approach that enhances the quality of life for patients and their families facing life-threatening illnesses, palliative care encompasses the identification, evaluation, and meticulous management of pain, alongside addressing psychosocial, physical, and spiritual concerns. Nurses' understanding of palliative care tends to evolve over time, often influenced by the development of the field [4]. The assessment of their knowledge and understanding was conducted using the Palliative Care Quiz for Nursing (PCQN) [2].

Misconceptions among nurses, such as equating palliative care solely with life extension and associating it with feelings of depression and hopelessness, persist. Despite the growing recognition of the need for palliative care in Saudi Arabia, investigations into nursing students' perceptions in this area remain scarce [5]. Although the demand for palliative care is rising, the existing training fails to adequately equip nurses to provide adept post-graduation care. Within the Saudi context, a substantial proportion of nurses lack a comprehensive grasp of palliative care's overarching concept [6].

Addressing these gaps, this study aims to assess the impact of an educational program on nursing students' knowledge and attitudes pertaining to palliative care. By bridging the knowledge and practice divide through education, this research endeavors to contribute to the enhancement of palliative care understanding and delivery among nursing professionals.

MATERIAL AND METHODS

The study was conducted employing a quasi-experimental (pre-post) design, at the Faculty of Nursing, Najran University, Najran, Saudi Arabia, from February to May 2022. A quasi-experimental (pre – post) design was utilized to evaluate the effect of the implementation of an educational program on the nursing students' knowledge and attitude regarding palliative care. The study was conducted in Faculty of Nursing at Najran University, Saudi Arabia. A non-probability convenience sampling method was used to recruit participants for this study at levels seven and eight (graduated students) and excluded students from different levels in nursing college.

Data was collected with an electronic questionnaire and consisted of three sections: The first section included the demographic data of nursing students such as age, previous training, duration of training, articles read about palliative care. The second section was the Palliative Care Quiz for Nursing (PCQN), developed by Ross and her group in 1996. It consists of 20 items⁷ divided in three categories: palliative care philosophy and principles (4 items), pain and symptom treatment (13 items), and psychosocial and spiritual care (3 items). Each item had a “true”, “false”, or “do not know” response. A correct response was worth 1 point, while incorrect or “do not know” responses were worth 0 points. The total of the subscale scores yielded an overall score ranging from 0 to 20. Satisfactory knowledge was defined as a score between 14 to 20, and less than 14 was considered unsatisfactory. The third section was adapted from Omar et al., 2018 with modifications, to assess the attitude towards palliative care and included 9 items, scored on a five-point Likert scale, from 1 = strongly disagree to 5 = strongly agree, for the positive items

and vice versa for negative items, giving a possible total score ranging from 9 to 45. Any score equal to or above the midpoint (i.e., 27 and above) was categorized as a "Positive Attitude."; and any score below the midpoint (i.e., below 27) was categorized as a "Negative Attitude."

The first stage was the pre-intervention assessment of the nursing students' knowledge and attitude regarding palliative care. The second stage consisted of the implementation of the educational program. There were four sessions in the education program. Each session lasted 30 to 45 minutes and focused three to four objectives. Understanding life and death, the concept of palliative care, spiritual care, and ethical palliative care were the themes discussed in the first session. Nutritional management, mental and emotional care, and therapeutic communication in the second session, and pain and the management of symptoms, social care, and planning for a dignified death in the third. The fourth class included cancer and nursing, as well as the right attitudes and duties of a palliative care provider, stress management, and the foot massage theory and practice. The researchers presented the lectures and conference. The intervention was delivered via several innovative strategies, including a palliative care knowledge notebook distributed to each student, a PowerPoint presentation and through the black board or zoom. The last stage was an evaluation of the effects and changes post-intervention.

The questionnaire was tested on 10% of the nursing students to determine the clarity and applicability of the instrument, after which the required revisions were made. It provided an estimate for the time required as well as to uncover any difficulties that occurred during data gathering. To avoid any contamination of the results, the pilot study results were omitted from the actual study.

For statistical analysis, the data collected from the sample was revised, coded and entered in an Excel sheet and the Statistical Package for Social Sciences (SPSS) version 22 was used for the analysis. The data are presented with descriptive statistics as frequency, percentage and mean±SD. A t-test was used to determine if there was a significant difference between the means of two groups. A correlation coefficient was used to measure the strength of the relationship between two variables. The Chi-square test was used to compare categorical variables. The significance of the results were categorized as highly significant at p-value < 0.01, and statistically significant at p-value < 0.05.

For ethical issues, official permission was obtained from the Najran University coordinator to implement the research and maintain ethical standards. The design and data collection for this study was approved by the Standing Committee of Research Ethics at Najran University (Ref.#: 443-42-9821-DS). To maintain full privacy and confidentiality, all participants were made aware of the study's aims. They were also aware of their right to withdraw from participating in the study at any time, without any consequences.

RESULTS

The data in table-1 presents the frequency and percentage distribution of a sample consisting of 43 individuals based on various characteristics. The sample seems to be predominantly young, with 86% falling in the age range of 21 to 23 years, while only 14% are between 24 to 26 years old. The mean age of the participants is approximately 22.12 years with a standard deviation of 1.40. In terms of education, the participants are fairly evenly split between the seventh level (48.9%) and eighth level (51.5%). Regarding gender, the sample comprises 53.5% males and 46.5% females. When it comes to the participants' attitude toward end-of-life issues, a significant majority (88.4%) hold a positive attitude, while a smaller portion (11.6%) express a negative attitude. The participants' engagement with palliative care training courses and reading resources is as follows: 72.1% of the participants have undergone training courses about palliative care, while 27.9% have not. Moreover, 79.1% of the participants have read resources such as articles and brochures about palliative care, while 20.9% have not engaged with such materials. In terms of professional experience, slightly more than half of the participants (51.2%) have some form of professional experience, while the remaining 48.8% do not. Lastly, in relation to previous involvement in end-of-life care, 46.5% of the participants have had prior experience, whereas 53.5% have not. Overall, the sample appears to consist primarily of young individuals with a positive attitude toward end-of-life matters. A significant proportion has engaged in palliative care training and reading resources, with around half possessing professional experience and previous exposure to end-of-life care.

Table 1: Frequency and percentage distribution of the sample according to their characteristics (n=43)

Items	N	%
Age (Year)		
21 - 23	37	86
24 - 26	6	14
Mean	22.12	±1.40

Level of education		
Seventh level	21	48.9
Eight level	22	51.5
Gender		
Male	23	53.5
Female	20	46.5
Attitude toward end of life		
Positive	38	88.4
Negative	5	11.6
Training courses about Palliative care		
Yes	31	72.1
No	12	27.9
Reading resources about Palliative care (articles, brochures)		
Yes	34	79.1
No	9	20.9
Having professional experience		
Yes	22	51.2
No	21	48.8
Having previous experience in end-of-life care		
Yes	20	46.5
No	23	53.5

The table-2 presents a comparison of knowledge levels about palliative care before and after an intervention among the participants. The table includes information about correct and incorrect answers for specific knowledge items, as well as statistical analyses to determine the significance of changes. Here is a concise description of the results:

Concept of Palliative Care: Before the intervention, 15 participants (34.9%) correctly understood the concept of palliative care, while 28 (65.1%) had an incorrect understanding. After the intervention, the correct responses significantly increased to 37 participants (86%), with only 6 (14%) providing incorrect responses. The observed improvement was highly significant (T-test = 11.565, $p < 0.01^{**}$).

Management of Pain during Palliative Care: In the pretest, 12 participants (27.9%) had a correct understanding of pain management in palliative care, while 31 (72.1%) had incorrect responses. Following the intervention, the number of correct responses rose to 35 participants (81.4%), and incorrect responses decreased to 8 (18.6%). This change was highly significant (T-test = 9.775, $p < 0.01^{**}$).

Aim and Benefits of Palliative Care: Prior to the intervention, 10 participants (23.3%) accurately recognized the aim and benefits of palliative care, while 33 (76.7%) did not. After the intervention, the correct responses substantially increased to 39 participants (90.7%), with only 4 (9.3%) having incorrect responses. This improvement was highly significant (T-test = 13.006, $p < 0.01^{**}$).

Components of Palliative Care: In the pretest, 13 participants (30.2%) correctly identified the components of palliative care, while 30 (69.8%) did not. Following the intervention, correct responses rose to 40 participants (93%), and incorrect responses decreased to 3 (7%). This change was highly significant (T-test = 10.818, $p < 0.01^{**}$).

In summary, the intervention led to a substantial improvement in participants' knowledge of palliative care across all assessed items. The correct responses significantly increased while incorrect responses decreased. The changes were highly significant ($p < 0.01^{**}$) for all knowledge items, highlighting the effectiveness of the intervention in enhancing participants' understanding of various aspects of palliative care.

Table 2: Comparison of the pre-and post-intervention regarding knowledge of palliative care (n=43)

Items	Pretest				Post test				T-test	P-value
	Correct		Incorrect		Correct		Incorrect			
	N	%	N	%	N	%	N	%		
Concept of palliative care	15		28	65.1	37	86	6	14	11.565	<0.01*
Management of pain during palliative care	12	27.9	31	72.1	35	81.4	8	18.6	9.775	<0.01*
Aim and benefits of palliative care	10	23.3	33	76.7	39	90.7	4	9.3	13.006	<0.01*
Component of palliative care	13	30.2	30	69.8	40	93	3	7	10.818	<0.01*

**highly significant at $p < 0.01$.*

The table-3 presents a comparison between the attitudes of studied students toward palliative care before and after an intervention. The table contains information about positive and negative attitudes for specific items, as well as statistical analyses to determine the significance of changes.

Giving Nursing Care to a Dying Person: Before the intervention, 15 participants (34.9%) expressed a positive attitude toward viewing nursing care for a dying person as a valuable learning experience, while 28 (65.1%) held a negative attitude. After the intervention, the number of participants with a positive attitude significantly increased to 40 (93%), with only 3 (7%) retaining a negative attitude. This change was highly significant (T-test = 9.95, $p < 0.01^*$).

Verbalizing Feelings of the Dying Person: Initially, 10 participants (23.3%) perceived it as beneficial for a dying person to express their feelings, while 33 (76.7%) had a negative attitude. Post-intervention, 38 participants (88.4%) exhibited a positive attitude, and 5 (11.6%) maintained a negative attitude. This change was highly significant (T-test = 10.66, $p < 0.01^*$).

Family Involvement and Professional Job: Before the intervention, 12 participants (27.9%) believed that family members interfered with professionals' care, while 31 (72.1%) did not. Following the intervention, 37 participants (86%) had a positive attitude, and 6 (14%) had a negative attitude. This change was highly significant (T-test = 12.77, $p < 0.01^*$).

Time Required for Nursing Care: Initially, 14 participants (32.6%) felt frustrated by the time needed for nursing care, while 29 (67.4%) did not. After the intervention, 41 participants (95.3%) had a positive attitude, and only 2 (4.7%) had a negative attitude. This change was highly significant (T-test = 10.82, $p < 0.01^*$).

Family Concern for Dying Members: Before the intervention, 11 participants (25.6%) believed families should help dying members, while 32 (74.4%) did not. After the intervention, 40 participants (93%) expressed a positive attitude, and 3 (7%) maintained a negative attitude. This change was highly significant (T-test = 11.00, $p < 0.01^*$).

Nurse Talking About Death: Initially, 13 participants (30.2%) were uncomfortable with nurses discussing death, while 30 (69.8%) were comfortable. Post-intervention, 39 participants (90.7%) exhibited a positive attitude, and 4 (9.3%) retained a negative attitude. This change was highly significant (T-test = 13.76, $p < 0.01^*$).

Table (3): Comparison between the studied students at pre intervention and post intervention regarding their attitude about palliative care (n=43).

Items	Pre-test				Post-test				t- test	P- value
	Positive		Negative		Positive		Negative			
	n	%	n	%	n	%	n	%		
Giving nursing care to a dying person is a worthwhile learning experience.	15	34.9	8	5.1	40	93	3		9.95	<0.01*
It is beneficial for the dying person to verbalize his/her feelings.	10	23.3	3	6.7	38	88.4	5	1.6	0.66	<0.01*
Family members who stay close to a dying person often interfere with a professionals' job with the patient.	12	27.9	1	2.1	37	86	6	4	2.77	<0.01*
The length of time required to give nursing care to a dying person would frustrate me.	14	32.6	9	7.4	41	95.3	2	.7	0.82	<0.01*
Families should be concerned about helping their dying member make the.	11	25.6	2	4.4	40	93	3		1.00	<0.01*
The nurse should not be the one to talk about death with the dying person.	13	30.2	0	9.8	39	90.7	4	.3	3.76	<0.01*
The family should be involved in the physical care of the dying person.	16	37.2	7	2.8	42	97.7	1	.3	4.90	<0.01*
It is difficult to form a close relationship with the family of a dying member.	10	23.2	3	6.7	40	93	3		2.00	<0.01*
There are times when death is welcomed by dying person.	12	27.9	1	2.1	41	95.3	2	.7	3.86	<0.01*

**Highly significant at $p < 0.01$.*

Family Involvement in Care: Before the intervention, 16 participants (37.2%) believed families should participate in physical care, while 27 (62.8%) did not. After the intervention, 42 participants (97.7%) had

a positive attitude, and only 1 (2.3%) had a negative attitude. This change was highly significant (T-test = 14.90, $p < 0.01^*$).

Forming Relationships with Families: Initially, 10 participants (23.2%) found it difficult to build relationships with families, while 33 (76.7%) did not. After the intervention, 40 participants (93%) had a positive attitude, and 3 (7%) maintained a negative attitude. This change was highly significant (T-test = 12.00, $p < 0.01^*$).

Welcoming Death by Dying Person: Before the intervention, 12 participants (27.9%) believed death could be welcomed by a dying person, while 31 (72.1%) did not. Post-intervention, 41 participants (95.3%) expressed a positive attitude, and 2 (4.7%) maintained a negative attitude. This change was highly significant (T-test = 13.86, $p < 0.01^*$).

In summary, the intervention led to substantial shifts in the attitudes of students toward palliative care, with a significant increase in positive attitudes across all assessed items. The changes were highly significant ($p < 0.01^*$) for all attitude items, highlighting the effectiveness of the intervention in fostering more positive perceptions of various aspects of palliative care.

The table-4 presents the correlation between total knowledge and total attitude scores before and after an intervention. The table includes correlation coefficients (R) and corresponding p-values to assess the significance of the relationships.

Total Knowledge and Total Attitude before the Intervention: The correlation coefficient (R) between total knowledge and total attitude scores before the intervention was 0.601. This positive correlation indicates a moderate to strong relationship between participants' overall knowledge levels and their attitudes toward palliative care before the intervention. The p-value was $< 0.01^*$, indicating that this relationship is highly significant.

Total Knowledge and Total Attitude after the Intervention: Similarly, the correlation coefficient (R) between total knowledge and total attitude scores after the intervention was 0.589. This positive correlation also suggests a moderate to strong relationship between participants' overall knowledge levels and their attitudes toward palliative care after the intervention. The p-value was $< 0.01^*$, indicating a highly significant relationship.

In summary, the study found a notable positive correlation between participants' total knowledge and total attitude scores both before and after the intervention. This indicates that individuals with higher levels of knowledge about palliative care tend to have more positive attitudes toward it. The observed correlations were highly significant ($p < 0.01^*$) in both cases, underscoring the importance of knowledge in shaping attitudes toward palliative care.

Table 4: Correlation between total knowledge and total attitude at pre- and post-intervention (n=43)

Item	Total knowledge pre	
	R	P- value
Total attitude pre	0.601	$< 0.01^*$
Total attitude post	Total knowledge post	
	0.589	$< 0.01^*$

*Highly significant at $p < 0.01$.

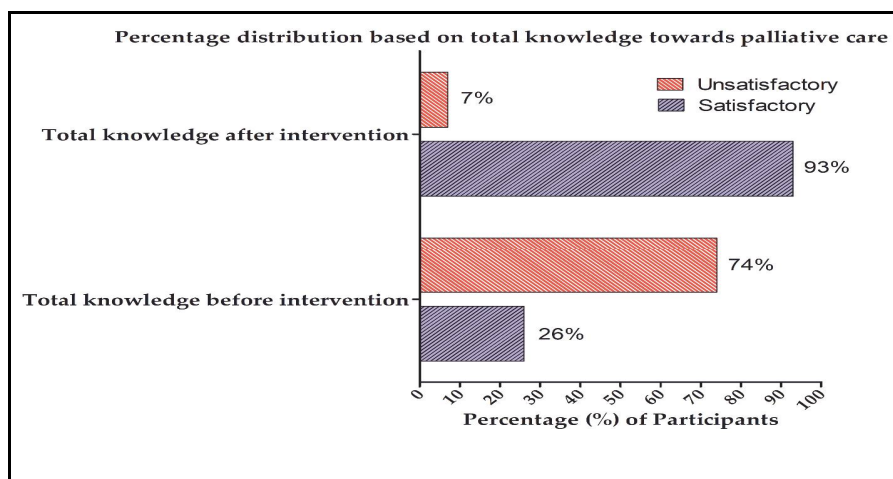


Figure 1: Percentage distribution based on total knowledge (n=43); T=25.998, $P < 0.01^{**}$

The data in figure-1 provides a percentage distribution of participants' knowledge levels before and after the intervention. The information includes percentages of participants who were categorized as having "Satisfactory" and "Unsatisfactory" levels of knowledge. The percentage distribution indicates that prior to the intervention, only 26.0% of participants had a satisfactory level of knowledge about the subject, while the majority, 74.0%, were categorized as having an unsatisfactory level of knowledge. Following the intervention, a remarkable shift occurred, with 93.0% of participants achieving a satisfactory level of knowledge, and only 7.0% falling into the unsatisfactory category. A statistical test was performed, indicating a T-value of 25.998 and a p-value of <0.01**, underscoring the highly significant improvement in knowledge after the intervention.

Similarly, data in figure 2 provides the percentage distribution of participants' attitude levels before and after an intervention. The data includes the percentages of participants categorized as having "Satisfactory" and "Unsatisfactory" attitudes. Prior to the intervention, the data shows that 32.5% of participants held a satisfactory attitude level, while the majority, accounting for 67.5%, had an unsatisfactory attitude. After the intervention, there was a significant shift, with a notable increase to 90.6% of participants demonstrating a satisfactory attitude, while only 9.4% retained an unsatisfactory attitude. A statistical analysis was performed, yielding a T-value of 26.701 and a p-value of <0.01**, indicating a highly significant change in attitudes following the intervention. This indicates that individuals with higher levels of knowledge about palliative care tend to have more positive attitudes toward it.

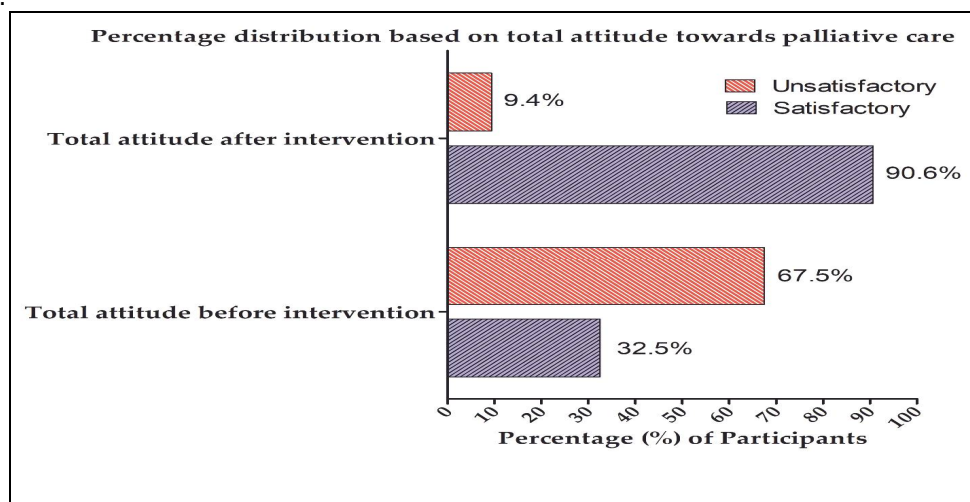


Figure (2): Percentage distribution based on total attitude towards palliative care (n=43); T=26.701, P <0.01**

Table 5. Relation between socio-demographic data of the studied students and their total knowledge score (n=43).

Items		Total knowledge pre	X ² P value	Total knowledge post	X ² P value
		Mean SD		Mean SD	
Age (year)	21-23	5.34±2.76	5.913 <0.05*	17.22±3.90	6.806 <0.05*
	24-26	7.11±1.80		18.24±1.99	
Level of education	Seven	4.90±1.84	6.102 <0.05*	16.72±2.01	5.389 <0.05*
	Eight	6.45±0.97		18.57±1.32	
Gender	Male	6.22±2.45	1.007 >0.05	18.12±3.7	2.102 >0.05
	Female	6.09±2.11		18.54±2.99	
Training courses about palliative care	Yes	6.89±1.78	9.890 <0.01**	18.69±4.11	12.423 <0.01**
	No	4.37±0.97		15.32±3.80	
Having professional experience	Yes	7.12±1.45	10.712 <0.01**	18.90±2.87	13.668 <0.01**
	No	4.68±0.97		16.08±3.14	
Having	Yes	6.23±1.30		18.12±3.31	

previous experience in end-of-life care	No	4.89±1.01	5.341 <0.05*	16.45±2.87	6.212 <0.05*
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*Significant at $p < 0.05$. **highly significant at $p < 0.01$.

The average total score for knowledge pre-test was 5.87 ± 1.16 and post-test was 17.69 ± 2.95 . Table 5 depicts that there is a highly statistically significant ($p < 0.01$) relation between total knowledge score and training courses about palliative care, and having professional experience pre and post intervention. In addition, there were statistically significant ($p < 0.01$) relation between total knowledge score and age, level of education, and having previous experience in end-of-life care pre and post intervention.

Table 6. Relation between socio-demographic data of the studied students and their total attitude score (n=43).

Items		Total attitude		X ² P value	Total attitude	
		Pre			post	
		Mean SD		Mean SD		X ² P value
Age (year)	21-23	19.51±5.66	2.134 >0.05	39.89±6.70	1.976 >0.05	
	24-26	20.11±5.23		41.46±7.81		
Level of education	Seven	18.76±4.84	1.855 >0.05	40.22±7.13	1.522 >0.05	
	Eight	19.73±3.99		41.23±6.85		
Gender	Male	17.35±3.01	6.234 <0.05*	37.50±5.70	7.103 <0.05*	
	Female	22.55±2.61		41.67±6.11		
Training courses about palliative care	Yes	23.01±4.56	9.767 <0.01**	42.08±7.12	10.807 <0.01**	
	No	18.01±3.90		38.00±5.43		
Having professional experience	Yes	22.89±3.42	13.121 <0.01**	41.75±6.08	12.004 <0.01**	
	No	19.12±3.56		37.54±4.90		
Having previous experience in end-of-life care	Yes	24.11±5.00	10.660 <0.01**	42.31±5.90	14.052 <0.01**	
	No	19.13±2.87		36.86±4.38		

*Significant at $p < 0.05$. **highly significant at $p < 0.01$.

The average total score for attitude pre-test was 20.59 ± 4.34 and post-test was 39.86 ± 5.14 .

Table 6 shows that there is a highly statistically significant ($p < 0.01$) relation between total attitude and training courses about palliative care, having professional experience and having previous experience in end-of-life care pre and post intervention. In addition, there were statistically significant ($p < 0.05$) relation between total attitude and gender pre and post intervention.

Discussion

Patients and their families benefit from palliative care through reducing suffering, preventing pain, and treating physical, psychosocial, and spiritual issues. Palliative care is traditionally thought of as intensive care for a dying patient. Palliative care now includes patients with end-stage organ failure or cancer who may live for years [8,9]. Insufficient information can limit excellent nursing care, causing nurses to feel unprepared and stressed when caring for patients with palliative and end-of-life needs. A negative attitude towards death and dying might develop or worsen, affecting the quality of treatment. Death attitudes and caring for the dying are psychological behaviors acquired via lifelong social and cultural experiences [10].

In the present study, attendance of a palliative educational programme, the majority (72.1%) of the students attended an educational programme and 79.3% have resources (articles, brochures) about palliative care. More than half of the sample had prior professional experience, but no experience in end-of-life care. These results was in contrast to Afifi et al., in a study done at King Saud bin Abdulaziz University for Health Sciences with a sample of 273 nursing students from levels 5 to 8. The majority had no knowledge of palliative care, one-third attended an elective course, and nearly all had no experience caring for terminally ill patients and their families [11]. This could be due to a lack of knowledge in

healthcare facilities. Palliative care should be included in the nurse education curricula of all nursing specialists.

Regarding the students' knowledge about palliative care, around a quarter responded correctly pre-intervention regarding the concept of palliative care, and the management of pain, compared to the more than three quarters post-intervention. For all the items, the statistical difference was highly significant ($p < 0.01$). The average total score for knowledge was 5.87 ± 1.16 . There was variation in the mean total score for knowledge based on the demographic characteristics of the participants. There is a significant rise in average scores among participants aged 24 years and above, individuals in a higher education level, those having training courses about palliative care, having professional experience, and those having previous experience in end-of-life care.

This result contrasted with the study conducted by Dimoula et al, at the National Kapodistrian University of Athens, Greece with 529 students, which showed a low level of knowledge [12]. Our sample's level of knowledge was low pre-intervention, which was significantly improved post intervention. This may be due to improving the level of knowledge through the educational intervention, which reflects positively in the score.

Regarding to total knowledge score of the sample, one quarter had a satisfactory level of knowledge pre-intervention, which changed to three-quarters post-intervention ($p < 0.01$). This result agreed with Arber et al, reporting a study with 130 students. They reported that the students' knowledge improved after the educational module [13]. This could be because there was a requirement to create a mandatory palliative care module that was formally assessed and included in a palliative care placement. This would make it possible to include palliative care in the undergraduate nursing curriculum in a complete and systematic way.

In terms of students' attitudes toward palliative care, the current study indicated that more than a third of the students had a positive attitude prior to the intervention that providing nursing care for a dying person is a worthwhile learning experience, it is beneficial for the dying person to verbalize his/her feelings, and family members who stay close to a dying person often interfere with the professional care for the patient, compared to more than 90% post-intervention. The average total score for attitude pre-test was 20.59 ± 4.34 and post-test was 39.86 ± 5.14 . The intervention led to a substantial improvement in participants' knowledge and attitude of palliative care across all assessed items, the changes were highly significant ($p < 0.01^{**}$), highlighting the effectiveness of the intervention in enhancing participants' understanding of various aspects of palliative care. The result is supported by the study done by Cerit 2019, at Abant Izzet Baysal University, Turkey. The sample was 81 nursing students whose attitudes toward death were measured as 146.43 (16.741) and 152.75 (15.132) pre- and post-training, respectively. The student attitudes toward caring for dying patients were 103.02 (7.655) pre-training and 111.02 (10.359) post-training [14]. The difference in mean attitudes regarding death and caring for the dying patient between pre- and posttests was statistically significant. According to the findings, training was successful in instilling positive attitudes toward death and caring for dying patients. This result contrasted with Jiang and his group in a study done in China with 1200 students. The Chinese undergraduate nursing students' knowledge about palliative care was minimal, and the majority had negative attitudes [15]. In terms of overall attitudes regarding palliative care, the current study found that more than one-third of the sample had a positive attitude pre-intervention, compared to more than two-thirds post- intervention ($p < 0.01$). This result was in the same line with Abu-El-Noor in a study with 160 students. The author reported that the majority of the students had a good attitude towards palliative care [16]. This could be because all health-care facilities should support palliative care and include it in the nurse education curriculum. In agreement with Chacko in a study with 100 students, he reported that two thirds had a good attitude toward end-of-life care [17].

In determining the relationship between a socio-demographic characteristics and total knowledge, the current study found a highly statistically significant relationship between total knowledge and palliative care training courses, as well as having professional experience pre- and post-intervention ($p < 0.01$). There was a statistically significant relationship ($p < 0.05$) between total knowledge and age, level of education, and previous experience in end-of-life care before and after the intervention. This agreed with Berndtsson, who found that there was a statistically significant relationship between total knowledge and age, level of education and training courses regarding palliative care [18]. This result is similar to Karkada and Nayak in a study done at nursing schools in the Udupi district with a sample of 83 students. They reported that there was a statistically significant relationship between total knowledge and age and having previous experience in end-of-life care [19].

The current study found a highly significant relationship between total attitude and palliative care training courses, professional experience, and prior experience in end-of-life care ($p < 0.01$), as well as

between total attitude and gender ($p < 0.05$). This result agreed with Dimoula et al., who found that there was statistically significant relationship between attitude and gender, level of education and experience with palliative care [12]. This may be due to an increasing level of education and improvement in student knowledge and a positive attitude towards palliative care. The current study found a highly statistically significant difference between total knowledge and total practice post-intervention with an instructional supportive guideline ($p < 0.01$). This finding support the study by Cerit, who found that providing nursing students with sufficient theoretical and simulated training about end-of-life care would terminate their tendency to withdraw from care and the feelings of incompetence associated with lack of knowledge and experience [14]. Sufficient and good quality care is only possible with good training. This result was similar to Kirkpatrick and his group in a study done at the Midwest Jesuit University with 75 students. They reported that increasing student knowledge and awareness post-program affected the students' practice positively, with a statistically significant relationship [20].

CONCLUSION

The student's knowledge and attitude improved significantly after the educational intervention. The proportion with a satisfactory level of knowledge changed from one quarter to three quarters post-intervention, and a satisfactory level of attitude changed from one third to more than two-thirds post-intervention. The correlation analyses revealed a strong positive relationship between participants' knowledge and their attitudes both before and after the intervention. This underlines the crucial link between understanding and positive perceptions of palliative care. The intervention yielded highly significant improvements in both knowledge and attitudes among the participants. The study highlights the potential of targeted educational interventions to reshape perceptions and enhance understanding, ultimately contributing to more informed and empathetic approaches to palliative care. These outcomes have implications for healthcare education and practice, emphasizing the importance of education in fostering positive attitudes and improving patient care quality in sensitive contexts like palliative care.

RECOMMENDATIONS

Nursing educational requirements should receive more attention and research. Palliative care must be an intrinsic part of the nursing curriculum, and students must be encouraged to acquire a positive attitude towards palliative terminal care through internalizing appropriate principles of care for dying patients.

AUTHOR CONTRIBUTIONS

Conceptualization, Abdalla Mohamed Osman, Samah R. Elrefaey and Sadeq Abdo Alwesabi; Data curation, DaifAllah Al-Thubaity, Wargaa Hashim Taha, Ohud Mofareh Alhuraysi and Elwaleed Idris Sagiron; Formal analysis, Nahid Khalil Elfaki, Amna Idris, Salwa Sallam, Wargaa Hashim Taha, Hend Turki Almutairi and Ahmed Jarelnape; Investigation, Samah R. Elrefaey, Amna Idris, Yahya Abdulla and Ohud Mofareh Alhuraysi; Methodology, Abdalla Mohamed Osman, Mohammed Zahrani, DaifAllah Al-Thubaity, Maram Alhemairy, Amna Idris and Elwaleed Idris Sagiron; Resources, Mohammed Zahrani, Nahid Khalil Elfaki, DaifAllah Al-Thubaity, Ibrahim Shaikh, Maram Alhemairy, Ohud Mofareh Alhuraysi and Hamza Balola; Software, Samah R. Elrefaey, Mohammed Zahrani, Ibrahim Shaikh, Yahya Abdulla, Salwa Sallam, Elwaleed Idris Sagiron, Hend Turki Almutairi and Ahmed Jarelnape; Supervision, Nahid Khalil Elfaki; Validation, Maram Alhemairy and Sadeq Abdo Alwesabi; Writing – review & editing, Abdalla Mohamed Osman, Samah R. Elrefaey, Ibrahim Shaikh, Yahya Abdulla, Salwa Sallam, Sadeq Abdo Alwesabi, Wargaa Hashim Taha, Hamza Balola, Hend Turki Almutairi and Ahmed Jarelnape.

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