

## Effect of Educational Intervention on Knowledge and Attitude Regarding Liver Transplantation among Nursing Students at College of Nursing Al-Ahsaa

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### Abstract:

**Background:** There exists a gap between knowledge regarding organ donation and willingness to donate among health profession personnel. Nursing students need to have a sufficient knowledge and positive attitude regarding liver transplantation through appropriate education during their course of study. **The aim** of the study was to assess Effect of Educational Intervention on Knowledge and Attitude Regarding Liver Transplantation among Nursing Students at College of Nursing Al-Ahsaa. **Setting:** the study was carried out at Faculty of Nursing – Al Ahsaa. **The sample** consists of 98 level four nursing students. **Tools:** Student Self-assessment questionnaire was used pre and post the Educational Intervention for the purpose of data collection to assess knowledge and attitudes of nursing students related to liver transplantation. **Research design:** Quasi Experimental design was used in this study. **Data were collected** in Fall semester 2020/2021. **The results proved that;** student' knowledge has been enhanced and their attitude has been improved after application of the educational intervention, in addition to highly significant correlation between knowledge score of the studied students and their attitude post the intervention, moreover; there was a significant correlation between total knowledge level score with student' previous Information about liver transplantation pre the intervention. **Conclusion and recommendation:** implementation of the educational program positively affected the nursing students' knowledge and their attitude toward liver transplantation. So, it is recommended to include organ transplantation education in the nursing program to raise the students' awareness and positively change their attitude toward organ donation and transplantation.

**Key words:** Educational Intervention, Knowledge and Attitude, Live Transplantation, Nursing Students.

### Introduction:

Organ donation is a unique surgical procedure that has a direct influence on the delivery of healthcare to a wide range of patients; it is the procedure of surgically removing of a healthy organ or tissue from one person "Donor" and placing it into another person with not functioning organ "Recipient" (Rani S et al 2020). Organ transplantation is

recognized as a lifesaving procedure for patients with potentially terminal illnesses (Meghana, et al 2018). Although organ donation is a very personal issue, the organ donation process involves medical, legal, ethical, organizational, and social factors. Organ donation and transplant rates vary widely across the globe, but there remains an almost universal shortage of deceased donors (Gerbi, et al 2020). It was documented that; availability of donated organs

may save lives of people with end-stage disease; however, multiple barriers exist for obtaining donated organs such as insufficient knowledge and lack of a positive attitude towards organ donation (Yadav, Nisha, et al 2020). Misunderstandings and inadequate knowledge among the prospective donors, and failure to identify the proper possible donors by healthcare professionals are two key factors contributing to the shortage of accessible organs (Gerbi A et al 2020).

Liver transplantation provides long survival times and improved quality of life for patients with liver disease whose prognosis is short if they do not have the transplantation in the proper time; the tremendous developments in the field of liver transplantation throw light to the humans which are in need of survival (Sarah, et al 2019). Liver transplantation is recognized as a lifesaving procedure for patients with potentially terminal illnesses (Agrawal, et al 2018). However, the liver transplant organ donation rates are inadequate for meeting the minimum transplant requirements, many studies recognize that poor knowledge and negative attitude about organ donation which contributes to the supply of organs continues to be much less than the demand (Bekele M et al 2021), moreover; organ shortage for transplantation is a crucial problem worldwide.

One of the possible obstacles to liver transplantation development could be the risk involved for the donor and the fact that the results of the transplant are somewhat poorer than when the liver is transplanted from a deceased donor (Song, al 2014). There is a high demand for liver transplantation in kingdom of Saudi Arabia because of the high burden of liver disease in the kingdom (Al Sebayel, et al 2017). Despite the importance of the issue, few studies have assessed the knowledge, and attitudes of health care professionals and almost none for nurses regarding organ donation in kingdom of Saudi Arabia (Majeed, 2016). Existing evidence suggests that nurses' attitudes and knowledge about donation and transplantation are essential factors in organ donation rates and that educational sessions can increase awareness of organ donation. Contrary attitudes and deficient knowledge about organ donation among health care professionals can

have significant values toward the organ donation process (Kondori, et al 2021). The attitude of health professionals is crucial to improve potential donors' involvement (Araujo, et al 2016). Physician and allied health professionals play a critical role in continuing its advocacy and sharing knowledge within the community (Almutairi, 2020). Attitudes, knowledge, and actions are correlated and previous studies showed that culture background, perception and religion were important external influences affecting the decision process of organ transplantation (Jeong HS 2013).

Specifically, the attitudes of healthcare workers about organ donation and transplantation are fundamental to obtaining organs. This is because the medical profession plays a central role in raising public awareness of both living and postmortem organ donation. Healthcare professionals are the critical link in augmenting public awareness about organ donation (Gerbi, et al 2020).

According to the literature, involvement of nurses in the process of organ transplantation is the most positive and rewarding part of this profession (Najafi & Manzari 2017).

Misunderstandings and insufficient knowledge among the prospective donors, and failure to identify possible donors by healthcare professionals are two key factors contributing to the shortage of available organs. The attitude of health professionals is also critical to improve potential donors' participation (Chakradhar, et al 2016 & Araujo, et al 2016)

There is a need to provide sufficient information about liver transplantation and its associated topics and test its effectiveness using valid and reliable instruments, thus, the purpose of this study was to investigate the knowledge and attitudes of level four nursing student before and after liver transplantation educational intervention.

### The objective of this study

Is to assess effect of educational intervention on knowledge and attitude regarding liver transplantation among nursing

students at college of nursing Al-Ahsaa

### Research Hypothesis:

H1: Nursing students' knowledge level regarding liver transplantation will exhibit improvement in the posttest than in the pretest.

H2: Nursing students who participated in the educational intervention will exhibit positive attitude toward liver transplantation posttest than in the pretest.

H3: There will be an association between knowledge and attitude of nursing students regarding liver transplantation.

H4: There will be an association between sociodemographic characteristics of nursing students and their knowledge and attitude regarding liver transplantation.

### Methods

**Research design:** A quasi-experimental pre and posttest design was utilized to fulfill the aim of the present study.

**Setting:** This study was conducted at the Collage of Nursing, Al-Ahsa, Eastern Region, affiliated to KSAU-HS, Kingdome of Saudi Arabia.

**Sample:** A convenience sample of 98 students from level 4 was included in the study. This level was chosen to assess their row and preliminary data before exposing to organ transplantation related courses and compare their knowledge pre to post implementation of the educational intervention related to liver transplantation.

**Tools of the study:** In addition to demographic factors such as age, GPA, and previous information related to liver transplantation and information resources if any, knowing of anyone who donated or transplanted liver, students' knowledge and attitude toward liver transplantation questionnaire was used. The questionnaire was developed by the investigators after extensive reviewing of the related literatures and previous studies with similar objectives. The questionnaire consisted of 2 parts; part one is

related to knowledge regarding liver transplantation which contains 13 main parts where each part comprises related questions, scoring system: a-3 points Likert scale was used for knowledge questions and coded as (3) correct answer, (2) don't know and (1) wrong answer. To better presentation of knowledge, the total knowledge levels were categorized as <60% Poor (60-75) % Fair and >75% Good.

Part two of the questionnaire is related to student' attitude toward liver transplantation, it contains 24 statement with 3 points scale which describe student concept and views regarding; supporting, agreement and encouraging others of LT, role of LT in saving lives, donated liver can be trafficking, LT against human dignity; willingness to donate or transplant liver to family member or different nationality person, ethical dilemma of LT, Islamic religion prospective of LT, willing to donate liver while alive or after death. Scoring system: the attitude statement was coded as agree (3), neutral (2), disagree (1), the total attitude levels were categorized as 60% Negative (60-75) % Neutral>75% Positive. The study questionnaire was piloted on five students for clarity and applicability, since there were no major concerns in the questions; the 5 subjects were included in the main study. The educational intervention was conducted and data were collected over a period of three months September to November 2020. The study questionnaire was tested for validity through revision by a panel of 4 experts in medical surgical nursing. Reliability was tested before the main data analysis and was reported as .90 for knowledge and .83 for attitude.

### Ethical considerations

The approval to conduct the study was obtained from CON –A, KAIMRC- IRB with approval number: SP 19/551/A.

Nursing students were informed about the study objectives, voluntary to participate and their right to withdraw at any time throughout the study process without any interference with their study or grades. Students who agree to take a part were asked to sign an informed consent. The educational session was planned based on the availability of the students

and the researchers. Confidentiality was ensured throughout the study process, and the students were assured that all data will be used only for research purpose.

**The program:** The study was done in 4 phases. **First**, developing the study questionnaire and the educational contents that cover all concepts related to liver transplantation such as; definition, indication, contraindication, patient preparation, consultations, informed consent, post-operative intensive care unit preparation and tests, post-operative pharmacological treatment, post-operative complication, specific care and follow up. The study questionnaire was tested for face and content validity through revision by 4 experts who are holding PhD in nursing. The questionnaire was piloted on 5 students for applicability and clarity. The contents of the program were prepared by the researchers after extensive reviewing of all related literature. The plan of the educational sessions and time of sessions were communicated to the students. **Second** was the pretest that assesses the students' knowledge and attitude regarding liver transplantation after piloting the questionnaire. Students were told about the study and the questionnaire was applied. **Third** was implementation of the educational program: Students were divided into 2 groups 48 students in one group and 50 students in the second group. Due to COVID 19 pandemic; virtual online session was conducted to the students. The program was prepared by the researchers and include all liver transplantation related information such as; definition, indication, contraindication, patient preparation, consultations, informed consent, post-operative intensive care unit preparation and tests, post-operative pharmacological treatment, post-operative complication, specific care and follow up in addition to Islamic position of organ donation, Fatwa of the Senior Ulama Council of Saudi Arabia, and Fatwa of Majma' al-Fiqh al-Islami. Power point presentation session was presented by the researchers in the presence of the principal investigator. Each session lasted 90 minutes and each participant had the chance to interact and ask questions. The session included pictures, illustration, questions, brain storming, active discussion and feedback. Sessions were provided in English

language.

**Forth phase** was posttest after the implementation of the educational sessions the posttest was performed utilizing the same questionnaire used in the pretest. The average time needed to complete the questionnaire in the pre and posttest ranged from 30 to 45 minutes. To avoid transmission of information between the students that might affect the study results on the posttest; the pretest, intervention and the posttest were done for each group separately.

**Statistical Analysis:** The data entry and statistical analysis were done using SPSS 22.0. Results were presented as the frequencies, percentage, paired t-test, Pearson correlation analysis to test statistical significance of some variables and to test effectiveness of the intervention. Statistical significance was considered at p-value < 0.05.

## Results

**Sociodemographic characteristics:** The result revealed that majority of the study sample 84.7% age was  $\geq 20$  years, range of grade point average (GPA) was 3.30-4.89 with Mean  $\pm$  SD  $3.97 \pm 0.34$ , more than half of the student 54.1% doesn't have information regarding liver transplantation, and those who have information got it from media followed by health care agencies and friends 43.9%, 22.4% and 16.3% respectively. In addition; more than two thirds of the student 70.4% knew that liver transplantation is performed in KSA while majority 88.6% knew that there is liver translation center at Riyadh and less than third of them 33.4% knew that there is liver translation center at Dammam. Most of the students 96.9% don't know anyone who donated or transplanted liver and more than half 66.7% of those who know someone who transplanted liver was a family member.

**Table 1** presented Mean score of knowledge domains of the studied students regarding liver transplantation pre and post implementation of the educational intervention; it highlighted that students' total knowledge mean score was improved post than pre the educational intervention for all knowledge domains and there was a highly statistically significant difference pre and post

implementation of the educational program since  $P < 0.05$  for all knowledge domains except for their knowledge related to post-operative test, where there is a statistically significant difference pre and post implementation of educational intervention since  $P = 0.019$ .

**Table 2** illustrated distribution of the studied students according to their total knowledge level about liver transplantation pre and post intervention; it showed that most of the studied student 86.73% had poor knowledge level compared to small percent 2.04% of them pre and post intervention respectively, on the other hand small percent 2.04% of the student had a good knowledge level compared to majority of them 91.84% pre and post intervention respectively. Moreover; there was a highly statistically significant difference of the students' knowledge levels pre and post implementation of the educational intervention since  $P = 0.000$  both for students' knowledge level score and range.

**Table 3** showed distribution of the studied students according to their attitude related to liver transplantation pre and post intervention; it presented that less than third 30.61% of the students had negative attitude compared to small percent 8.16% of them pre and post the intervention respectively; on the other hand, more than quarter 27.55% of the student had positive attitude compared to less than half of them 46.94% of them pre and post the intervention respectively. In addition; there

was a highly statistically significant difference of the students' attitude pre and post implementation of the educational intervention since  $P = 0.000$  both for students' attitude level score and range.

**Table 4** presented relation between total knowledge level of the studied students and their attitude related to liver transplantation pre and post intervention. It illustrates that; more than quarter 29.6% of the student with poor total knowledge level score have a negative attitude while about fifth of them 20.4% have a positive attitude regarding liver transplantation pre the intervention with a non-statistically significant difference between total knowledge level of the studied students and their attitude since  $P = 0.164$ .

Moreover; the same table demonstrates that; less than half 41.8% and 45.9% of the student with good total knowledge level score have a neutral and positive attitude respectively post the intervention with a highly significant difference since  $p = 0.00$ .

**Table 5** showed correlation between knowledge and attitude scores of the studied students about liver transplantation and their sociodemographic characteristics pre and post intervention, it proved that the only significant correlation was found related to students' previous information about liver transplantation and their total knowledge score level pre the intervention with  $P = 0.002$ .

**Table (1): Mean score of knowledge domains of the studied students regarding liver transplantation pre and post intervention.**

Knowledge domains	No of items	Range Mean $\pm$ SD		t P
		Pre	Post	
1.Definitions	4	(0-4) 2.21 $\pm$ 0.90	(2-4) 2.86 $\pm$ 0.56	<b>14.94</b> <b>0.000*</b>
2.Indications of liver transplantation	5	(0-5) 2.21 $\pm$ 1.56	(1-5) 4.17 $\pm$ 1.00	<b>24.61</b> <b>0.000*</b>
3.Contraindications of liver transplantation	12	(0-11) 4.29 $\pm$ 2.93	(4-12) 10.43 $\pm$ 2.04	<b>8.82</b> <b>0.003*</b>
4.Blood tests and others studies	38	(1-36) 15.78 $\pm$ 8.32	(11-38) 31.07 $\pm$ 5.47	<b>15.37</b> <b>0.000*</b>
5.Consultations	10	(0-10) 4.86 $\pm$ 2.68	(0-10) 8.82 $\pm$ 1.66	<b>31.70</b> <b>0.000*</b>
6.Consent	5	(0-5) 2.89 $\pm$ 1.32	(0-5) 4.57 $\pm$ 0.92	<b>7.28</b> <b>0.008*</b>
7.Post-Operative Intensive Care	7	(0-7) 2.20 $\pm$ 2.23	(0-7) 5.77 $\pm$ 1.72	<b>9.68</b> <b>0.002*</b>
8.Post-Operative tests (blood and daily)	18	(0-18) 7.06 $\pm$ 4.72	(4-18) 15.37 $\pm$ 2.67	<b>44.62</b> <b>0.000*</b>
9.Pharmacological Treatment	11	(0-11) 2.65 $\pm$ 3.91	(0-11) 10.65 $\pm$ 1.69	<b>68.78</b> <b>0.000*</b>
10. Post-Operative Tests	6	(0-6) 2.54 $\pm$ 1.63	(2-6) 5.16 $\pm$ 1.24	<b>5.62</b> <b>0.019*</b>
11. Post-Operative complication	14	(5-14) 6.45 $\pm$ 3.05	(5-14) 11.49 $\pm$ 1.89	<b>9.16</b> <b>0.003*</b>
12. Specific Care	7	(0-7) 3.69 $\pm$ 2.39	(4-7) 6.49 $\pm$ 0.85	<b>81.07</b> <b>0.000*</b>
13. Post-Transplant Follow Up	4	(0-4) 1.41 $\pm$ 1.50	(0-4) 3.48 $\pm$ 0.91	<b>33.30</b> <b>0.000*</b>

\* Significant at level P &lt; 0.05

**Table (2): Distribution of the studied students according to their knowledge about liver transplantation pre and post intervention**

Total knowledge level	The studied students (n=98)				<sup>2</sup> x P
	Pre		Post		
	N	%	N	%	
▪ Poor	85	86.73	2	2.04	<b>16.48</b> <b>0.000*</b>
▪ Fair	11	11.22	6	6.12	
▪ Good	2	2.04	90	91.84	
<b>Range</b>	<b>(14-124)</b>		<b>(55-140)</b>		<b>t=24.81</b>
<b>Mean <math>\pm</math> SD</b>	<b>58.24<math>\pm</math>24.19</b>		<b>120.33<math>\pm</math>14.22</b>		<b>P=0.000*</b>

&lt;60% Negative (60-75)% Neutral &gt;75% Positive \* Significant at level P &lt; 0.05 .

**Table (3): Distribution of the studied students according to their attitude related to liver transplantation pre and post intervention**

Total Attitude level	The studied students (n=98)				$\chi^2$ P
	Pre		Post		
	N	%	N	%	
▪ Negative	30	30.61	8	8.16	17.78 0.000*
▪ Neutral	41	41.84	44	44.90	
▪ Positive	27	27.55	46	46.94	
<b>Range</b>	<b>(44-66)</b>		<b>(47-70)</b>		t=25.06
<b>Mean ± SD</b>	<b>55.48±5.567</b>		<b>59.47±5.483</b>		P=0.000*

<60% Negative (60-75) % Neutral >75% Positive \* Significant at level P < 0.05

**Table (4): Relation between knowledge level of the studied students and their attitude regarding liver transplantation pre and post educational intervention**

Total knowledge level	The studied students (n=98)						$\chi^2$ P
	Total attitude level						
	Negative		Neutral		Positive		
	N	%	N	%	N	%	
<b>Pre</b>							
▪ Poor	29	29.6	36	36.7	20	20.4	6.508
▪ Fair	1	1.0	4	4.1	6	6.1	0.164
▪ Good	0	0.0	1	1.0	1	1.0	
<b>Post</b>							
▪ Poor	1	1.0	1	1.0	0	0.0	21.16
▪ Fair	3	3.1	2	2.0	1	1.0	0.00*
▪ Good	4	4.1	41	41.8	45	45.9	

\* Significant at level P < 0.05

**Table (5): Correlation between knowledge and attitude scores of the studied students about liver transplantation and their socio characteristics pre and post intervention.**

Characteristics	Knowledge score				Attitude score			
	Pre		Post		Pre		Post	
	r	P	r	P	r	P	r	P
<b>Age (in years)</b>	0.053	0.606	0.066	0.517	0.042	0.683	-0.006	0.954
<b>GPA</b>	0.037	0.720	0.056	0.581	0.156	0.126	0.022	0.832
<b>Previous Information about liver transplantation</b>	0.231	0.022*	0.050	0.623	0.037	0.715	0.043	0.677

\* Significant at level P < 0.05

### Discussion:

The purpose of this study was to assess effect of educational intervention on knowledge and attitude regarding liver transplantation among nursing students at college of nursing Al-Ahsaa.

The implementation of the educational program proved significant improvements in students' knowledge and attitude regarding liver transplantation. This improvement might be related to that the majority of nursing student where eager and enthusiastic to attain knowledge related to organ transplantation and

they expressed their needs to acquire more knowledge about liver transplantation.

#### Concerning the knowledge domains:

In relation to the students' score of knowledge domains about liver transplantation; the current study revealed that; there is a marked significant improvement in the students' mean score in all domains related to the knowledge of liver transplantation post than pre intervention.

This result could be attributed to the effectiveness of conducting the educational program and most of level 4 students were keen and interested to acquire knowledge related to liver transplantation which supports the first research hypothesis.

#### Regarding the students' total knowledge level:

The current study revealed that the students' total knowledge score level was dramatically improved post in comparison to pre intervention; the majority of the students had poor level of knowledge score pre-intervention while the majority of them had good level of knowledge score post intervention and this improvement was highly statistically significant. And this result also indicates the effectiveness of the educational program in improving the students' knowledge related to liver transplantation.

This study results are supported by several studies which proved the positive effect of educational programs to improve participants' knowledge in relation to liver transplantation or to organ transplantation in general; **Kasim & Shohor (2021)**, found that; knowledge among the nurses can be markedly improved by organ donation educational program, and stated that; there was statistically significant difference in increasing participants' knowledge from pretest before implementation of educational program to posttest 1 and posttest 2 after the program .

**Karalya & Abo Elfetoh, (2020)** found that; the majority of nurses included in their study had an unsatisfactory score of knowledge

regarding nursing care of postoperative liver transplantation at pre implementation phase, which has been improved to the satisfactory score post-educational guidelines implementation and in the follow-up phase. Also, **Bijani, et al (2020)**, concluded that; the mean score of participants' knowledge was increased after implementation of the educational program regarding the brain death and organ donation.

**Kim & Shin (2019)** proved the study hypothesis "experimental group undergoing the educational program got higher knowledge about hematopoietic stem-cell donation than the control group". In addition; **Al Sebayel, et.al (2017)** recorded that; the participants' knowledge wasn't satisfactory in the pretest and improved post the educational intervention related to organ donation. Although **Caymaz & Aydin (2020)** used a different educational method which is argumentation-based activities, they also proved that the students' misunderstandings decreased dramatically and the students' awareness has been raised related to organ donation post intervention.

Although the present study implemented only one session educational program, there was an improved the nursing students' knowledge regarding liver transplantation, this is consistent with **Radunz, et. al., (2015)** proved that; education can significantly increase medical students' perceived knowledge and found that only one brief intervention significantly increased perceived knowledge of organ donation. In a resemble study, the educational intervention was effective not only to improve the knowledge, but also the performance of the participants; **Karalya & Abo Elfetoh, (2020)** concluded that the educational guideline for nurses in the critical care unit was effective in improving their performance regarding caring for patients' post-liver transplantation.

In the current study the results revealed that the majority of students' knowledge scores were poor and this could be related to the student junior level where they didn't receive any prerequisite information related to liver transplantation. This result is supported by many recent studies; **Yadav, Jain, Sharma, Jain and Verma (2020)** found that although



university faculty had fair level of knowledge in relation to organ donation, their knowledge was inadequate and inaccurate. In contrast, with resemble studies; there are some controversies; **Kondori et.al., (2021)**, assessed the Emergency medical and nursing staffs' knowledge and attitude about organ donation after circulatory determined death, and they found that the knowledge of physicians and nurses was moderate to high. In addition; **Ashfaq et.al. (2020)** proved that medical students were found to have good knowledge regarding live organ donation, but they had very little information about potential organ donation.

#### Regarding the student attitude:

This study result revealed that the educational program improved the students' attitude related to liver transplantation and this improvement was highly statically significant post than pre the program, thus proved the second research hypothesis.

This result is supported by **Kasim & Shohor (2021)** proved that attitude among the nurses was improved and stated that about two thirds of participants in the post test having positive attitude after receiving organ donation education. Also, it was demonstrated by **Bijani, et al (2020)** that the mean score of attitude was increased after application of the educational program. In congruence with the present study; **Kim & Shin (2019)** proved that the educational program for hematopoietic stem-cell donation promotion was effective in improving the attitude toward hematopoietic stem-cell donation. Also, **Al Sebayel, et. al (2017)** found that; half of the nursing students reported positive attitude regarding organ donation in the pre-test and this percentage were improved in the post-test after implementation of the educational program.

In accordance with the current study; **Najafi & Manzari (2017)** concluded that; training is considered to be the most vital factor in altering the attitudes and performance of nurses toward organ donation assured that consciousness should be considered to produce positive attitudes in the persons who participate in organ donation. Another study conducted in Italy by **Potenza, et al (2015)** demonstrated that

effective education on organ donation to nursing student, resulting in a noticeable improvement in their knowledge, attitude and motivation.

In contrast of the result of the present study; **Gezgin, Goktas, & Caglayan (2020)** reported that primary assessment of nurses' attitude revealed that most of them had a positive attitude regarding organ donation, added that although most of them did not donate organs, the majority of them were willing to donate.

#### Concerning the relation between knowledge level of the studied students and their attitude related to liver transplantation pre and post intervention:

The current study revealed that; there was no significant relation between students' knowledge score and their attitude pre-intervention. However the results showed that; there was a high significant difference between knowledge and attitude score of the studied students post intervention, thus the study third hypothesis has been proved. This result may be attributed to that; providing detailed knowledge, answering student' questions, discuss query can positively change the students' misconception and attitude regarding liver transplantation.

These results are consistent with some similar studies; it was illustrated by **Bijani, et al (2020)** that mean score of knowledge and attitude in the studied participants was increased after implementation of the educational program with a significant relationship between post-test with knowledge and attitude on organ donation.

The result of the present study was corresponding with **Kasim & Shohor (2021)** revealed that; nurse's attitude can positively change after receiving organ donation education which enhanced their knowledge level too.

Also this was accepted with **Almaeen, Wani and Thirunavukkarasu (2021)** who documented significant positive correlation between knowledge and attitude scores among healthcare sciences students related to stem cells and its significance of medical application. Additionally, this result was in accordance with

**Meghana, et.al. (2018)** who revealed; positive correlation between the mean knowledge scores with attitude and practice habits concerning organ donation and transplantation among final year health science students. Also this finding was in line with **Najafi & Manzari (2017)** who concluded in the systematic review that; adequate knowledge could effectively change the attitudes and improve the performance of nurses. **Chakradhar, et.al., (2016)**, who studied the knowledge, attitude and practice regarding organ donation among Indian dental students, founded that, knowledge, attitude and practice had a significant positive correlation with each other. Moreover this finding was consistent with **Poreddi, Katyayani, Gandhi, Thimmaiah & Badamath (2016)** who confirmed that; there is a positive correlation between knowledge and attitudes among Indian nursing students toward organ donation.

In contrary to the current study; **AlAbdulqader AlMulhim & Almubarak (2017)** reported a weak correlation between knowledge and attitude toward blood, organ and stem cells donation . Also, **Lye et al. (2015)** noted poor correlation between the knowledge and attitude score among the study participants attributed that to; acceptance towards stem cell is not solely based on the knowledge level among nursing students regarding stem cells and their application in medicine.

#### **Concerning the correlation between students' knowledge and attitude scores about liver transplantation and their sociodemographic characteristics pre and post intervention:**

The present study proved that; there were no significant correlations between the students' sociodemographic characteristics and their knowledge and attitude scores pre and post intervention, except with their previous information about liver transplantation. The results revealed that there is a significant correlation between students' previous information about liver transplantation and their total knowledge score level only pre the intervention which may be related to previous information about liver transplantation had an effect on knowledge scores in the pre intervention, while it is not expected to have a

significant effect on their scores post the intervention, as they already received the educational program.

There are a several similar studies supported the present study results, although in the same studies there are also some controversies. **Almaeen, Wani and Thirunavukkarasu, (2021)** found that; there is no any significant relationship between socio-demographic characteristics with either the knowledge or the attitude scores among healthcare sciences students towards stem cells and its significance of medical application. **Almutairi (2020)** revealed that; female students scored higher than male in all the three domains of knowledge, attitude, and willingness toward organ donation, and such was statistically significant.

**Chakradhar et.al (2016)** reported that; the mean knowledge score regarding organ donation of the Indian dental students did not show any significant difference based on their gender and year of study, while the religion had an effect of their knowledge score. In the same study and in relation to students' attitude score; the gender difference was seen with males having a noticeably more positive attitude than females. Furthermore, based on year of study, third-year students exhibited a significantly higher attitude score than other students.

**Kondori et.al (2021)**, was in accordance with the present study and stated that; there was no statistically significant association between physicians' and nurses' attitude and any of the socio-demographic characteristics (Sex, age, history of general and emergency services, religion, educational background, and employment status) but marital status was found to have a statistically significant relationship with agreement with organ donation. Those who were married as well as those possessing a higher education had a higher knowledge score concerning organ donation. **Bekele, Jote , Workneh & Worku, (2021)** proved that; only sex was found to be significantly associated with satisfactory knowledge about organ donation among patient companions, the male gender was found to be a significant influence associated with good knowledge adding that approximately half of the patient companions'

attitude regarding organ donation was found to be negative and having more than one source of information and a higher educational level were found to be significantly associated with a positive attitude.

Moreover; **Bijani, et al (2020)** study revealed that; there was no significant relationship between the employment history and level of education and gender and knowledge and attitude of head nurses and clinical supervisors related to organ donation after implementation of clinical scenario-based educational workshop. In addition; **Foong, (2019)**, concluded that; department, profession and ethnicity were only the demographic characteristics that correlated with the knowledge and attitudes of health care professionals toward deceased organ donation. In controversy; **Gezginci, Goktas, & Caglayan (2020)** concluded that attitudes of the nurses toward organ donation and transplantation were affected by many factors such as religious beliefs, cultural and sociodemographic characteristics.

### **Conclusion:**

The existing data support the need of increased and sustain organ and tissue donations. Knowledge and attitude towards organ donation affect donor rates; this highlights the importance of educating the community to create a positive modification in their thoughts, beliefs, attitudes and practices regarding organ donation and transplantation. This study was an attempt to assess the effect of educational intervention on knowledge and attitude regarding liver transplantation among nursing students at college of nursing Al-Ahsaa. The study results concluded that; implementation of the educational program, positively enhanced the nursing students' knowledge and improve their attitude toward liver transplantation.

### **Recommendations:**

1. Conducting further similar studies on an extensive range of different health care professionals' categories to widely assess the effect of educational intervention on knowledge

and attitude regarding liver transplantation.

2. Including education for the nursing students throughout their study program to increase their awareness and positively change their attitude toward organ donation and transplantation.

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