



## Nurses' Performance Regarding Care of Hepatocellular Carcinoma Patients Undergoing Thermal Ablation

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### Abstract

**Background:** Thermal ablation is one of the radical treatment methods listed in the guidelines for the diagnosis and treatment of hepatocellular carcinoma. Thermal ablation is a widely employed procedure to treat both primary and metastatic hepatic tumors. **Aim of the study:** This study aimed to assess nurses' performance regarding care of hepatocellular carcinoma patients undergoing thermal ablation. **Research design:** A descriptive exploratory design was used. **Setting:** The study was conducted at Interventional Radiology unit in National Research Institute of Endemic and Liver Diseases. **Methods:** A convenient sample of 60 nurses which represents all available nurses caring of hepatocellular carcinoma patients. **Tools:** Three tools were used to conduct this study; Tool (I) Self-administered structure questionnaire. Tool (II): Nurses' knowledge assessment questionnaire. Tool (III): Nurses' practice observational checklist. **Results:** The study demonstrated that majority of the studied nurses had unsatisfactory level of knowledge, three quarter of the studied nurses had incompetent level of practice. **Conclusion:** There was a highly statistically significant relation between total level of knowledge and total level of practice regarding care of Hepatocellular Carcinoma patients undergoing thermal ablation procedure. **Recommendations:** Continues in-service training programs should be designed and carried out to oncology nurses to promote the knowledge and practice about care for Hepatocellular Carcinoma patients and thermal ablation based on nurse's needs.

**Keywords:** Hepatocellular Carcinoma, Nurses' Performance, Thermal Ablation.

### Introduction

Hepatocellular carcinoma is a primary malignancy of the liver that occurs predominantly in patients with underlying chronic liver disease and cirrhosis. However, up to 25% of patients have no history of cirrhosis or risk factors for it (Zanetto et al., 2022). The incidence of Hepatocellular carcinoma (HCC) is one of the highest in the world. HCC accounts for up to 90% of all liver tumors. In Egypt, HCC is a major public health problem. It is responsible for 33.63% and 13.54% of all cancers in men and women, respectively. HCC occurs in a number of pre-existing conditions, which usually include hepatitis C and B, alcoholic and non-alcoholic cirrhosis. It has a poor prognosis after detection, generally occurring late in the disease (Elghazaly et al., 2020).

Thermal Ablation (TA) is a treatment that removes liver tumors without removing them. These techniques can be used in patients with a small tumor, no more than 3 cm (just over an inch) in diameter, slightly larger tumors (1 to 2 inches or 3 to 5 cm in diameter), which require embolization. It can be used when surgery is not a good option (often due to health problems or liver failure). They are less likely to cure cancer than surgery, but they can still be very helpful for some patient. These treatments are also sometimes used in patients awaiting a liver transplant (Violi et al., 2020).



The most widely used thermal ablation technique, whose principle is based on ionic movement and heat generated by the electrical impedance of the tissue (**Zhang et al., 2023**). TA represents an effective therapeutic procedure to destroy unrespectable primary and metastatic liver tumors of various sizes and locations and has been shown to be successfully performed transcutaneous or by laparotomy or laparoscopy using ultrasound or guided by computed tomography (CT) (**Künzli et al., 2021**).

Contraindication of TA as unresolved coagulopathies and uncontrolled infection, invasion of the bile ducts or main vessel, significant extra hepatic disease, childhood class C cirrhosis or active infection, decompensated liver disease, lesions of the worn with the pads or if the placement of the pads is damaged. In addition, tumors occupying > 40% of the liver volume cannot be safely removed. In addition, proximity to vital structures such as adjacent vessels and organs, and lesions larger than 5 cm are relative contraindications for TA (**Salah et al., 2021**). Complications of TA include hemorrhage, infection, bile duct complications, liver failure, pneumothorax, pleural effusion, pneumonia, skin burns, vascular injury (portal vein thrombosis, vein injury, hepatic artery injury and visceral injury) (**Hui et al., 2021**).

Nurses play an important role in the multidisciplinary team because they perform comprehensive and continuous care of hepatocellular carcinoma patient undergoing thermal ablation. Nurses need to be familiar with all phases of the Thermal ablation (TA) to create an optimal environment for patients (**Goda et al., 2020**). However, the procedure required good nursing management that ensures maximum patient comfort, improving outcome and maintain technical success of the procedure.

Nurse's performance refers to the ability of nurses to achieve a certain level of productivity in the aspects of quantity or quality. Nurse performance affects the success of the hospital, while institutional factors in turn affect the performance of workers. Nurses performance is the final result of particular tasks which made by nurses (**Salah et al., 2021**).

### Significance of the study

Liver disease is a leading cause of mortality; statistically, hepatic cancer remains the 8<sup>th</sup> most and 5<sup>th</sup> most common malignancy in women and men, respectively. Among those malignant neoplasms of the liver, primary hepatocellular carcinoma are the most frequent and amount to (500,000) new cases per year worldwide. Primary liver cancer is the fifth -most common cancer in the world and the second leading cause of death due to cancer, after lung cancer. Its incidence is the highest in Asia and Africa. Hepatocellular carcinoma is the most common type of liver cancer (**Sung., 2021**).

Worldwide, hepatocellular carcinoma is a universal problem. It is the 6<sup>th</sup> and 4<sup>th</sup> common cancer in worldwide and Egypt respectively. Egypt ranks the 3<sup>rd</sup> and 15<sup>th</sup> most populous country in Africa and worldwide respectively (**Rashed et al., 2020**). National Research Institute of Endemic and Liver Diseases documented that the admitted patients for thermal ablation in year 2022 were 50 patients (**Statistical department of National Research Institute of Endemic and Liver Diseases, 2023**).

Thermal ablation is one of the radical treatment methods listed in the guidelines for the diagnosis and treatment of HCC. TA is a widely employed procedure to treat both primary and metastatic hepatic tumors (**Abdelghani et al., 2020**). Therefore, this study was conducted to assess nurses' performance regarding care of hepatocellular carcinoma patients undergoing thermal ablation.

### Aim of the study:

This study aimed to assess nurses' performance regarding care of hepatocellular carcinoma patients undergoing thermal ablation. This aim achieved through the following:

1. Assess nurses' level of knowledge regarding care of hepatocellular carcinoma patients undergoing thermal ablation.



2. Assess nurses' level of practice regarding care of hepatocellular carcinoma patients undergoing thermal ablation.

#### **Research questions:**

1. What is the level of nurses' knowledge regarding care of hepatocellular carcinoma patients undergoing thermal ablation?
2. What is the level of nurses' practice regarding care of hepatocellular carcinoma patients undergoing thermal ablation?

#### **Operational definition:**

**Nurses' Performance:** refers to nurses' knowledge and practice regarding thermal ablation for hepatocellular carcinoma patients

### **Subjects and Methods**

#### **Research Design:**

A descriptive exploratory research design was utilized to conduct the study.

#### **Research Setting:**

This study was conducted at Interventional Radiology unit in National Research Institute of Endemic and Liver Diseases that affiliated to the Egyptian Ministry of Health and Population.

#### **Research Subject:**

A convenient sample of 60 nurses which represents all available nurses caring of hepatocellular carcinoma patients undergoing thermal ablation working the previous mentioned setting.

#### **Tools for data collection:**

Data was collected by using three tools as following.

##### **Tool (I): Self-administered structure interview questionnaire:**

It was developed by the investigator after reviewing of related literature. It was concerned with demographic characteristics of nurses as (age, gender, educational level, position, years of experience and training courses regarding to thermal ablation).

##### **Tool (II): Nurses' knowledge assessment questionnaire:**

It was developed by the investigator after reviewing of related literature. It aims to assess nurses' level of knowledge regarding care of hepatocellular carcinoma patient undergoing thermal ablation (**Singh et al., 2023**).



**Scoring system:** The correct answer scored (1 grade) and incorrect or unanswered questions scored (zero). The total score of the knowledge assessment for every nurse was summed-up, and then converted to percentage score. The total level of nurses' knowledge score was classified as following;

- **Satisfactory level of knowledge:** If the total score was equal to or more than 75%.
- **Unsatisfactory level of knowledge:** If the total score was less than 75%.

#### **Tool (III): Nurses' practice observational checklist:**

It was developed by the investigator based on the extensive review of relevant and recent literature (Jin et al., 2021). It aimed to assess nurses' level of practices regarding care of hepatocellular carcinoma patients undergoing thermal ablation.

**Scoring system:** Each done step scored (1 grade) and the not done step scored (zero). The total score of the practice for every nurse was summed-up, and then converted into percentage score. The total level of nurses' practice score was classified as following:

- **Competent level of practice** if the total score was equal to or more than (80%)
- **Incompetent level of practice** if the total score was less than (80%)

#### **Validity:**

The content validity of the tools was done by a panel of 5 experts in medical surgical nursing department from Faculty of Nursing, Helwan University, who reviewed the content of the tools for comprehensiveness, accuracy, clarity, relevance and applicability. Suggestions were given and modifications were done.

#### **Reliability:**

Reliability of the tool was tested to determine the extent to which the questionnaire items are related to each other. The Cronbach's alpha model, which is a model of internal consistency, was used in the analysis. Statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0 and 1. Higher values of Cronbach's alpha (more than 0.7) denote acceptable reliability. Cronbach's alpha was 0.88 for knowledge questionnaire and 0.85 for observational check list.

#### **Ethical considerations:**

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee of the Faculty of Nursing at Helwan University. Participation in the study was voluntary and subjects were given full information about the study and their role before signing the informed consent. The ethical considerations included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, and confidentiality of the information where it couldn't be accessed by any other party without taking permission of the participants. Ethics, values, culture, and beliefs was be respected.

#### **Pilot study:**

The pilot study was done on 10% (6 nurses) collected by the investigator to examine the clarity of questions and time needed to complete the study tools. The nurses who were shared in the pilot study were included to the subjects study because no modifications were done after conduction pilot study.

#### **Field work:**

- The interview was conducted with all available nurses.
- Written consent was obtained from every nurse to collect the necessary data using the tools for data collection.
- Data collection was started and completed within 3 months from the beginning of May 2023 until the end of July 2023.

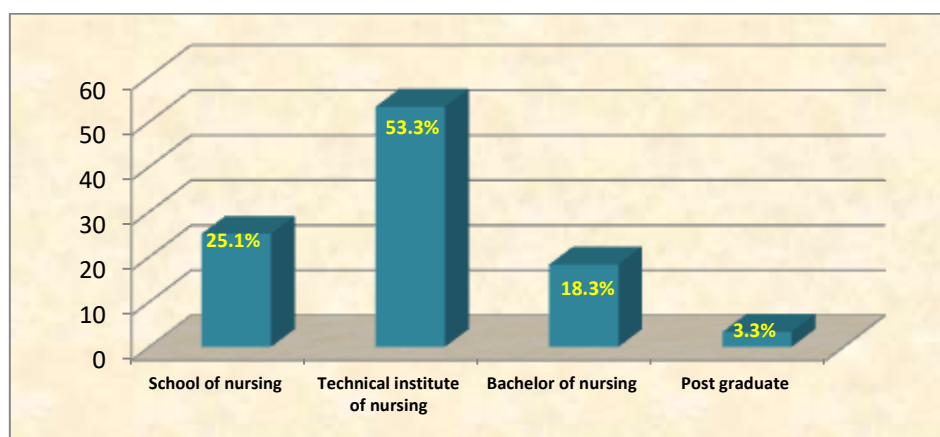
- The data of this study was collected on two days per week (Sunday and Tuesday) during morning shift by using the previously mentioned study tools.
- The investigator collected the data during interview with the nurses individually to observe and evaluate their performance using checklist which filled by the investigator.
- The investigator gave each nurse the knowledge questionnaire to answer it and observed each nurse individually during their work to assess their level of practice.
- The time consumed for interviewing and completing the questionnaires data was about 40-50 minutes as the following; interviewing questionnaire took about 5 minutes, knowledge questionnaire took about 15-20 minutes, and observation checklist was about 20-25minutes.

**RESULTS:**

**Table (1):** Frequency and percentage distribution of the studied nurses according to their demographic characteristics (N=60).

Demographic characteristics	N	%
<b>Age (in years)</b>		
20 < 30 years	19	31.7
30 < 40 years	22	<b>36.7</b>
40 < 50 years	15	25.0
50- 60 years	4	6.7
<b>Mean ± SD = 34.06±10.36</b>		
<b>Gender</b>		
Male	20	33.3
Female	40	<b>66.7</b>
<b>Job title /position</b>		
Charge nurse	7	11.7
Head nurse	25	41.7
Staff nurse	27	<b>45.0</b>
Nursing supervisor	1	1.7
<b>Years of experience</b>		
Less than 1 year	3	5.0
1 < 5 years	29	<b>48.3</b>
5 < 10 years	2	3.3
10 < 15years	12	20.0
>15 years	14	23.3
<b>Mean ± SD</b>		8.53±6.63
<b>Attended training courses related to thermal ablation</b>		
No	27	45.0
Yes	33	<b>55.0</b>

Table (1) shows that 36.7% of the studied nurses' age was between 30-40 years old with a Mean ± SD age of 34.06±10.36. Also, 66.7% of the studied nurses were female. The highest groups of the studied nurses were 45.0% their work as a staff nurse. Furthermore, nearly half of them 48.3% had experience years from 1 to < 5 year with the Mean ± SD of 8.53±6.63. Meanwhile, 55.0% of the studied nurses were previously attended training related to thermal ablation.



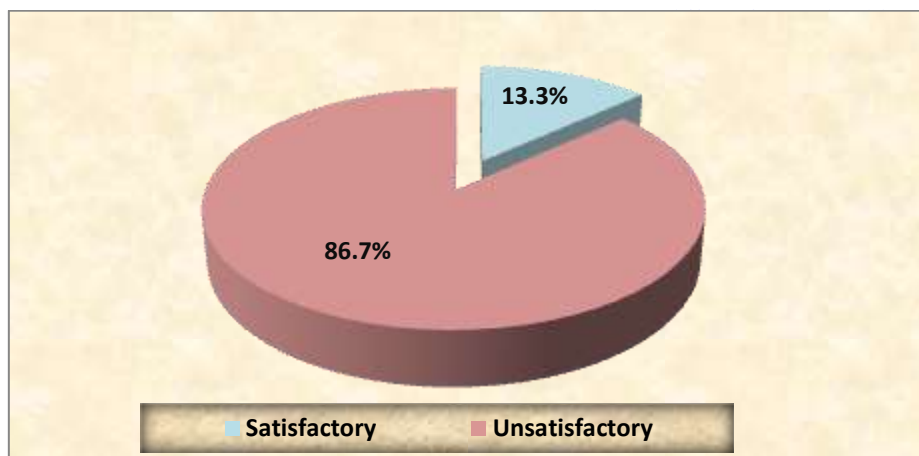
**Figure (1):** Percentage distribution of the studied nurses according to their educational level (N= 60).

Figure (1) illustrates that, 53.3% of the studied nurses had technical institute of nursing and 25.1% of them had school of nursing. While, 18.3% of them had bachelor degree of nursing and only 3.3% of them had post graduate studies.

**Table (2):** Total means score of knowledge regarding hepatocellular carcinoma, thermal ablation, and care of hepatocellular carcinoma patients undergoing thermal ablation procedure among the studied nurses (N = 60).

Domains of knowledge	Satisfactory $\geq 75\%$		Unsatisfactory $<75\%$		Mean $\pm$ SD
	N	%	N	%	
Nurses' knowledge about hepatocellular carcinoma	40	66.7	20	33.3	3.85 $\pm$ 0.89
Nurses' knowledge about thermal ablation	19	31.7	41	68.3	4.33 $\pm$ 2.29
Nurses' knowledge regarding care of hepatocellular carcinoma patients undergoing thermal ablation	2	3.3	58	96.7	4.35 $\pm$ 1.65

**Table (2)** demonstrates that, two thirds (66.7 %) of the studied nurses had satisfactory knowledge level regarding hepatocellular carcinoma with Mean $\pm$  SD 3.85 $\pm$ 0.89, more than two thirds (68.3 %) of the studied nurses had unsatisfactory knowledge level of thermal ablation with Mean $\pm$  SD 4.33 $\pm$ 2.29. Moreover, the majority (96.7 %) of them had unsatisfactory knowledge level regarding care of hepatocellular carcinoma patients undergoing thermal ablation with Mean $\pm$  SD 4.35 $\pm$ 1.65.



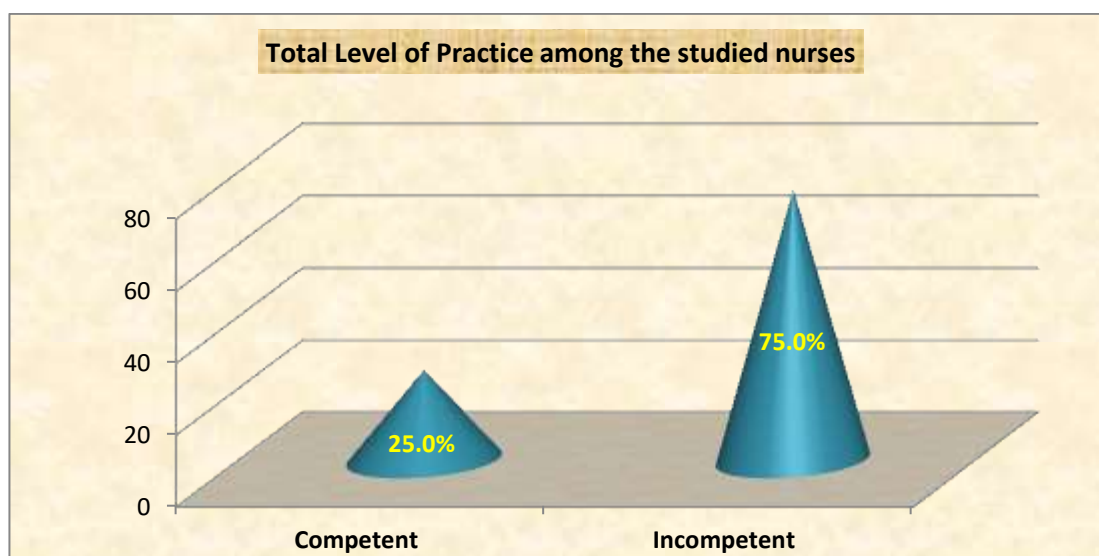
**Figure (2):** Percentage distribution of total level of studied nurses' knowledge regarding thermal ablation procedure (N = 60).

**Figure (2)** clarifies that, most (86.7%) of the studied nurses had unsatisfactory level of knowledge, while 13.3% of them had a satisfactory level of knowledge regarding thermal ablation procedure.

**Table (3):** Total means score of nurses' level of practice regarding preparation, during and post procedure among the studied nurses (N = 60).

Domains of practice	Competence $\geq 80\%$		Incompetence $< 80\%$		Mean $\pm$ SD
	N	%	N	%	
Preparation patient for thermal ablation	19	31.7	41	68.3	16.53 $\pm$ 2.36
Practice during thermal ablation	20	33.3	40	66.7	8.70 $\pm$ 1.01
Practice post thermal ablation procedure	23	38.3	37	61.7	6.63 $\pm$ 1.99

**Table (9):** Demonstrates that more than two thirds (68.3 %) of the studied nurses had Incompetence level of practice regarding Preparation patient for thermal ablation procedure with Mean $\pm$  SD 16.53 $\pm$ 2.36, two thirds (66.7 %) of the studied nurses had Incompetence level of practice regarding their practice during thermal ablation with Mean $\pm$  SD 8.70 $\pm$ 1.01. Moreover, (61.7 %) of them had Incompetence level of practice regarding their practice Post thermal ablation procedure with Mean $\pm$  SD 6.63 $\pm$ 1.99.



**Figure (3):** Percentage distribution of total level of studied nurses' practice regarding thermal ablation procedure (n=60).

**Figure (3)** Illustrated that three quarter (75.0%) of the studied nurses had incompetent level of practice. While, (25.0%) of them had a competent level of practice regarding thermal ablation procedure.

**Table (4):** Relation between demographic characteristics of the studied nurses and their total level of knowledge (N=60).

Demographic characteristics		Total level of knowledge				$\chi^2$	P-value
		Unsatisfactory		Satisfactory			
		N	%	N	%		
Age (year)	20 < 30	19	31.7	0	0.0	10.621	<b>0.01*</b> (S)
	30 < 40	15	25.0	7	11.7		
	40 < 50	14	23.3	1	1.7		
	50 ≤ 60 years	4	6.7	0	0.0		
Gender	Male	18	30.0	2	3.3	0.288 <sup>FET</sup>	0.591 (NS)
	Female	34	56.7	6	10.0		
Educational level	Technical School of nursing	11	18.3	0	0.0	9.258	<b>0.04*</b> (S)
	Technical institute of nursing	30	50.0	2	3.3		
	Bachelor degree of nursing	10	16.6	5	8.3		
	Post graduate studies	1	1.7	1	1.7		
Job title /position	Charge nurse	5	8.3	2	3.3	8.637	0.201 (N)
	Head nurse	23	38.3	2	3.3		
	Staff nurse	24	40.0	3	5.0		
	Nursing supervisor	0	0.0	1	1.7		
Years of experience	Less than 1 year	3	5.0	0	0.0		



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	1 < 5 years	27	45.0	2	3.3	5.974	0.03* (S)
	5 < 10 years	2	3.3	0	0		
	10 < 15 years	8	13.3	4	6.7		
	>15 years	12	20.0	2	3.3		
Attended training courses related to thermal ablation	No	26	43.3	1	1.7	3.393 FET	0.04* (S)
	Yes	26	43.3	7	11.7		

$\chi^2$  = Chi Square Test FET = Fisher Exact Test was used Not statistically significant at  $p > 0.5$  (\*) Statistically significant at  $p \leq 0.05$

**Table (4)** shows that there was a statistically significant relation between age, educational level, years of experience & attending training courses of the studied nurses and their total level of knowledge at P- value= 0.01, 0.04, 0.03 & 0.04. Respectively. While, that there was no statistically significant relation between gender and job titles of the studied nurses and their total level of knowledge.

**Table (5):** Relation between demographic characteristics of the studied nurses and their total level of practice (N=60).

Demographic characteristics		Total level of practice				$\chi^2$	P-value
		Incompetence		Competence			
		N	%	N	%		
Age (year)	20 < 30	14	23.3	5	8.3	3.955	0.264 (NS)
	30 < 40	14	23.3	8	13.3		
	40 < 50	13	21.7	2	3.3		
	50 < 60 years	4	6.7	0	0.0		
Gender	Male	18	30.0	2	3.3	3.600 <sup>FET</sup>	0.05* (S)
	Female	27	45.0	13	21.7		
Educational level	School of nursing	10	16.6	1	1.7	14.469	0.002* (S)
	Technical institute of nursing	31	51.7	1	1.7		
	Bachelor degree	3	5.0	12	20.0		
	Post graduate studies	1	1.7	1	1.7		
Job title /position	Charge nurse	6	10.0	1	1.7	4.071	0.277 (NS)
	Head nurse	20	33.3	5	8.3		
	Staff nurse	19	31.7	8	13.3		
	Nursing supervisor	0	0.0	1	1.7		
Years of experience	Less than 1 year	3	5.0	0	0.0	3.597	0.473 (NS)
	1 < 5 years	19	31.7	10	16.7		
	5 < 10 years	2	3.3	0	0		
	10 < 15 years	10	16.7	2	3.3		
	>15 years	11	18.3	3	5.0		
Attended training courses related to thermal ablation	No	24	40.0	3	5.0	6.074 <sup>FET</sup>	0.01* (S)
	Yes	21	35.0	12	20.0		

$\chi^2$  = Chi Square Test FET = Fisher Exact Test was used Not statistically significant at  $p > 0.5$  (\*) Statistically significant at  $p \leq 0.05$

**Table (5):** Show that, there was a statistically significant relation between demographic characteristics (gender, educational level, & attending training courses related to thermal ablation) and total level of practice regarding care for hepatocellular carcinoma patients undergoing thermal ablation procedure at P -value = (0.05,0.002 & 0.01) respectively. Where, there was no significant statistically relation between demographic characteristics (age, job position, & years of experience) and total level of practice regarding care for hepatocellular carcinoma patients undergoing thermal ablation procedure.

**Table (6):** Correlation between total nurses' level of knowledge and total level of practice scores regarding care for hepatocellular carcinoma patients undergoing thermal ablation procedure and their demographic characteristics

Items	Pearson 's rank correlation coefficient			
	Knowledge		Practice	
	R	p	r	p
<b>Knowledge</b>	-	-	0.333	<b>0.009**</b>
<b>Age (Years)</b>	0.285	<b>0.04*</b>	0.189	<b>0.214</b>
<b>Educational level</b>	0.088	<b>0.565</b>	0.304	<b>0.01*</b>
<b>Years of experience</b>	0.164	<b>0.282</b>	0.319	<b>0.01*</b>

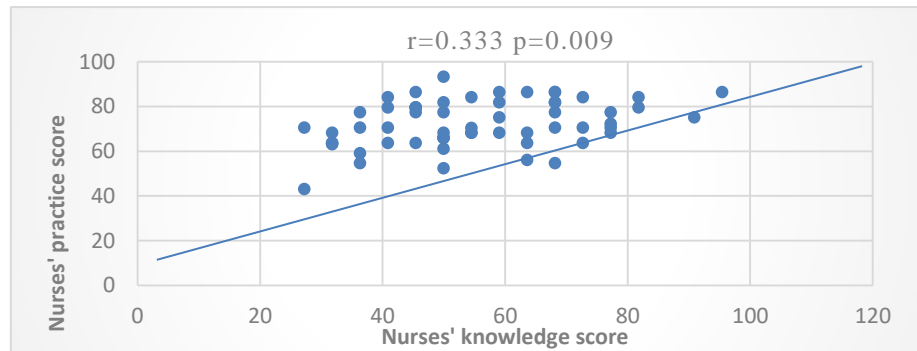
Not statistically significant at  $p > 0.5$  (\*),  
 Statistically significant at  $p \leq 0.05$  (\*\*)  
 Highly statistically significant at  $p \leq 0.01$

**Table (7):** Relation between total level of knowledge regarding care for hepatocellular carcinoma patients undergoing thermal ablation procedure and total level of practice among the studied nurses (N=60)

Total knowledge level	Total practice level				FET	P-value
	Incompetence		Competence			
	N	%	N	%		
Unsatisfactory	42	<b>70.0</b>	10	16.7	6.923	<b>0.009**</b> (HS)
Satisfactory	3	5.0	5	8.3		

FET =Fisher Exact Test was used

(\*\*) Highly statistically significant at  $p \leq 0.01$



**Figure (4): Correlation between nurses' knowledge and practice**

**Figure (4):** Clarifies a highly statistically significant positive correlation between the studied nurses' total level of knowledge and total level of practice regarding care for hepatocellular carcinoma patients undergoing thermal ablation procedure with  $r = 0.333$  &  $P = 0.009$ .

## DISCUSSION

Thermal ablation involves destroying tumors with heat or cold, delivered through a probe that is inserted directly into the tumor without an incision. It can be used when surgery is not a good option (often due to health problems or liver failure). They are less likely to cure cancer than surgery, but they can still be very helpful for some people. These treatments are also sometimes used in patients awaiting a liver transplant (Violi et al., 2018).

**Regarding to age** of the studied nurses in the current study, it was showed that, near to two fifths of the studied nurses were in age group 30-<40 years with mean age  $34.06 \pm 10.36$ . This finding is consistent with Yun and Park (2020), in study entitled "Factors influencing radiation protection behaviors of endoscopy nurses during endoscopic interventional radiology" who found that near to half of studied nurses were in age group 30-39 years old with mean age  $37.2 \pm 7.4$  years. On the other hand, this result is in contrast with Abo El-Ata, et al. (2021), in a study entitled "Nurses' knowledge and practice regarding nursing care of patients with liver cirrhosis" who found that about half of studied nurses were in age group 20-<30 years.

**In relation to the gender** of the studied nurses in the current study, it was showed that two thirds of the studied nurses were females. From researcher point of view, this result could be attributed to that female nurses in Egypt are predominant and male nurses are new comers to the nursing profession. Also, male nurses prefer to work at private hospitals for higher salaries, unlike most of female nurses prefer to work in the governmental hospitals.

This finding is consistent with Zoheir et al. (2022), in study entitled "Nurses' Performance Regarding Palliative Care among Patients with Cancer", who found that, majority of studied subjects were females this result was inconsistent with Shashi, et al (2023), in a study entitled "Effect of implementing teaching program on nurses knowledge, practice score and response time related to management of upper GI bleeding among chronic liver disease patients" who found that more than two third of the nurses were males .

**Concerning to title /position**, the results of the current study revealed that more than two fifths of studied nurses were staff nurses. From researcher point of view, this result could be attributed to that more than half of studied nurses were graduated from technical institute of nursing so they were assigned to technical work as direct patient care. While bachelor nurses usually assigned to administrative positions.



This finding is consistent with **Yun and Park (2020)**, in study entitled "Factors Influencing Radiation Protection Behaviors of Endoscopy Nurses during Endoscopic Interventional Radiology" who found that more than two thirds of studied nurses were staff nurses. This result is in accordance with **Eldoushy and Behairy (2023)**, in a study entitled "Effect of nursing informatics' training program on nurses' proficiency in remote follow-up for liver transplant recipients" who found that more than three quarters of studied nurses were staff nurses.

**As regard to educational level**, results of the current study revealed that, more than half of studied nurses had technical institute of nursing. This result could be attributed to that the technical school of nursing has been cancelled and not yet graduate nursing professional. In addition, the graduate of faculty of nursing is usually working in the administrative positions.

This finding was in the same line with **Mahmoud, et al. (2021)**, in a study entitled "Impact of educational program for hepatic encephalopathy on nurses' performance and patients' outcomes" who found that, majority of studied subject had a technical institute of nursing. Also, **Masha, et al (2023)**, in a study entitled "Factors Affecting Nurses' Attitude Regarding Care of Patients with Liver Transplantation" found that more than three fifths of studied nurses had a technical institute degree of nursing. This result was contradicted with **Hassan, et al (2023)**, in a study entitled "Knowledge and Attitude Towards Hepatitis B virus Infection Among Nurses in Benadir Hospital, Mogadishu, Somalia" who found that more than half of studied nurses had a bachelor degree of nursing.

**Regarding years of experience**, the current study revealed that, about nearly half of studied nurses had 1 < 5 years of experience with mean  $8.53 \pm 6.63$ . From the investigator' point of view, this result could be due to the nurses don't continue for a long period of time at Interventional Radiology unit in National Research Institute of Endemic and Liver Diseases due to increasing workload and responsibilities on the nurses.

This finding was in agreement with **Mahmoud, et al. (2021)**, in a study entitled "Impact of educational program for hepatic encephalopathy on nurses' performance and patients' outcomes" who found that more than three fifths of studied nurses had less than five years of experience. On the other hand, this finding is disagreed with **Masha, et al (2023)**, in a study entitled "Factors Affecting Nurses' Attitude Regarding Care of Patients with Liver Transplantation" found that three fifths of studied nurses had more than five years of experience.

This finding is agreed with **Farmani et al. (2019)**, his research title "Dataset on the nurses' knowledge, attitude and practice towards palliative care", who demonstrated that, half of study subjects had less than 5 years of experience. In this respect, a study conducted by **Paul et al. (2017)**, who evaluate the knowledge, attitude and practice of health staff of hospitals in Yaoundé and its environs (Cameroon) and found that the majority of health care givers have a more than five years of working experience. On the other hand, this result is in contrast with **Zoheir et al. (2022)**, who found that about three quarters of studied nurses had more than 10 years of experience.

**Concerning to training course**, the current study revealed that, more than half of the studied nurses had attended training courses related to thermal ablation. From the investigator' point of view, this finding could be attributed to that the National Research Institute of Endemic and Liver Diseases interested in increasing nurses level of knowledge and practices to improve their performance.

This result is in accordance with **Abdrabo, et al. (2023)**, in a study entitled "Nurses' performance regarding management of patients with hepatic encephalopathy at the endemic care unites" who found that more than three fifths of studied nurses had attended training courses about management of patients with liver disease. On the other hand, this result is in contrast with **Abo El-Ata, et al. (2021)**, in a study entitled "Nurses' knowledge and practice regarding nursing care of patients with liver cirrhosis" who found that about most of studied nurses didn't attend any training courses.



**Concerning the studied nurse's total level of knowledge about thermal ablation**, findings of the current study showed that majority of the studied nurses had unsatisfactory level of knowledge regarding thermal ablation procedure. From the investigator' point of view, it might be attributed to several reasons; work overload, lack of nurses' incentives to improve their knowledge and lack of desire to update knowledge. Also, the investigator believes that these findings reflect the need for continuous training programs about thermal ablation to enhance knowledge of all nursing qualification categories.

This finding was in agreement with **Mahmoud, et al. (2021)**, who found that three quarters of studied nurses had unsatisfactory level of total knowledge. Also, this result was agreed with **Zoheir et al., (2022)**, who reported that, majority of the studied nurses had unsatisfactory level of total knowledge. This result was disagreed with **Alwesabi, et al., (2023)**, in a study entitled "The Level of knowledge among nurses regarding care of patients with hepatic encephalopathy at Najran Hospitals, Saudi Arabia" who found that more than half of the studied nurses had moderate level of knowledge and more than one quarter of them had good level of knowledge. This discrepancy in findings might be due to the differences in the tool and scoring levels used to rate the knowledge.

**Concerning nurses' practice** regarding patient preparation for thermal ablation procedure, the current study results clarify that all of the studied nurses making sure that connecting patients to IV access, assessing vital signs, ensure that the patient sign informed consent, and instruct patient wearing operation gown. Also, more than three quarters of them had removing artificial things e.g. lenses and hearing and artificial teeth, prepare skin, instruct patient to be fasting 8 hours before procedure and ensure diagnostic tests / labs investigation present in patient's medical file. This finding may be due to they believe that this considered the daily routine of nurses' duties. These findings were in the same line with **Karaly et al., (2019)**, in study entitled "Effect of an educational guideline on nurses' performance caring for patients post liver transplantation" who stated that most of the nurses had unsatisfactory level of practice regarding caring for patients.

This result agrees with **Christoforo and Carvalho (2016)**, who reported in the study which was entitled "Nursing care applied to surgical patient in the pre--surgical period in Brazil" that almost all nurses had performed all care procedures as regarding assessing vital signs, regarding removing jewelry, dental prosthesis, eyeglasses, and contact lenses, near half of them, had satisfactory practice regarding pre--anesthetic medication at the day of surgery.

The current study reveals that all of the studied nurses didn't perform this task, asks the patient to urinate. Also, more than half of the studied nurses didn't ensure patient take pre procedure medication, monitor blood glucose level and ensure the availability of blood / blood products. In addition, the most of them didn't ask the patient if he has allergic to any kind of medications or food and other. This from investigator point of view finding may be due to a lack of nurses' awareness and knowledge about the importance of some aspects of patient preparation for thermal ablation and their dependence on nurses' aid and relatives until they reach the Interventional Radiology unit.

Concerning the nurses' practice regarding patient care during thermal ablation procedure, the current study results clarify that the majority of the studied nurses preparing examination table, adequate light, equipment, put the patient on supine position in examination table, exposed the site of procedure and ensure market site of procedure, placed grounding pads on the patient's skin, perform surgical hand scrub, sterilization site of insertion while all of them wear sterile gown and gloves. In the same context, this finding is contrasting to **Ali and Ali (2019)**, who found that all the studied nurses had inadequate level of practice at preprogram implementation.

The findings of this study revealed that in post thermal ablation procedure another significant shortcoming of the studied nurses that around three quarter of the studied nurses didn't maintain airway patency and monitor Glasgow Coma Scale and half of them didn't monitor blood glucose level immediate post procedure. This finding may be due to a lack of nurses' training and awareness about the primary approach for assessing immediate postoperatively patients. Also, in agreement of the study with **Singh and Chong (2016)** who mentioned in the study entitled: "Assessing Nurses Knowledge of Glasgow Coma Scale in the Emergency and Outpatient Departments of a Tertiary Medical Centre" more than half of studied nurses had poor practice regarding use of the Glasgow coma.



This finding raises concerns about the importance of knowledge and skill in assessing GCS. Continuing education and practice on the use of the GCS are essential.

The current study revealed that more than three fifths of the studied nurses didn't administer pain killer as needed. This result may be due to nurses' pain assessment being mostly constrained by; lack of guidelines/ protocols, assessment tools, documentation charts, education on assessment tools, inadequate documentation of pain assessment, management, and poor communication of pain assessment priorities. These findings are in the same line with **Milutinovic et al. (2016)**, who showed a lack of regular assessment of pain intensity and follow up the effects of analgesic therapy in professional nursing care.

In concern to the studied nurses' total practice regarding hepatocellular carcinoma patients undergoing thermal ablation procedure, the current study clarified that, three quarter of the studied nurses had incompetent level of practice regarding hepatocellular carcinoma patients undergoing thermal ablation procedure from the researcher point of view. It might be due to the lack of training for nurses, less than half of them didn't attend any conference, work shop and self-learning in addition, to increased number of patients and work load. On other hands from the researcher observation, some nurses worked by repetition, imitation, and experience.

This result agreed with another study by **Zoheir et al., (2022)**, who clarified that, most of the studied nurses had incompetent level of total practice regarding of patient care. This could be due to, the nurses perform only the professional activities such as taking vital signs, giving treatment, but they didn't perform patient full assessment for annoying symptoms, nurse's dependent on junior doctor to perform assessment and follow up of symptoms have a lack of clinical skills to patient care.

Furthermore, lack of facilities like, unavailability of guideline books, procedure book about dimensions of care, care to patient with HCC, lack of job description, unavailability of online book, and lack of interest of nurses to attend workshops, seminars and conferences, all these factors contributed to the incompetent practice level of nurses regarding patient care among patients with HCC. In addition, these findings are consistent with previous studies as regard to practice level. Our finding aligned with **Wang Qin & Hong Lin, (2018)** and **Pasaol, (2019)**, who found that, more than three quarters of the participants, had inappropriate practice towards patient care. This result is in contrast with **Farmani et al., (2019)**, and **Sorifa & Mosph, (2015)**, who reported that, about three quarters of studied subjects had high total score regarding practice of patient care.

**As regard to relations between demographic characteristics of studied nurses and their knowledge**, this study demonstrated that there were statistically significant relations between total knowledge of the studied nurses and their age, educational level, years of experience and attending training courses. While there was no significant relation between total knowledge of the studied nurses and their gender and job position.

The researcher believes that a relation between age and knowledge level could be attributed to that the participants working for extended period of time in their professions, they could obtain various exposures that increase their knowledge related to their day to day activities.

This finding is consistent with **Yun and Park, (2020)**, in study entitled "Factors influencing radiation protection behaviors of endoscopy nurses during endoscopic interventional radiology" who found that knowledge level of the studied nurses were significantly related to their age and attending training courses. This result in the same line with **Shashi, et al (2023)**, in a study entitled "Effect of implementing teaching program on nurses knowledge, practice score and response time related to management of upper GI bleeding among chronic liver disease patients" who found that there was no statistically significantly relation between level of knowledge of nurses and their gender and job position.



This result was agreed with **Alwesabi, et al., (2023)**, in a study entitled “The Level of knowledge among nurses regarding care of patients with hepatic encephalopathy at Najran Hospitals, Saudi Arabia” who found that there was a significant association between knowledge levels with education level. Also, this finding is agreed with **Alaa Eldin, et al (2023)**, in study entitled "Nurses' knowledge and practices regarding the perioperative care of patients with cholelithiasis undergoing laparoscopic cholecystectomy" who found that knowledge level of the studied nurses had a statistically significant relation with their years of experience.

This result was contradicted with **Hassan, et al (2021)**, in a study entitled “Knowledge and Attitude Towards Hepatitis B virus Infection Among Nurses in Benadir Hospital, Mogadishu, Somalia” who found that there was no significant statistically relation between total level of knowledge of nurses and their age and educational level.

**As regard to relations between demographic characteristics of studied nurses and their practice**, the current study showed that, there was a statistically significant relation between total practice of the studied nurses and their gender, educational level, & attending training courses related to thermal ablation. While there was no significant relation between total practice of the studied nurses and their age, job position and years of experience. The researcher believes this result may be interpreted as more time of education and clinical training may assist studied nurses to develop their skills and improve their practices.

These findings were in the same line with **Karaly et al., (2019)**, in study entitled “Effect of an educational guideline on nurses’ performance caring for patients post liver transplantation” who found that there was statistically significant relation between total practice level of the studied nurses and their sex and educational qualification. While there was statistically insignificant relation between total practice level of the studied nurses and their age and years of experience.

This finding is agreed with **Alaa Eldin, et al (2023)**, who found that total practice level of the studied nurses had no statistically significant relation with their years of experience. On the other hand, this finding is disagreed with **Masha, et al (2023)**, in a study entitled “Factors Affecting Nurses’ Care of Patients with Liver Transplantation” who found that there was no significant statistically relation between total level of practice of nurses and their gender, educational level and attendance of training courses.

**Concerning the correlation between total level of nurses’ knowledge and total level of nurses’ practice**, the current study found a highly statistically significant positive correlation between the total level of knowledge and practice regarding care for hepatocellular carcinoma patients undergoing thermal ablation. The researcher believes that this finding reflects the importance of integration between theory and practice. The researcher believes that, this findings support the hypothesis that when the nurse's knowledge of care increase, their practice will improve too.

These findings were in the same line with **Karaly et al., (2019)**, who found that there was a positive correlation between total knowledge and total practice of the studied nurses. This finding was in agreement with **Mahmoud, et al. (2021)**, who found that there is highly statistically significant correlation between total knowledge level of studied nurses and their total performance level. Also, this result in the same line with **Shashi, et al (2023)**, who found that there was statistically significantly positive relation between level of knowledge of nurses and their level of knowledge and practice. Additionally, this finding is agreed with **Masha, et al (2023)**, who found that there was a statistically significantly positive correlation between total knowledge score of nurses and their level practice score. The possible justification for this similarity might be due to similar study design used and poor nurses’ level of knowledge and practice in both studies.



The researcher believe that there is a need to focus on the development of nursing staff knowledge and practice regarding caring for patients undergoing thermal ablation. Also, nurses must have access to updated information, learning resources, and continuous educational opportunities.

### Conclusion:

Based on the current findings, it can be concluded that: more than four fifth of the studied nurses had an unsatisfactory level of knowledge and three quarter had incompetent level of practice regarding care for HCC patients undergoing thermal ablation procedure.

### Recommendation:

On the light of current study, the following recommendations are suggested:

- Continues in-service training programs should be designed and carried out to oncology nurses to promote the knowledge and practice about care for HCC patients and thermal ablation based on nurse's needs.
- Develop system of periodical nurses' evaluation to determine strategies for enhancing their practice.
- Supply nurses with simple, detailed, clear Arabic nursing performance guidelines, books include all needed knowledge about HCC patients and thermal ablation procedure.
- .Hospitals should enable the nurses to conduct research and follow up to date information.
- Replication of the current study on larger probability sample and various setting in Egypt for HCC patients to understand their condition.

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