

Effect of preoperative instructions related to immunosuppressive therapy on post liver transplantation patients' outcomes

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Abstract: Background: Today, liver transplantation (LT) is considered the golden standard for management of end stage liver diseases patients and early liver tumor. Pre-operative instructions are playing important role to maintain patient safety and success of a transplant. **Aim of the study:** Evaluate the effect of preoperative instructions related to immunosuppressive therapy on post liver transplantation patients' outcome in terms of patient compliance to immunosuppressive therapy, knowledge about liver, liver transplantation, immunosuppressive therapy, nutrition and post liver transplantation patients' complications. **Design:** Quasi experimental design was used in the study. **Study sample:** was a conducted on (36) patient undergoing liver transplantation operation. **Tools:** Patients' knowledge assessment questionnaire sheet in addition to Sociodemographic and medical data, Patients' compliance to immunosuppressive therapy and therapeutic diet questionnaire sheet and post liver transplantation patients' Complications assessment sheet. **Results:** there was a positive association between total patients' knowledge, patient compliance to immunosuppressive therapy and a decrease post liver transplantation patient' Complications after exposure to preoperative instructions were highly statistical significant *p* value equal (<0.001) for all of them. **Conclusion:** There were improvements of patients' knowledge, patients' compliance to immunosuppressive therapy, therapeutic diet and decrease post liver transplantation patients' Complications after exposure to preoperative instructions. **Recommendations:** All patients scheduled for liver transplantation and their families need adequate knowledge and skills about liver transplantation to adapt with their life after transplantation and Distributing the health education instructions to all liver transplant patients.

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Key words: complication, immunosuppressive therapy, knowledge, Liver transplantation, preoperative instruction, patients' outcomes.

1. Introduction

Today, liver transplantation (LT) is being studied only for patients with chronic liver disease at the end of the stage (Masala, et al. 2013). It is a complex surgical procedure that requires removing the diseased liver from the recipient and replacing it with a whole liver or part of the liver from the donor. The most common technique is orthotopic transplantation, where the diseased liver is removed and transplant liver grafting in the same place as the original liver.

Following liver transplantation, the recipient immune system recognizes the new graft (transplant organ) as foreign body, activating a complex immune response that would result graft rejection (Zarrinpar & Busttil, 2012). Immunosuppressive Therapy (anti-rejection medication) are taking to prevent graft rejection following LT and given for rest of the patients life. Post-implantation success depends on continuous equilibrium of immunosuppressant therapy between low dose due to rejection and high

dose due to toxicity (Abegr, et al, 2010 and Giorgi, 2013).

Knowledge about immunosuppressive medication, their side effects, and possible individual drug interactions is important in managing liver transplant patients. Complications related to immunosuppressive drugs occur with longer use. More than half of deaths in liver transplant patients result from complications related to immunosuppressive drug such as cardiovascular disease, renal failure, infection or malignant tumors. A common strategy is to use many high-dose immunosuppressive drugs at an early stage of the postoperative phase and a lower dose of immunosuppressive drugs after LT to avoid acute rejection and manage potential side effects (American Journal of Transplantation, 2009).

Standard regimens generally consist of a mixture of three types of therapy, calcineurin inhibitor (CNI) is considering the mainstay of immunosuppressive therapy can be typically combined with antimetabolites as cellcept, myfortic

and corticosteroids use as a short-term steroids taper more than 3 months except in hepatitis C and auto-immune hepatitis patients. The advantage of this combination is increasing effectiveness, allow low doses of each drug and minimize drugs side effects. On the other hand, standard regimens frequently change during a liver transplant recipient's life (Abger, 2010).

The outcomes after liver transplantations have shown consistent improvement in the recent years. Now a day's liver transplantation was one, three and five years survival rates (88%, 80% and 75% respectively). Effective immunosuppressant in transplantation relies on achieving most advantageous graft function while avoiding its adverse drug toxicity (Girland, 2013). The major reasons for this improvement include improvement in surgical and preservation techniques, better anesthetic, good monitoring in ICU, advancements in immunosuppressive strategies, effective treatment of infections and enhanced care during the preoperative stage (Dienstag & Cosimi, 2012).

Pre-operative instruction is a very important part of nursing care. Studies have revealed that pre-operative instruction decrease patient's anxiety, post-operative complications and increases their satisfaction with the surgical experience (Berman and Syders, 2012). Thus, Proper preoperative instruction also encourage the patients go back to work and ability to make of daily living activities. Moreover, the patient's knowledge of post-transplant care influences the patient's outcomes and satisfaction. Transplant team must identify information, contributing factors, and advanced methods to met patient's education needs (Wager et al, 2006 & Pellino, 2009).

The vital role of the nurse instruct the patient and his family about measures to promote health due to success of transplantation and notify the patient and his or her family to understand why they need to adhere to medication, with particular focus on the methods of given medication, accurate time and side effects of the prescribe immunosuppressive therapy (Smeltzer, et 2010 & Mendes 2012).

Significance of study:

Egypt is countries with high prevalence of HCV infection (26%) which lead to increase numbers of Egyptian patients suffer from liver disease at the end of the stage, which is a major indicator for liver transplantation in Egypt, followed by hepatic cell carcinoma (HCC).

The statistical reports in Gastro Enterology surgical Center at Mansoura University Revealed that, the number of living donor liver transplantations cases is increasing and reached to 500 cases from 2004 to February 2017. These recipient required

intensive collaborative care to save their lives and they are at risk for several post transplantation complication result from surgery or medication, these complications may lead to negative impact on the patient's physical and psychological condition and prolonged patient's hospital stay and increase hospital costs. So, there is an interest to conduct such type of research which may save this category of the patient against these serious complications.

Effective preoperative teaching will be reduce patient's anxiety and post-operative complications and increases their satisfaction with the surgical experience. Proper preoperative instruction also encourage the patients go back to work and to be able to carry out daily activities. In addition, the patient's knowledge about of post-transplant care influences the patient's outcomes and satisfaction. Therefore, it is important for liver transplant patient and their families to understand the essential process concerned with liver transplants, to recognize several of the challenge and complications that faced after liver transplant, and to know symptoms that should be alert to request medical assist. There is no written nursing care instructions; policy, guidelines and the place not protocol care of patient undergoing liver transplantation. So these studies done to evaluate the effect of preoperative instructions.

aim of the Study: Evaluate the effect of preoperative instructions related to immunosuppressive therapy on post liver transplantation patients' outcome in terms of patients' knowledge about liver, liver transplantation, immunosuppressive therapy, nutrition, compliance to immunosuppressive therapy and post liver transplantation patients' complications.

Research hypothesis:

H₁. There will be improvements of patients' knowledge about preoperative instructions related to liver transplantation, immunosuppressive therapy, nutritional and follow up after their exposure to preoperative nursing instructions.

H₂. There will be improvements of patients' compliance to immunosuppressive therapy after their exposure to preoperative nursing instructions.

H₃. There will be a decrease of post liver transplantation patients' complications after their exposure to preoperative ensuring

2. Subject and Methods:

Research design:

Quasi- experimental one group method research design was utilized in this study. The investigator utilized this design because it's difficult to select random sample representing patients who had liver transplantation (El gamal, 2013).

Study setting:

The study was conducted at the Liver Transplantation Intensive Care unit (ICU) and ward of Gastroenterology Surgical Center affiliated to Mansoura University. The liver transplantation ICU has two rooms one of them called donor rooms which has three beds, and recipient rooms which has four beds. The liver transplant operations usually occur twice weekly. The nurse patient ratio is 1:1. Preoperative patients' hospital stays is usually one week if the patient is stable hemodynamically and general normal, it may increase according to the patients' health status.

Sample:

A convenience sample of 36 adult patients, their age's ranges from 20 to 60 years old (27 male and 9 female), conscious patients who were scheduled for liver transplantation surgery throughout a period of six months duration starting from the beginning of November 2017 till the end of April 2017.

Inclusion criteria: willing to participate voluntarily and gave consent, able to communicate and verbalized their needs.

Exclusion criteria: Mentally disordered patients, unconscious patients.

Tools of the study:

Three tools were used in this study.

1. Patients' knowledge questionnaire sheet about preoperative instructions related to liver, liver transplantation immunosuppressive therapy, nutrition pre and post liver transplantation operation and follow up visits. In addition to Sociodemographic and medical data sheet.
2. Patients' compliance to immunosuppressive therapy and therapeutic diet questionnaire sheet.
3. Patients' complications assessment sheet as early graft rejection, new onset diabetes mellitus, neurological and psychological complications.

Tool 1: Patients' knowledge questionnaire sheet that was developed by (EL-Gamal et al, 2013) and modified by the investigator to assess Patients' knowledge about liver, liver transplantation, immunosuppressive therapy, nutrition pre-post liver transplantation. It consists of 39 questions and divided into six main parts:

Part (1): Sociodemographic and medical data sheet consisted of 9 questions which includes age, gender, occupation, marital status, level of education (6questions)

The second section covers current medical health status as past medical history, allergy to medication, food and co morbidity diseases as diabetes, hypertension, and renal disease (3questions)

Part (2): General knowledge about liver (2questions)

Part (3): General knowledge about liver transplantation (10questions)

Part (4): Knowledge about immunosuppressive therapy (10questions)

Part (5): Knowledge about nutrition pre and post liver transplantation (6questions)

Part (6): Knowledge about follow up visits (2 questions)

Scoring system:

The answers were scored as the following; a score of 1 was given to correct and complete answer while 0 score was given to wrong answer or don't know. The total knowledge scores ranged from 0 to 30 point. Patient who had knowledge score below 50% was categorized as having poor knowledge level, while those who had knowledge score 50% to less than 75% was categorized as having fair knowledge level and those who had $\geq 75\%$ was categorized as having a good knowledge level.

Tool 2: Patients' compliance related to immunosuppressive therapy and therapeutic diet questionnaire sheet was developed by the investigator after reviewing recent related literatures to evaluate patients' compliance to immunosuppressive therapy and therapeutic diet post liver transplantation operation. It consists of 21 questions and divided into two parts:

Part (1): Patients' compliance to immunosuppressive therapy (15 questions)

Part (2): Patients' compliance to therapeutic diet (6questions)

Scoring system:

Patients' compliance regarding medication use and diet regimen was assessed, each patient was asked about their attitude regarding adherence to medication and their responses were reflecting their agreement or disagreement a score of (1) was given for agree response and a score of (0) for disagree or no response.

Tool 3. Patients' complications assessment sheet was developed by the investigator after reviewing recent related literatures to assess postoperative liver transplantation complications as a result of taking immunosuppressive therapy during patients' hospitalization. This sheet has included the following complication such as early graft rejection, new onset diabetes mellitus, neurological and psychological complications, renal dysfunction, cardiovascular complications, infection post liver transplantation according to site of infection and respiratory complication as (pneumonia).

Methods

1. An official approval from ethical committee of faculty of Nursing, Mansoura University was

- obtained. Approval from Faculty of Nursing of Mansoura University
2. An official approval for conducting the study was obtained from the responsible administrative personal of the hospital based on an official letter from the faculty of Nursing, which includes the aim nature and duration of the study.
 3. The study tools were developed by the investigator after reviewing recent related literatures except Tool number one developed by (El Gamal et al, 2013) and modified by the investigator.
 4. Validity take permission to use scale of the tools were tested by five experts in the field of medical surgical nursing at the faculty of nursing and medical fields. The tools were reviewed for relevance, comprehensiveness and clarity.
 5. Pilot study was conducted on 10% from sample to ensure clarity, feasibility, applicability, free from a mistake and suitable time to fill of the tools. These selected patients didn't included in the main study sample
 6. **Ethical considerations and human right :**
 - Official approval was obtained to conduct the study.
 - Aim and nature of the study were explained to patients and then consent were obtained
 - Patients were assured that their information will be used only for research purposes and they have the right to withdraw from the study at any time without any effects on their care.
 - Confidentiality of data ascertained and patient privacy was considered.
 7. Patients who able to read and write were self answered questionnaire but patients are illetered were interviewed individually by the investigator.

Preparatory phase:

A review of the past, current, national and international literatures related the various aspect of the study was done using books, articles, internet and magazines. The preparation was include developing tool 2, 3 and developing preoperative instructions.

Implementation phase:

The investigator was met the patients in the liver transplantation ward according to their convenience, Introduced herself to each patient and explain the aim and nature of the study for each patient. Consent approval was obtained from each patient included in the study. The investigator with patients arranged session according to their suitable time and place should be free from any noisy. The investigator interviewed each patient individually to fulfill the

study tools (pretest). The investigator implements preoperative instructions in the form of six teaching sessions to each patient. Each patient choose the optimal time for receiving the teaching sessions whenever they have ready to learn. The duration of each session ranged from 20- 30 minutes and varied according to the level of understanding for each patient and content of each session. An open channel communication was achieved between the investigator and patients to assure understanding and answer any question. Every session usually started by a summary of what had been taught in the previous session and the objectives of the new session. After each session, there was 10 minutes for discussion and gave feedback. Diverse teaching methods were used to attract patients' attention and motivate them to participate. The teaching methods included group discussion, pictures, and videos. Educational preoperative instructions were written in simple Arabic language with illustrated colored picture to enhance the learning process and facilitate patients understanding. A brief summary was given by the investigator and direct reinforcement in the form of a copy of the educational preoperative instructions were given as a reward for each patient to use it as a future reference. After completion of all sessions, the investigator interviewed patients to fill the patients' knowledge and patients 'compliance to immunosuppressive therapy sheet form immediately post. Also, the investigator fills patients post operative complications sheet from immediately post liver transplantation to one month post liver transplantation.

Preoperative instructions were developed according to patients' needs of knowledge and compliance to therapy according to extensive literatures to improve patients' knowledge, compliance to immunosuppressive therapy and a decrease of postoperative complications as possible. It was classified into six sessions.

- **First sessions:** The investigator introduce herself to the patients and informed patients about aim of the study after that told the patients about general knowledge about definitions of liver, liver transplantation.
- **Second sessions:** It includes general knowledge about preoperative preparation before transplantation surgery
- **Third sessions:** It Includes knowledge about immunosuppressive therapy such as importance, definitions, type, side effect, action and Different teaching methods were used during the session, which includes instructional media such as picture of immunosuppressive therapy.

- **Fourth session:** It includes knowledge about complications that occurs if not compliance to immunosuppressive therapy.
- **Five sessions:** It includes knowledge about nutrition pre- post liver transplantation surgery and knowledge about follow up visits.
- **Six sessions:** It includes knowledge about post operative liver translation complications as a result of prolonged taking immunosuppressive therapy such as infection, new onset of diabetes mellitus, psychological and neurological complications and Knowledge.

Statistical Analysis:

After data collection, it was revised, coded and fed to statistical package for Social Sciences version 21(SPSS) .Suitable statistical test were used as follows:

Qualitative data were described using number and percent. Association between categorical variable was tested using Friedman test. Continues variables were presented as mean \pm SD (stander deviation).

Level of significance: for all the above mentioned statistical tests, threshold of significant (p-value) is fixed at 5%.

The results were considered:

Non- significant when the probability of error (P-value) is more than 5% (p0.05)

Significant when the probability of error (P-value) is less than 5% (p0.05)

Highly Significant when the probability of error (P-value) is less than 0.1 % (p0.001)

3. Results

Table (1) Show the distribution of the study participants according to their socio-demographic characteristics, the majority (75%) of the studied patients were male. Less than half of them were aged 40 to less than 49 years and 50 to 60 years (47.2% for both). Almost all (94.4%) were married. Regarding educational level around one third of the studied patients graduated from University level and

Secondary level of education (41.7% and 36.1% respectively), Furthermore, around one tenth were illiterate and didn't work with the same percentage for both (11.1%), while more than half (52.8%) of them were working.

Table (1): Distribution of the study participants according to their socio-demographic characteristics:

Socio-demographic data	Frequency n (36)	Percent %
Gender		
– Male	27	75.0
– Female	9	25.0
Age (years)		
– 20 to less than 30 years	1	2.8
– 30 to less than 40years	1	2.8
– 40 to less than 50 years	17	47.2
– 50 to 60 years	17	47.2
Marital status		
– Married	34	94.4
– Divorced	2	5.6
Educational Level		
– Illiterate	4	11.1
– Read and write	3	8.3
– Intermittent educations	14	38.9
– University education	15	41.7
Occupation		
– Don't work	4	11.1
– Employee	19	52.8
– House wife	7	19.4
– Retired	6	16.7

Table (2) presents the distribution of the study participants according to their health history; the majorities (91.7%) of the studied patients have a previous history of Encephalopathy, followed by slightly more than two third (69.4%) who have liver cirrhosis, compared to the minority of them who have liver failure and liver tumor (8.3% and 5.6% respectively). Finally, less than one fifth of them suffering from diabetes mellitus and renal disease (19.4% and 16.7% respectively) and the minority (5.6%) were suffering from hypertensive disorder.

Table (2): Distribution of study participants according to their health history & Co morbidity N = 36

Health history	Frequency n (36)	Percent
Previous history:		
– Liver cirrhosis	25	69.4
– Liver failure	33	91.7
– Primary liver tumor	2	5.6
Associated co morbidity:		
– D.M	7	19.4
– Renal disease	6	16.7
– Hypertension	2	5.6

Table (3) Portrays the distribution of the study participants according to their general knowledge related to the liver pre and post-instruction, more than half (52.8%) of the studied patients has incorrect knowledge regarding liver anatomy, compared to all of them who have correct

knowledge Post-instruction (100%). Only 13.9% of the study participants' pre-instruction has correct knowledge regarding liver function compared to the majority (94.4%) of them who have correct knowledge.

Table (3): Comparison between study participants general knowledge related to liver pre and post exposure to preoperative instructions N=36

General knowledge related to liver	Patients' knowledge Pre-instruction (36)		Patients' knowledge Post-instruction (36)	
	Incorrect	Correct	Incorrect	Correct
	No (%)	No (%)	No (%)	No (%)
- Liver anatomy	19 (52.8)	17 (47.2)	0 (0.0)	36 (100.0)
- Liver function	31 (86.1)	5 (13.9)	2 (5.6)	34 (94.4)

Table (4) shows the distribution of the study participants according to their knowledge related to the liver transplantation pre and post-instruction, around one quarter of the study participants pre instruction didn't know contraindication for liver transplantation, sign and symptoms of body resistance (rejection) of the transplantation, and sign & symptoms of respiratory tract infection (22.2%, 22.2%, 25% respectively), compared to all of them who have knowledge post instruction regarding the same items (100%, 100%, 97.2% respectively).

Moreover, around one third of the study participants pre-instruction have correct knowledge regarding the immediate post-operative complications, causes of infection postoperatively, high risk site of infection postoperatively, sign and symptoms of wound infection, and reasons to call doctor immediately postoperatively (30.6%, 33.3%, 30.6% and 30.6% respectively) compared to nearly all of them who have correct knowledge regarding the same items post instruction (100%, 91.7%, 88.9% and 86.1% respectively).

Table (4): Comparison between study participants knowledge related to liver transplantation pre and post exposure to preoperative instructions N=36

Knowledge related to liver transplantation	Patients' knowledge Pre-instruction (36)		Patients' knowledge Post-instruction (36)	
	Incorrect	Correct	Incorrect	Correct
	No (%)	No (%)	No (%)	No (%)
- Source of donation	1 (2.8)	35 (97.2)	0 (0.0)	36 (100.0)
- Contraindications for liver transplantation	28 (77.8)	8 (22.2)	0 (0.0)	36 (100.0)
- Immediate post-operative complications	25 (69.4)	11 (30.6)	0 (0.0)	36 (100.0)
- Sign and symptoms of body resistance (rejection) of the transplantation	28 (77.8)	8 (22.2)	0 (0.0)	36 (100.0)
- Causes of infection postoperatively	24 (66.7)	12 (33.3)	3 (8.3)	33 (91.7)
- High risk site for infection postoperatively	25 (69.4)	11 (30.6)	5 (13.9)	31 (86.1)
- Sign and symptoms of respiratory tract infection	27 (75.0)	9 (25.0)	1 (2.8)	35 (97.2)
- Sign and symptoms of wound infection	25 (69.4)	11 (30.6)	4 (11.1)	32 (88.9)
- Reasons for calling doctor immediately postoperatively	25 (69.4)	11 (30.6)	5 (13.9)	31 (86.1)
- Time to return home postoperatively	26 (72.2)	10 (27.8)	0 (0.0)	36 (100.0)

Table (5) portrays the distribution of the study participants according to their knowledge related to the immunosuppresses pre and post-instruction, none of the patients' pre instruction has knowledge regarding side effects of prograf (LFK) and Prograf (Level FK) precautions, compared to the majority (94.4%) of them post instruction who have correct knowledge regarding the side effects of prograf (LFK). The minorities of patients pre instruction have correct knowledge regarding

medication used as immunosuppressive, Side effects of Neural, certican precautions, side effects of myofortic, side effects of difflucan and side effects of immunosuppressive that effect on neurological (8.3%, 5.6%, 2.8%, 2.8%, 2.8%, 2.8%, 8.3% and 5.6% respectively), compared to the majority of them who have correct knowledge post-instruction related to the same items (97.2%, 88.9%, 91.7%, 88.39%, 86.1%, 86.1%, and 91.7% respectively).

Table (5): Comparison between study participants knowledge related to immunosuppressive drugs before and immediately post exposure to preoperative instructions N=36

Knowledge related to immunosuppresses	Patient's knowledge Pre-instruction (36)		Patient's knowledge Post-instruction (36)	
	Incorrect	Correct	Incorrect	Correct
	No (%)	No (%)	No (%)	No (%)
– Medication used to decrease body resistance (rejection)	28 (77.8)	8 (22.2)	1 (2.8)	35 (97.2)
– Medication used as immunosuppressive	33 (91.7)	3 (8.3)	1 (2.8)	35 (97.2)
– Side effects of Prograf (LFK)	36 (100.0)	0 (0.0)	2 (5.6)	34 (94.4)
– Prograf (LFK) precautions	36 (100.0)	0 (0.0)	35 (97.2)	1 (2.8)
– Side effects of Neural	34 (94.4)	2 (5.6)	4 (11.1)	32 (88.9)
– Side effects of Prednisolone	35 (97.2)	1 (2.8)	3 (8.3)	33 (91.7)
– Certican precautions	35 (97.2)	1 (2.8)	4 (11.1)	32 (88.9)
– Side effects of Myfortic	35 (97.2)	1 (2.8)	5 (13.9)	31 (86.1)
– Side effects of Diffucan	33 (91.7)	3 (8.3)	5 (13.9)	31 (86.1)
– Side effects of Immunosuppres that effect on nervous system	34 (94.4)	2 (5.6)	3 (8.3)	33 (91.7)

Note: LFK (level of prograf in the blood)

Table (6) presents the distribution of the study participants according to their knowledge related to nutrition pre and post-instruction, around two fifth of the study participants pre instruction have correct knowledge regarding the relation between liver and nutrition, diet plan post transplantation, and food that should be taken (recommended) post transplantation (38.9%, 41.7% and 36.1% respectively), compared to the majority who have correct knowledge regarding the same items post instruction (91.7%, 88.9%, and 94.4%

respectively). Moreover, study participants according to their knowledge related to postoperative visits and follow-up pre and post-instruction, only 16.7% of the study participants' pre instruction have correct knowledge regarding family visiting schedule postoperatively in contrast the majority (94.4%) of them have correct knowledge post instruction. Additionally, only 2.8% of the study participants' pre instruction has correct knowledge regarding follow-up schedule after discharge compared to 22.2% who have correct knowledge post instructions.

Table (6): Comparison between study participants Knowledge related to post operative nutritional regimen & follow up before and immediately post exposure to preoperative instructions N=36

Knowledge related to nutrition, postoperative visits and follow-up	Patients' knowledge Pre-instruction (36)		Patients' knowledge Post-instruction (36)	
	Incorrect No (%)	Correct No (%)	Incorrect No (%)	Correct No (%)
– The relation between liver and nutrition	22 (61.1)	14 (38.9)	3 (8.3)	33 (91.7)
– Diet plan pre transplantation	13 (36.1)	23 (63.9)	4 (11.1)	32 (88.9)
– Diet plan post transplantation	21 (58.3)	15 (41.7)	4 (11.1)	32 (88.9)
– Food that should be taken (recommended) post transplantation	23 (63.9)	13 (36.1)	2 (5.6)	34 (94.4)
– Food that should be avoided post transplantation	14 (38.9)	22 (61.1)	1 (2.8)	35 (97.2)
– Nutritional precautions post transplantation	3 (8.3)	33 (91.7)	4 (11.1)	32 (88.9)
– Family visiting schedule postoperatively	30 (83.3)	6 (16.7)	2 (5.6)	34 (94.4)
– Follow-up schedule after discharge	35 (97.2)	1 (2.8)	28 (77.8)	8 (22.2)

Table (7) distribution of the study participants according to their mean percent score in each knowledge domain pre and post-instruction, there were significant relation between patients knowledge pre and post instruction in their knowledge regarding general knowledge related to liver, knowledge related to liver transplantation,

knowledge related to immunosuppresses, Knowledge related to nutrition, Knowledge related to postoperative visits and follow-up and their total knowledge score, where Friedman test equal (32.0, 34.0, 31.0, 19.5, 29.1 and 32.1 respectively) with p value equal (<0.001) for all of them.

Table (7): Total knowledge pre & post instructions between liver transplant recipient N = 36

Knowledge domains	Knowledge pre	Knowledge post	F	p- value
	Mean± SD	Mean ± SD		
– General knowledge related to liver	0.6±0.6	1.9± 0.2	Friedman:32.0	p:<0.001*
– Knowledge related to liver transplantation	3.5±2.8	9.5±1.0	Friedman:34.0	p:<0.001*
– Knowledge related to immunosuppress	0.5±1.5	8.2±1.6	Friedman:31.0	p:<0.001*
– Knowledge related to nutrition	3.3±1.8	5.5±1.0	Friedman:19.5	p:<0.001*
– Knowledge related to postoperative visits and follow-up	0.2± 0.4	1.1± 0.5	Friedman:29.1	p:<0.001*
Total knowledge score	8.2±5.6	26.3±3.5	Friedman:32.1	p:<0.001*

* Significant at p value<0.005

F= Friedman test

Figure (1): portrays the distribution of the study participants according to their total knowledge category pre and post-instruction, less than half (44.4%) of the studied patients have good knowledge

pre-instruction compared to slightly less than seventy percent (69.4%) who have good knowledge post instructions.

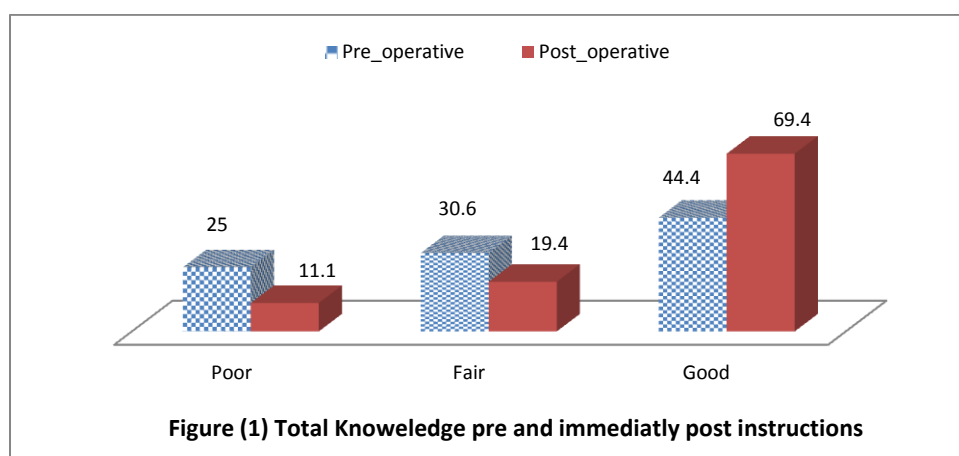


Figure (1): Comparison between study participants total knowledge related to liver transplantation before and immediately post after exposure to preoperative instructions. N=36

Table (8) presents the distribution of the study participants according to their medication adherence pre and post-instruction, the majority (86.1%) of the study participants didn't know the prescribed immunosuppressive medication to him/her pre instruction, compared to the majority (97.2%) of them who knows post instruction. the majority (83.3%) of the studied patients didn't know the type of immunosuppressive medication used pre

instruction, compared to the minority (5.6%) of them who didn't know post instruction. Moreover, the majority (88.9 %) of the studied patients didn't know the Frequency of receiving the medications pre instruction, compared to the minority (2.8%) of them post instruction. Finally, the majority of the studied patients pre and post instruction with the same percent (97.2%) reflect that their adherence to use prescribed dose correctly.

Table (8): Assessment patients' compliance to immunosuppressive therapy one month post exposure to preoperative instructions N= 36

Medication Compliance	Pre-instruction (36)	Post-instruction (36)
	No (%)	No (%)
Know the prescribed immunosuppressive medication to him/her		
– No	31 (86.1)	1 (2.8)
– Yes	5 (13.9)	35 (97.2)
The type of immunosuppressive medication used		
– Tablet	4 (11.1)	30 (83.3)
– Tablet and Injection	2 (5.6)	4 (11.1)
– Don't know	30 (83.3)	2 (5.6)
Do you keen to Receive the medication on time daily?		
– Yes	36 (100.0)	36 (100.0)

Medication Compliance	Pre-instruction (36)	Post-instruction (36)
	No (%)	No (%)
The time of receiving the medications		
– Don't know	6 (16.7)	1 (2.8)
– In the middle of meal	1 (2.8)	0 (0.0)
– After meals	3 (8.3)	0 (0.0)
– Fasting two hours before and After	26 (72.2)	35 (97.2)
Frequency of receiving the medications		
– Twice	4 (11.1)	35 (97.2)
– Don't know	32 (88.9)	1 (2.8)
Number of prescribed medications		
– Once	3 (8.3)	14 (38.9)
– Twice	0 (0.0)	17 (47.2)
– Three	1 (2.8)	3 (8.3)
– Don't know	32 (88.9)	2 (5.6)
Adherence to use prescribed dose correctly		
– No	1 (2.8)	1 (2.8)
– Yes	35 (97.2)	35 (97.2)

4. Discussion

The current study shows that the majority of the study participants were male (Table 1). This finding similar to **Mendes et al (2013)** who reported that the majority of the study participants were male, additionally, more than two third of the study participants were male according to **Rowe (2014)** results, and more than half of the studied transplant recipient by **Gordin, (2016)** were male. From the researcher perspectives the reasons behind that male patient were exposed to transplantation greater than female may be attributed to the level of exposure of these patients to liver problems than female since male exposure to factors that affecting liver is high such as viruses, toxic substances and so on.

Furthermore, the current study declared that less than half of the studied patients aged 40 to less than 49 years and 50 to less than 59 years (Table 1). The same findings reported by **Mendes et al (2013)** and **Rowe, (2014)** who found that the mean age of their patients was above 50 years. These findings were realistic from the researcher point of view since the liver transplantation surgery commonly observed among older people.

Regarding educational level the current study revealed that around one third of the studied patients graduated from University level and Secondary level of education (Table 1). Nearly the same was reported by **Abdel-Ghany et al (2016)** study and **Mendes et al (2013)** since they found that less than one quarter of liver transplant clients was university graduate. It is considered a strength point from the researcher perspective, since it affects patient gain for education regarding transplantation.

In relation to working condition, the current study revealed that around one tenth of the studied patient didn't work (Table 1). In contrast **Mendes et al (2013)** findings revealed that the majority of their patients were on a leave of absence and almost two

thirds of liver transplant clients did not work (**Abdel-Ghany et al, 2016**).

Regarding patients health history the current study presents that majorities of the studied patients have a previous history of Encephalopathy, followed by slightly more than two third who have liver cirrhosis, compared to the minority of them who have liver failure and liver tumor (Table 2). These findings supported by different studies either nationally or international, where **Byass (2014)** suggests that liver Cirrhosis caused more than one million deaths in 2010, with more than one million due to liver cancer and acute hepatitis. Moreover, according to **WHO Global status report on non-communicable diseases (2011)** there are more than half of deaths occurred as a result of non-communicable diseases (NCDs), including cancers, cardiovascular disease and liver cirrhosis, and **Tucker (2013)** report that the total death from liver cirrhosis and liver cancer increases by 50 million a year for more than two decades, according to the World Health Organization's first study on liver disease deaths. These findings give the reason behind the excess rate of transplantation related to liver problems from the researcher perspective.

Furthermore, less than one fifth of the studied patients in the current study suffering from diabetes mellitus and renal disease and the minority were suffering from hypertensive disorder (Table 2). Nearly the same findings reported by **Abdel-Ghany et al, (2016)** where more than half of patients had chronic diseases such as diabetes, hypertension and heart diseases.

The current study revealed that more than half of the studied patients Pre-instruction have incorrect knowledge regarding liver description, compared to all of them who have correct knowledge Post-instruction. Only around one tenth of the studied patients' pre-instruction has correct knowledge

regarding liver function compared to the majority of them who have correct knowledge post-instruction (Table 3). In this regards according to **a study done in Egypt for Knowledge and Daily Living Activities of Post Liver Transplant Clients (2016)** the majority of the studied clients had poor score level of knowledge about liver features (**Abdel-Ghany et al, 2016**).

Around one quarter of the studied patients in the current study pre instruction didn't know sign and symptoms of body resistance (rejection) of the transplantation, and sign & symptoms of respiratory tract infection, compared to all of them post instruction (Table 4). These results supported by **Mehrez (2017)** findings who study Liver Transplantation in Egypt and found the same results regarding rejection as the current study finding.

So the researcher in the current study focusing on raises patients 'awareness regarding signs of rejection in order to provide early intervention to such condition.

The current study revealed that the minorities of patient's pre instruction have correct knowledge regarding medication use as immunosuppressive compared to the majority of them post-instruction (Table 5). This finding goes in line with **Abdel-Ghany et al (2016)** who reported that almost two thirds of the studied patients in their study had poor score level of knowledge regarding to medication compliance. So the researcher highlights the importance of teaching clients about medication use and its side effects.

The current study presents that around two fifth of the studied patients pre instruction have correct knowledge regarding the relation between liver and nutrition, diet plan post transplantation, and food that recommended be taken post transplantation compared to the majority of them post instruction (Table 6). This finding agree with **Abdel-Ghany et al, (2016)** stated that almost three quarters of the studied patients had poor score level of knowledge about permitted nutrition and allowed activities

The researcher interprets the importance of teaching the patient their needs to fulfilling the nutritional requirements post operatively. The same interpretation reported by **Hammad et al (2017)** who declared that patient's nutritional status can worsen quickly in the immediate postoperative period as a result of preoperative malnutrition, surgical stress, immunosuppressive therapy, post-interventional complications, postoperative protein catabolism, and fasting periods. This suggests require for preemptive nutritional support with liver-adapted formulas contain added carbohydrates, fat and proteins.

From the researcher perspective critical care nurses play a significant roles regarding patients

education regarding transplantation which in turn leads to decrease the incidence rate of post transplantation complications. Health education can be provided through using multimedia for teaching, in this regards **Zheng (2014)** concluded that the Patient Health Record system could be a useful tool to support patient-centered liver transplant care by bridging the health information gaps, enhance communication between patients and physicians, facilitating clinical process and patient empowerment in addition to follow up.

The current study portrayed that the minorities of the studied patients' pre instruction have correct knowledge regarding follow-up schedule after discharge compared to less than one quarter who have correct knowledge post instruction (Table 7) the same finding reported by **Young (2017)**. From the researcher perspective follow-up is one of the important issues to be discussed with the client in order to safeguard them against complication and equip them with adequate information regarding early detection of any problem.

Generally, the current study findings related to patient's knowledge pre and post instruction revealed a significant relation between patients knowledge pre and post instruction in each knowledge domain. Additionally, less than half of the studied patients have good knowledge pre-instruction compared to less than three quarter who have good knowledge post instruction, with a statistically significant relation between both of them (Figure (1) and Table 8). These findings similar to the **Egyptian study done at 2016** which present that the majority of the studied clients had poor score level of knowledge, and most of them had improper score of daily living activities (**Abdel-Ghany et al, 2016**). Also, the correct answer rate increased from around two third before the intervention to more than three quarters afterwards. This difference was statistically significant as reported by **Mendes et al, (2013)**.

From the researcher point of view these findings reflect the positive effects gained from the instruction provided for the patients that declared by the presence of significant relation, since the objective of health education is to facilitate patients not only to understand their current health condition, but also to make decisions about health care as well as improve the stability of care at home, reduce levels of anxiety and potential complications, and improve adherence to the proposed treatment plan, maximizing independence and empowerment.

5. Conclusion

The main conclusion drawn from the present study, it can be concluded that, patient who were exposed to the preoperative instruction related to

immunosuppressive therapy post liver transplantation showed a relative improvement in their knowledge as liver transplantation, nutritional, follow-up, adherence to immunosuppressive therapy and reduce of immunosuppressive complication as rejection, onset of new diabetes mellitus, infection, neurological, psychological, renal dysfunction and respiratory than before application of instruction.

Recommendations

The following recommendations are based on the findings and conclusions drawn from the study:-

- All client scheduled for liver transplantation and their families need adequate knowledge and skills about liver transplantation to adapt with their life after transplantation
- Distributing the health education instructions to all liver transplant clients.
- Orienting health team personnel about the importance of health education provided to liver transplant clients.
- Establishment of a web site that includes all information related to liver transplantation process and all aspects of health education that involve different educational materials, Medias, and audio -visual aids.
- Conducting of psychological rehabilitation programs to meet the liver transplantation client s' needs and encouraging them to participate in.

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