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Original Article

Effect of Stem Cell Transplantation Preparation on Patients' Knowledge and Anxiety Level

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ABSTRACT

Background: Hematopoietic stem cell transplantation is a complex and singular treatment used for hematological and non-hematological diseases. Preparation related to hematopoietic stem cell transplantation reduce feeling of anxiety and improve quality of life. **Aim:** Evaluate the effect of stem cell transplantation preparation on patients′ knowledge and anxiety level. **Methods:** Quasi-experimental research design was used. **Setting:** The study was conducted at Oncology center, Mansoura University, Egypt. **Subject:** A purposive sample of 27 patients of both sexes who were willing to participate in the study. **Tools:** Two tools were used; Tool I Interview questionnaire sheet and Tool II State-Trait Anxiety Inventory (STAI). **Results** There was a statistically significant improvement in patients′ knowledge level regarding stem cell transplantation post- and follow up compared to before implementation of transplant preparation. The level of anxiety among stem cell transplantation patients decreased post-transplant and follow (48.1%-40.7% respectively) compared to pre implementation of transplant preparation (81.5%)**Conclusion:** Preparation of patients undergoing hematopoietic stem cell transplantation had a great value in enhancing patients′ knowledge and reducing anxiety level. **Recommendations:** Written instruction related to preparation about stem cell transplantation should be available for all patients undergoing stem cell transplantation.

Keywords: *Anxiety level, Preparation, Stem cell, Transplantation*

Introduction:

Hematopoietic stem cell transplantation is a medical procedure used to replace and replenish the defective bone marrow of those with malignant and non-malignant hematologic diseases **(Ali, Mohmed, Sayed & Ahmed, 2019)**. It has the potential to improve outcomes and provide certain cancer patients hope and practical therapeutic options **(Nikolousis, Sakia, Horgan & Ahmed, 2021).** Hematopoietic stem cell transplantation therapies combine high-dose chemotherapy and radiation regimens, the infusion of healthy bone marrow or peripheral blood stem cells and carefully supportive care to combat cancers that persist beyond first line therapy **(Nelson, 2020).**

Hematopoietic stem cell transplantation remains a dangerous procedure with many potential complications **(Board, 2022).** Complications are inevitable, but continuous follow-up education and screening post-transplant may guide program development strategies that enhances coping, communication and education to better meet SCT patient needs **(Gournay et al.,2021).** Also, anxiety and depressive symptoms impair treatment adherence and have a negative impact on patients' survival and perceptions of quality of life after the transplant **(Janicsák, Ungvari & Gazdag, 2021).**

Education on HSCT is recommended for all patients to improve their knowledge and decrease anxiety. The nurse plays a vital role before, during and after HSCT. Preparation related to hematopoietic stem cell transplantation include helping patients to understand complex information, providing support and assisting them to understand all information regarding the transplant process and possible complication. The nurse′s role in educating the patient is important part of successful HSCT. So, adequate preparation prior to transplant and effective communication throughout the transplant process can help HSCT patients and their caregivers in making informed treatment decisions, improve patients and their families' knowledge regarding HSCT, reduce anxiety and depression and increase quality of life **(Cioce et al., 2020).**

Significance of the study:

The medical complexity and multiple transition points associated with transplant treatment made the patients have a higher risk for

hospital readmission, medication errors, and safety issues, which can lead to life-threatening issues and prolong recovery **(Avlijas, Squires, Janet, Lalonde, & Backman, 2023)**. In order to make stem cell transplantation safer, psychological distress of patient must be taken into account. Patient need to know therapeutic procedure, pharmaceutical treatment, Additionally, proper education, preparation, and effective patient communication may reduce readmission rates and length of stay **(West, Varnes & Hudspeth 2023).**

Aim of the study:

Evaluate the effect of stem cell transplantation preparation on patients' knowledge and anxiety Level.

Research Hypothesis:

HI: Stem cell transplantation preparation will improve patients' knowledge.

HII: Stem cell transplantation preparation will reduce patients' anxiety level.

Methods:[1]

Research Design: A quasi-experimental research design one group pre/ post- test was utilized to achieve the aim of the study.

Setting: This study was conducted at Stem Cell Transplantation unit at Oncology Center Mansoura University Hospital.

Subjects: A purposive sample of 27 patients who were willing to participate in this study.

Inclusion criteria:

- Adult patients of both sexes between (20-60) years.
- Full conscious patients.

Exclusion criteria:

- Patients with chronic disease such as cardiac, renal and diabetes mellitus
- **Sample size:**

Calculating sample size for studying the effect of pre stem cell transplantation preparation on patients' knowledge and anxiety, using clin calc.com to calculate sample size at 3% ∞ error (97.0% significance) and 10.0 β error (90.0% power of the study), assuming the average score of preparatory instruction for HSCT is (3.48±1.54) before education and it is (5.0 ± 0.0) after education (Hashem and Abd El-Naby, 2016). The calculated sample size is 24 in each group. We can add 10 % for better data and follow up drop out, so the field study sample will be 27 patients.

Tools: Two tools were used to collect data of this study, it includes:

Tool I: Interview Questionnaire Sheet:

This tool was developed by the researcher after reviewing relevant literatures to collect base line data. It consists of two parts as follow:

Part 1: Demographic and Medical Data:

This part was used to assess personal data such as patient's age, gender, marital status, level of education and occupation. Medical data such as patients' diagnosis, date of admission, past and present medical history

Part 2: Patient's Knowledge Assessment Sheet:

This part was used to assess patients' knowledge as pre and posttest. It includes 65 questions; 9 multiple choices questions for knowledge related to stem cell transplantation and 56 true or false questions to assess knowledge related to preparation of stem cell transplantation covering general and specific preparation. General preparation includes 20 questions; (5 questions general), diet (8 questions for diet), (4 questions for personal hygiene), (3 questions for infection control measures). Specific preparation includes 36 questions; (3 questions for growth factor), (7 questions for stem cell separation and peripheral catheter insertion), (3 questions for conditioning treatment), (4 questions for hickman catheter insertion), (5 questions for stem cell transplantation), (4 questions after stem cell transplantation), (10 questions for discharge plan) **(Sekerci & Bicer, 2020).**

scoring system: Knowledge variables were divided into multiple choice questions and true, false questions. Each respondent was given one point for each correct answer and zero for an incorrect, wrong or missed answers. The total score of the patient′s knowledge include the following:

Poor < 50% of total score (< 18.5)

Fair = 50 % to 75% of total score (18.5-27.75)

Good ≥ 75 % (> 27.75)

Tool II: Anxiety Scale:

State- Trait Anxiety Inventory (STAI) was adopted from **Spielberger and Reheiser (2017).** It consists of two scales state and trait. A-State scale required people to indicate how they feel at the present moment, it contains 20 questions (1-20) and four-point scale (not at all, sometimes, moderately so and very much so). A-Trait scale asked people to describe how they feel generally, it includes 20

questions (21-40) and four- point scale (almost never, sometimes, often and almost always).

Scoring system:

State scale:	Trait scale:
Score1: not at all	Score1: almost never
Score2: sometimes	Score2: sometimes
Score3: moderately so	Score3: often
Score4: very much so	Score4: almost always

Level:

Range of scores for each subscale is (20-80)

Mild anxiety: (20-40)

Moderate anxiety:(40-60)

Severe anxiety: (60-80)

Data collection process:

Phase I: preparatory phase:

- An ethical approval was obtained from the Research Scientific Ethical Committee of the Faculty of Nursing Mansoura University.
- An official written permission to carry out the study was obtained from the director of the oncology center mansoura university hospital.
- **Validity of the tools:** The tools was tested for content validity by a jury of ten experts from both field of nursing and medicine faculty staff and any required modifications was done.
- **Reliability**: The tools were assessed by Cronbach's alpha to check the internal consistency of the tools as follow, knowledge reliability 0.895 which refers to be reliable, while hospital anxiety was 0.874.
- **Pilot study:** It was carried out on 10% (3) of study sample before starting the data collection and they were excluded from the total studied sample to test the tool for applicability and clarity of the developed tool and to determine the length time needed to collect data. The tools were modified according to results of pilot study.
- **Tool development:** Tool I (part1 and 2) was developed by the researcher after reviews of related literature. Tool (II) was adopted from (Spielberger & Reheiser,2017).
- **Phase II: Implementation phase:**
- During this phase the researcher met every patient included in the study to give full explanation of the aim of the study.
- The instruction about stem cell transplantation preparation was implemented by the researcher in form of two sessions as follows:
- First session: it covered items related to knowledge about stem cell transplantation such as definition, types, sources, uses and complication.
- Second session: it covered knowledge about general and specific preparation. General preparation such as diet, personal hygiene, infection control measures. Specific preparation such as growth factor, stem cell separation, peripheral catheter insertion, conditioning treatment, stem cell transplantation catheter insertion, preparation during, after stem cell transplantation and discharge plan.
- The researcher interviewed each patient individually two times in preparation room where patient stays approximately two weeks before admission to transplantation unit.
- The time consumed for each educational session was 30-45 minutes.
- Colored booklet was given to patients to understand educational content.
- Data were collected from the beginning of September 2021 to the end of August 2022.

Phase III: Evaluation phase:

- Patient was evaluated for knowledge and anxiety as a pretest and was evaluated for two times as a posttest using the developed and adopted tools as follows:

a. First time: immediately after hematopoietic stem cell transplantation preparation implementation

b. Second time: two weeks from first time.

Ethical consideration:

Permission to conduct the study was obtained from research ethical committee of faculty of nursing, Mansoura University (1109). Prior to the initial interview, the researchers introduced themselves to patients; each potential patient was fully informed about the purpose and nature of the study, each potential subject who agreed to participate in the study asked to sign a written consent form. The researchers emphasized that participation in the study is entirely voluntary and withdrawal from the study would not affect the care provided; Anonymity and confidentiality was assured through coding the data.

Statistical Analysis:

All statistical tests were conducted using SPSS for windows version 25.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean ±standard deviation

(SD). Categorical data were expressed in frequency and percentage. The comparisons were determined using Student's t test for two variables with continuous data, One Way ANOVA test for more than two variables with continuous data Chi-square test was used for comparison of variables with categorical data. Pearson correlation analysis was used for assessment of the inter-relationships among quantitative variables. To identify the independent predictors of total knowledge & hospital anxiety score, multiple linear regression analysis was used after testing for normal distribution, normality, and analysis of variance for the full regression models were done. Statistical significance was set at $p<0.05$.

Results:

Table 1 Demographic characteristics of the studied patients. In relation to gender, it can be observed that three fifths of the patients (63%) were male and one third of them (33.3%) aged (41-50). In relation to educational level, the highest percentage of patients were secondary (40.8%) and about two thirds of patients were working (70.4%).

Figure 1 Medical data of the studied patients regarding stem cell transplantation. It was noticed that majority of studied patients were diagnosed with lymphoma (85.2%). Previous admission to hospital for surgery was reported in (44.4%) of studied patients for a period of more than 5 years (37%). In relation to family history of cancer (29.6%) reported positive family history of cancer with (18.6%) from second degree and (11.1%) from first degree.

Figure 2 Total knowledge levels of the studied patients. This figure illustrated that level of knowledge was significantly higher post-transplant and at follow up in comparison to pre transplant.

Figure 3 Total anxiety level of studied patients. This table clarified that the severity level of anxiety of the studied patients post-transplant and follow up were (48.1% -40.7% respectively) while pre transplant was (81.5%), this means that level of anxiety was significantly low post transplant and at follow up in comparison to pre transplant.

Table 2 Correlation between knowledge and anxiety level of studied patients pre, post and follow up the transplant. This table showed that there was statistically significant correlation between patients' knowledge and anxiety post-transplant and follow up (P=0.045- 0.037 respectively).

Table 1: Demographic characteristics of the studied patients (N=27)

Items	No	%
Gender		
▪ **Male**	17	63
▪ **Female**	10	37
Age group (Years)		
▪ **21-30**	3	11.1
▪ **31-40**	8	29.7
▪ **41-50**	9	33.3
▪ **51-60**	7	25.9
Marital status		
▪ **Married**	27	100
Educational level		
▪ **Illiterate**	7	25.9
▪ **Preparatory**	5	18.5
▪ **Secondary**	11	40.8
▪ **University**	4	14.8
Occupation		
▪ **Working**	19	70.4
▪ **Not working**	8	26.6

Figure 1: Medical data of the studied patients (N=27)

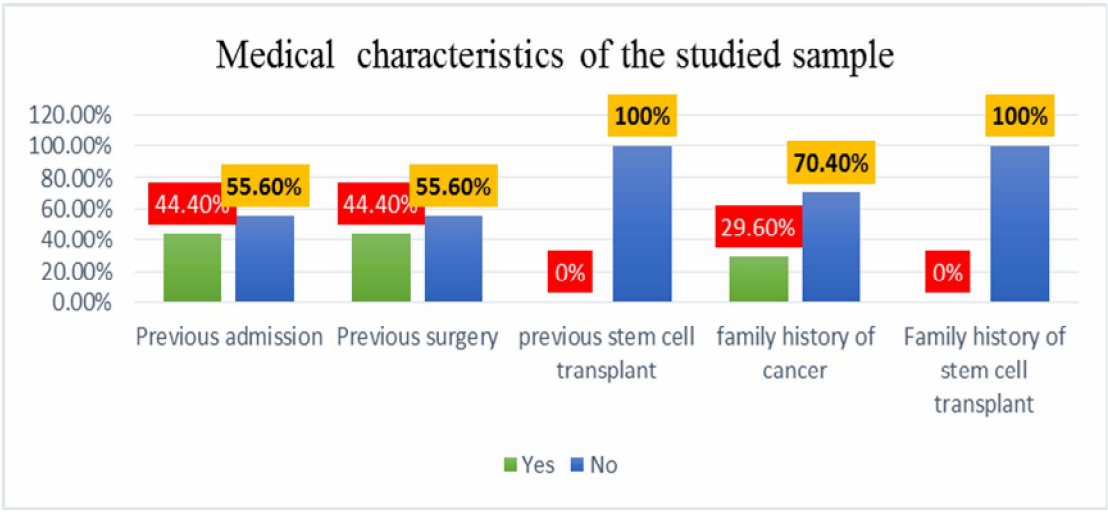

Figure 2: Total knowledge levels of the studied sample (N=27)

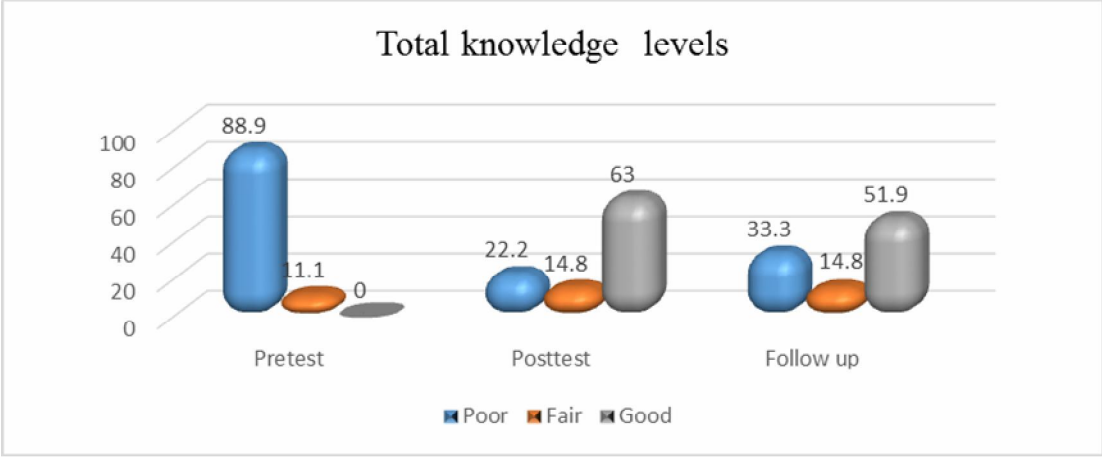

Figure 3: total anxiety level of studied patients pre, post and follow up the transplant

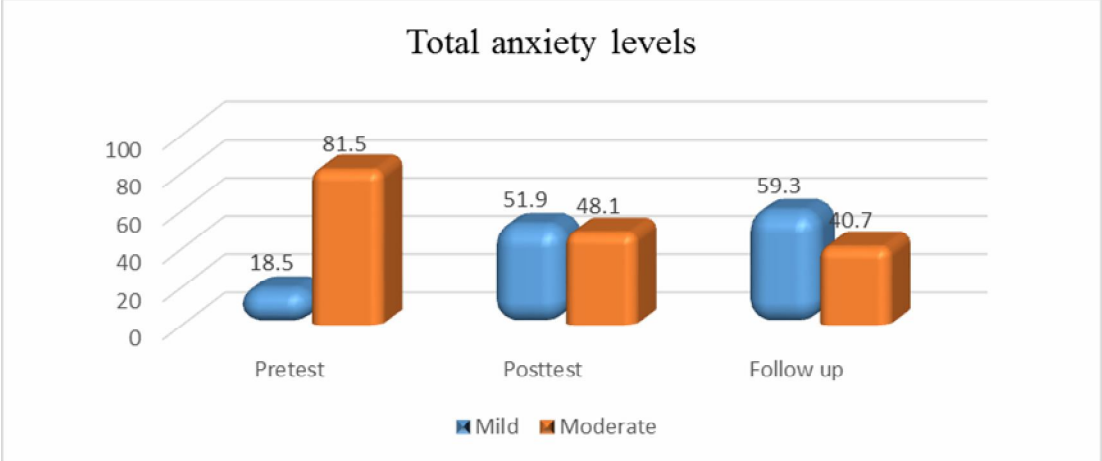

Table 2: Correlation between knowledge & anxiety level of studied patients pre post and follow up the transplant

Phase	Variables	r	*p*
Pre transplant	Total knowledge & total anxiety score	-0.361	0.065
Post-transplant	Total knowledge & total anxiety score	-0.123	0.045
Follow up	Total knowledge & total anxiety score	-0.186	0.037

Discussion

Stem cell transplantation (SCT) is a set of techniques aim to replace disease-damaged or destroyed cells with healthy, functioning ones. The SCT procedure is quite aggressive and exposes patients and their families to several risks. The procedure exposes the patient to a variety of potentially stressful physical and psychological events. Because of these numerous pressures and poor knowledge patients' coping mechanisms deteriorate, which leads to a variety of stress-related behavioral and psychological reactions. So it is very crucial for patients to have stem cell transplantation preparation to improve knowledge and decrease anxiety **(Machowicz et al., 2022)**

Regarding demographic characteristics of the studied patients, the findings of the present study represented that about more than half of patients were males. This result agrees with **Abd Elrhman Khalil, Sheta &Ali Ibrahim, (2022)** who confirmed that near more than half of study group were males. The results also agree with **Carre et al. (2019)** who found that more than half of the studied patients were males. This is because lymphoma is more common among males.

According to age, the present study revealed that one third of studied patients′ age was range from forty to fivty years. This finding is consistent with **Abd Elrhman Khalil, Sheta &Ali Ibrahim, (2022)** who reported that more than half of the studied patients were in the age group of forty-one to fivty years. In contrast, **Abdelkader Abdelfattah, Mohamed Safwat, Mohamed& Mohamed Maarouf, (2022)** revealed that about more than half of studied patients′ age was range from twenty to forty years.

Pointing to education level, the highest percentage of patients were secondary education. This finding in accordance with **Abd Elrhman Khalil, Sheta and Ali Ibrahim, (2022)** who found that the majority of studied patients had secondary educational level. Also, **Evans et al., (2021)** revealed that more than half of study group had secondary education. This could be due to low socioeconomic status community policies in graduating quickly from school and this helps in employment.

The present study show that the majority of patients were diagnosed with lymphoma. This result supported by **Azevedo et al., 2018** who confirmed that autologous transplantations were performed in patients with non-Hodgkin′s lymphoma (NHL) and Hodgkin′ disease (HD). In contrast, **Abdelkader Abdelfattah, Mohamed Safwat, Mohamed& Mohamed Maarouf, (2022)** who revealed that two fifth of studied patients had acute myeloid leukemia(AML). Also, **Passweg et al. (2019)** found that about half of patients had acute myeloid leukemia.

Concerning patients′ knowledge about hematopoietic stem cell transplantation and preparation, the current study demonstrated that the level of knowledge was significantly higher post-transplant and at follow up in comparison to pre transplant. This result is consistent with **Rafik, El-senousy, Mohamed and Hussein (2021)** who clarified that the majority of studied patients had satisfactory level of general knowledge post-transplant regarding to signs and symptoms of disease, definition stem cells used in transplant and complication of stem cell transplantation. Moreover, **Cioce et al., (2020)** who demonstrated that there is statistically significant increase in knowledge among patient post –transplant compared to pre transplant. Furthermore, **Ali, Elsawi, Hashem, and Mohammed, (2018)** who reported that the majority of the studied patients had increased level of knowledge post-transplant compared to pre transplant. Pre stem cell transplantation, there was poor knowledge among studied patients regarding stem cell transplantation. This could be due to their educational level and lack of guidance from health care members**.** Improvement of the knowledge post transplantation may be attributed to influence of preparation beside the participants′ adherence with these preparations using attractive booklet with a simple language.

Concerning patients′ anxiety, the present study revealed that anxiety level decrease in post-transplant and follow up compared to pre transplant. This may be due to preparation and written guidelines that increase patients′ knowledge and decrease their anxiety. This result is consistent with **Chen, Yu, Xie, Wu and Hu (2022)** who clarified that the severity of anxiety of hematopoietic stem cell transplantation patients increased before transplantation, due to lack of information and declined after transplantation. In the same line, **Rafik, El-senousy, Mohamed and Hussein (2021**) reported that slightly more than two fifths of the patients developed moderate to severe anxiety before transplantation that decrease post stem cell transplantation due to decreased their knowledge. In contrast, **van Haren et al., (2018)** reported that there were no marked differences found in level of anxiety before and after implementing stem cell transplantation. This study finding may be due to preparation and written guidelines that increase patients′ knowledge and decrease their anxiety.

The present study showed that there was statistically significant correlation between patient′s knowledge and anxiety post-transplant and follow up. This is in the line with **Rafik, El-senousy, Mohamed and Hussein (2021**) who stated that there was statistically significant correlation between patients′ anxiety and their level of knowledge as patients with high level of knowledge, their anxiety level may decrease. Also, this finding is supported by **Hashem& Abd El-Naby, (2016)** who reported that there was statistically significant correlation between patients′ knowledge and anxiety as the patient level of knowledge would be helpful in reducing anxiety during hematopoietic stem cell transplantation. This may be related to preparation before transplantation that increase knowledge and decrease anxiety.

Conclusion

- Level of knowledge was significantly higher after stem cell transplantation and follow up in comparison to before stem cell transplantation.
- The anxiety level was significantly low after stem cell transplantation and at follow up in comparison to before stem cell transplantation.

Recommendations

In the light of the findings of the present study, the following recommendations are suggested:

1. Continuous education is necessary for patients because stem cell transplantation is vital procedure.
2. Written instruction related to preparation should be available for all patients undergoing stem cell transplantation.
3. Activate a hot line contact for urgent consultations of patient after stem cell transplantation.

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