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Effect of Exercise Program on Hematopoietic Stem Cell Transplantation Related Morbidities

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INTRODUCTION

The positive effects of exercise interventions on hematopoietic stem cell transplantation (HSCT) related side effects were reported in the previous studies.

These include:

- ✓ Fatigue, GIS symptoms ↓
- ✓ Physical fitness, cardiopulmonary capacity, muscle strength ↑
- ✓ Emotional status ↑
- ✓ Quality of life ↑
- ✓ Immune functions ↑
- ✓ Survival rates ↑

Wiskemann J, Huber G (2008) Physical exercise as adjuvant therapy for patients undergoing hematopoietic stem cell transplantation. *Bone Marrow Transplant* 41:321–329

Steinberg A, Asher A, Bailey C, Fu JB (2015) The role of physical rehabilitation in stem cell transplantation patients. *Support Care Cancer* 23:2447–2460

De Lisio M, Baker JM, Parise G (2013) Exercise promotes bone marrow cell survival and recipient reconstitution post-bone marrow transplantation, which is associated with increased survival. *Exp Hematol* 41:143–154

AIM

- There was no study regarding effects of exercise on HSCT-related morbidities
- Therefore, we aimed to investigate effect of exercise on HSCT related morbidities during the first 100 days.



MATERIALS AND METHODS


The present study was performed at Hacettepe University Oncology Hospital Department of Bone Marrow Transplantation.

Inclusion Criteria

- Individuals between the age of 18 and 65 years and planning HSCT,
- Individuals without severe cardiovascular, pulmonary, musculoskeletal, and/or neurologic disease,
- Individuals who were able to cooperate and willing to participate in the study.



MATERIALS AND METHODS

- Physical assessments were performed by a physical therapist.
 - After assessments, included patients (n=50) were assigned as intervention group (IG, n=25) and control group (CG, n=25).
 - A supervised and individual aerobic, strengthening, and endurance exercises were performed through hospitalization.
 - Exercise program was adjusted to the patients' functional status and individual needs.
 - After discharge, home exercises (walking, strengthening, and endurance exercises) were given to the IG.
 - The CG received usual care during the study process.
 - The presence of HSCT-related morbidity was recorded from hospital records.
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EXERCISE PROGRAM

- Supervised exercise program was performed based on patients' daily hematologic, clinical status, and vital signs.
- If needed, exercise sessions were modified, postponed, or cancelled.
- Light to moderate intensity exercises (RPE: 10-14) were implemented.
- Exercise compliance to the home exercises was controlled during the hospital controls up to the 100th day of HSCT.



RESULTS

- The demographic and medical characteristics were showed in the Table.
- There was no significant difference between the groups terms of the assessed variables.

	IG (n=25)	CG (n=25)
Age, years	51.56±12.22	46.0±16.63
Gender, n (%)		
Female	11 (44)	13 (52)
Male	14 (56)	12 (48)
Diagnosis, n (%)		
Multiple Myeloma	14 (56)	7 (28)
Lymphoma	7 (28)	11 (44)
Leukemia	3 (12)	5 (20)
Myelodysplastic syndrome	1 (4)	1 (4)
Germ cell tumor	-	1 (4)
Transplantation type, n (%)		
Autologous	21 (84)	19 (76)
Allogeneic	4 (16)	6 (24)
Preparation regiment, n (%)		
Myeloablative	25 (100)	23 (92)
Non-myeloablative	-	2 (8)



RESULTS

- The recorded post-HSCT morbidities were showed in the table.
- There was significant difference between the groups in terms of complication rate during the first 100 days of transplantation (Ki-square test; IG: 20%, CG: 52%, $p=0.018$).

Complication, n	Intervention Group	Control Group
Relapse	1	6
Acute renal failure	1	1
Severe infection	1	2
Thrombo-phlebitis	1	-
Engraftment syndrome	1	-
Myocardial infarction	-	2
Hepatitis B	-	1
Mortality	-	1
Total	5 (20%)	13 (52%)

DISCUSSION

- The first 100 days after HSCT is a critical period which early post-HSCT adverse events are highly seen.
- In our study exercise have led to decrease in HSCT-related morbidities during the first 100 days.
- Exercise interventions may increase treatment success and recovery after HSCT by improving hematologic reconstitution, immune cell functions, and physical fitness.
- The possible physiologic mechanisms underline exercise and hematopoietic reconstruction after HSCT should be further investigated in HSCT population.

De Lisio M, Baker JM, Parise G (2013) Exercise promotes bone marrow cell survival and recipient reconstitution post-bone marrow transplantation, which is associated with increased survival. *Exp Hematol* 41:143–154

Wiskemann J, Kleindienst N, Kuehl R, Dreger P, Schwerdtfeger R, Bohus M. Effects of physical exercise on survival after allogeneic stem cell transplantation. *Int J Cancer*. 2015;137(11):2749-2756.