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Original Article

Psychosocial Assessment of Patients Undergoing Bone Marrow Transplant and Its Correlation with Transplant Outcome

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ABSTRACT

Objective: To look at how the psychosocial factors impact outcomes of bone marrow transplant in transplant recipients, in a resource-limited country.
Study Design: Cross-sectional study.
Place and Duration of Study: Armed Forces Bone Marrow Transplant Centre, Rawalpindi, Pakistan from Jul 2022 to Jun 2023.
Methodology: A total of 30 adult patients were included by non-probability Convenience Sampling, who underwent bone marrow transplant. Transplant outcome was measured in terms of hospital readmission rate, overall survival and disease-free survival at 90 days post-transplant. Pre-transplant Psychosocial assessment was done at time of admission for transplant prior to start of conditioning chemotherapy using Psychosocial Assessment of Candidates for Transplantation scale (PACT).
Results: Out of total, 21 patients (70.0%) were male and 9 patients (30.0%) were female. Median age at time of transplant was 30.50(IQR: 20.75- 49.25) years. At follow up of 3 months OS was 87% (n=26, mean OS days= 81.20+4.14) and DFS was 83.0% (n=25, mean DFS days=69.04+4.66). Average duration of hospital stay was 20.53+ 9.58 day. All patients were low risk on HCT CI score. Higher Readmission rates were seen in patients (n=4, 13%) with lower PACT scores in domain of social stability. Higher final PACT score was significantly associated with improved OS and DFS.
Conclusion: We concluded that patient's psychosocial status can impact post HSCT outcome. Post transplant outcome and hospital readmission rate can be improved with good psychosocial support. Therefore, we recommend psychosocial assessment before transplant to identify high risk patients, who require additional resources and support, to improve post-transplant outcome.

Keywords: Bone marrow transplantation, Disease-free survival, Psychosocial factors, Readmissions, Survival.

How to Cite This Article: *Awan MN, Shahbaz N, Hidayat I, Riaz S, Tariq H, Toor SH. Psychosocial Assessment of Patients Undergoing Bone Marrow Transplant and Its Correlation with Transplant Outcome. Pak Armed Forces Med J 2025; 75(6): 1235-1239.*
DOI: https://doi.org/10.51253/pafmj.v75i6.12223

INTRODUCTION

Hematopoietic stem cell transplant (HSCT) has many psychosocial implications.[1] Various psychosocial factors can impact transplant outcomes in terms of survival, readmission rate, non-relapse mortality, duration of hospital stay and post-transplant quality of life (QOL).[2] Factors including family support, psychological issues, and patients' attitude and compliance can impact transplant outcomes. With help of various psychosocial assessment tools, patients who need additional support can be identified prior to HSCT, to reduce post-transplant mortality risk.[3,4]

Psychosocial assessment was initially utilized in solid organ transplantation for selection of appropriate candidates, in developed world.[5] Psychosocial evaluation is considered a part of the comprehensive pre transplant assessment along with other pre- BMT assessments.[6] Anxiety and depressive symptoms influence patients' compliance and adversely affect patients' survival and perceptions of QOL after the transplant.[7]

In Pakistan, limited data is available regarding implication of psychosocial factors on post-transplant outcome.[8] The aim of this study was to look for association of various psychosocial.

METHODOLOGY

This was a cross sectional study, approved by the ethics committee (Ref: IRB-014/AFBMTC/Approval/2021) and was performed according to the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. A total of 30 patients who underwent Bone marrow transplant from July, 2022 till March 2023 were enrolled.

Inclusion Criteria: Patients of either gender with age ranging from 13 to 65 years who underwent bone

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Received: 13 May 2024; revision received: 22 Aug 2024; accepted: 23 Aug 2024

marrow transplant at Armed Forces Bone Marrow Transplant Centre, Rawalpindi for any hematological illness were included in the study after taking informed written consent.

Exclusion Criteria: Pediatric patients with less than 13 years of age , adult patients not consenting to be included in the study and patients who had not underwent bone marrow transplant were excluded from study.

Pre-transplant Psychosocial assessment was done at the time of admission for transplant before the start of conditioning chemotherapy using the Psychosocial Assessment of Candidates for Transplantation Scale (PACT). Transplant outcome was measured in terms of total duration of hospital stay, hospital readmission rate, overall survival (OS) and disease-free survival (DFS) at 90 days (3 months) post-transplant. Almost an equal number of patients underwent autologous HSCT vs allogeneic HSCT. The most common indication for auto HSCT was Multiple myeloma (MM), followed by Hodgkin lymphoma (HL). The allogeneic transplant was performed for Acute myeloid leukemia (AML), Acute lymphoblastic leukemia (ALL), Aplastic anemia (AA), Fanconi anemia (FA), Myelodysplastic syndrome (MDS) and Glanzmannthrombasthenia (GT).

PACT was formerly established to evaluate psychosocial risks in solid organ transplant recipients and had utility in HSCT recipients.[7,8] PACT was an 8-item scale with four domains: social support, psychological health, lifestyle factors, and understanding of transplant and follow-up. Each domain has further subscales. The subscale of social support included support stability and support availability, psychological health was assessed by questions regarding the existence of psychopathology and risk for psychopathology, lifestyle factors included three questions about drug and alcohol use, healthy lifestyle and compliance and follow-up and understanding of transplant included 1 question about relevant knowledge. Each question was rated on an ordinal scale from 1 to 5, higher score showed more positive status.[9] The overall impression of the patient's appropriateness for transplantation was allocated a final PACT score. Final PACT rating scores were recorded from 0-4 (poor to excellent transplant candidate) independent of the scores assigned to other subscales.[10]

In descriptive analysis, percentage and frequency was calculated for categorical variables and Mean±SD or median (IQR) for all the continuous variables. In uni-variable analysis, the chi-square test was applied to look for the association of neutrophils and platelets engraftment and the number of readmissions with the psychosocial factors and primary diagnosis. One-way ANOVA was used to check the relationship between days of admission with psychosocial factors. The median days of OS and DFS were calculated by applying the Kaplan-Meier test. Log-rank test was applied to check for the association of psychosocial factors with OS and DFS. The *p*-value equal to or smaller than 0.05 was considered a significant value with a 95% confidence interval.

RESULTS

Of all transplant candidates that were included 21 patients (70.0%) were male and 09 patients (30%) were female. Median age at time of transplant was 30.50(IQR: 20.75- 49.25) years. Twenty-six patients (87%) were alive at 03 months post-transplant and 04 patients died (13%). All deaths were related to therapy (transplant). Twenty-eight patients (93.0%) achieved neutrophils engraftment on average of 12.18+1.46 days. Out of the 02 patients who did not engraft, 01 had primary graft failure and 01 died at day +10 post-transplant. Twenty-five patients (83.0%) achieved platelets engraftment on an average of 15.12+7.60 days. Twenty-four patients (80.0%) received myeloablative conditioning (MAC), 05 patients (18%) received non-myeloablative conditioning (NMA) and 01 patient (3.0%) received reduced intensity conditioning (RIC). There were 09(30.0%) patients of MM, 05(17.0%) of AA, 05(17.0%) of AML, 04(13.0%) of HL, 03(10.0%) of ALL, 02(07.0%) of MDS, 01 (03.0%) of GT and 01(03.0%) of FA. Thirteen patients (n=13, 43%) underwent auto HSCT, 13 patients (43.0%) had MSD HSCT while rest of the04 patients (13.0%) underwent Haplo-identical transplant. The average in hospital days were 20.53+9.58 days. All patients were low risk on HCT CI score (with a maximum score of 02), 26 patients (87.0%) had an HCT-CI score of zero while there were only 04 patients (10.0%) with a score of 1-2. Performance score was ECOG-1 in 25 patients (84%), ECOG-2 in 04 patients (13.0%) and ECOG-3 in 01 patient (3.0%). Among social support, 26 patients (87%) had good family and support system stability and 23 patients (77.0%) had good family and support system availability. Among Psychological health factors, 19 patients (63.0%) had no psychopathology with stable personality while rest 11 patients (37.0%) had moderate personality and adjustment problems or

some psychopathology. The risk for psychopathology was high to intermediate in 07 patients (23.0%). Majority of patients (n= 27, 90%) had a healthy lifestyle with no major change required and were willing to make a change if any change was required. Twenty-eight patients (n=28, 93.0%) had no drug or alcohol addiction and only 02 patients (07.0%) had moderated addiction but were willing to quit. Majority of patients (n=27, 90.0%) had good compliance with treatment and doctor advice. Only 11 patients (37.0%) had a good understanding of transplant and follow-up, while 19 patients (63.0%) had a very poor to moderate understanding of the transplant (Figure-1). Twenty patients (n=20, 67.0%) had a good final rating score of 3-4 (3 as good and 4 as excellent candidates) while the remaining 10 patients (33.0%) patients had a final rating score of 2(acceptable with some reservation). There were no patients with a final pact rating score of 0(poor) or 1(borderline).

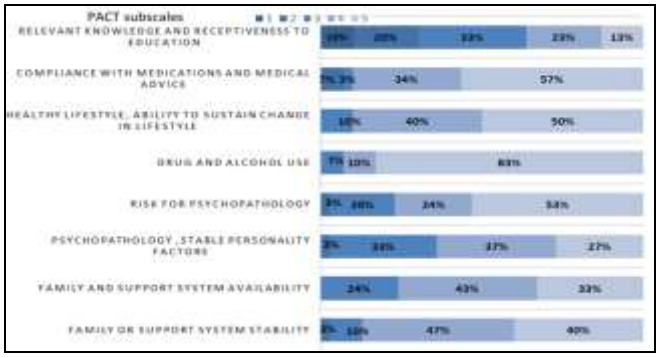

Figure-1: Psychosocial Assessment by PACT Scale

Moreover, average hospital stay was significantly associated (PAnova- Value =0.04) with primary diagnosis. There was an association between social support stability (P-chi=0.04) and primary diagnosis (P-chi=0.03) with no of hospital re-admission. In 04(13%) patients with lower PACT scores in terms of social stability readmission rate was higher as compared to patients with higher scores. Meanwhile, there was no significant association among social support availability, psychological health factors, drug and alcohol use, transplant knowledge, compliance and final rating with neutrophils or platelets engraftment and number of hospital readmissions. Average in hospital days for various diseases were MM with 13.40±1.94 days, HL with 16.25 ± 3.40 days, AA with 23.20±13.29 days, FA with 26 median days, GT with 28 median days, AML 31.20 ± 12.27 days, ALL 21±6.08 days and MDS 20.50±0.70 days.

Out of total 30 patients, 26 (87.0%) patients were alive and 04 (13%) patients died at the end of this study. At a follow-up of 03 months, OS was 87.0% (mean = 81.20+4.14 days) and DFS was 83% (mean= 69.04+4.66 days). We found significant association (Plog-rank= 0.009) of final rating with OS, out of 10 (33.0%) patients with low final rating score of 02 (7.0%) (acceptable with some reservations), only 06 (20.0%) patients were alive and 04 (13.0%) patients died. More patients were alive with good final rating score (3-4), 12 (40.0%) patients as good and 08 (27.0%) patients as excellent candidates (Figure-2).

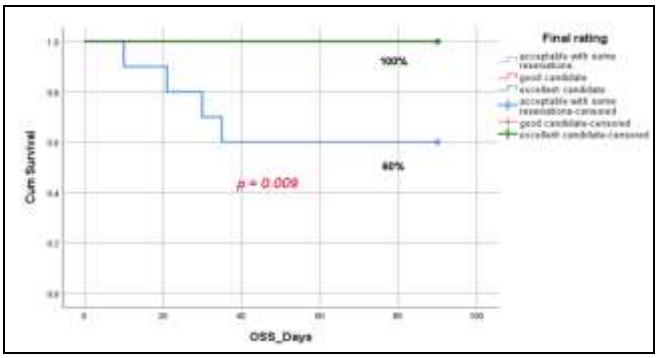

Figure-2: Association of Final Rating with Overall Srvival

There was a significant association of final rating with DFS (Plog-rank=0.03), more patients were alive and disease-free with good and excellent final rating score of 03 and 04 (11 (36%) and 08 (27%) patients respectively) than with low final rating score of 2 (6 (20%) patients) (Figure-3). There was a significant association of healthy lifestyle factors with DFS (Plog-rank=0.05), DFS was higher (89%) in patients with good habits and a healthy life-style, compared to patients who require some modifications in their lifestyle habits (33%) (Figure-4). There was a significant association between type of conditioning (Plog-rank=0.0001), type of transplant (Plog-rank=0.05) and ECOG (Plog-rank=0.02) with OS. However, there was no statistically significant association of OS and DFS with primary disease.

DISCUSSION

Selection of suitable candidates for hematopoietic stem cell transplantation is a complicated process that considers various patients, disease, transplant related factors, and in addition assessment of patient psychosocial risk factors. There is no standardized tool for psychosocial evaluation in HSCT; however, scales used in solid organ transplantations have been increasingly used for HSCT.[11] For psychosocial

assessment different screening tools are available including Transplant Evaluation Rating Scale (TERS), PACT and Stanford Integrated Psychosocial Assessment for Transplantation (SIPAT). PACT and TERS are both clinicians rated tools have high inter-rater reliability and are most frequently used scales in HSCT for psychosocial evaluation. PACT is more useful as it shows more diverse results and provides more flexibility in clinical marking.[12] PACT can provide objective parameters to aid psychosocial risk assessment to identify at vulnerable patients, who may require additional support and resources.[13] Our study has been highlighted the association of PACT score with OS, DFS and hospital re-admission rate at 90 days after transplantation.

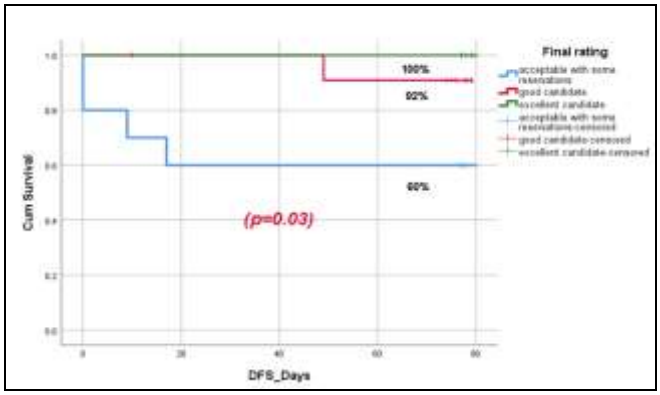

Figure-3: Asociation of Final Rating with Disease free Survival

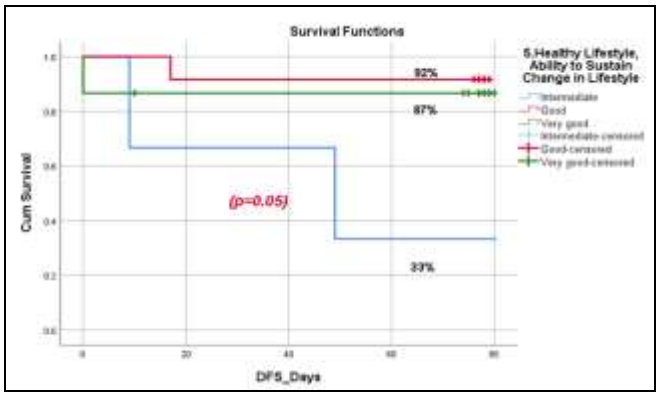

Figure-4: Association of Lifestyle with Disease Free Survival

In our study and majority of patients had good social support and all allogenic transplant recipients underwent related donor transplant. In our study although there was no significant association of disease and HCT CI score with OS and DFS. Though, previous studies has shown predictive value of HCT CI score on OS12 Nonetheless, there was significant association of type of conditioning, type of transplant, ECOG with OS. Our study showed that hospital readmission rate was influenced by primary disease as also previously well-established.[14].

There was no association of psychosocial factors or final PACT score with neutrophil and platelet engraftment. Similarly, There was no influence of final PACT score with neutrophil and platelet engraftment, as evaluated by Hong *et al*.[3] Our study showed that amongst PACT subscales merely social support was associated with hospital readmission rate, Higher readmission rate was seen among patient with poor social support stability. Meanwhile, no significant association of social support with OS and DFS. Richardson *et al*.[5] reported increased hospital re admission rate among patients with psychosocial risk factors. According to previous studies, psychosocial factors also predicted for post-transplant adherence to treatment which could impact transplant outcome.[15] In our study, no significant association of psychological health, patients' compliance with post-transplant outcomes. However, we found that patients with healthy life style habits had improved DFS. Correspondingly, Several studies have shown that life styles habits, compliance to treatment and medical advice impact post HSCT outcome and unhealthy life style and non-adherence to treatment was related with co morbidities.[16,17,18] In comparison, Harishima *et al*.[7] has also concluded that lower PACT scores in domains of compliance, psychopathology, lifestyle factors and disease knowledge and receptiveness to education were related with inferior OS7. In our study, there were no patients with poor /borderline score and patients with good and excellent PACT score had significantly improved OS and DFS as compared to patients who were acceptable with some reservations, in which Non relapse mortality (NRM) was high. Similarly, Solh *et al*.[6] concluded that patients as evaluated by TERS score, who had high or intermediate psychosocial risk predicted for inferior OS, and higher NRM.

In our study we concluded that apart from patient, disease and transplant related factors, good psychological health and social support were important to decrease hospital readmission rate and to improve DFS and OS. Hence, we recommend psychosocial assessment before transplant to identify high risk patients, who require additional resources and support, to improve post-transplant outcome. However, further studies are required over a longer follow-up period to predict impact of psychosocial

assessment in our population. Findings of our study needs to be interpreted in the background of some study restrictions. The study population was small, we have also included auto transplant candidates and outcomes were measured at 3 months post-transplant. Long term implication of psychosocial risk assessment on transplant outcomes cannot be predicted. Moreover, we did not include some variables including QOL assessment, patient health literacy, education and socioeconomic status that may be associated with psychosocial status.

CONCLUSION

In our study we concluded that patient's psychosocial status can impact post HSCT outcome. Post transplant outcome and hospital readmission rate can be improved with good psychosocial support. Therefore, we recommend psychosocial assessment before transplant to identify high risk patients, who require additional resources and support, to improve post-transplant outcome.

Conflict of Interest: None.

Funding Source: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

MNA & NS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

IH & SR: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

HT & SHT: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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