Master of Science in Public Health

HEALTH RELATED QUALITY OF LIFE FOLLOWING ALLOGENIC STEM CELL TRANSPLANTATION IN A TERTIARY CARE HOSPITAL OF RAWALPINDI CITY.

By: Tahreem Tahira

(362849-PIO/MSPH-2021)

Al-Shifa School of Public Health, PIO,
Al Shifa Trust Eye Hospital
Quaid-i-Azam University
Islamabad, Pakistan

(2023)

Word count: 9718

Declaration

In submitting this dissertation, I certify that I have read and understood the rules and regulations of ASOPH and QAU regarding assessment procedures and offences and formally declare that all work contained within this document is my own apart from properly referenced quotations.

I understand that plagiarism is the use or presentation of any work by others, whether published or not, and can include the work of other candidates. I also understand that any quotation from the published or unpublished works of other persons, including other candidates, must be clearly identified as such by being placed inside quotation marks and a full reference to their source must be provided in proper form.

This dissertation is the result of an independent investigation. Where my work is indebted to others, I have made acknowledgments.

I declare that this work has not been accepted in substance for any other degree, nor is it currently being submitted in candidature for any other degree.

_____ _____

(Miss Qandeel Tahir) (Miss Tahreem Tahira)

Al-Shifa School of Public Health,

PIO, Al Shifa Trust Eye Hospital Date: _____

DEDICATION

Dedicated to my dear mother and brother, whose support made this work possible.

This thesis is also dedicated to the goodwill of my father, who planted trees in whose shade he did not intend to sit.

ACKNOWLEDGEMENT

First of all, I would like to thank Almighty Allah, the most beneficent and the most merciful. Secondly, I would like to express my sincerest gratitude to all those who have helped me in completion of this research, particularly my family and friends who were always there for moral support. I am deeply obliged to my supervisor Mam Qandeelwho supported me throughout the study and addressed all my concerns and queries. Her assistance and encouragement was always there.

I would also like to thank all the participants of the research who have helped me to collect the data in a smooth way. Finally, I would acknowledge the efforts of our teachers who have taught us the research methodologies and SPSS. The experience of thesis writing was an exciting but at the same time challenging job for me. However, it provided me with great opportunities to learn and conduct research in an effective and efficient manner.

LIST OF ABBREVIATION

1. Allo-SCT: allogenic stem cell transplantation.
2. BMT: bone marrow transplant.
3. HRQOL post HSCT: health related quality of life post hematopoietic stem cell transplant
4. LSC: leukemic stem cell

Table of Content

List of Tables

List of Graphs

ABSTRACT

Bone marrow transplantation is an extended medical process, and many people experience a variety of physical, biological, emotional and social challenges during treatment and recovery. The aim of our cross-sectional study was to determine health related quality of life of hematopoietic stem cell transplant recipients.Our study comprised 32 bone marrow transplant patients selected through consecutive non-probability sampling; their data were collected at six month post-transplantation. The (FACT-BMT) questionnaire was used to assess HRQOL. Cronbach's alpha was determined to be 0.97. We also evaluated the patients' demographic and clinical characteristics to determine the relative contributions of these factors to health-related quality of life. As evidenced by our results, the recipients reported a mean overall HRQOL of 148.3(±35.50) at sixth month post-transplant. The subscale score reported for additional concerns (BMTS) was highest 68.06 (±16.83) and that for emotional well-being was lowest 18.46(±4.81). Effect of HRQOL on factors of Age (p=0.022), diagnosis (p=0.003) and socioeconomic status (p= 0.05) were found to be statistically significant. Patients of young age group and those diagnosed with aplastic anemia had better outcomes.

CHAPTER 1

INTRODUCTION

Health-related of life (HrQOL) is a dynamic, multifaceted concept related to physical, cognitive, emotional, and social functioning and well-being. Issues related to HrQOL are routinely cited by cancer survivors as among their greatest concerns. HrQOL is an especially important consideration in the counseling, implementation, and post treatment management of arduous treatments for life-threatening conditions, such as allogeneic hematopoietic cell transplantation (HCT).

Stem cell populations may behave abnormally or be altered by genetic or environmental factor, resulting in the development of cancer or other disorders. (Clavert A et al. 2018).

Leukemia comprises a group of hematologic disorders that usually begin in the bone marrow and resulting a high number of abnormal blood cells. It is the result of deregulation of normal hematopoietic SC (HSC) development by genetic mutation that produces a cell population known as leukemic Stem cells (LSCs). The generation of blood cells depends on the regulation of differentiation and proliferation characteristics of HSCs (Inoue A et al, 2018).

Deregulated differentiation and proliferation activity of HSCs, including chromosomal translocation and somatic mutation, leads to different hematologic disorders: -

There are four major abnormalities identified under LSCs: such as acute myeloid leukemia (AML), acute lymphoblastic leukemia (ALL), chronic LL (CLL) and chronic ML (CML). Leukemia and lymphoma (Hodgkin's lymphoma [HL] and non-HL [NHL]) are the two major types of blood cancers that result from uncontrolled proliferation of white blood cells, and

were the first to be treated clinically using HSC transplantation (HSCT). (Hawsawi YM et al, 2018).

An increase in scientific knowledge of cell-differentiation pathways has promoted the application of Stem Cell therapy. Autologous SCT (auto-SCT) and allogeneic SCT (allo-SCT) are the best known and most applicable. Emphasis on the eradication of hematologic malignancies has shifted from cytotoxic chemotherapy to donors' immune cells. Hematopoietic stem cell transplant is a special therapy for patients with certain cancers or other diseases (Kurusawa S et al, 2018).

A Stem Cell transplant involves taking cells that are normally found in the bone marrow (stem cells), filtering those cells, and giving them back either to the donor (patient) or to another person. The goal of Stem cell transplant is to transfuse healthy bone marrow cells into a person after his or her own unhealthy bone marrow has been treated to kill the abnormal cells. (Lelakis L et al,2018).

Bone marrow transplant has been used successfully to treat diseases such as leukemias, lymphomas, aplastic anemia, immune deficiency disorders, and some solid tumor cancers since 1968. Bone marrow–SC transplantation is utilized in various hematologic malignancies, such as AML, ALL, CML and Aplastic Anemia. (Roubelakis MG, 2019).

A series of tests and procedures are conducted to assess general health and the status of patient's condition. The tests and procedures also ensure that recipient is physically prepared for the transplant. The evaluation may take several days or more. In addition, intravenous catheter will be implanted into a large vein in the chestor neck. The catheter, often called a central line, usually remains in place for the duration of the treatment. This central line is used by the transplant team to infuse the transplanted stem cells, medications and blood products into the body. Next, the Stem cells are harvested from the donor's blood or bone

marrow. A soft, gelatinous tissue, bone marrow is used as the source of peripheral HSCs . The transplant team decides which is better based on each unique case. After completing the pretransplant tests and procedures, the process of conditioning begins. During conditioning, patient undergoes chemotherapy and possibly radiation in order to destroy cancer cells if they are being treated for cancer that may spread to other parts of the body, suppress immune system and prepare patient's bone marrow for the new stem cells. Stem cells are infused into the body through the central line. The transplant infusion is painless process. When the new stem cells enter the body, they travel through blood and reach the bone marrow. In time, they multiply and begin to make new, healthy blood cells. This is called engraftment. It usually takes several weeks before the number of blood cells in the body starts to return to the standard range. (Lydon H et al, 2018)

ALL patients who develop high relapse risk are indications for treatment with allo-HSCT. Similarly to CML, highly complicated and severe AML is effectively treated with allo-HSCT . Disease recurrence is a devastating event after allogeneic hematopoietic stem cell transplantation Relapse generally results from residual malignant cells that survive the preparative regimen and are not eliminated by the graft-vs-leukemia effect. In a minority of patients, relapse appears to occur in donor-derived cells. Relapse may occur by immune escape from graft-vs-leukemia effects. This may be due to loss of expression of leukemia related antigens; one case was reported associated with loss of expression of an HLA haplotype by deletion of chromosome 6. Another mechanism of immune escape is development of tolerance in donor-derived T cells post-transplant (Kuruka SE et al, 2019).

Duration of remission after hematopoietic stem cell transplantation is an important predictor of survival after recurrence; the best results occur in patients with remission duration greater than 6 months. Since much of the benefit of allogeneic hematopoietic transplantation is related to the immune graft-vs-leukemia effect, there has been speculation that use of a

different donor might improve the outcome of a second transplant. A donor lymphocyte infusion (DLI), sometimes called a donor leukocyte infusion, is a treatment option for some patients who relapse after a transplant using donor cells (an allogeneic transplant). It may also be offered to patients who have a high risk of relapsing after transplant (Santoro N et al, 2020)

Lymphocytes are a type of white blood cell that help defend the body against disease. When a bone marrow or stem cell donor's lymphocytes are infused into a patient, they can kill cancer cells that remain after transplant. Allogeneic stem cell transplantation (SCT) represents an intensive curative treatment for high-risk malignancies, its failure to prevent relapse leaves few options for successful salvage treatment. When considered in combination with a patient's age; co-morbidities; and performance status, these factors can help to inform the appropriate therapy for the treatment of post-transplant relapse. Besides the risk of relapse, hematopoietic stem cell transplantation (HSCT) remains associated with significant early and late treatment related mortality (TRM). Infections, toxicity, and (after allogeneic HSCT only), graft-vs.-host disease (GVHD) are the main causes of death. (Penack O Et al, 2020)

The improvement in outcome in the 1990ies has been confirmed by a single centre study for the years 1993–2007 in the United States. It showed a reduction of deaths from organ damage, infections, and severe acute GVHD. No in depth large analysis has been conducted since. Transplant centers have successfully managed to reduce complications after HSCT in the early and intermediate post-transplant phases, and have identified risk factors.

Bone marrow transplant is associated with many post-transplant complications which Include infections, graft vs host disease. Acute GVHD happens in the first 3 months after an Allogeneic stem cell transplant. It often affects the skin, intestines, and liver. It can cause rashes, diarrhea, and jaundice. Chronic GVHD usually develops more than 3 months after an

allogeneic stem cell transplant. It can last a few months or the rest of the patient's life. Other common complications include nausea, vomiting, mouth sores, appetite loss, fatigue, hairloss, low platelet count, anemia, taste changes. Long term side effects include infertility, thyroid problems, lung damage, bone damage. Moreserious risks include transplant failure, high relapse rate and transplant associated mortality**.** (Clavert A et al, 2018)

According to International Agency for Research on Cancer Globocan, Incidence ofLeukemiain Pakistan is83055 new case(weighted/simple average of the most recent local Rates applied to 2020 population) and is ranked number 5 among incidence of all types of Cancers. The five-year prevalence of leukemia's is 18, 903 (IARC,2023).

There is no available data on the incidence of Aplastic anemia in Pakistan. Recently, it has beenestimated to be about 3.5 patients/million population by collecting data from all the tertiary care facilities of the country (personal communication) but the figures are likely to be higher since majority of the population (>60%) lives in rural areas with limited access to advanced health care facilities. (Ahmed P et al, 2020).

Consanguineous marriages are common (48.5%)in Pakistani population resulting in high prevalence of genetic diseases like inherited bone marrow failure syndromes, thalassemia, immunodeficiency diseases and metabolic disorders. (Pakistan demographic andhealth survey, 2018).

Health experts warn about the high incidence of aplastic anemia in Pakistan as compared toWestern countries. The risk factors associated with the onset of the disease include exposure to pesticides, chemicals, medications, and genetic and environmental factors. At the 3rd National Symposium on Pediatric Hematology and Oncology at the Children's Hospital Karachi, pediatric hematologist Dr Saqib Husain Ansar referenced to the fact that the disease incidence in Pakistan is even higher when compared to neighboring countries

such as India, Bangladesh. According to the speaker, a lot of environmental factors such as medicine, toxin exposure, pesticide and radiation exposure are the leading causes of aplastic anemia(Heathwire, 2023*).*

Bone marrow transplantation is an extended medical process, and many people experience a variety of emotional and social challenges during this treatment and recovery. Stem Cell transplants affect patients at a physical, biological, emotional and social level. Hematopoietic stem cell transplantation (HSCT) is a possible therapeutic choice; however, the procedure is complex and aggressive. The treatment is relatively long. Technological and supportive care advances in HSCT have improved survival rates; however, the procedure still affects physical and long-term mental health sequelae that impacts HRQoL.

1.1 Research Questions

1. What is the health-related quality of life of patients who have received allogenic stem cell transplant for treatment of myelodysplastic syndromes in a tertiary care hospital of Rawalpindi.

1.2 Objective

To determine the health-related quality of life in allogenic stem cell transplant recipients of Tertiary Care Hospital Rawalpindi

To find out the association between variables of allogenic stem cell transplant recipients and Health-related quality of life.

1.3 Rationale

Bone marrow transplant is associated with many complications, transplant related mortality and morbidity. Furthermore, it is an extended medical process thereby impacting patients at a physical, biological, emotional and social level.

Incidence of leukemia is ranked #5 among incidence of all types of Cancer in Pakistan and the 5 year prevalence of leukemia is 18, 903 (IARC, 2023).

Research gap: Allogenic stem cell transplantation for treatment of myelodysplastic syndromes has proven to be extremely advantageous treatment. Despite the potential benefits and risks, there is little body of work present that explores the HRQOL on this subject in our region.

CHAPTER 2

LITERATURE REVIEW

Advances in HSCT techniques and supportive care have led to dramatic improvements in relapse mortality in patients with high-risk hematologic malignancies. Nearly 60% of HSCT recipients exhibit long-term survival with no disease Hematopoietic stem cell transplantation (HSCT) is the most effective way of treating hematologic malignanciesTo determine the effect of health related quality of life in allogenic stem cell transplant patients a longitudinal study was conducted in Suzhou, China (Liang Y et al, 2018) which comprised 191 HSCT patients; their data were collected before transplantation and at 30, 90, and 180 days post transplantation. The Functional Assessment of Cancer Therapy-Bone Marrow Transplant (FACT-BMT) questionnaire was used to assess HRQOL. Patients' demographic characteristics and clinical histories data was also collected to determine the relative contributions of these factors to health-related quality of life outcomes.

All the participants were undergoing an allogeneic/autologous bone marrow or peripheral blood stem cell transplant for a hematologic malignancy. Participants were 18 years and older and pediatric patients were not included in the study. Those who experienced graft failures, whose illness was recrudescent, who were too sick to participate, or who died were not included in the study.

The duration of study was 1 year. Sample size calculations were based on the detection of medium effect sizes with a prior estimation of 10–15 predictor variables. A total of 191 participants were enrolled in the study andeach completed the questionnaires before transplantation. The number of participants on days 30, 90, and 180 was 182, 162, and 138, corresponding to participation rates of 95.3%, 84.8%, and 72.3%, respectively.

HRQOL was measured by the Functional Assessment of Cancer Therapy – Bone Marrow Transplant (FACT-BMT, V4.0) questionnaire. Sociodemographic characteristics included age, sex, marital status, residence, education level, and household income, marital status included both unmarried and married; and there was no category for divorce or separation in this study. Education was determined according to the highest level attained, including junior high school or below, high school, baccalaureate degree, and above). Household income was divided into 4 categories, from low to high. Clinical materials included disease diagnosis (acute leukemia/nonacute leukemia), stem cell source (allogeneic/autologous), preparative regimen (busulfan and cyclophosphamide or not), platelets (the level of platelet measured when patients got out of the purifying ward), and transplant-related complications (including infection, GVHD, urocystitis, etc.)

Data were presented as mean ± SD, for continuous variables and count (percentage) for categorical variables. Repeated measuresANOVA was used to assess the changes between different time points and the LSD method for comparison between different measurement points. The GEE method was used to identify the risk factors for HRQOL. All statistical assessments were evaluated with a2-sided alpha level of 0.05. Results showed that quality of life improves in later stages of follow-up. Before HSCT, the patients reported a mean overall HRQOL of 110.31 (±14.99); this reached a minimum of 105.07 (±18.85) at day 30 after HSCT and increased steadily over time to 106.71 (±18.34) at day 90 and 108.16 (±18.34) at day 180 after HSCT.

Overall HRQOL returned to near pretransplant levels at 180 days after HSCT . Patients reported a meanPWB HRQOL of 22.14 (±4.05) at baseline and 21.92 (±4.12) at day 180 post-transplant.

SWB HRQOL showed a continuous decline with means 23.63 (±4.16), 22.24 (±4.88), 21.90 (±4.83) and 21.29 (±5.45) at baseline and at 30, 90, and 180 days, respectively. Within SWB HRQOL, the decrease from baseline was significant at 30 (SE, 0.38; $P < .001$), 90 (SE, 0.41; $P < .001$), and 180 (SE, 0.45; $P < .001$) days after HSCT.

On the other hand,EWB HRQOL showed a rising trend, with means 18.85 (±3.77), 19.57 (±3.70), 19.76 (±3.45) and 20.04 (±3.28) at baseline and at 30, 90, and 180 days, respectively. The improvement at day 30 was not significant (SE, 0.38; $P = .061$). However, it was significant at days 90 (SE, 0.40; $P = .024$) and 180 (SE, 0.36; $P = .001$) after HSCT.

The score of FWB HRQOL also changed dynamically at different time points ($F = 3.794$; $P = 0.013$). It reached its highest level before HSCT, with a mean of 14.93 (±6.53) and then descended to its lowest level, to 13.43, at 30 days after HSCT (±6.58). These changes were significant (SE, 0.59; $P = .012$). Improvement began at 90 days, with a mean of 13.89 (±5.72) after HSCT, representing a change of −1.04 (SE, 0.57; $P = .068$). It then and returned nearly to baseline level (SE, 0.57; $P = .929$) at 180 days after HSCT.

Last, BMTS HRQOL was highest before HSCT, with a mean of 30.76 (±4.59). Patients experienced the most serious damage at 30 days after HSCT, with a mean of 29.45 (±4.39); this decline was statistically significant (SE, 0.43; $P = .003$). And there was a mean of 29.58 (±4.78) at 90 days after HSCT, still lower than pretransplant levels (SE = 0.49; $P = .017$). But patients began to recover at 180 days after HSCT, with a mean change of −0.74 (SE = 0.43; $P = .086$) from baseline.

Factors associated with HRQOL 180 days after HSCT household income, age and transplant related complications. (Liang Y et al, 2018)

Generalized estimating equation (GEE) models showed that household income (β = 6.590; P < .001),transplant-related complications (β = -6.101; P < .001), and patient age(β = 0.243, P = .045) were associated with HRQOL. (Liang Y et al, 2018)

Another Prospective cohort study, **c** developed in a Bone Marrow Transplant Service, located in Latin America public hospital in the south of Brazil. Fifty-five patients who met the following inclusion criteria were included. Participants of age equal to or greater than 18 years, diagnosed with hematological cancer and submitted to HSCT were included.

Non-probability sampling was conducted corresponding to the total number of patients who met the inclusion criteria. The sample size was based on the average number ofhospitalizations in the service during the two years (36.6 patients).Data were collected (pre-HSCT, pancytopenia, pre -hospital discharge), and five in the outpatient follow-up phase (after 100 days, after 180 days, after 360 days, after two years and after three years of HSCT).

To measure HRQOL, two instruments were used: a generic one, applicable to cancer patients in general, and another specific to patients undergoing HSCT. These were, respectively, the Quality of Life Questionnaire Core C30 (QLQ C30) version 3.0, developed by the European Organization for Research Treatment of Cancer (EORTC) and the FunctionalAssessment Cancer Therapy – Bone Marrow Transplantation (FACT-BMT) version 4.0 Sociodemographic and clinical data were collected using an instrument developed by the researchers in the pre-HSCT stage. (Marques, A. D. C. B. et al, 2021)

Post HSCT 180 days all the subscales of HRQoL showed improvement with the exceptionof Functional well-being. Scores of each domain are PWBphysical well-being22.7 (± 6.4),

SWBSocial and family well-being21.2(± 5.9),EWB emotional well-being19.4(± 4.1),FWBfunctional well-being18.6(± 5.3), Additional Concerns29(± 6) and total score FACT-BMT 111.1(± 22.2). (Marques, A. D. C. B. et al, 2021).

2.1 Operational Definitions

ALLO-SCT/HSCT/SCT:A procedure in which a patient receives healthy blood-forming cells (stem cells) derived from bone marrow of a donor to replace their own stem cells that have been destroyed by treatment with radiation or high doses of chemotherapy.

High risk : Age 20 years, time from diagnosis to transplant > 3 months, heavily transfused > 20 RBC transfusions or >50 random platelets, and failed previous HSCT.

Intermediate risk: Time from diagnosis to transplant<8months.

Low risk: No previous HSCT. Less than two hospital admissions in the past six months.

CHAPTER 3

METHODOLOGY

3.1Study design

The design used for this research was Cross- Sectional study design.

3.2 Study setting

The study was carried out in a tertiary care hospital of Rawalpindi city. All of the data was collected from non-admitted, post-transplant patients visiting at sixth months follow up.

3.3 Sampling population

Adults above 18 years old diagnosed with Acute myeloid leukemia, Acute lymphocytic anemia, chronic myeloid leukemia or aplastic anemia undergone allogenic stem cell transplantation in the past six months.

3.4 Duration of the study

Six months from September 2022 to February 2023.

3.5 Sample size

Total number of patients included in the study was 32. Sample size was determined with the help of www.openepi.comby entering the known population of patients (34) receiving bone marrow transplant for treatment of myelodysplastic syndromes annually in our study setting.

A study conducted in Brazil determined sample size for their research with the help of same approach. (Marques, A. D. C. B. et al, 2021)

$$\text{Sample size } n = [\text{DEFF}*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$$

3.6 Sampling technique

Consecutive non-probability sampling technique will be used; in every subject meeting the criteria of inclusion is selected until the required sample is achieved.

3.7 Sample selection

INCLUSION CRITERIA: Adults above 18 years who have received allogenic stem cell transplantation for Leukemia or aplastic anemia in past six months, willing to participate in this study.

EXCLUSION CRITERIA: Pregnant patients, Very seriously ill patients, Mental illness or cognitive impairment.

3.8 Data collection procedure

Informed consent was taken from the participants.

The data was collected through administering interview of Urdu translated questionnaire. The Urdu translation was done by a Professor of Urdu literature and tested for its effectiveness by administering the questions to friends and family and gaining perspective from their feedback and their understanding of each question.

The outcome variable of the study is the health-related quality of life while the independent variables are the socio-demographic variables of allogenic stem cell transplant recipients.

Questionnaire contains two sections.

1st section contains of demographic variables and medical section.

Socio-demographic and medical history variables included the following seven variables:

1. Age.

2. Gender.

3. Marital status.

4. Education

5. Socioeconomic Status.

6. Diagnosis.

7. Risk assessment.

All the variables in the Socio-Demographic section were categorical with the exception of age with was quantitative data. Gender and marital status were binary categorical variables with two options each, whereas the rest of the variables contained more than two categories.

2nd section contains Questionnaire for outcome variable which is HRQol in HSCT patients. Data collection was done through a validated tool functional assessment of cancer therapy-bone marrow transplant FACT-BMT version 4, which is found to be both reliable and sensitive to change in patients who had received either autologous or allogeneic HSCT. Hematopoietic cell transplant specific FACT-BMT contains 50 items in a format of five pointer Likert scale with a recall period of past seven days

It contains the following four subscale domains:

1. Physical Well-Being.

2. Social/Family Well-Being.

3. Emotional Well-Being.

4. Functional Well-Being.

5.BMT-specific concerns (BMTS).

Patients were asked to best describe their response to specify their level of agreement to each of the 50 statements by selecting one option from the following 5 levels:

(1) Not at all (2) a little bit (3) somewhat (4) quite a bit (5) very much.

Responses of each item were scored from 0-4. Most positive response was scored a 4 and least positive response from the patient was scored a 0.

The Total score range of each subscale is as follow:

- Physical wellbeing (PWB) 0-28.
- Social well-being (SWB) subscale is 0-28.
- Emotional well-being (EWB) 0-24.
- Functional well-being (FWB) 0-28.
- BMT-specific concerns (BMTS) 0-40

Total score of each subscale was summed up to derive FACT-BMT total score which ranges from 0-148, high scores show good quality of life whereas lower scores show poor HRQol:

(PWB total) + (SWB total) + (EWB total) + (FWB total) + (BMTS total) = (FACT-BMT total)

Data of all the thirty-two respondents was entered into the software SPSS and the value of Cronbach's alpha was obtained for validity and reliability which came out to be 0.97.

3.9 Data analysis procedure

All the data collected was analyzed by using statistical package for social sciences (SPSS) version 29.0. Qualitative data of demographic and medical section such as gender, education,

diagnosis was entered in the SPSS by using codes that was assigned to each category. Whereas data for quantitative variables like age was entered as such in numbers. Likert scale of each question in our study instrument was also coded from 0-4 and reverse coded where needed.

The Descriptive result of the Socio-demographic variables was presented in a compiled table with percentages and frequencies and quantitative variable with mean and SD. Total score of outcome variable i.e HRQOL of HSCT patients was then computed in SPSS and expressed as mean and SD.

Statistical test:

Our non-gaussian data was analyzed by running non-parametric tests for inferential analysis. To analyze the association between independent qualitative variables having two categories such as gender, marital status and dependent quantitative variable, Mann-Whitney U test was applied. For analysis between dependent quantitative variable and independent qualitative variables having three or more categories such as socioeconomic status, diagnosis, risk assessment, Kruskal-Wallis test was applied. Post hoc Dunn'stest was performed for pairwise comparisons between each independent groupand to find out which groups are statistically significantly different.

The results are interpreted and also shown in a table. The table shows variable along with the significant association p-value. The independent categorical demographic variables are presented in the table with percentages, whereas quantitative variables are provided with mean and standard deviation.

3.10 Ethical Considerations

Informed consent was obtained from the respondents

The information acquired from the questionnaire was used for the purpose of research. All the information and data collected from individuals would be kept strictly confidential.

Ethical consideration was taken from the ethical committee of Al Shifa school of public health.

Ethical consideration also obtained from the MS (medical superintendent) of the Tertiary Care Hospital.

CHAPTER 4

RESULTS

4.1 Descriptive Results

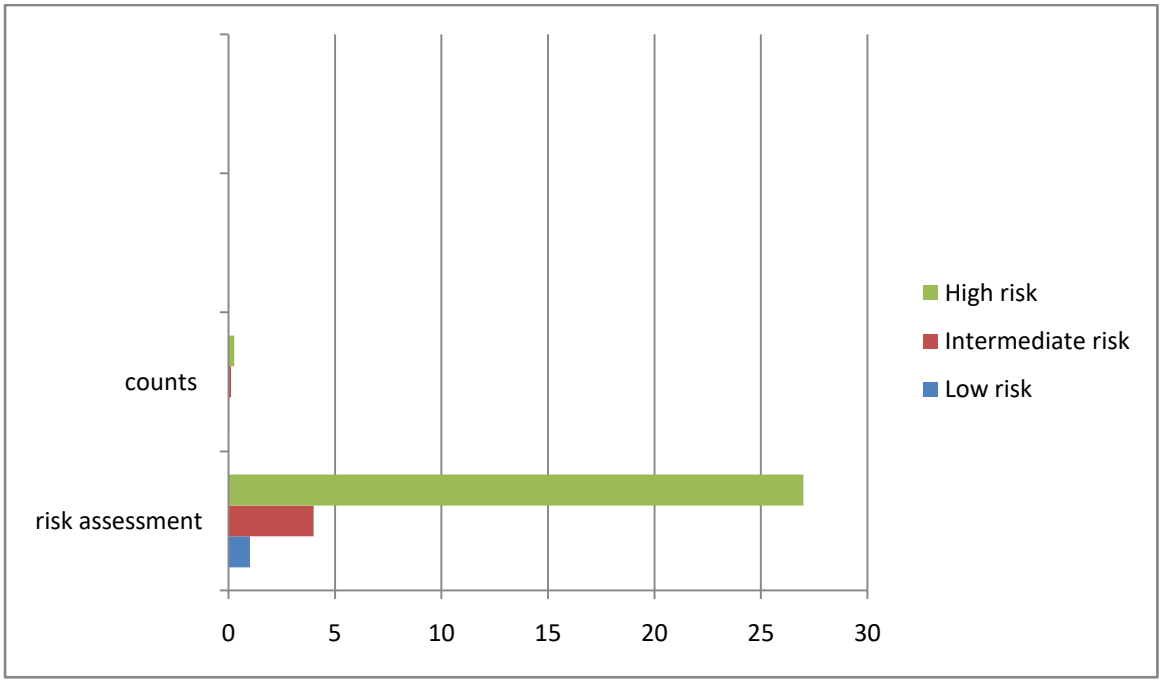
Total sample size of study was N=32. Mean age of the participants was 36(±18.5) years. Among the participants n=19(59.4%) were **male**. Majority of the patients belonged tomiddle class status n=22(68.8%) and only a minority of participants n=2(6.3%) to upper class socioeconomic status. As shown in graph-1, the maximum number of participants were diagnosed with aplastic anemia n=18(56.3%) followed by acute myeloid leukemia n=8(25.0%) and only n=2(6.3%) had a diagnosis of chronic myeloid leukemia. Risk assessment of the sample demonstrated the bulk of patients as high risk n=27(84.4%) and only n=1(3.1%) as low risk as shown in graph 2. The descriptive results of socio-demographic variables are shown in the table 1.

Table 1 DESCRIPTIVE SUMMARY OF SOCIODEMOGRAPHIC CHARACTERISTICS:

VARIABLE	**N (Percentage)**
1.Age	
Young age (19-39 years)	22(68%)
Middle age (40-59 years)	1(3.1%)
Old age (60 years and above)	9(28.1%0
2.Gender	
Male	19 (59.4%)
female	13 (40.6%)

3.Marital status	
unmarried	11 (34.4%)
Married	21 (65.5%)
4.Education	
No formal education	1 (3.1%)
Primary education	2 (6.3%)
Secondary education	6 (18.8%)
College and above	23 (71.9%)
5.Socioeconomic status	
Upper class	2 (6.3%)
Middle class	22 (68.8%)
Lower class	8 (25.0%)
6.Diagnosis	
Acute Lymphocytic Leukemia (ALL)	4 (12.5%)
Chronic myeloid leukemia (CML)	2 (6.3%)
Acute myeloid Leukemia (AML)	8 (25.0%)
Aplastic anemia	18 (56.3%)
7.Risk	
Low risk	1 (3.1%)
Intermediate risk	4 (12.5%)
High risk	27 (84.4%)

Graph-1 illustrates the distribution of risk assessment among the patients. The magnitude of high risk patients seven folds as compared to second highest distribution of intermediate risk.



Graph 1 FREQUENCY AND PERCENTAGE OF RISK AMONG PARTICIPANTS.

The computed FACT-BMT score of our study participants reported a mean score of 148(±35.5) as illustrated in table 2. The mean score of each subscale is also provided. BMTS had the highest mean score 68.06(±16.83) were as EWB had comparatively, the lowest score 18.46 (±4.81).

Table 2DESCRIPTIVE SUMMARY OF HRQOL POST-HSCT AMONG PARTICIPANTS:

SUBSCALE	**Min score**	**Max score**	**Mean**	**Std. Deviation**
PWB TOTAL	7.00	28.00	20.59	±5.74
SWB TOTAL	12.00	28.00	20.40	±4.81
EWB TOTAL	9.00	24.00	18.46	±4.81
FWB TOTAL	10.00	28.00	20.81	±5.96
BMTS TOTAL	41.00	92.00	68.06	±16.83
FACT-BMT TOTAL	91	199	148.3	±35.50

As shown in table3, the category of young age group 18-39 years had higher scores 162(±33.1) compared to old age group119(±9.0) 59 and above years old. There was no significant difference between scores of males and females with mean score 148(±35.3) and 148(±37.1) respectively. Participant identifying as upper-classscored highest among the

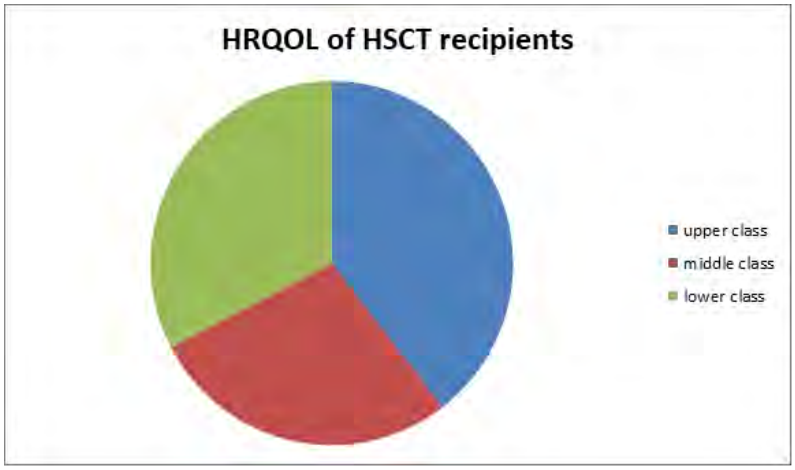
group 196(±2.8) and middle class scored the lowest 138(±34.2). Regarding medicalcharacteristics, patients diagnosed with aplastic anemia had the highest score 172(±28.4) while scores of ALL and AML patients were comparatively on the lower side 119(±7) and 115(±13) respectively. Patients assessed as intermediate risk, scored higher 154(±41) as compared to high risk patients 146(±35).

Table 3 HRQOL OF HSCT RECIPIENTS WITH RESPECT TO SOCIODEMOGRAPHIC CHARACTERISTICS:

	Categories	Mean+Std
Age	Young age	162 (±33.1)
	Old age	119 (±9.0)
Gender	Male	148 (±35.3)
	Female	148 (±37.1)
Marital status	Unmarried	157 (±39.5)
	Married	143(±33.1)
Socioeconomic Status	Upper class	196 (±2.8)
	Middle class	138 (±34.2)
	Lower class	162 (±30.1)

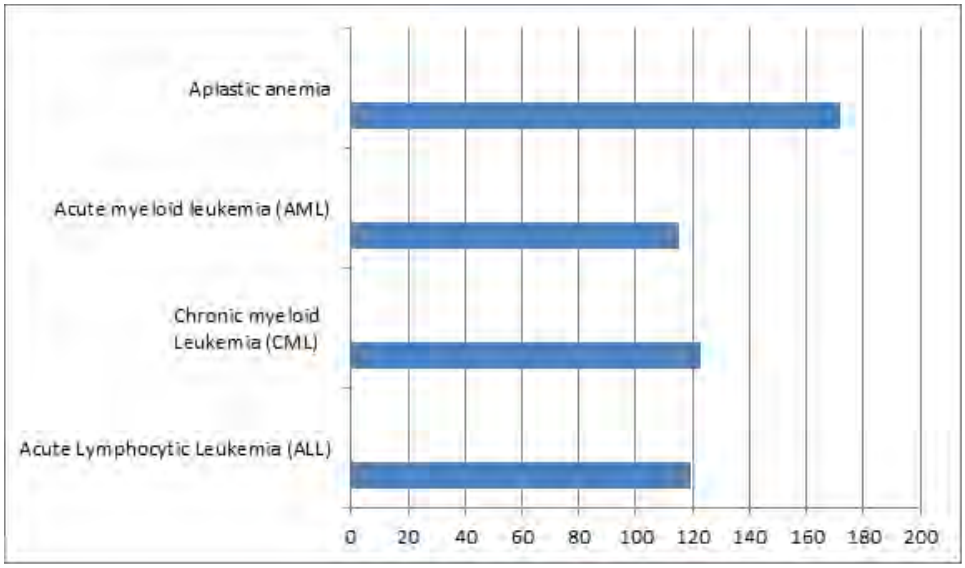
Education	Primary	152 (±46.6)
	Secondary	146 (±40.5)
	College	148 (±36.0)
Diagnosis	Acute Lymphocytic Leukemia (ALL)	119 (±7.1)
	Chronic myeloid Leukemia (CML)	123 (±1.4)
	Acute myeloid leukemia (AML)	115 (±13.5)
	Aplastic anemia	172 (±28.4)
Risk	Intermediate	154 (±41.1)
	High	146(±35.4)

Graph-2 shows upper class group reporting the highest HRQOL mean score 198(±2.8) among categories of socioeconomic status.



Graph 2 SOCIOECONOMIC STATUS AND HEALTH RELATED QUALITY OF LIFE.

Graph-3 reveals patients of aplastic anemia reporting the highest mean HRQOL scores among different categories of diagnosis. The other three categories showing small difference of mean scores amongst themselves.



Graph 3 HRQOL OF HSCT RECIPIENTS WITH RESPECT TO DIAGNOSIS.

4.2 Inferential Statistics

Bivariate analysis was carried out for independent variables of two categories such as marital status and gender. Mann-Whitney U test was run to check the association of health-related quality of life post allogenic stem cell transplantation between males (R=16.97) and females (R=15.81)and married(R=15.24) and unmarried (R=18.91) patients. Results showed that unmarried patients showed more association to HRQOL post HSCT of patients as compared to married participants. However, it is not statistically significant (p-value 0.29) as shown in table-4.

Table 4 ASSOCIATION BETWEEN HRQOL OF HSCT RECIPIENTS ANDSOCIODEMOGRAPHIC VARIABLES OF TWO CATEGORIES:

CHARACTERISTICS	**Mean Rank**	**Sum of Ranks**	**Asymp Sig(2-tailed)**	**Exact Sig (1-tailed)**
Marital status				
Unmarried	18.91	208.00	0.293	03.7
Married	15.24	320.00		
Gender				
Male	16.97	322.50	0.730	0.734
Female	15.81	205.50		

Kruskal-Wallis test was applied to check the difference in mean ranks of young age (19.89),middle age (1.00) and old age (9.94). The results showed that patients in young age group had significant difference in mean which was statistically very significant (p=0.007).Furthermore, patients belonging toupper class (30.5) had highest difference in

mean followed by patients belonging to lower socioeconomic status (19.44).Moreover,these results were statistically significant (p=0.037).

Kruskal Wallis test was run to check the difference in mean ranks of diagnosis. Acute lymphoid leukemia (9.88), Chronic myeloid leukemia (12.25), Acute Myeloid Leukemia (8.25) and Aplastic anemia (22.11). The results show that the difference in mean ranks of patients diagnosed with Aplastic anemia was largest than might be expected by chance. In addition, it was statistically highly significant (p=0.002)**,** as shown in table-5.

Table 5 ASSOCIATION BETWEEN HRQOL OF HSCT RECIPIENTS AND DIFFERENT SOCIODEMOGRAPHIC VARIABLES OF MORE THAN TWO CATEGORIES:

Sr.#	**CHARACTEISTICS**	**MEAN RANK**	**ASYMP SIG.**
1.	**EDUCATION**		
	No formal education.	17.00	
	Primary education.	18.00	0.993
	Secondary education.	15.75	
	College and above.	16.54	
2.	**SOCIOECONOMIC STATUS**		
	Upper class.	30.50	
	Middle class.	14.16	0.037
	Lower class.	19.44	
3.	**RISK**		
	Low risk.	25.00	
	Intermediate risk.	18.50	0.572
	High risk.	15.89	
4.	**DIAGNOSIS**		

	Acute lymphocytic leukemia. Chronic myeloid leukemia. Acute myeloid leukemia. Aplastic anemia	9.88 12.25 8.25 22.11	 0.002
5.	**AGE** Young age. Middle age. Old age.	 19.89 1.00 9.94	 0.007

DUNN'S NONPARAMETRIC COMPARISON FOR POST HOC:

Dunn's test was run for pairwise comparisons between each independent group of three sociodemographic variables which are diagnosis, age and socioeconomic status to find out which groups and are statistically significantly different thereby demonstrating the strongest effect on HRQOL of HSCT recipients.

Table-6 shows highly statistically significant (p=0.003) difference in the mean ranks between acute myeloid leukemia (AML) and aplastic anemia.

Table 6 PAIRWISE COMPARISON BETWEEN INDEPENDANT GROUPS OF DIAGNOSNIS

Sr. no	**Sample1, Sample2**	**Sig.**	**Adj. sig**
1	Acute myeloid leukemia (AML)- Acute Lymphocytic leukemia (ALL)	0.777	1.000
2	Acute myeloid leukemia (AML) - chronic myeloid leukemia (CML)	0.590	1.000

3	Acute myeloid leukemia (AML) – Aplastic Anemia	<0.001	0.003
4	Acute lymphocytic leukemia (ALL)- Chronic myeloid leukemia (CML)	0.770	1.000
5	Acute lymphocytic leukemia (ALL) - Aplastic anemia	0.018	0.110
6	Chronic myeloid leukemia (CML)- Aplastic anemia	0.158	0.950

Pairwise comparison of agecategories showed statistically significant (p=0.022) difference in the mean effect between the groups of old and young age,as shown in table 7.

Table 7PAIRWISE COMPARISON BETWEEN AGE GROUPS

Sr.#	**Sample1, Sample 2**	**Sig.**	**Adj.sig.**
1	Middle age- old age	0.366	1.000
2	Middle age- young age	0.49	0.147
3	Old age- young age	0.007	0.022

Table-8 shows details of Pairwise comparison between independent groups of socioeconomic status. However,p value = 0.05suggests weak evidence to reject the null hypothesis.

Table 8 PAIRWISE COMPARISON BETWEEN INDEPENDANT

GROUPS OF SOCIOECONOMIC STATUS:

Sr.#	**Sample1, Sample 2**	**sig**	**Adj. sig**
1	Middle class- lower class	0.173	0.519
2	Middle class-upper class	0.018	0.055
3	Lower class- Upper class	0.136	0.407

CHAPTER 5

DISCUSSION

Our study determined the health-related quality of life of patients receiving allogenic bone marrow transplant. It was carried out with the help of FACT-BMT study instrument. Our study collected data from follow-up patients at 6 months post-transplant.

Our research results demonstrated statistically significant effect ofage (p-value=0.022), diagnosis (p-value=0.003) and socioeconomic status (p-value= 0.05) on HRQOL post-HSCT. Similar factors were reported statistically significant, which were household income (p-value=<0.001) andage (p-value=0.045) in the study conducted in China (Liang Y et al, 2018).

Regarding clinical data, Our study differs, however, from a longitudinal study conducted in Brazil (Marques, A. D. C. B. et al, 2021). Majority of the study population had diagnosis of leukemia 39(71%) whereas aplastic anemia was prevalent 18(56.3%) followed by Acute lymphocytic leukemia (ALL) 4(12.5%) in our study population

A comparison was made with studies conducted in Suzhou, China (Liang Y et al, 2018) and Brazil (Marques, A. D. C. B. et al, 2021). The evaluated subscale domains of physical well-being PWB20.59(±5.74), social well-being SWB 20.40(±4.81) and emotional wellbeing EWB 18.46(±4.81), corroborated with the evaluated results of a study conducted in Brazil, PWB22.7(±6.4), SWB 21.2(±5.9), EWB 19.4(±4.1) and China, PWB21.92(±4.12), SWB 21.29 (±5.45), EWB20.04 (±3.28).

With respect to the subscale results of functional well-being FWB20.81(±5.96) and additional concerns BMTS 68.06(±16.83)our results differedfrom the Brazilian and study (Marques, A. D. C. B. et al, 2021), FWB 18.6(±5.3) BMTS 29(±6) ; as well as the Chinese study (Liang Y et al, 2018) resultsFWB 14.88(±5.47), BMTS 30.02(±4.73). The FACT-BMT total score also evidenced dissimilar results 148.3(±35.50) with respect to the research conducted in Brazil 111.1(±22.2) and China 108.16(±18.34).

Our study sheds light on improvement in Health-Related Quality of life in patients post-hematopoietic Stem Cell transplant at six months; which can be a valuable knowledge both clinically and with respect to public health.

5.1 Strengths

We used validated and internationally accepted study instrument for assessment (FACT-BMT) version 4, which comprise of 5 subtypes which enabled an in-depth assessment of HRQOL post HSCT.

First study conducted on health-related quality of life of BMT recipients in Pakistan,

Strong validity and reliability Cronbach's alpha 0.97.

5.2 Limitions

Our research was a Cross-sectional study. Our study time duration was confined to six months which was limited to fully explore the scope of our outcome, which is health related quality of life in patients post stem cell transplant therefore the medical history section especially, data for relapse occurrence and complications post-transplant was not collected.

Moreover, the median time for relapse occurrence differs from aplastic anemia to one type of leukemia to another, most of which occurring past six months and generally would have created a selection bias. Similarly, some post-transplant complications develop immediately, some at six months and others take longer than six months (a year and more) to develop.

Our sample size was small because few and far in between stem cell transplants are being performed in our city and the number of transplant centers is limited as well.

5.3 Conclusion

Our study demonstrated that HRQoL post-HSCT improves at 6 months post-transplant and was significantly related withage, socioeconomic status and the diagnosisof the patient.

Our study population was a relatively young public, belonging to age group (18-39) that represents a productive period of life and who, unexpectedly, find themselves in a situation of vulnerability when facing a serious illness. However, our results suggestyoung age group indicating better outcomes in comparison to middle or old age group.

It is noteworthy that patients belonging to higher socioeconomic status report betterHRQoL. Economic factors affect HRQOL in many ways, since they involve treatment costs, nutritional options, health conditions, and compliance with treatment. Hence, measures should be adopted at all levels of healthcare to ensure health equity and medical treatments should not become a financial liability through implementation of Universal Health Care.

Emotional well-being EWB scores were comparatively lower in comparison to other subscale scores which stresses that attention must be paid to the trajectory of emotional well-being. Mental health care must be incorporated and implemented as a part of primary health care system of Pakistan in addition to providence of support groups and an emphasis on regular psychological counseling of the patients receiving HSCT.

These findings can be used by health professionals, especially nurses, who spend most of their time with patients, to promote hope and comfort regarding expectations related to treatment. Nursing interventions based on scientific evidence, such as integrative and complementary practices, which take into account the multidimensional aspect of the construct, can offer the possibility of promoting well-being and improving HRQOL commitment.

5.4 Recommendation

The government should generate policies at local, National and International levels that protect and support HRQoL of BMT recipients. Policies should be generated to erect dedicated and specialized infrastructure in the public sector as there are none present in the twin cities at the moment and to frame policies for affordable healthcare. BMT costs ranges from 35 hundred thousand PKR to 70 hundred thousand PKR. The medical bills are beyond affordability of a lower income household and are enough to drive any middle-income household to poverty.

Strategic use of multi-media can be used in health promotion & prevention through education of risk factors. Transplant recipients are exposed to inherent risks due to transplant-related complications. Many of these identified risks are modifiable through proper education and the cultivation of health-promoting behavior in the recipients.

REFERENCES:

Ahmed, P., Chaudhry, Q. U. N., Satti, T. M., Mahmood, S. K., Ghafoor, T., Shahbaz, N., ... & Iftikhar, R. (2020). Epidemiology of aplastic anemia: a study of 1324 cases. *Hematology*, *25*(1), 48-54.

Clavert A, Peric Z, Brissot Eet al. (2018). Late complications and quality of life after reduced-intensity conditioning allogeneic stem cell transplantation.*Biol Blood Marrow Transplant,* 23: 140-146.

Hawsawi YM, Al-Zahrani F, Mavromatis C, Baghdadi MA, Saggu S, Oyouni AAA. (2018). Stem cell applications for treatment of cancer and autoimmune diseases: its promises, obstacles, and future perspectives. *Technol Cancer Res Treat,* 17:1533033818806910.

Inoue A, Kobayashi CI, Shinohara H, et al. (2018). Chronic myeloid leukemia stem cells and molecular target therapies for overcoming resistance and disease persistence. *Int J Hematol,* 108(4):365–370.

Kurosawa S, Oshima K, Yamaguchi T, et al. (2018).Quality of life after allogeneic hematopoietic cell transplantation according to affected organ and severity of chronic graft-versus-host disease. *Biol Blood Marrow Transplant,* 23: 1749-1758.

Kuruka SE, Çelik DD, Özerkan D, Erdemir G. (2019). Characterization and Isolation of Very Small Embryonic-like (VSEL) Stem Cells Obtained from Various Human Hematopoietic Cell Sources. *Stem Cell Rev Rep,* 1–13.

Lekakis, L., & Komanduri, K. (2018). Pathology of Hematopoietic Stem Cell Transplantation. In P. Ruiz (Ed.), *Transplantation Pathology* (pp. 260-293). Cambridge: Cambridge University Press.

Liang Y, Wang H, Niu M, Zhu X, Cai J, Wang X. (2018) Health-related quality of life before and after hematopoietic stem cell transplant: evidence from a survey in Suzhou, China.*Hematology,*23: 626-632.

Lydon H, Brooks R, McCaskie A, Henson F. (2018). Peripheral mononuclear blood cell apheresis in a preclinical ovine model. *BMC Vet Res,*14(1):47.

Marques, A. D. C. B., Szczepanik, A. P., Machado, C. A. M., Santos, P. N. D., Guimarães, P. R. B., & Kalinke, L. P. (2018). Hematopoietic stem cell transplantation and quality of life during the first year of treatment. *Revista latino-americana de enfermagem*, *26*, e3065.

National Institute of Population Studies (Pakistan), Macro International. Institute for Resource Development. Demographic, & Health Surveys. (2018). *Pakistan demographic and health survey*. Retrieved from https://dhsprogram.com/pubs/pdf/FR354/FR354.pdf.

Penack, O., Peczynski, C., Mohty, M., Yakoub-Agha, I., Styczynski, J., Montoto, S., Duarte, R. F., Kröger, N., Schoemans, H., Koenecke, C., Peric, Z., & Basak, G. W. (2020). How much has allogeneic stem cell transplant-related mortality improved since the 1980s? A retrospective analysis from the EBMT. *Blood advances*, *4*(24), 6283–6290.

Pakistan - International Agency for Research on Cancer. (2023). Globocon. Retrieved from https://gco.iarc.fr/today/data/factsheets/populations/586-pakistan-fact-sheets.pdf

Roubelakis MG. (2019). Introduction to Stem Cell Principles and Biology In: *Digestive System Diseases*. Springer, 7–20.

Santoro N, Ruggeri A, Labopin M, et al. (2020). Unmanipulated haploidentical stem cell transplantation in adults with acute lymphoblastic leukemia: a study on behalf of the Acute Leukemia Working Party of the EBMT. *J Hematol Oncol,* 10(1):113.

APPENDIX

Informed Consent

Title of research

Health related quality of life following allogenic stem cell transplantation in a Tertiary care hospital of Rawalpindi city.

Researcher:

Dr Tahreem Tahira

MSPH Al Shifa school of public health

Tehreemtahira@gmail.com

03305978280

Purpose of study:

The purpose of the study is to find out the health-related quality of life of allogenic stem cell transplant recipients.

Study procedure:

Participants will be provided translated written questionnaire and the questionnaire will be interview administered if need be.

Risks:

There is no anticipated risk in this study

Benefits:

Findings of this study will be an evidence-based work that will be utilized to advocate the importance of this particular intervention which can potentially drastically improve native's quality of life.

Confidentiality:

All the data will be kept confidential. The results of the research will be shared with the participants and only aggregated data will be shared in researcher's journal.

Voluntary participation:

Participation is completely voluntary you may withdraw at any time without consequences of any kind. You may refuse to answer any questions you are reluctant to answer and still remain in the study.

Consent certificate:

I have read the foregoing information.

I have opportunity to ask any question and answered to my satisfaction. I have been told all the potential risks and benefits as well.

- My participation is voluntary
- I may with draw at any time during the study without any consequences

.

By clicking Yes you will consent to participate and no for not participating.

Yes (I participate)

No (I decline).

Participant's signature date;

Researcher's signature date;

_____

QUESTIONNAIRE

SECTION A:

Socio-demographic variables

1. Age in (years)…….

2. Gender:

   a) Male.

   b) Female

3. Marital status:

   a) Unmarried.

   b) Married.

4. Education:

   a) No formal education.

   b) Primary school .

   c) Secondary school.

   d) College and above.

5. Socioeconomic Status:

a) Upper class.

b) Middle class.

c) Lower class.

Medical section

6. Diagnosis:

a) Acute lymphocytic leukemia

b) Chronic myeloid leukemia

c) Acute myeloid leukemia

d) Aplastic anemia.

7. Risk assessment:

a) Low risk

b) Intermediate risk

c)High risk

SECTION B:

FACT-BMT

Below is a list of statements that other people with your illness have said are important. Please circle or mark one number per line to indicate your response as it applies to the past 7 days.

	PHYSICAL WELL-BEING	Not at all	A little bit	Some-what	Quitea bit	Very much
GP1	I have a lack of energy	0	1	2	3	4
GP2	I have nausea	0	1	2	3	4
GP3	Because of my physical condition, I have trouble meeting the needs of my family	0	1	2	3	4
GP4	I have pain	0	1	2	3	4
GP5	I am bothered by side effects of treatment	0	1	2	3	4
GP6	I feel ill	0	1	2	3	4

GP7	I am forced to spend time in bed	0	1	2	3	4

	SOCIAL/FAMILY WELL-BEING	Not at all	A little bit	Some-what	Quitea bit	Very much
GS1	I feel close to my friends	0	1	2	3	4
GS2	I get emotional support from my family	0	1	2	3	4
GS3	I get support from my friends	0	1	2	3	4
GS4	My family has accepted my illness	0	1	2	3	4
GS5	I am satisfied with family communication about my illness	0	1	2	3	4
GS6	I feel close to my partner (or the person who is my main support)	0	1	2	3	4
Q1	☐ Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please mark this box and go to the next section.					
GS7	I am satisfied with my sex life	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.

	EMOTIONAL WELL-BEING	Not at all	A little bit	Some-what	Quitea bit	Very much
GE1	I feel sad	0	1	2	3	4
GE2	I am satisfied with how I am coping with my illness	0	1	2	3	4
GE3	I am losing hope in the fight against my illness	0	1	2	3	4
GE4	I feel nervous	0	1	2	3	4
GE5	I worry about dying	0	1	2	3	4
GE6	I worry that my condition will get worse	0	1	2	3	4

	FUNCTIONAL WELL-BEING	Not at all	A little bit	Some-what	Quitea bit	Very much
GF1	I am able to work (include work at home)	0	1	2	3	4
GF2	My work (include work at home) is fulfilling	0	1	2	3	4

GF3	I am able to enjoy life	0	1	2	3	4
GF4	I have accepted my illness	0	1	2	3	4
GF5	I am sleeping well	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun	0	1	2	3	4
GF7	I am content with the quality of my life right now	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.

	ADDITIONAL CONCERNS	Not at all	A little bit	Some-what	Quite a bit	Very much
BMT1	I am concerned about keeping my job (include work at home)	0	1	2	3	4
BMT2	I feel distant from other people	0	1	2	3	4
BMT3	I worry that the transplant will not work	0	1	2	3	4
BMT4	The side effects of treatment are worse than I had imagined	0	1	2	3	4

C6	I have a good appetite	0	1	2	3	4
C7	I like the appearance of my body	0	1	2	3	4
BMT5	I am able to get around by myself	0	1	2	3	4
BMT6	I get tired easily	0	1	2	3	4
BL4	I am interested in sex	0	1	2	3	4
BMT7	I have concerns about my ability to have children	0	1	2	3	4
BMT8	I have confidence in my nurse(s)	0	1	2	3	4
BMT9	I regret having the bone marrow transplant	0	1	2	3	4
BMT10	I can remember things	0	1	2	3	4
Br1	I am able to concentrate	0	1	2	3	4
BMT11	I have frequent colds/infections	0	1	2	3	4
BMT12	My eyesight is blurry	0	1	2	3	4
BMT13	I am bothered by a change in the way food tastes	0	1	2	3	4
BMT14	I have tremors	0	1	2	3	4
B1	I have been short of breath	0	1	2	3	4
BMT15	I am bothered by skin problems	0	1	2	3	4
BMT16	I have trouble with my bowels	0	1	2	3	4

BMT17	My illness is a personal hardship for my close family members	0	1	2	3	4
BMT18	The cost of my treatment is a burden on me or my family	0	1	2	3	4

عشری و ڈیموگرافک کی خصوصیات

نشاں لگائیں جو آپ کے بارے میں صحیح ہے ۔

حصہ الف (عوالبّہ)						
		a	b	c	d	e
1	عمر (شوبل)					
2	خ ظ	مشد	عوست			
3	اصدواخی زنیت	شبدی شدِ ی شرغش	شبدی شدِ			
4	تعلین	کسی ق عوی تعلین ہیں	پشیوشری اعکول	نٹکسی اعکول	حکل اوس اط ع ے بلپوش	
5	ال ی و عوب خی زنیت	الچی طقہ	نقوعظ طقہ	ج . طقہ		
طبی زصہ						
6	مش ضرک ی نشخیص	Acute lymphocytic Leukemia	Chronic myeloid Leukemia	Acute myeloid Leukemia	Aplastic anemia	
7	عشطبوک ی ایحج	Low risk	Intermediate risk	High risk		

(عوالّبہ زصہ) ة

7 نشاں لگائیں جو آپ کے بارے میں صحیح ہے ۔ آپ کب خوابقشاں گشت ہ

د ویپش ہج یوبّ چہبمی ے ۔

	-1 تسلیں بخوف:	قطعی نہیں	معمولی سا	کچھ تھوڑا	کافی	بہت زیادہ
1	مدھے طاقت توانائی کی کمی ہے۔	0	1	2	3	4
2	مدھے تھکاوٹ ہے۔	0	1	2	3	4
3	مدھے اپنی خوراک زبان تک کی وجہ سے غیر معمولی کھانا کی وجہ سے میرے کنبہ میں دشواری ہے۔	0	1	2	3	4
4	مدھے درد ہے۔	0	1	2	3	4
5	میں علاج کے مضر اثرات سے تنگ ہوں۔	0	1	2	3	4
6	میں بیمار محسوس کرتی ہوں۔	0	1	2	3	4
7	میں بستر پر لیٹنے پر مجبور ہوں۔	0	1	2	3	4

	-2 سماجی اور خاندانی بہبود	قطعی نہیں	معمولی سا	کچھ تھوڑا	کافی	بہت زیادہ
1	میں خود کو دوستوں کے قریب محسوس کرتی ہوں۔	0	1	2	3	4
2	مدھے اپنے خاندان کی طرف سے جذباتی سہارا حاصل ہے۔	0	1	2	3	4
3	مدھے اپنے دوستوں کی طرف سے سہارا حاصل ہے۔	0	1	2	3	4
4	میرے خاندان نے میری بیماری کو قبول کر لیا ہے۔	0	1	2	3	4
5	میں اپنے خاندان سے بیماری کے متعلق بات چیت سے مطمئن ہوں۔	0	1	2	3	4
6	میں اپنے شریک حیات کے بہت قریب محسوس کرتی ہوں۔	0	1	2	3	4
	قطع نظر آپ کی موجودہ جنسی سرگرمی کے، براہ کرم مندرجہ ذیل سوال کا جواب دیں۔ اگر آپ جواب نہ دینا چاہیں تو یہاں نشان لگائیں اور اگلے سوال کی طرف بڑھیں۔					
7	میں اپنی جنسی زندگی سے مطمئن ہوں۔	0	1	2	3	4

	3- تبفیعشیخ نیزتبج	قطعی نہیں	معمولی سا	کچھ تھوڑا	کافی	بہت زیادہ
1	میں اُداس رہتا ہوں۔	0	1	2	3	4
2	میں اپنی صلاحیتوں سے متعلق خود کو بے بس محسوس کرتا ہوں، اس لیے مایوس ہوں۔	0	1	2	3	4
3	میں اپنی صلاحیتوں سے متعلق تجربے رکھنے کے بعد بھی خود کو بے کار محسوس کرتا ہوں۔	0	1	2	3	4
4	میں گھبراہٹ اور غلط کام کرنے کے ڈر کا شکار ہوں۔	0	1	2	3	4
5	مجھے ہر وقت کسی غلطی کا خدشہ رہتا ہے۔	0	1	2	3	4
6	میں فکرمند ہوں کہ میرا مستقبل نہ خراب ہو جائے گا۔	0	1	2	3	4

	4- تبفیعہلاج وجود	قطعی نہیں	معمولی سا	کچھ تھوڑا	کافی	بہت زیادہ
1	(میری صلاحیتوں کو مقابلے کے قابل سمجھا جاتا ہے)	0	1	2	3	4
2	میری صلاحیتوں کو تسلیم کیا جاتا ہے (اور میں خوش ہوں)۔	0	1	2	3	4
3	میں محسوس کرتا ہوں کہ میری طرف توجہ نہیں دی جاتی۔	0	1	2	3	4
4	میں نے اپنی صلاحیتوں کے بارے میں کسی کو نہیں بتایا ہے۔	0	1	2	3	4
5	میری تعریف کی جاتی ہے۔	0	1	2	3	4
6	میں شاعری کرنے کے لیے خود کو تیار کرتا ہوں اور اپنی صلاحیتوں کی طرف توجہ دیتا ہوں۔	0	1	2	3	4
7	ہر وقت میں اپنی زندگی کے مختلف پہلوؤں کے بارے میں سوچتا ہوں۔	0	1	2	3	4

	5- تبفیعخذشبت ضبلب	قطعی نہیں	معمولی سا	کچھ تھوڑا	کافی	بہت زیادہ

1	ہدھیکًشیگیی سہٌے کے بنعلقذشبتیں گہش ہکببکہکب ج (زبہل ہے	0	1	2	3	4
2	ہیں دوشعے لوگوں ہےصل ہںغط کشب ہوکےشتی ہوں۔	0	1	2	3	4
3	ہدھیبششب ًیہے کمٹشا ًیغلا ًگبم زیکشگیب۔	0	1	2	3	4
4	ٹشیٹو ٹ/علاج کے مضرثاشاتوشیتوق ع یثفش یں۔	0	1	2	3	4
5	یشیثھوک اچھی ہے۔	0	1	2	3	4
6	ہدھےپلب خوغبًی زلیپ غٌذ ہے۔	0	1	2	3	4
7	ہیں لَبً خجبً خونکشعکتب ہوکےشعکتی ہوں۔	0	1	2	3	4
8	ہیں آعًی عیتھک خبتب ہوں/خبتی ہوں۔	0	1	2	3	4
9	ہیں خ ٌغیتعلق ہیں دلچغپی سکتب ہوں/سکتی ہوں۔	0	1	2	3	4
10	صیزتِ اولادہو ًںکیقیلیتک ےنقلیق ہ دھے خشیتیں۔	0	1	2	3	4
11	ہدھےپلٌ یًشعوش پوس ا وقبد ہے۔	0	1	2	3	4
12	ہدھیثنیشوٹشا ًیغلٹ کش ًبہشیبجھوا ہے۔	0	1	2	3	4
13	ہدھیثبتی ری/ضزییبد سرتی یں۔	0	1	2	3	4
14	یریتشخموص کشعکب ہوکے/شعکتی ہوں۔	0	1	2	3	4
15	ہدھیشیبسًضطلیکبم اوسًقلکشٌض ہوتے یں۔	0	1	2	3	4
16	ہدھے دھٌذلا دھکبئیتیب ہے۔	0	1	2	3	4
17	یریتٌگ ہوں کیشوے کھب ًکیب وأقہتجفلہوگب ہے۔	0	1	2	3	4
18	ہدھے کپکپی ہے۔	0	1	2	3	4
19	یشوا عب ً ظپھولب ہے۔	0	1	2	3	4
20	خلذ کے ہغبئل عیتٌگ ہوں۔	0	1	2	3	4
21	یشلیٹ خشاۃ ستب ہے۔	0	1	2	3	4
22	یشیقشھی خب ًفا کفیشاد کے لئے یشیوثبسی کل ربلی فلآت/شواسی ہے۔	0	1	2	3	4
23	یشے علاج کا خرچ یشے اوسگھشوالوں کے لئےثوخھ ہے۔	0	1	2	3	4

IRB LETTER