

# Medical Students' knowledge, attitude towards hematopoietic stem cell transplantation and donation behaviour at Taif university

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## Abstract

**Introduction:** The most effective therapy for life-threatening blood disorders and bone marrow dysfunction is using hematopoietic stem cell transplant (HSCT). World wide, patients' waiting lists for HSCT donor are increasing since the number of requirement is bigger than voluntary donors. The major reason behind inadequate number of donors is lacking of community awareness and low level of knowledge. Thus, this study aimed to assess medical students' experience in donation, basic knowledge and attitudes regarding HSCT.

**Method:** This study was carried out in Medicine College at Taif University. An online questionnaire was created and consisting of 23 questions.

**Result:** showed 41.7% of medical students were not registered in Saudi stem cell donor registry (SSCDR). Only 1.7% of students have donated marrow in the past. However, 19.5% of them were donated blood and/or blood products previously. In this study, students showed low level of basic knowledge regarding donation process. Only 5% of the students were aware of that the registration in the SSCDR is not require providing a blood sample. Positive attitude toward joining donor registry drive and donating with HSC was reported among medical students. The result showed more than 50% of participants were agree to join registry drive in their area and 60.1% were welcome to donate stem cells during their medical school days for unrelated individual. Majority of students (89%) were willing to donate stem cells to any family member who matched with them and needed bone marrow transplantation.

**Conclusion:** This study suggested that increasing awareness level and education is essential for the purpose of improving the medical students information, attitude toward joining SSCDR and donating HSC to save others' life.

## Introduction

Recently, the most effective and curative therapy for life-threatening blood disorders and bone marrow dysfunction is using hematopoietic stem cell transplant (HSCT) [1]. Such of the haematological disorders could be cured with HSCT are; lymphomas, leukaemia, acquired aplastic anaemia, sickle cell disease and thalassemia [2-4]. Since, hematopoietic stem cells function as a lifelong source of blood cells and have the ability to differentiate and synthesising mature blood cells [5]. Numerous research studies and clinical trials are still performing to evaluate the efficacy of HSCT in different therapeutic conditions [6,7].

There are two main methods for HSCT; firstly bone marrow transplantation (BMT), and secondly is peripheral blood stem cell transplantation (PBSCT) [6,7]. However, in more than 70% of patients, bone marrow transportation was replaced with peripheral blood stem cell donation, which is simpler and quicker. Several health complications have been found to be associated with hematopoietic stem cell transplantation including high risk of infection, haemorrhage and organ failure. In addition, different factors were related to the complications' severity such as patient's age, gender, stage of disease and health status [8]. Donor's age has significantly associated with the success of the transplant and younger age and healthy donors having lower risk factors [9]. The best donor for success transplant is sibling with the fully matched human leukocyte antigen (HLA). However,

finding a healthy-matched donor within the family presented with no more than 30%. According to the result of a study done in 2011, found that 12% of patients were matching with their mothers and 10% were matching with their fathers [10].

Although, the high number of genetic and haematological disorders that require HSCT in Saudi Arabia, there is very limited number of transplant centres [7]. In 2011, Saudi Stem Cell Donor Registry (SSCDR) was established and works to provide stem cells from unrelated donors for both Saudi and non-Saudi patients, who do not have an appropriate donor within their family. It has been reported that, in Saudi Arabia children and adult patients cannot find a well-matched family donor with 60% and 30% respectively. In all over the world, patients' waiting lists for HSCT donor are increasing since the number of requirement is bigger than voluntary donors [11]. It has been reported that the major reason behind inadequate number of HSCT

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donors is lacking of community awareness and incorrect information about the importance of HSCT [12]. Moreover, high awareness level among the public and individuals is crucial component for person's dedication to donate and joining transplant centres. Thus, educational campaigns, which increasing the awareness level is an essential factor for encouraging individuals willing for registration and donation to save others' life. Students at medical field were considered important sources of correct information and they can influence public attitudes regarding HSCT and donation. Thus, this study aimed to assess medical students' experience in donation, basic knowledge and attitudes about hematopoietic stem cell transplantation at Taif University, medical college, Taif, Saudi Arabia.

### Methods

This study was carried out in Medicine College at Taif University, in Saudi Arabia between February 2020 and April 2020. An online questionnaire was created from a previous study performed in Mayo Medical School at United State of America (permission to use the questionnaire was taken from the corresponding author). The questionnaire was consisting of 23 questions. The first part of the questionnaire was about the socio-demographic data of participants (gender, age, academic year, GPA and social status). The second part of the questionnaire was to evaluate students' experience of towards HSCT and BMR donation. The third part was focused on basic knowledge regarding donor eligibility (DE) and the donation process (DP). The last part of the questionnaire composed of five items to assess students' attitude toward joining Saudi stem cell donor.

**Ethical Consideration:** Ethical approval for this study was obtained from the ethics review committee of Medicine College at Al-Taif University. All information obtained at each course of the study was kept confidential.

**Data analysis:** All responses to the questionnaire were assessed and transfer to Excel. The data was analysed statistically using SPSS version 16.

### Results

Three hundred and three medical students were participated and completed the online questionnaire of this study. The first part of the questionnaire was about the socio-demographic data of participants' gender, age, academic year, GPA and social status, which showed non-significant differences between the 303 participants. All participants were Saudi and the majority was female (n = 193,64 %), between the ages of 17 and 22 (n = 264, 87%), single (n = 294, 97.4%) and at their third academia year (n = 85, 28%) (Table 1).

This study showed that 41.7% (n = 126) of medical students' participants were not registered in Saudi stem cell donor registry (SSCDR), while few students were registered (n = 17, 5.6%) and about half of them never heard about it (n = 159, 52.6%) (Table 2). Only 1.7% (n = 5) of students have donated marrow in the past. Similarly 1.7% (n = 5) donated stem cells to an unrelated recipient and 2.3% (n = 7) were donated peripheral blood stem cells. Out of those who had been donated stem cells only 1% were donated to a family member. The result of this study was also showed that 19.5% (n = 59) of students were donated blood and/or blood products. Fortunately, most of the students have no family history of blood cancer (n = 7.3, 92.7%).

The basic knowledge about donor eligibility (DE) and the donation process (DP) were assessed within six questions of the questionnaire. Students showed low level of basic knowledge regarding donation process. The result found that half of the students' participants were unaware of that the person who can't donate blood for any medical

**Table 1.** Shows the number and percentage of socio-demographic data for medical students participants

Socio-demographic data	% of medical students
Age	
17-22	86.6 %
23-25	13.4 %
>25	0 %
Gender	
Female	63.6 %
Male	36.4 %
Academic year	
First year	13.2 %
Second year	19.2 %
Third year	27.8 %
Fourth year	31.1 %
Fifth year	8 %
Sixth year	0 %
GPA	
4- 3.75	31.1 %
3.74-3.5	28.8 %
3.49-3.00	26.8 %
2.9 - 2.5	8.9 %
2.49-2.00	3.3 %
<2.00	1 %
Marital status	
Single	97.4 %
Married	2.0 %
Divorced	0.7 %

**Table 2.** Shows the history and experience of donation among registered and unregistered medical students

	Yes (%)	No (%)	Never heard of it %
Are you Registered in Saudi stem cell donor registry (SSCDR)	5.6 %	41.7 %	52.6 %
Have you ever donated marrow in the past	1.7 %	98.3 %	
Have you ever donated peripheral blood stem cells in the past	2.3 %	97.7 %	
Have you ever donated stem cells to a family member	1 %	99 %	
Have you donated stem cells to an unrelated recipient	1.7 %	98.3 %	
Have you ever donated blood or blood products	19.5 %	80.5 %	
Do you have a family history of blood cancer	7.3 %	92.7 %	

reason, can donate bone marrow (BM) (Table 3). Only 5% of the students were know that the registration in the Saudi stem cell donor registry not require providing a blood sample (Table 3). More than one third of students were never know that ethnicity and race are important factors that influence finding a matched donor for stem cells transplantation (Table 3). The majority of students answered with "I don't know " and "True" when they asked with that "harvested bone marrow from donor 's hip in the operation room is required for bone marrow transplantation" with 17.5% and 76.5% respectively. Thus means that more than two third of medical school participants were not aware of the correct answer (Table 3). Ten percent of students were know that in-patient hospitalization is not required for stem cell donors during the donation process. According to the result of this study, few of the students (n = 42, 13.9%) were aware of that stem cells donors are not vulnerable to common serious medical complications and side effects of stem cells donation (Table 3). However, it has been shown that there are no significant differences between the levels of basic knowledge among medical students with varying GPA.

**Table 3.** Shows knowledge assessment about donor eligibility (DE) and the donation process (DP) among medical students participants

	Correct answer	Student's True answer	Student's False answer	Student's answer with I don't know
If the person can't donate blood, he is also, unable to donate bone marrow	False	21.5 %	27.8 %	50.7 %
To be registered in the Saudi stem cell donor registry you need to provide a blood sample	False	33.4 %	5 %	61.6 %
Ethnicity and race are important factors that influence finding a matched donor for stem cells transplantation	True	18.9 %	34.1 %	47 %
Harvested bone marrow from donor's hip in the operation room is required for bone marrow transplantation	False	17.5 %	6 %	76.5 %
In-patient hospitalization is required for stem cell donors during the donation process	False	22.2 %	10.3 %	67.5 %
Stem cells donors are vulnerable to common serious side effects of stem cells donation	False	23.2 %	13.9 %	62.9 %

**Table 4.** Shows medical students participants' attitude toward joining Saudi stem cell donor registry/donating stem cells

	Agree %	Neither agree nor disagree %	Disagree %
I will join any donor registry drive applied in my area	51 %	41.3 %	7.7 %
During medical school days, If unrelated individual required stem cells transplant I will donate my stem cells to him	60.1 %	33.7 %	6.2 %
Health care professionals and medical students who haven't been on stem cell donation registry should register.	36.7 %	50.3 %	13.9 %
I will donate my stem cells to any patient I match with	62 %	28.8 %	9.2 %
I will donate my stem cells to any family member needed bone marrow transplant and matched with me.	89 %	6.2 %	4.8 %

In general, students' attitude was positive toward joining donor registry drive and donating with HSC. The result of this study showed more than 50% of medical school participants were agree to join registry drive in their area and 60.1% were welcome to donate stem cells during their medical school days for unrelated individual who, required stem cells transplant (Table 4). However, half of students were neither agree nor disagree about "those health care professionals and medical students should register with stem cell donation registry". Majority of students (89%) were willing to donate stem cells to any family member who matched with them and needed bone marrow transplant (Table 4).

### Discussion

The most effective and curative therapy for life-threatening blood disorders and bone marrow dysfunction is using hematopoietic stem cell transplant (HSCT). Such haematological disorders could be cured with HSCT including lymphomas, leukaemia, acquired aplastic anaemia, sickle cell disease and thalassemia [2-4]. Patients' waiting lists for HSCT donor are increasing since the number of requirement is much higher than voluntary donors world widely [11]. The presence of insufficient healthy HSC donors has been highly associated with individual's attitudes and beliefs towards donation. Thus, improving individuals' basic knowledge and awareness specially among health care providers will helps in person's dedication to donate and joining transplant centres. Students at medical field were considered important sources of correct information and they can influence public attitudes regarding HSCT and donation. Accordingly, educational campaigns, which increasing the awareness level and improving score of knowledge is an essential factor for encouraging individuals willing for registration and donation to save others' life.

This study aimed to assess medical students' experience in donation, basic knowledge and attitudes about HSCT. Our results reported only 5% of medical students were registered in Saudi stem cell donor registry (SSCDR). This percentage was lower than that reported within

medical students at Jazan University in Saudi Arabia, which, reported 9% of their students were registered at SSCDR [7]. On the other hand, studies from different country in United State at Mayo Medical School showed higher percentage of registered medical students (43%) at bone marrow registry (BMR) [1].

One of the main purposes of this study was to assess knowledge on HSCT. According to the result of this study, medical students showed inadequate basic knowledge on HSCT. Similarly, low score of knowledge regarding donation process was reported among medical students at Jazan University [7]. In 2015, Lye and colleagues reported moderate level of knowledge about stem cells among nursing students in University of Sains, Malaysia [12]. However, a study done in Turkey showed a significant higher level of knowledge regarding HSCT among medical students comparing to law students of Gazi University [13].

The result of this study also showed that more than one third of students were never know that ethnicity and race are important factors that influence finding a matched donor for stem cells transplantation. Moreover, the majority of students were unknown of that in-patient hospitalization is not required for stem cell donors during the donation process. When comparing differences in knowledge between medical students with varying GPA, we found that there were no significant differences at their level of basic knowledge.

Our study showed that most students had positive attitude toward joining donor registry drive and donating with HSC. It has been showed that more than half of medical school were agree to join registry drive in their area and 60.1% were welcome to donate stem cells during their medical school days for unrelated individual who, required stem cells transplant. Moreover, majority of students (89%) were willing to donate stem cells to any family member who matched with them and needed bone marrow transplant. Several research studies showed positive attitude form health care professionals and medical students toward HSC donation. In Jazan University, they found that 87% of medical students were willing to register and donate stem cells to any patient they matched [7]. Another study performed among nursing

students (76.1%) showed positive attitude towards stem cell donation and its therapeutic potential [12].

## Conclusions

This is the first study to be done in Taif city at western region of Saudi Arabia to assess medical students' experience, knowledge level and attitude toward HSCT and donation. This study suggested that increasing awareness level by education is vital strategy for the purpose of improving the medical students information, attitude toward joining SSCDR and donating stem cells for saving other's lives.

## Authors' contributions

Abaad: preparing the questionnaire, sending the questionnaire to the medical students and analysing the results)

Rana: writing the introduction, method, results, discussion, preparing tables and doing the submission).

## Conflict of interests

None.

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