

Saudi population Awareness and Attitude Regarding Stem Cell Donation

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Abstract

Worldwide stem cells (SC) donors' number is still insufficient. To identify the attitudes of Saudi participants regarding their registration to be future donors, a case-control study was conducted at SC donor registration campaigns, King Faisal Hospital, Riyadh. Although (41.7%) of participants were aware of SC, (93%) of them had bad academic knowledge score. More than half of participants (67.3%) were registered as a donor in Saudi Stem Cell Donation Center (SSCDC). Of these participants, (15.5%) knew the Saudi SC donation center. A significant difference was found between registered and non-registered participants regarding age, education level, and knowledge score ($P\text{-value} \leq 0.05$). The main encouraging attitude was relieving the patient's pain (65.3%). In conclusion, the majority of Riyadh's population accepted the idea of SC donation; however, there was a lack of academic knowledge. So that awareness strategies are needed to enhance knowledge, clarify the role of SSCDC, and improve attitudes through correcting wrong ideas.

Keywords: stem cell, donation, decision, Saudi Arabia

INTRODUCTION

Stem cell transplantation becomes the baseline for the treatment of many disorders and diseases [1, 2]. The unspecialized long term self-renewal SC can repair any body system by differentiating into specialized cells [3].

Parallel to the development in the world, there have been numerous active researches in Saudi Arabia on SC studies and practices [4]. In 2007, the Stem Cell Therapy Program at King Faisal Specialist Hospital and Research Center in Riyadh was established in collaboration with Harvard Medical School [5-9].

Donation is the only source to obtain SC, and as a result, donors are the key players in this process. Donors are usually of three types: Volunteer, replacement, and paid donors [10].

Developed countries have well-established voluntary-based transfusion systems and can meet SC demands. However, Saudi Arabia law has some difficulties in achieving this fate. Socio-cultural, as well as ethical and religious contexts of the Saudi nation, should be considered during the establishment of interoperable guidelines [11].

Specific studies on the Saudi population regarding their knowledge and attitudes concerning SSCDC registration are lacking. Therefore, our study aims to highlight the Saudi

population's readiness to be a future donor through detecting their attitudes toward SSCDC registration and understanding factors affecting it to be taken into consideration when establishing SC practices regulations.

METHODOLOGY:

Study design

This case-control study was approved by the institutional review board, Princess Nourah Bint Abdulrahman University (H-01-R-059), with the number (16-0034) and was conducted between January and April 2017. Informed consent was obtained from each participant at the beginning of the interview using a consent form.

Study population

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Participants were enrolled from Riyadh, the capital city of Saudi Arabia. Participants were adult Saudi citizens who were visiting stem cell donation registration campaigns (SCDR), King Faisal Specialist Hospital that was running in a shopping mall, and Princess Nourah Bint Abdulrahman University at the time of the study. These participants are proxy, as they might be asked –at any time- to donate their SC to be transplanted into another matched recipient. Non-Saudi, critically ill, and diminished decisional capacity persons were excluded.

Recruitment method

The targeted participants, visitors of SCDR campaigns, were invited to participate in the study. Assuming a significant level of 5% and a precision of 20%, the sample size of 500 subjects was estimated by using stratified quota sampling.

Data collectors

Data collectors were responsible for recruiting participants, taking written consent from them, and helping them to complete the pre-designed questionnaire.

Study tool

A self-completed questionnaire was developed, including closed-ended questions. It was developed in English and then translated into Arabic. The questionnaire was pilot-tested at Princess Nourah Bint Abdulrahman University and then modified to ensure that questions were comprehensible and clear. The questionnaire was covering three main domains: (1) socioeconomic and demographic data, (2) academic knowledge regarding stem cell and Saudi stem cell donation center, and (3) participant's decision and attitudes to be recruited as a donor.

Participant's protections

Informed consent was signed by each participant before starting the questionnaire. To ensure confidentiality, participants' response sheets were serially arranged by a code number, and the name of the participants was not required.

Statistical analysis:

All statistical analysis was conducted by SPSS software version 16.0. The descriptive statistics of the studied sample were analyzed in terms of mean, standard deviations. Cross tabulation was used to compare the independent variables (e.g., demographic) against dependent variables (questions eliciting participants' attitudes and knowledge); analysis of quantitative data by t-test and association of qualitative variables by chi-square test was conducted. A P-value of less than 0.05 was considered statistically significant.

RESULTS:

Socioeconomic and demographic data:

Table 1 shows the distribution of the participants by selected sociodemographic characteristics. A total of 600 questionnaires were filled, of which 100 were from university students, and 500 were from the general population. The

mean age was 29.2 ± 9.3 years, and (73.6%) of the participants were below 36 years of age. The study sample had an equal proportion of gender. Regarding education, (90%) classified themselves in different levels of education, whereas slightly more than (70%) of participants reported their field as a non-healthcare field. Using monthly expenses as an indicator of economic status, (41.8%) stated that they spend less than 6000 Riyals/month.

Knowledge score regarding stem cell and donation centers

Regarding their previous academic knowledge about SC and SSCDC, (93%) participants fall in the bad knowledge score. (58.3%) of them stated that they had never heard about it; also (50.8%) of them declared that they did not have any source to read about it table (2). Most of the participants, who had insufficient knowledge scores, were males (50.9%) less than 25 years old (44.8%), undergraduates (62.5%), in the non-healthcare field (73.3%), and with mild to moderate-income. Moreover, table (2) showed a significant difference between participants with bad knowledge scores and those with good one in field, awareness about SC, and knowledge sources. The logistic analysis revealed that non-health field, SC unaware participants and who had not any Knowledge source could have bad knowledge score with odd ratio (.408, .155 and .156) and 95% confidence intervals (.216-.770, .07-.342 and 2.9 -14.08) respectively.

SSCDC registration decision

Two-thirds (67.3%) of participants favor being registered in the Saudi Stem Cell Donation Center (SSCDC). A significant difference was found between registered and non-registered participants, particularly in age, education level, career field, knowledge score, school/college, and brochures as stem cell knowledge's source. The logistic analysis revealed that participants with young age (OR 1.41; 95% CI .96-2), non-healthcare field (OR 2.76; 95% CI 1.78-4.26), bad knowledge (OR .341; 95% CI .141-.82), knowledge from school (OR 2.39; 95% CI 1.33-4.32) and brochures (OR 2.449; 95% CI .99-6) were more likely to favor registration as SC future donor table (2). More than half of the registered participants chose to donate to any needed patients with a percentage of (86.6%).

Participants' attitude regarding stem cell donation decision

Among ten statements that evaluate the participants' attitude toward their participation as a stem cell donor, the majority of the participants showed a positive attitude to encourage stem cell donation as near (65%) of the participants believed that it relieves patient's pain and is morally accepted (61.7%). There were a fairly moderate number of participants who were worried to be a donor as they considered the stem cell donation process as an unsafe procedure with many complications (35%) tables (3), (4), (5).

Table 1: Distribution of the participants by selected sociodemographic characteristics

Data	No. of participants	% (n=600)
Gender		
Male	300	50
Female	300	50
Participants' age (years)		
18-25	275	45.8
26-35	167	27.8
36-45	108	18
>46	50	8.3
Education level		
Postgraduate	60	10
University	382	63.7
Secondary education	140	23.3
Basic education	15	2.5
Read and write	3	.5
Occupation		
Healthcare worker	169	28.2
Other jobs	431	71.8
Socioeconomic status		
High	115	19.2
Middle	251	41.8
Low	234	39

aModified from Fahmy & Elsherbini [12].

Table 2: Distribution of the participants registering in Saudi Stem Cell Donation Center (SSCDC) by age, gender

Variable	No. of participants registering in (SSCDC)	% (n=404)	p-value
Gender			
Male	189	46.8	.015
Female	215	53.2	
Participants' age (years)			
18-25	199	49.3	.014
26-35	108	26.7	
36-45	72	17.8	
>46	25	6.2	
Education level			
Postgraduate	39	9.7	.024
University	268	66.3	
Secondary education	90	22.3	
Basic education	7	1.7	
Read and write	-	-	

Occupation

Healthcare worker	138	34.2	.000
Other jobs	266	65.8	

Socioeconomic status

High	79	19.6	.8
Middle	171	42.3	
Low	154	38.1	

Table 3: distribution of the studied participants according to their knowledge, attitude, and practice about stem cell donation

Item	No. of participants	% (n=600)
Heard about stem cell donation		
Yes	250	41.7
No	350	58.3
Source of knowledge (n=250)		
Textbooks	31	12.4
Part of the education curriculum	81	32.4
Media	130	52
Attending course by specialist	47	18.8
Campaign brochure	33	13.2
Attitude		
Any individual should donate stem cell donation as it is safe	320	53.7
Stem cell donation is morally accepted	370	61.7
Stem cell donation can reduce the country's budget in managing chronic disease	337	56.2
Willing to attend education workshops	145	24.2
The donor should have compensation	123	20.5
Willing to be registered as a donor	404	67.3

Table 4: factors affecting participants' mean scores on knowledge, attitudes, and practice (KAP) of stem cell donation

Variable	KAP score mean±SD	F-test	P-value
Participants' age (years)			
18-25	5.2±3	5	.002
26-35	4.3± 2.6		
36-45	5.5±3		
>46	4.7±2.8		
Gender			
Male	4.8±2.8	2.1	.14
Female	5.7±3		

<i>Education level</i>			
Postgraduate	4.6±2.8	2.8	.026
University	5.3±2.9		
Secondary education	4.5±2.8		
Basic education	4.1±1.9		
Read and write	2.6±2		
<i>Occupation</i>			
Healthcare worker	5.8±2.9	16	.000
Other jobs	4.7±2.9		
<i>Socioeconomic status</i>			
High	5.9±3	9	.000
Middle	4.5±2.9		
Low	5±2.9		
Heard about stem cell donation			
Yes	6±3	49	.000
No	4.3±2.7		
Source of knowledge (n=250)			
Textbooks	7.2±3.4	16	.000
Part of the education curriculum	6±2.8		
	5.8±3		
Media	6.3±3		
Attending course –specialist	5.7±3.2		
Campaign brochure			

Table 5: Stepwise multiple regression analysis of factors affecting scores on knowledge, attitude, and practice about stem cell donation

Variable	Beta	95% Confident interval	p-value
Age	0	-.027 to .026	.9
Gender	.25	-.21 to .7	.3
Education level	.09	-.26 to .45	.6
Occupation	-.41	-.96 to .13	.1
Socioeconomic status	.11	-.22 to .44	.5
Heard about stem cell donation	-1.3	-1.8 to -.8	.000*
Source of knowledge (n=250)	-1.4	-2.4 to -.26	.01*

*R²= .295, F test=28.5, df= 2, P-value=.000

DISCUSSION:

This study elicits the attitudes and opinions of Saudi participants regarding their registration in SSCDC as a future donor. Regarding SC donation, a large majority of our registered population thought that all types of SC donations, e.g., peripheral blood and bone marrow, were important. However, a lower percentage had good academic knowledge about stem cells and Saudi stem cell donation center. Similar results were obtained from studies involved university students. These studies revealed that targeted education could influence low-grade university students' knowledge and attitudes towards SC donation and accounted for the observed difference in the desire to participate. Zuhre et al. [13] and Azzazy and Mohamed [14]. The insufficient knowledge could be explained by lack of experience as most of the participants

were young, most of them were undergraduate in the non-healthcare field. Also, the majority had no source to increase their knowledge about SC.

Although the insufficient knowledge of registered participants, they were willing to donate and agreed comfortably with full leniency. This reflected their positive attitude toward SC donation and raised the concept of insufficient knowledge was not a barrier for SC donation. This could be boosted by Lye et al. [12] and Sorgo and Ambrozic-Dolinsek's [12] studies. They showed that the relationship between knowledge and attitude was weak; also, pure academic scientific knowledge was not solely a factor in accepting stem cell Donation, but many factors were affecting it such as religion, culture, moral and ethical concerns.

It is interesting to note that compared with Alfraidy et al. [15] results regarding the most effective SC knowledge source, most of their participants agreed that media involving TV advertisings followed by school/university books were the commonly used sources. Consequently, the most effective methods to improve SC knowledge are encouraging specialists' participation in social media programs and increasing the availability of easy cheap interesting medical books.

Attitudes toward the SC donation were elicited. Most of the participants (65%) agreed that SC donation could relieve the patient's suffers. This is possible because of the religious background of participants who followed Islam. Islamic believes have colored the Saudi Arabia population into the uniqueness of religious perception that has shaped the Saudi population's perception of encouraging stem cell donation. We were in the same line with Al-Hayani [16].

The respondents expressed many concerns about their negative attitude regarding registering as a donor. The most frequent one is the stem cell donation's complications. Similar concern has been raised worldwide, suggesting that improving medical care will lead to faster recovery and fewer complications by encouraging and pushing more population to participate in the SC donation process [2].

CONCLUSION:

Although the majority of Riyadh's population accepted the idea of SC donation, awareness strategies are needed to enhance the population's SC knowledge, clarify the role of Saudi stem cell donation centers and improve their attitude by correcting wrong ideas. Moreover, improving medical care in stem cell donation procedures can motivate the public to participate in SC donation.

REFERENCES

1. Gratwohl A, Baldomero H, Aljurf M, Pasquini MC, Bouzas LF, Yoshimi A, Szer J, Lipton J, Schwendener A, Gratwohl M, Frauendorf K. Hematopoietic stem cell transplantation: a global

- perspective. *Jama*. 2010 Apr 28;303(16):1617-24. doi:10.1001/jama.2010.491.
2. Jee Leng LY, Lean Keng SO, Wan Amir Nizam WA, Suat Cheng TA. Knowledge and attitude about stem cells and their application in medicine among nursing students in Universiti Sains Malaysia, Malaysia. *The Malaysian journal of medical sciences: MJMS*. 2015 Jul;22(4):23.
3. Stem Cell Basics I. | stemcells.nih.gov [Internet]. US National Library of Medicine. US National Library of Medicine; [cited 2016Nov17]. Available from: <https://stemcells.nih.gov/info/basics/1.htm>
4. Flynn JM, Matthews KR. Stem cell research in the Greater Middle East: the importance of establishing policy and ethics interoperability to foster international collaborations. *Stem Cell Reviews and Reports*. 2010 Jun 1;6(2):143-50. doi: 10.1007/s12015-010-9133-6.
5. El-Awady N. Gulf states embrace stem cell technologies at home and abroad. *Nature Reports Stem Cells*. (Accessed January 2010 at <http://www.nature.com/stemcells/2008/0801/080117/full/stemcells.2008.21.html>)
6. Alamoudi NM, El-Ashiry EA, Allarakia RM, Bayoumi AM, El Meligy OA. Adipose Tissue and Bone Marrow-Derived Mesenchymal Stem Cells Role in Regeneration of Cleft Alveolus in Dogs. *International Journal of Pharmaceutical Research & Allied Sciences*. 2019 Jan 1;8(1).
7. Yeganeh A, Athari B, Tavakoli N, Moghtadaei M. Comparison of Polyglycolactic-Hydroxyapatite-CHITOSAN Scaffolds with or without Mesenchymal Stem Cells in an in-vivo Study. *Int J Pharm Phytopharm*. 2018 Feb 1;8(1):69-74.
8. Farsi NM, El Ashiry EA, Abdrabuh RE, Bastawi HA, El Meligy OA. Effect of Different Pulp Capping Materials on Proliferation and Odontogenic Differentiation of Human Dental Pulp Mesenchymal Stem Cells. *International Journal of Pharmaceutical Research & Allied Sciences*. 2018 Jan 1;7(3):209-23.
9. Izadi MA, Valiani A, Bahramian H, Esfandiari E, Hashemibeni B. Which factor is better for cartilage tissue engineering from human adipose-derived stem cells? Kartogenin or avocado soybean unsaponifiable. *Pharmacophore*. 2018;9:140-8.
10. WHO and International Federation of Red Cross and Red Crescent Societies, 2010). Available at http://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf.
11. Isasi RM. Policy interoperability in stem cell research: demystifying harmonization. *Stem Cell Reviews and Reports*. 2009 Jun 1;5(2):108-15.
12. Sorgo A, Ambrozic-Dolinsek J. The relationship among knowledge of, attitudes toward, and acceptance of genetically modified organisms (GMOs) among Slovenian teachers. *Electron J Biotechnol*. 2009;12(3):1-13.
13. Kaya Z, Gültekin KE, Demirtaş OK, Karadeniz D, Calapkulu Y, Tap Ö. Effects of targeted education for first-year university students on knowledge and attitudes about stem cell transplantation and donation. *Experimental and Clinical Transplantation*. 2015 Feb 1;13(1):76-81.
14. Azzazy HM, Mohamed HF. Effect of educational intervention on knowledge and attitude of nursing students regarding stem cells therapy. *IOSR Journal of Nursing and Health Science*. 2016;5(2):75-80.
15. Alfraidy OB, Alharbi HH, Alrehaili MN, Alfridy M, Alkabli RS, Alwasaidi TA. Rising of public medical awareness is the most important motivating factor for hematopoietic stem cell donation in Saudi Arabia. *International Journal of Academic Scientific Research*. 2016; 4(4): 63-68.
16. Al-Hayani FA. Muslim perspectives on stem cell research and cloning. *Zygon®*. 2008 Dec;43(4):783-95.