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Effect of Educational Intervention on Knowledge and Attitude of Nursing Students Regarding Stem Cells Therapy

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Abstract: *Recent advances in science have proven that stem cell could potentially generate cure and treatment for various diseases including cancers, cerebrovascular, and immune diseases. This promising evidence support the hope of achieving stem cell therapy in the medical field. Nursing curriculum needs to be updated with the promising concept in order to equip future nurses with required knowledge for safe practice. The present study aimed at examining the effect of an educational intervention on knowledge and attitude of nursing student regarding stem cell therapy. A quasi experimental design with pre and posttest utilizing a convenience sample of 53 students was used to collect data using the knowledge and attitude of stem cell therapy questionnaire. Results showed poor knowledge about stem cells therapy in the pretest with a remarkable improvement and statistical significance in the posttest. Although, student's knowledge in the pretest was poor, they showed a positive attitude toward stem cells therapy in the pretest and posttest. The study concluded that the educational intervention was effective in improving future nurse's knowledge and attitude regarding stem cells therapy. Further educational programs that utilize religious, cultural, and social factors are crucial. Including such critical topics in nursing curriculum is also required.*

Keywords: Stem Cells, therapy, educational intervention, knowledge, attitude

I Introduction

Stem cells are undifferentiated cells with the ability to divide and give rise to identical and undifferentiated cells (Acharya, 2013). Hematopoietic stem cell transplantation is a life-saving treatment for numerous diseases including malignant conditions, immune disorders, and certain inherited metabolic diseases (Appelbaum, 2007). Research evidence showed great benefits of stem cell therapy such as a successful treatment of leukemia and many other hematologic disorders. However, the real promise of stem cell research is the development of a new field of medicine known as regenerative medicine (Wobus, and Boheler, 2005; Weismann, 2005). Stem cells are found in all multi cellular organisms, and are characterized by the ability to renew through mitotic cell division and differentiate into a diverse range of specialized cell types. The two broad types of mammalian stem cells are: embryonic stem cells that are isolated from the inner cell mass of blastocysts, and adult stem cells that are found in adult tissues (American College of Obstetricians and Gynecologists, 2011).

Although, stem cells researches related to hematopoietic stem cells are increasing worldwide with promises to human health, debate about stem cells therapy is intense due to the involvement of scientific, religious, societal and political opinions. This scientific innovation requires nurses to prepare themselves with knowledge gained from specialized nursing research and their own ethical decision (Yıldırım, &Sahin, 2007). The main reason for the insufficient number of donors for stem cell transplantation is the lack of public awareness about the importance of stem cell transplantation. Increasing public knowledge and awareness about solid-organ transplantation has accelerated donor recruitment in many countries (Studts, Ruberg, McGuffin, &Roetzer, 2010; Konaka, Kato, Ashikari, & Fukushima, 2012; Harbaugh et al., 2011). Little is known in developing countries regarding the efficacy of public education to increase the number of stem cell donors (Bapat, Kedlaya&Gokulnath, 2010; Onitilo, et al, 2004).

Nursing students need to hold a proper knowledge and attitude regarding stem cells therapy through appropriate education during their course of study. This medical innovation is recent and nurses are challenged to integrate knowledge and attitude related to newly developed concept in clinical practice. Nursing curriculum needs to remain up to date to be able to meet the standards of nursing practice (Miok&Hyunmi, 2013; Abdullah, 2011, Mohammed & Sayed, 2015).

Aim:

The aim of this study was to evaluate the effectiveness of educational intervention on Knowledge and attitude of nursing student toward stem cells therapy in Saudi Arabia.

Research hypothesis:
1-Nursing students who participated in the educational intervention will exhibit higher level of knowledge and will show positive attitude toward stem cells therapy in the posttest than in the pretest.

II Methods

Research design: A quasi-experimental pre and posttest design was utilized to fulfill the aim of this study.
Setting: This study was conducted at Collage of Nursing, KSAU-HS, Riyadh, Kingdome of Saudi Arabia.
Sample: A convenience sample of 53 students from level 6 and 7 were included in the study. These levels were chosen because they have finished most of clinical nursing courses especially medical surgical nursing courses.
Tools of the study: Plus demographic factors such as age, academic level, and previous attendance of workshops or conference related to stem cell therapy, students' knowledge and attitude toward stem cells therapy questionnaire was used. The questionnaire was developed by the investigators after reviewing related literatures and previous studies with similar objectives. The questionnaire consisted of 2 parts; part one is related to knowledge regarding stem cells that contains 30 questions on a-3 points Likert scale with (2) correct answer, (1) wrong answer and (0) don't know. To better present knowledge, scores were presented as good, fair and poor. The questionnaire also contains 7 open ended questions related to stem cells therapy definition, characteristics, types, indications, sites of obtaining, advantages and disadvantages of stem cells therapy. The open ended questions were coded as correct (3), incomplete (2), wrong (1) and don't know (0). Part two of the questionnaire is related to attitude toward stem cells therapy. It contains 25 items with 2 points scale; agree (2), and disagree (1). The study questionnaire was piloted on five students for clarity and applicability. There were no major concerns in the questions and the 5 subjects were included in the main study. The educational intervention was conducted and data were collected over a period of two months November and December 2015. The study questionnaire was tested for validity through revision by a panel of 2 experts holding a PhD in medical surgical nursing. Reliability was tested before the main data analysis and was reported as .90 for knowledge and .83 for attitude.

Ethical considerations

Nursing students were told about the study objectives, voluntary to participate and their right to withdraw at any time throughout the study process without any interference with their study or grades. Students who agree to take a part were asked to provide consent. The educational session were planned based on the availability of the students and the investigators. Confidentiality was ensured throughout the study process, and the students were assured that all data will be used only for research purpose.

The program:

The study was done in 4 phases. First, developing the study questionnaire and the educational contents that cover all concepts related to stem cells therapy. The study questionnaire was tested for face and content validity through revision by 2 faculties who are holding PhD in nursing. The questionnaire was piloted on 5 students for applicability and clarity. The contents of the program were prepared by the researchers after reviewing all related scientific sources. The plane of educational sessions and time of sessions were communicated to participants. Second was the pretest that assesses the students' knowledge and attitude regarding stem cells therapy after piloting the questionnaire. Students were told about the study and questionnaire applied. There was no limited time to complete the questionnaire. Third was implementation of the educational program. Students were divided into 4 groups 13 students in 3 groups and 14 students in one group. Each educational session lasted 2 hours and each student had the chance to interact and ask questions. The session included power point presentations that include pictures, questions, brain storming and active discussion. Sessions were provided in English language. The last phase was posttest after the educational sessions. The average time needed to complete the questionnaire in the pre and the posttest ranged from 20 to30 minutes. To avoid transmission of information between level 6 and level 7 students that might affect results on the posttest, the pretest, intervention and the posttest were done for each level separately.

III Results

Fifty three students participated in this study, the mean age was reported as 21(.62). 49% were in level 6 and 51% in level 7. No one of participants participated or attended any scientific activity related to stem cells before. Regarding knowledge, results showed a mean score of 1.75 (.56) in the pretest. Poor knowledge was reported among 30.2% of participants, fair knowledge among 62.3% and good knowledge among 7.5%. The analysis showed that high knowledge was related to items such as stem cell are capable of dividing and can self-renew for long period, experience and proficiency is required for stem cell collection, it is necessary to perform stem cell cross matching before using it, adult stem cells are capable of forming any cell type in the body and stem cell have tissue-specific structures that allow it to perform specialized functions.
Knowledge in the posttest revealed a mean score of 2.61 (.31). There was a noticeable improvement in the level of knowledge since 80.8% of the participants reported good knowledge of stem cells therapy and 19.2% reported fair knowledge. No poor knowledge was reported in the post test. Paired sample t-test showed

significance relationship between knowledge in the pre and posttest (t =. -13.37, p = .000). Data on knowledge are presented in table 1.

Table 1: Knowledge of Stem Cells Therapy in the pre and posttest

	Pre		Post		t	p
	Number (n= 53)	%	Number (n=52)	%		
Poor	16	30.2	0	0	-13.37	.000
Fair	33	62.3	10	19.2		
Good	4	7.5	42	80.8		
Mean	1.75		2.61			
SD	.56		.31			

Open ended questions

Regarding short essay questions in the pretest, participants reported 87.5% as don't' know and 12.5% as wrong answer for the definition of stem cells therapy. 79% indicated that they don't know and 9% wrong answer, 10% incomplete answer and 2% correct answer regarding the indications for stem cell therapy. As for types of stem cells, 85% reported don't' know, 8% wrong answer, 6% incomplete answer, and 1% correct answer. Stem cells characteristics was reported as 92% don't' know and 8% as wrong answer. Concerning sites of obtaining stem cells, 75% reported don't' know, 23% reported wrong answer and 2% incomplete answer. Advantages of stem cells therapy got 4% correct answer and 96% as don't' know, while disadvantages of stem cells therapy 6% as correct answer and 94% as don't' know.

In the posttest, definition of stem cell reported correct among 32%, incomplete answer 26%, wrong answer 4% and 38% don't know. Indications of stem cells reported as correct answer in 51%, incomplete answer 32%, and 17% don't know. Characteristics of stem cells reported correct among 26%, incomplete answer among 28%, and don't know 47%. Responses to the types of stem cells were 62% correct, 15% incomplete answer, and 23% don't know. Regarding sites of obtaining stem cells were 40% correct answer, 32% incomplete answer, and 28% don't know. Advantages of stem cells therapy got correct answer from 23%, incomplete answer from 30% and 47% reported don't know. Regarding disadvantages of stem cells therapy 13% reported correct answer, 40% incomplete answer, and 47% don't know. There was a statistical significance relationship between pre and posttest regarding the short essay questions as shown (t = 11.04, p = .000).

Data from open ended questions are reported in table 2.

Table 2: Results of open ended questions of knowledge questionnaire

Items	Responses pre test				Responses Posttest				t	p
	Correct	**Wrong**	**Incomplete**	**Don't know**	**Correct**	**Wrong**	**Incomplete**	**Don't know**		
Stem cells definition	0%	12.5%	0%	87.5 %	32%	4%	26%	38%	11.04	.000
Indications of stem cells therapy	2%	9%	10%	79%	51%	0%	32%	17%		
Characteristics of Stem Cells	0%	8%	0%	92%	26%	0%	28%	47%		
Types of stem cells	1%	8%	6%	85%	62%	0%	15%	23%		
Sites of obtaining Stem cells	0%%	23%	2%	75%	40%	0%	32%	28%		
Advantages of stem cells therapy	4%	0%	0%	96%	23%	0%	30%	47%		
Disadvantages of stem cells therapy	6%	0%	0%	94%	13%	0%	40%	47%		

Attitude toward stem cells therapy:
Although participants in this study reported poor knowledge regarding stem cell therapy in the pretest, their attitude toward stem cell therapy in the pretest was positive. In the pretest, positive attitude reported among 56%, neutral among 40% and negative attitude only among 4% of participants. In the posttest, positive attitude reported among 94% and neutral attitude among 6% and no negative attitude was reported in the posttest. The relationship between attitude in the pre and posttest was statistically significant (t = 4.48, p 0.000). Attitudes regarding stem cells therapy are presented in table 3.

Table 3: Attitude toward stem cells therapy

Items	**Pre**	**Post**	t	p
Positive	56%	94%	4.48	.000
Neutral	40%	6%		
Negative	4%	0%		
Mean	2.51	2.93		
SD	.50	.25		

Correlation among knowledge and attitude was week and showed no significance relationship in the pretest (r, =.15, p = .32) and posttest (r = .16, p 0.28) meaning that participants' poor knowledge does not affect their attitude regarding stem cells therapy. Correlation is presented in table 4.

Table 4: Correlation among knowledge and attitude in the pre and posttest

Knowledge X Attitude		
	Pre	post
r	.15	.16
P value	0.32	0.28

IV Discussion

The objectives of this study were to examine the effect of educational intervention on nursing student's knowledge and attitude regarding stem cells therapy. Results of this study proven that participants knowledge wasn't sufficient in the pretest and improved post the educational intervention. This result was supported by the work of Zuhre et al., (2015) who studied the knowledge and attitude of university students about stem cells transplantation and donation. Their results showed good knowledge after the program especially among medical students. In addition, Mohamed and Sayed (2015) reported that nurses in their study conveyed poor knowledge about cord blood collection and stem cells pre the educational program, and showed statistical significance improvement in knowledge in the posttest and 3 months later after the intervention. Similar results were reported by Kumarasawamy and Muthulakshmi (2010) who discovered that their structured teaching program was successfully effective in enhancing nurses' knowledge regarding cord blood stem cells collection. Further, physician's specific knowledge regarding stem cells and genetic information improved after attending vocational sessions as reported by Paola et al., (2014). Results from this study were also consistent with Lye et al. (2015) who found that only 7% of participants in their study had good knowledge about hematopoietic stem cells donation. Further, same results were also reported by Varghese (2015) who revealed poor knowledge regarding various aspects of hematopoietic stem cells transplantation.
Attitude:
Although participants in the present study reported poor knowledge regarding stem cells therapy, but about half of them reported positive attitude regarding stem cells therapy in the pretest and this percentage was doubled in the posttest. Although there is a debate about stem cells donation and transplantation among Muslim scholars, Muslims are willing to accept new medical innovation that would create a cure for diseases or provide promises to human being. This believes would affect students' positive view of stem cells therapy. This result was in accordance with a study done on Malaysia by Lye et al. (2015) who stated that among the 10 questions that evaluate the attitude level in their study, majority of the undergraduate nursing student showed a good attitude

towards stem cell application in medical setting. Another study done in Turkey by Sahin and Dinc (2009) had similar findings to the present study but with different population. They concluded that almost all of the pregnant women in their study had positive attitudes toward donation of their infants cord blood and about cord blood banking. On the other hand, results from our study were not congruence with Mohammed and Sayed (2015) who mentioned that about two thirds of the studied nurses had negative attitude toward cord blood collection and stem cells before intervention, immediately and after three months of intervention. This percentage changed to more than two thirds of the studied nurses who reported positive attitude toward cord blood collection and stem cells. On the contrary, Bombas et al (2012) reported that nurses' attitudes in their study showed least significant improvement and added there were difficulties in changing attitudes. Another study by Zuhre (2015) showed important finding that all students who had donated blood before the study expressed willingness to donate stem cells before the brief Hematopoietic stem cell transplantation lecture. The present study showed significance association between knowledge in the pre and in the posttest and there was no association between knowledge and attitude in the pre and in the posttest. Participants in this study showed poor knowledge in the pretest and 54% of them reported positive attitude toward stem cells therapy in the pretest and increased to 94% in the posttest. This piece of result was similar to the work of Sahin and Dinc (2009) who reported week correlation between knowledge and attitude among nursing students. In the present study, knowledge could not change attitude among participants. This could be explained by the fact that Muslims believe that any scientific invention that helps cure or reduce human suffering is permissible. Stem cells research using adult stem cells such as bone marrow, peripheral blood or umbilical cord blood is promising to humanity.

Conclusion and recommendations:

The objective of this study was to examine the effect of educational intervention on nursing students' knowledge and attitude regarding stem cells therapy. Results of this study revealed that evidence based intervention was beneficial since students' knowledge were enhanced and their attitude was improved. Considering this results, stem cells concept should be incorporated into nursing curriculum in order to update future nurses with current medical evidence based practice. Further research with larger sample is recommended to evaluate needed curriculum content, effective teaching strategies, and determine which practice matters are most effective. In addition, developing educational programs that utilize religious, cultural, and social factors should be considered.

Limitations of the study:

The present study has a relatively small sample size that could affect generalization of results. Data collection in this study was also limited to the use of quantitative methods; using qualitative approach of data collection in accordance with the quantitative method would have provided richer analysis of the phenomena. In addition, the intervention in this study used self-report survey and was implemented at the students' convenience which was after the end of their academic day and did not control for confounding variables. Confounding variables such as feeling tired at the end of the day and devoting break time to participate in a research would affect the way students' completed the questionnaire. This might explain that improvement in knowledge could be by chance and not due to the effect of the intervention.

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