

Stem Cell Therapy: Health Care Providers' Knowledge and Attitude

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Abstract

Background: Stem cell therapy is a lifesaving technique for a number of malignant and non-malignant disorders. Health care providers are considering the most confident source of knowledge for the majority of patients so that they should have the ability to provide information to patients in this advanced topic. Therefore, **Aim of this study:** was to assess knowledge and attitude of health care providers regarding stem cells therapy. **Method and Subjects:** A cross sectional research design has been utilized. Sample of this study comprised of 104 Physicians and nurses who working at Oncology Center and Mansoura University Children's Hospital, three tools were used in this study. Tool I: Health care providers' demographic and occupational characteristics questionnaire: It was used for collection of personal and occupational data, tool II: Health care providers' knowledge questionnaire; to assess general knowledge about stem cell therapy, tool III: Health care providers' attitude scale, aimed to assess participants' attitude toward stem cell therapy and its applications. **Results:** indicate that majority of health care providers have average knowledge and positive attitude regarding stem cell therapy. **Conclusion:** Conferences for health care providers to upgrade their level of knowledge, awareness, attitude and practice regarding stem cell therapy.

Keywords: Attitude, Health Care Providers, Knowledge, Stem Cell Therapy

Introduction

Stem cells are known to be undifferentiated body cells which are able to divide continuously and create every tissue within the body. Scientists and doctors have an interest in stem cells as they assist to elucidate how some functions of the body work, and how they sometimes go wrong. They're very important to the development growth, maintenance, and repair of many structures as bones, nerves, brain, muscles, blood, even skin, and other body organs (Acharya, 2013).

Stem cells can be classified by a very simple way, this is done by categorizing them into 2 forms: Early cells and mature cells. Early stem cells, also named embryonic stem cells and they present within blastocyst inner cell mass after the development with approximately 5 days. Mature stem cells known as adult stem cells and they are found in specific mature body tissues as well as the umbilical cord and placenta after birth (Kalra & Tomar, 2014).

The primary stem cells transplantation was performed at the United States in 1968 and from this moment a tremendous development was found in

this technology, research project and technological advances within this medical field (Murnaghan, 2016).

Researchers in the medical field predict that adult and embryonic stem cells will be the cure for many diseases as cancer, Type 1 DM, Parkinson's disease, Huntington's disease, heart failure, Muscle damage, Neurological disabilities, and a lot of diseases (Singec, Jandial, Crain, Nikkiah & Snyder, 2007).

Making stem cell a fundamental part of healthcare needs elevation in healthcare providers' awareness level specially the nurses regarding the concept, powerful legalized and less commercialized environment. So, that the attitude and knowledge of health professionals are significant for success of this therapy (Muffly, Pasquini, Martens, razauskas, Zhu, Adekola & Battiwalla, 2015).

Aim of the study:

To assess knowledge and attitude of health care providers regarding stem cells therapy.

Research Questions:

Q1. What is the level of health care providers' knowledge regarding stem cell and their application?

Q2. What is the level of health care providers' attitude toward stem cell and their application?

Q3. Is there a correlation between health care providers' attitude and knowledge toward stem cell and their application?

Methods:

Research design: Cross sectional research design has been utilized

Research Setting: This study was conducted at two hospitals, affiliated to Mansoura University; which are Oncology Center and Mansoura University Children's Hospital (MUCH), where stem cell therapy was applied

Subjects: The total sample is 104, divided as follows: 15 physicians and 89 nurses.

The instruments:

Three tools were used to conduct this study:

Tool I: Health care providers' demographic and occupational characteristics questionnaire: This tool was developed by the researchers, It was developed to gather personal and occupational data such as age, Gender, occupation, level of education, marital status, site of work, years of experience based on review of related literature.

Tool II: Health care providers' knowledge questionnaire; It was developed by the researchers after reviewing the related literature **Tork, Alraffaa, Almutairi, Alshammari, Alharbi, & Alonzi, (2018)** to assess general knowledge about stem cell therapy. It consisted of 20 statements which included definition, characteristics, types, sources, uses, and transplantation.

Scoring system: Each item in this sheet was given a score. A correct answer was scored by one mark and incorrect

Answer was scored by zero. Then the researcher summed all degrees up with a total score of 20 marks (100%) then it was divided into categories as follow: Poor Knowledge if score <50%, Average Knowledge if score 50%-75%, and Good Knowledge if score >75%.

Tool III: Health Care Providers' Attitude Scale; the researcher developed this tool after literature review (**Tork et al., 2018**). It involved 15 statement aimed to assess participants' attitude toward stem cell therapy and the applications related to it such as stem cells collection is approved by religious, Stem cells transplantation is a lifesaving treatment, using stem cell in the trial of treatment with new drug. To evaluate the attitude level, likert scale has been used. Attitude responses ranged from "Strongly Agree, taken 4" "Agree, taken 3", "Disagree, taken 2" and " Strongly disagree, taken 1" for responses. The score was ranged from 15 to 60, it was classified into two categories: positive attitude if score $\geq 60\%$, and Negative score if $<60\%$.

Validity of the tools: all developed tools were checked for the validity of its content by 5 experts at the field of the study, from the Faculty of Nursing and Faculty of Medicine at Mansoura University, experts revised all tools for simplicity, relevance, comprehensiveness, and its applicability. Minor modifications were done accordingly.

Reliability: Tools tested for reliability using test-retest methods. It indicated that tools had reliability ($r = 0,879$).

A pilot study was carried out on 10% of participants to test study tool's feasibility and applicability. Modification, omission and addition were done. Participants of pilot study weren't included into this sample size.

Ethical considerations: Ethical approval was attained from the Research Ethics Committee of the Faculty of Nursing, Mansoura University Reference No. (P.0205). A permission to carry on this study was obtained from the administrators of Hospitals after explaining the aim of study.

Field work: The researchers introduced themselves to the participants', explained the aim of the study and how to fill the questionnaire, consent was taken from participants and asked them for their cooperation.

Statistical analysis: The researcher used SPSS software (Statistical Package for the Social Sciences, version 22, SPSS Inc. Chicago, IL, USA) for statistically analyzed collected data after organizing, tabulating it. Categorical variables were represented as frequency and percentage. Continuous variables were represented as mean, and standard deviation. Independent t-test was used to test the difference between two mean of continuous variables. ANOVA test used to test the difference between more than two mean of continuous variables. Pearson correlation coefficient test was conducted to test the association between two continuous variables. Statistically significant was considered as (p -value ≤ 0.01 & 0.05).

Results:

Table (1) showed the general demographic and occupational characteristics of the studied sample. Concerning age (48.1%) of them aged from ($20 \leq 30$ years old). Above half (59.6%) of studied sample were female, the majority of participants were Muslim, about (70.2%) of the studied sample were married. Regarding occupation above three quarter of studied sample (85.6%) were staff nurses. In relation to level of education for nurses (48.1%) have technical degree while for physicians (14.4%) have Master degree. The majority (80.8%) of the studied sample worked into OCMU. About (52.9 %) had less than 3 years of experience. Less than half (45.2%) had less than 3 years' experience in stem cell unit, (86.5%) of participants not attending training courses about stem cell.

Table (2) illustrated the knowledge of health care providers concerning stem cells that evaluated based on correct answer of related 20 statements. knowledge of health care providers related to stem cells, sources, division of stem cell (79.8%, 85.6%.96.2%) respectively. Regarding health care provider's knowledge about uses of stem cells to treat, study diseases

and test new drugs (54.8%,96.2%,41.3%) respectively.

Figure (1) this figure proved that the majority of health care providers' have average level of knowledge regarding stem cell therapy.

Table (3) as observed from this table, the lowest mean \pm SD given for (S3, S2, S1) respectively this may return to ethical and worry about using of stem cells. On other hand the high mean score given for more education needed about stem cells (3.81 ± 0.40) followed by use of immunotherapy should be expanded (3.73 ± 0.54).

Figure (2) this figure clarified that about (90.4%) of the studied sample has positive attitude regarding stem cell therapy.

Figure (3) as observed from this figure there was a highly significant positive correlation between knowledge, and attitudes of health care providers' regarding stem cells therapy.

Table (4) according to this table, there was a significant relation between (gender, occupation, level of education) and health care providers' knowledge and attitude where p values were found to be ($p >, 050$), while there was no significant relation between workplace and health care providers' knowledge and attitude where p value were found to be (0.22, 0.12) respectively.

Table 1: Distribution of health care providers' according their demographic and occupational characteristics (n=104):

Variables	N	%
Age years:		
▪ 20 ≤ 30	50	48.1
▪ 30 ≤ 40	34	32.7
▪ > 40	20	19.2
Gender		
▪ Male	42	40.4
▪ Female	62	59.6
Religion		
▪ Muslim	101	97.1
▪ Others	3	2.9
Marital status		
▪ Single	31	29.8
▪ Married	73	70.2
Occupation		
▪ Physician	15	14.4
▪ Staff nurse	89	85.6
Level of education of nurses		
▪ Diploma degree	10	9.6
▪ Technical degree	50	48.1
▪ Bachelor degree	29	27.9
Level of education of physician		
• Master degree	15	14.4
Workplace		
▪ OCMU	84	80.8
▪ MUCH	20	19.2
Experience years:		
▪ <3	55	52.9
▪ 3-5	20	19.2
▪ 6-10	10	9.6
▪ >10	19	18.3
Experience years as staff nurses in stem cell unit		
▪ <3	47	45.2
▪ 3-5	28	26.9
▪ 6-10	14	13.5
▪ >10	15	14.4
Attending training courses about stem cell		
▪ Yes	14	13.5
▪ No	90	86.5

- OCMU: Oncology Center Mansoura University
- MUCH: Mansoura University Children's Hospital

Table (2): Distribution of health care providers' according their Knowledge concerning stem cells therapy (n=104):

Statements	Incorrect		Correct	
	N	%	N	%
1. Stem cells are specific cells and have the ability to develop into any of the different types of cells.	21	20.2	83	79.8
2. Umbilical cord is considered one source of stem cells.	15	14.4	89	85.6
3. Bone marrow stem cells are obtained from the spinal cord.	57	54.8	47	45.2
4. Stem cells are able to divide and renew themselves for long periods.	4	3.8	100	96.2
5. Umbilical cord stem cells are embryonic stem cells.	10	9.6	94	90.4
6. We can use stem cells to treat diseases such as diabetes and Alzheimer's.	47	45.2	57	54.8
7. Embryonic stem cells are able to form any type of cell in the body	21	20.2	83	79.8
8. Sources of adult stem cells are sperm and eggs.	100	96.2	4	3.8
9. Adult stem cells are also known as somatic stem cells.	14	13.5	90	86.5
10. Collecting umbilical cord stem cells can cause pain and harmful risks to the newborn and the mother.	51	49.0	53	51.0
11. Auto transplantation of adult stem cells is controversial due to immune rejection.	90	86.5	14	13.5
12. Stem cells can be used to test new drugs and their effectiveness.	61	58.7	43	41.3
13. Embryonic stem cell transplantations have dangerous defects, including the formation of tumors.	94	90.4	10	9.6
14. Bone marrow stem cell transplant is more efficient than the umbilical cord stem cell transplant.	95	91.3	9	8.7
15. The umbilical cord is the richest source of stem cells.	0	0.0	104	100.0
16. Stem cells can be used to study diseases.	4	3.8	100	96.2
17. Fetal stem cells can be taken from the fetus's blood, bone marrow, or fetal liver cells.	20	19.2	84	80.8
18. Adult stem cells are less likely to be rejected by the immune system.	7	6.7	97	93.3
19. Adult stem cells can divide ceaselessly into more than 200 different types of cells present in the body.	26	25.0	78	75.0
20. Adult cells are specialized, so their ability to regenerate damaged tissues is limited.	25	24.0	79	76.0

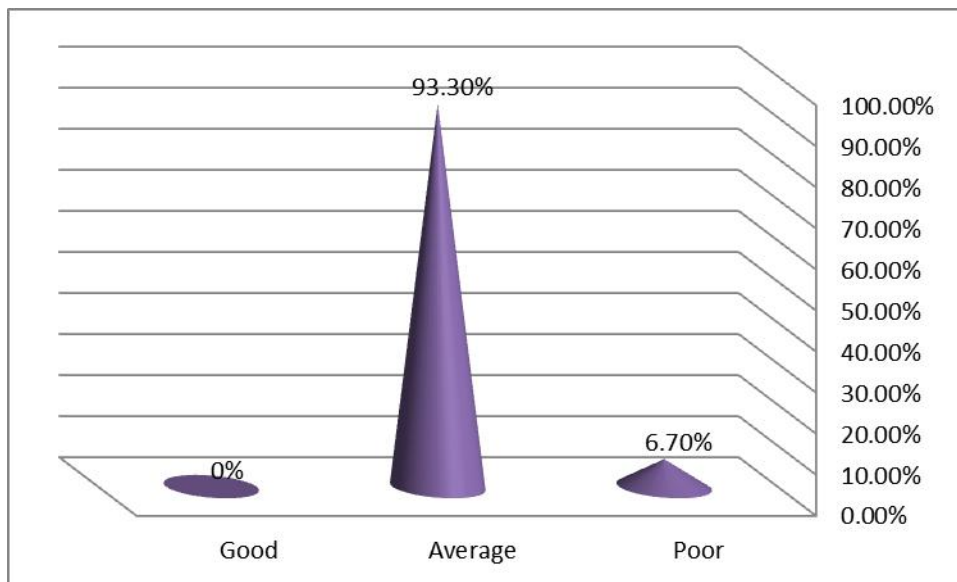


Figure (1): Distribution of health care providers' according their total Knowledge concerning stem cells therapy (n=104)

Table (3): Distribution of health care providers' attitude regarding stem cell therapy (n=104)

Statement (s)	Strongly disagree (1)		Disagree (2)		Agree (3)		Strongly agree (4)		Mean±SD
	N	%	N	%	N	%	N	%	
1. Worry about stem cell transplantation might open doors to killing some people for the benefit of others.	50	48.1	49	47.1	5	4.8	0	0.0	1.57±0.59
2. The government prohibits all research on stem cells obtained from an aborted fetus or fetus.	57	54.8	47	45.2	0	0.0	0	0.0	1.45±0.50
3. Searching for embryonic stem cells is illegal.	75	72.1	29	27.9	0	0.0	0	0.0	1.28±0.45
4. I advise pregnant mothers to store umbilical cord stem cells	5	4.8	0	0.0	36	34.6	63	60.6	3.51±0.74
5. The use of immunotherapy should be expanded.	0	0.0	5	4.8	18	17.3	81	77.9	3.73±0.54
6. If you become ill and cannot treat your disease by usual methods, you may resort to stem cell therapy.	0	0.0	0	0.0	89	85.6	15	14.4	3.14±0.35
7. Collection of stem cells must be approved by the clergy.	0	0.0	5	4.8	84	80.8	15	14.4	3.10±0.43
8. The necessity of holding workshops about stem cells and their uses on an ongoing basis.	0	0.0	0	0.0	69	66.3	35	33.7	3.34±0.47
9. Previous approval before birth is required for cord blood to be collected, stored and used before birth.	0	0.0	0	0.0	51	49.0	53	51.0	3.51±0.50
10. Stem cell transplantation is a life-saving treatment.	0	0.0	0	0.0	33	31.7	71	68.3	3.68±0.47
11. Blastocysts should be given the same respect and the right to live as an adult.	0	0.0	0	0.0	60	57.7	44	42.3	3.42±0.50
12. Providing healthcare providers with knowledge of stem cells is important.	0	0.0	3	2.9	50	48.1	51	49.0	3.46±0.56
13. Awareness of the advantages and disadvantages of using stem cells.	0	0.0	0	0.0	56	53.8	48	46.2	3.46±0.50
14. There should be more education about stem cells.	0	0.0	0	0.0	20	19.2	84	80.8	3.81±0.40
15. The use of stem cells in the trial of treatment with a new drug.	0	0.0	0	0.0	49	47.1	55	52.9	3.53±0.50

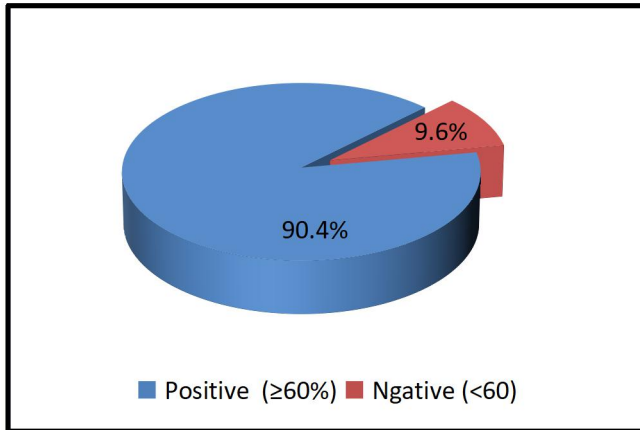


Figure (2): Distribution of health care providers' attitude regarding stem cells therapy (n=104)

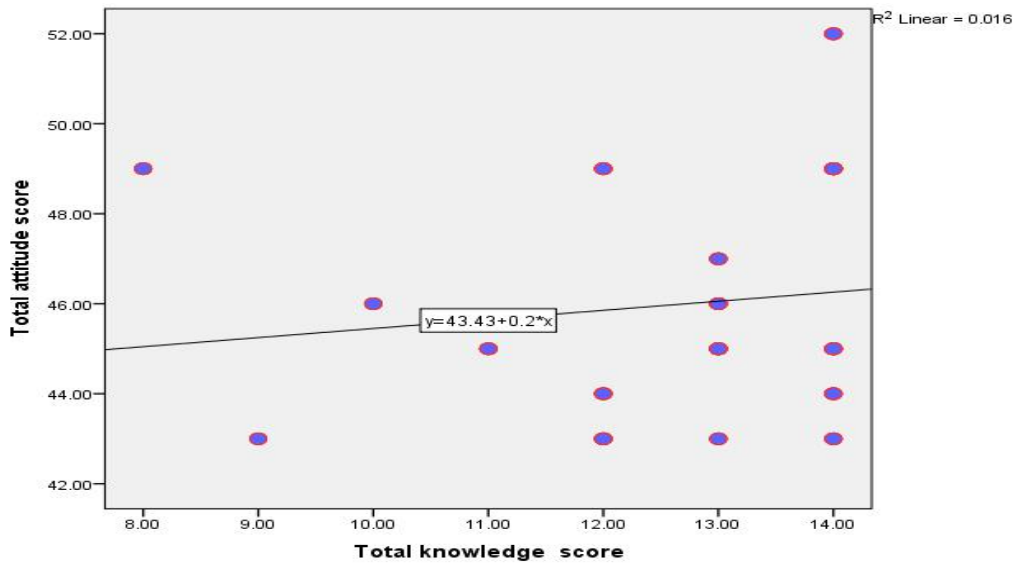


Figure (3): Correlation between knowledge, and attitudes of health care providers' regarding stem cells therapy

Table (4): Relation between demographic variables and health care providers' knowledge and attitude

Variables	Total knowledge score	Total attitude score
	mean± SD	mean± SD
Gender		
▪ Male	12.21±1.77	44.16±4.66
▪ Female	12.98±1.32	45.45±3.42
t-value/ p-value	2.53/ 0.01**	1.61/ 0.10
Occupation		
▪ Physician	14.05±1.98	49.02±5.13
▪ Staff nurse	12.44±1.58	44.24±3.93
t-value/ p-value	3.78/0.000**	4.66/0.000**
Level of education		
▪ Diploma degree	12.00±0.91	41.90±3.66
▪ Technical degree	13.10±0.95	46.02±2.81
▪ Bachelor degree	11.48±2.11	42.00±4.20
• Master degree	14.00±1.96	49.00±2.01
t-value/ p-value	15.93/0.000**	21.58/0.000**
Workplace		
▪ OCMU	12.48±1.69	44.32±4.25
▪ MUCH	12.86±1.40	45.53±3.67
t-value/ p-value	1.26/0.22	1.55/0.12

Discussion:

Stem cells are called the mother cells as it can generate any tissue in the human body subsequently, in recent time; research in stem cells is one of the most important, debatable aspects of science and technology (Philip & Devi, 2017). The incidence of malignant and non-malignant diseases is being increasing worldwide. Stem cell therapy is very effective in treating these diseases and disorders. It appears to be as effective as bone marrow, when a Human Leukocyte Antigen matched adult donor is not available (Abdullah, 2011).

The majority of patients consider health care providers as the primary source of data so that they must be qualified to the level at which they could provide counseling to patients in this advanced topic.

Discussion of the current results will be presented under the following: The socio-demographic and occupational background of the present study showed that, the largest proportion aged from $20 \leq 30$ this result in the same line with (Tork et al, 2018) who reported that majority of her sample aged ≤ 30 years. In relation to gender, the findings of the presented study illustrated that less than two third of health care providers' were female. This result in the same line with (Amin, Kumary, & Vijiprasad, 2016) who reported that, the highest of study sample were females. This may prove the fact that most nurses in our community are female.

In the current study less than three quarter of sample was married; this is in harmony with (Tork et al., 2018) who reported that the majority of the subjects were married. Regarding religion, the majority are Muslim, in the same line (Lye, Soon, Ahmad & Tan, 2015) who observed that the majority is Islam. In contrast (Amin, Kumary, & Vijiprasad, 2016) showed that majority of staff nurses (61%) belongs to Christian. This may be attributable to study setting difference; the present study done in Egypt.

Regarding educational level, this study showed that less than half had technical

degree. In contrast study conducted by (Khali & Sharshor, 2016), who reported that majority of the nurses had bachelor and diploma degree. Concerning years of general

experience, the results of presented study revealed that above half had experience < 3 years while (Ali, Mohmed, Sayed, & Ahmed, 2019) mentioned that majority have experience from 1 to less 5 years.

About attending training courses related to stem cell, largest proportion hasn't attend any training course, this is in accordance with study carried out by (Mohammed & El Sayed, 2015) who reported that only 1.9% of nurses attended training courses.

Regarding total score of health care providers' knowledge, the largest proportion has average level of knowledge, this is consistent with (Patyal, Kaur, Singh, Arushi, Reetu, Ridhim, et al 2018) who reported that nurses had average knowledge, also (Tork et al., 2018) who reported that majority has moderate level of knowledge. In contrast (Amin, Kumary, & Vijiprasad, 2016) observed that majority of staff nurses (90%) had poor knowledge and only 10% had average knowledge about stem cell therapy and umbilical cord.

Analysis of this data showed that the majority has positive attitude regarding stem cell therapy. This is in accordance with study carried out by (Venugopal, Joshi, Deka, & Seth, 2016) who highlighted that most of the subjects had neutral attitude concerning stem cells and umbilical cord blood banking.

The possible reason for most of the nurses having average knowledge and neural attitude may relate to the lack of pre-service and in-service education on stem cells and umbilical cord blood banking.

A significant positive correlation observed between knowledge and attitude of health care providers', this results supported by (Tork et al, 2018) who reported a significant correlation between health care providers' knowledge and attitude, this results is not in line with (Lye, Soon, Ahmad, & Tan, 2015) who reported that there is a poor association between undergraduate nursing students' stem cells score knowledge and attitude which was presented by the correlation coefficient ($r =$

0.08).

His results may related to acceptance of stem cells therapy not relies on scientific evidences, but on other factors like religion, values, and exposure to stem cells.

Concerning relation between demographic data and knowledge, attitude of health providers, there was a significant relation between (genders, occupation, and level of education) where p values found higher than 0.05. In opposite point (Amin, Kumary, & Vijiprasad, 2016) revealed that, there was no association found between knowledge score and the selected demographic variables like gender, educational status.

Conclusion:

The majority of health care providers' have average knowledge and positive attitude toward stem cell therapy based on the results of the recent study.

Recommendation:

The following recommendations are suggested depending on the current research findings:

A. For health care providers

- Applying periodic refresh in-service training and educational program for health care providers' working in stem cell unit.
- Conferences, workshops should be applied continuously for health care providers' to upgrade their level of knowledge, awareness, attitude and practice.
- Training program should be concluded for a newly nurses.

B. For the hospital's administration:

- Stem cell transplantation protocol should be instituted for health care providers' and evaluate their compliance with this protocol.
- Strategies and polices should be established according to published guidelines related to stem cell handling.

- Stem cell transplantation should be included in nursing curriculum at nursing schools and faculties.

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