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RESEARCH ARTICLE

TO ASSESS THE KNOWLEDGE AND AWARENESS OF HUMAN STEM CELL SOURCES IN MEDICAL AND PARAMEDICAL STUDENTS OF MEDICAL COLLEGE- A CROSS SECTIONAL STUDY

Dr. Shrirang Holkar¹, Dr. Deepali Vaishnav² and Dr. Manjusha Hivre¹

1. Assistant Professor, Department of Biochemistry, MGM Medical College, Aurangabad.
2. Professor, Department of Biochemistry, MGM Medical College, Aurangabad.

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Abstract

Introduction: Stem cells have the ability to build every tissue in the human body. Hence, they have great potential for future therapeutic uses in tissue regeneration and repair. Umbilical Cord Blood also contains stem cells that can differentiate into other types, such as cartilage, fat, hepatic, cardiac, and neural cells.

Aim: This study was conducted to assess the knowledge and awareness about stem cells and its sources among Undergraduate and postgraduate students.

Material And Methods: A cross sectional questionnaire based study was carried out among postgraduate and undergraduate medical and allied students of the medical college for a period of six months regarding knowledge and awareness about Stem Cells and its sources.

Results: This study included 300 participants. Data from this study revealed a high level of awareness and knowledge of the stem cells among the undergraduate and postgraduate students.

Conclusion: Our results showed excellent knowledge about sources of stem cell among the medical and para medical students.

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Introduction:-

Stem cells can be thought of as primitive, “unspecialized” cells that are able to divide and become specialized cells of the body such as liver cells, muscle cells, blood cells, and other cells with specific functions.[1] Stem cells are pluripotent cells that continuously divide, have the ability of self-renewal, and are capable of generating complex tissues and organs and referred to as “undifferentiated” cells because they have not yet committed to a developmental path that will form a specific tissue or organ. In some areas of the body, stem cells divide regularly to renew and repair the existing tissue. [2] Some documented sources of adult stem cells include umbilical cord blood, amniotic fluid, bone marrow, adipose tissue, brain, teeth, skin, and urine.[3] Umbilical Cord Blood also contains stem cells that can differentiate into other types, such as cartilage, fat, hepatic, cardiac, and neural cells. More than 40,000 stem cell transplant are being performed yearly worldwide although in India, progress has been slow.[4]

Stem cells have the ability to build every tissue in the human body. Hence, they have great potential for future therapeutic uses in tissue regeneration and repair. Personal or private storage of stem cell banking has extended worldwide, which seems to provide a type of biological insurance to their children which will secure their future.[5]

Corresponding Author:- Dr. Manjusha Hivre

Address:- Assistant professor Department of Biochemistry MGM Medical College Aurangabad.

Thus a basic knowledge and awareness amongst medical and non-medical undergraduates and postgraduate students was evaluated about stem cell sources for health and diseases.

Material and Methods:-

A cross sectional questionnaire based study was carried out among 300 students of MGM Medical College in Department of Biochemistry Aurangabad for a period of six months. Ethical clearance was obtained from the Institutional Ethics Committee. Inclusion criteria included subjects who were willing to participate in the study and then a written consent was obtained from them. A sample size of 300 included 50 MBBS students, 50 Allied health science students, 50 Physiotherapy students, 50 Nursing students, 50 Pharmacy students and 50 postgraduate/superspeciality students; and questionnaire was designed in such a way that the procedure should not take more than 10 minutes per participant.

The questionnaire was prepared in English language based on a search of review of the literature regarding stem cells. A structured questionnaire with a set of 15 questions was designed to evaluate the knowledge and awareness among participants regarding stem cells and their sources. The questionnaire was pre tested amongst 10 teaching faculty members to confirm its validity and reliability and to avoid uncertainty. Following the pretest, some modifications in the order of questions and terminologies were made in the final questionnaire. A five point Likert scale was used for scoring.

Likert scale: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly Agree (5).

The questionnaire consisted of 10 statements that suggested the degree of agreement or disagreement with each statement using a 5-point Likert scale [6]. Participants were instructed to choose only one answer for each statement. Score of (10 to 50) was given for all the questions. The portion of the questionnaire related to knowledge and awareness assessment is shown in Table 2.

Other 5 questions consisted of 4 or 5 responses. The responses thus obtained were then compiled, processed and analysed to arrive at the opinion on various answers.

11. On hearing about the term Stem Cells what comes in your mind
 - a) stem cell transplant b) stem cell banking c) stem cell research d) Surgical procedure
12. Source Of Information Regarding Stem Cell?
 - a) Physician b) Internet c) Television d) Hospital/Institute e) Newspaper f) Friend/Relative
13. Timing of blood for stem cell collection from umbilical cord after delivery
 - a) Immediately b) After 1 day c) After 2 days d) After 1 month
14. Opinion about preservation of the umbilical cord
 - a) Want to preserve b) Don't want to preserve c) May consult doctor
15. Who can be a Donor of stem cell transplant?
 - a) Person himself b) Identical twin c) Sibling d) Parents e) Blood donor f) Any person

After collection, the Descriptive analysis of the Data was performed to get the frequency of responses using SPSS version 20. Independent sample t-test was used to assess the difference between undergraduate and postgraduate scores for knowledge and awareness. Chi Square test was used to assess the significance of the responses and a P value <0.05 was considered statistically significant.

Result:-

The following observations were made by the data analysed for demographic variables. Majority of the participants were in the age group 21-30 years (51.7%). 98.7% of the participants were less than 40 years which comprises of the younger generation. The male-to-female ratio of the students participated was approximately 1:1, with 158 males and 142 females. Descriptive statistics of the participants are shown in Table 1.

Table 1:- Socio-demographic variables of participants.

Sr No.	Demographic Variable	Category	Number (%)
1	Age (years)	≤20	105 (35)

		21-30	155 (51.7)
		31-40	36 (12)
		41-50	4 (1.3)
2	Gender	Male	158 (52.7)
		Female	142 (47.3)
3	Qualification/Education	MBBS	50 (16.7)
		BPT	50 (16.7)
		BSc Nursing	42 (14)
		Post Basic Nursing	8 (2.7)
		BSc AHS	37 (12.3)
		MSc Medical	13 (4.3)
		B. Pharm	47 (15.6)
		MD/MS/Diploma/DNB	33 (11)
		DM/Mch/Ph.D	15 (5)
		Others	5 (1.7)

Table 2:- Knowledge and awareness of human stem cell and its sources among the participants in percentage (according to likert scale) (n=300).

Likertscale: Strongly Disagree (SD), Disagree(D), Neutral(N), Agree(A), Strongly Agree(SA).

SrNo	Knowledge and awareness question	SD n(%)	D n(%)	N n(%)	A n(%)	SA n(%)	p-value
1	Competency in stem cell knowledge is important as a aware human being.	30 (10)	39 (13)	12 (4)	48 (16)	171 (57)	<0.01
2	Stem cells are unspecialized type of cells which are capable of forming any cell type.	9 (3)	24 (8)	0	54 (18)	213 (71)	0.002
3	Human sperms and eggs are considered a source of adult stem cells.	159 (53)	78 (26)	15 (5)	39 (13)	9 (3)	0.003
4	Stem cells obtained from adults are specialized cells that can form either bone or cartilage only.	117 (39)	84 (28)	21 (7)	63 (21)	15 (5)	<0.01
5	Embryonic stem cells can be obtained from umbilical cord.	66 (22)	3 (1)	0	54 (18)	177 (59)	<0.01
6	Adult bone marrow stem cells are usually taken from the spine.	144 (48)	81 (27)	15 (5)	33 (11)	27 (9)	0.00
7	Stem cell transplants are costly.	6 (2)	15 (5)	18 (6)	42 (14)	219 (73)	0.001
8	The procedure of collecting stem cells is invasive.	6 (2)	63 (21)	18 (6)	30 (10)	183 (61)	0.001
9	Harvesting umbilical cord blood stem cells can cause pain and involve harmful risks to the newborn and mother.	204 (68)	69 (23)	9 (3)	6 (2)	12 (4)	0.03
10	Stem cell banks are now available in India.	36 (12)	30 (10)	0	27 (9)	207 (69)	0.000

According to the individual question analysis , participants showed poor knowledge related to fifth question where >50% participants strongly agreed to the question, while second and seventh question had the highest rate of strongly agreed percentage (71% and 73% respectively) showing correct basic knowledge regarding stem cells. Majority of the participants agreed that stem cell banks exist in India (78%). 73% of the participants agreed with the first question stating that they should be aware regarding stem cells knowledge. The number and percentage of students representing each question of knowledge level are presented in Table 2.

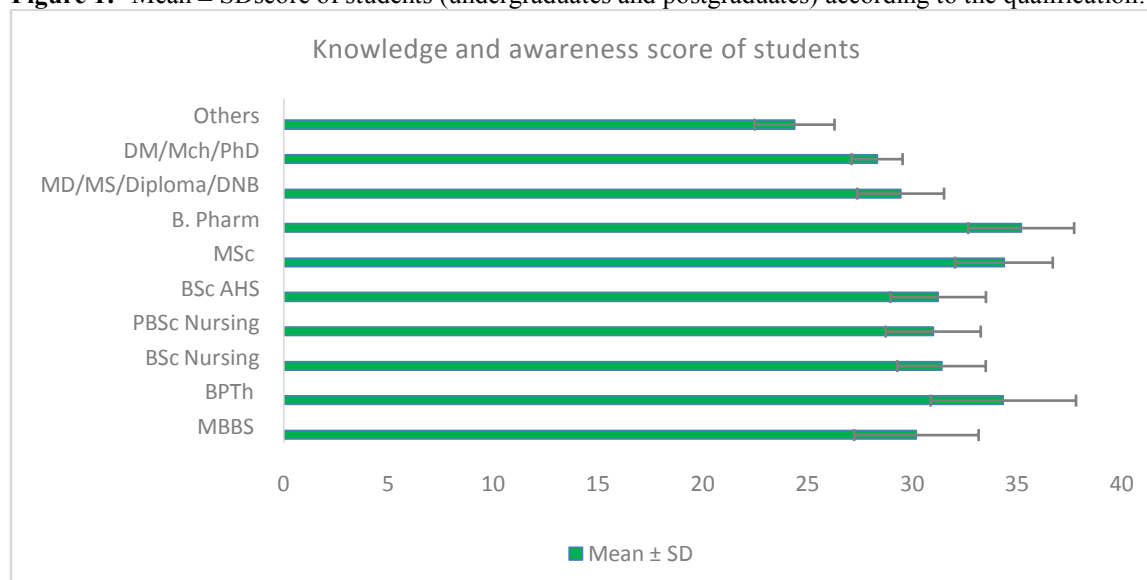
Calculating the correct response for the questionnaire, a score of around 29 was considered as having excellent knowledge regarding the study. Postgraduates showed higher level of knowledge (27.39 ± 2.27) with significant difference ($p < 0.0001$) compared to undergraduates (32.55 ± 3.48) as shown in Table 3. Similarly, the mean score among undergraduates and postgraduates with different qualification is represented in Figure 1. Amongst the

postgraduates, no significant difference between MD group and DM group was noted in regards to the mean score (29.46 ± 2.07 , 28.33 ± 1.22) using independent sample t-test ($p = 0.57$). However, a significant difference in mean score was found between MBBS students (30.21 ± 2.97) and paramedical students (35.21 ± 2.53) ($p = 0.04$) in the undergraduates.

Table 3:- Comparison of mean score of undergraduate and postgraduate students.

Participants (n)	Undergraduate (226)	Postgraduate (74)	P value
Mean \pm SD	32.55 ± 3.48	27.39 ± 2.27	<0.0001

Figure 1:- Mean \pm SD score of students (undergraduates and postgraduates) according to the qualification.



As per Figure 2 on hearing the term stem cells, 28% postgraduates and 25% undergraduates first think of the term stem cell transplantation. Medical students had a better knowledge about Stem Cells i.e. 95.45% followed by students of para clinical and non-medical stream i.e. 79.93%. Figure 3 represents the major source of information regarding stem cells in both the groups is internet (43%) followed by hospital/institute (25%). Majority of the participants (87% postgraduate and 61% undergraduate) agreed to immediate collection of blood for stem cells from the umbilical cord (Figure 4).

Figure 2:- Response of students in percentage (undergraduates and postgraduates) for question no 11.

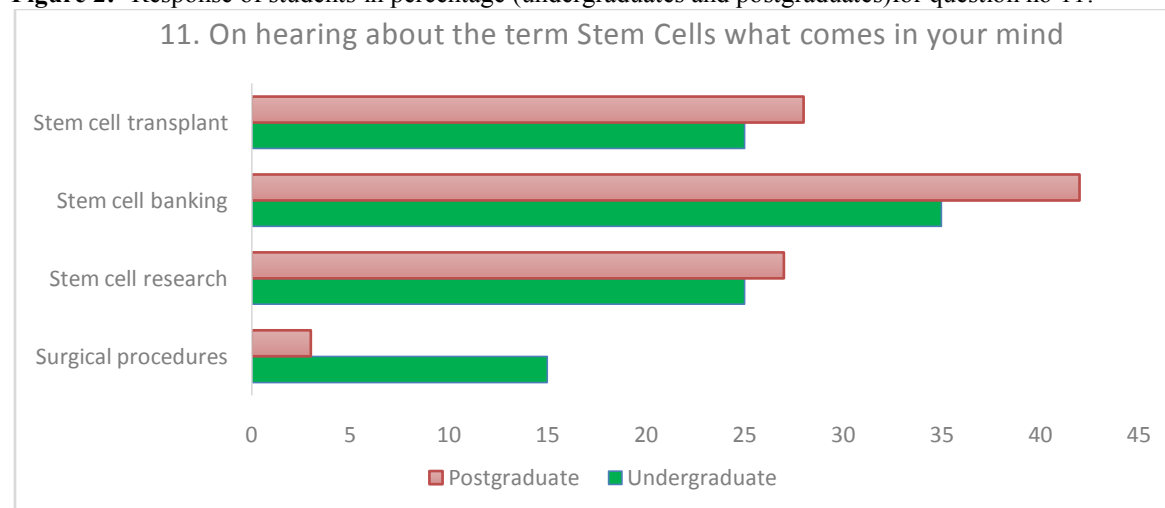
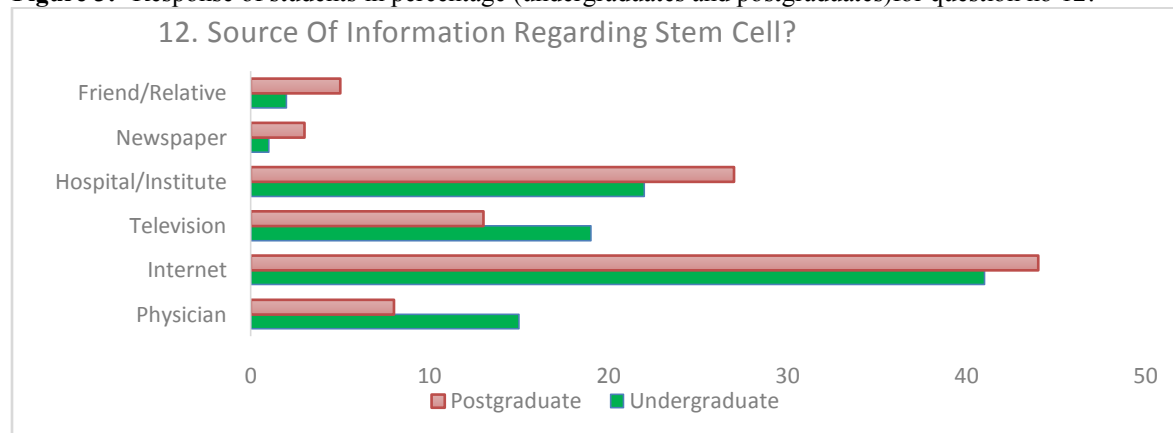
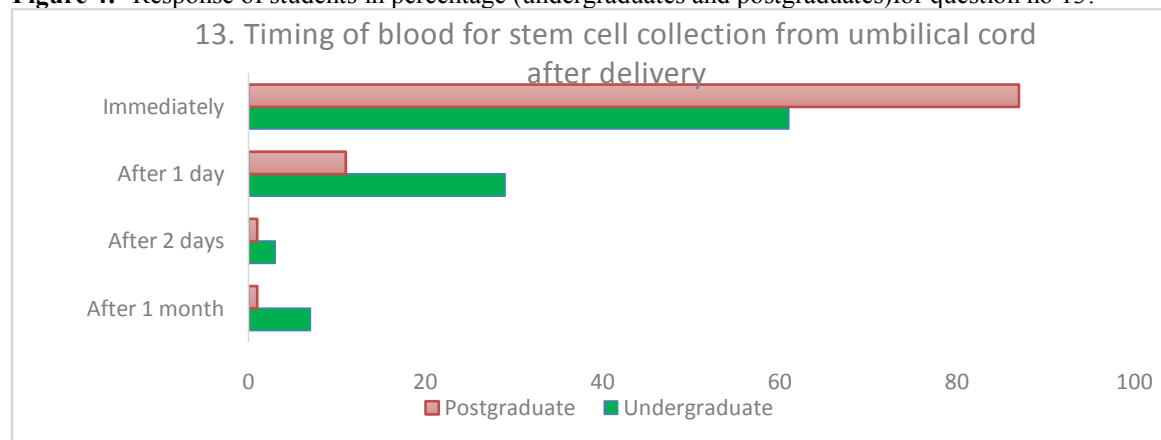
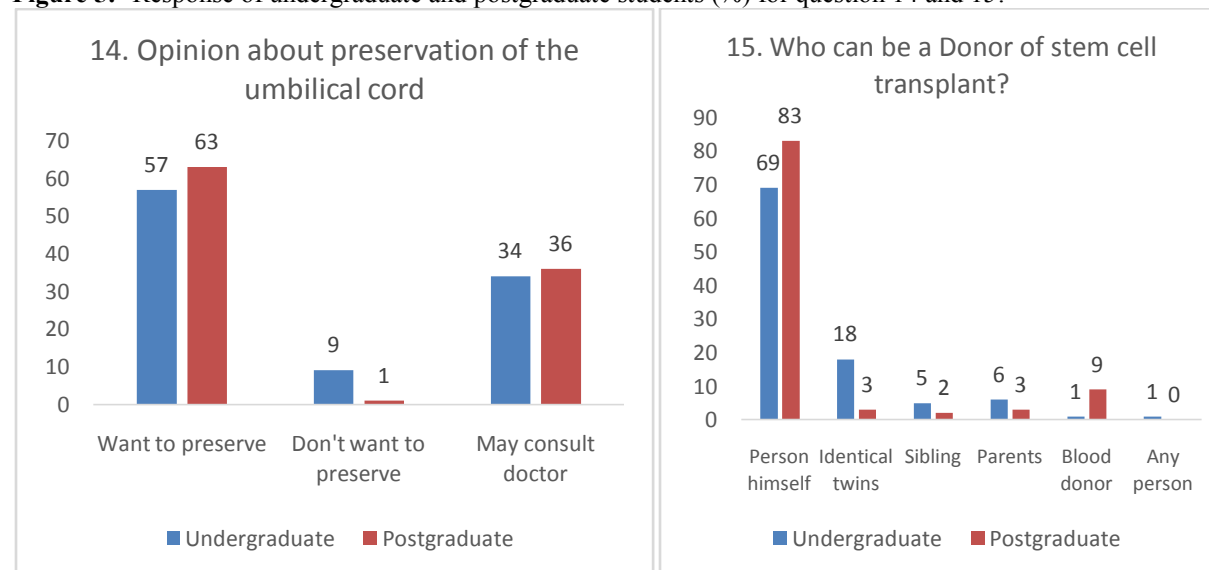


Figure 3:- Response of students in percentage (undergraduates and postgraduates)for question no 12.**Figure 4:-** Response of students in percentage (undergraduates and postgraduates)for question no 13.**Figure 5:-** Response of undergraduate and postgraduate students (%) for question 14 and 15.

Majority of the participants were in favour of stem cell preservation comprising of 63% postgraduate and 57% undergraduate students; while 36% and 34% of postgraduate and undergraduate students respectively believed that consulting the doctor would be beneficial. Interestingly, high percentage of participants (83% and 69%) considered

person himself as the donor for stem cell transplant. (Figure 5). This shows poor knowledge regarding stem cell donors among the participants.

Discussion:-

Stem cells have proved themselves to be of unique type of cells having specialized capacity to differentiate into variety of cells e.g smooth muscle cells, adipocytes, chondrocytes and neurons. Umbilical cord blood at the time of delivery is a rich source of stem cells and it is the finest gift parents can offer to their children.[7,8]Field of stem cell research has emerged with numerous applications in medicine due to potential ability to regenerate and repair damaged tissue. The current study investigated the level of knowledge and awareness regarding stem cells among undergraduate and postgraduate students of medical and paramedical fraternity.

In our study it was found that Postgraduates showed higher level of knowledge (27.39) with significant difference compared to undergraduates (32.55) which is quite high as compared to study done by Jee Leng et al; 2015 [9], the reason for this discrepancy can be the difference in knowledge. Medical students had a better knowledge about Stem Cells i.e. 95.45% followed by students of para clinical and non-medical stream i.e. 79.93%. Majority of the participants (87% postgraduate and 61% undergraduate) agreed to immediate collection of blood for stem cells from the umbilical cord. This is supported by the finding of Saran et al; 2015 in which more than 80% considered that stem cells should be collected immediately after delivery from the umbilical cord.[10] Majority of the participants were in favour of stem cell preservation comprising of 63% postgraduate and 57% undergraduate students; these findings are similar to the study done by Yesikar et al; 2016.[11] Over the years definitely knowledge has increased. This seems to be fairly good percentage and also draws attention to the fact that youths are concerned with knowledge regarding stem cell and its sources.

Data from this study revealed a high level of awareness and knowledge of the stem cells. It is high time that the message needs to be passed for the benefit of population. A concerted effort of creating awareness can take this message forward. It is time to develop programs to improve the awareness related to stem cells as stem cell therapy is said to have immense potential.[12] In few decades, we may see a day when genetic disorders are tackled effectively and efficiently with stem cell application. Government should make an amendment to make Stem cell Banking compulsory and free of cost for all the families having a history of genetic disorder.

Conclusion:-

The results of the present study concluded that majority of the medical students were aware of stem cell therapy in disease and health. The awareness regarding stem cells was generally poor among the paramedical students. Stem cell research and application should be a part of curriculum of medical and paramedical education. Most of the students supported the storage of Umbilical cord as a rich source of stem cell.

Limitation:

The sample size was smaller for this study, hence a study with larger sample size is needed for the assessing the awareness and knowledge among the students, not only medical but non medical also.

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Conflicts of interest

The authors declare no conflict of interest.

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