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Awareness on therapeutic potential of stem cell among college students

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ABSTRACT

Stem cells are undifferentiated cells with the ability to divide and give rise to identical and undifferentiated cells. Stem cells are most generally used in treating complicated diseases. Hematopoietic stem cell transplantation is a life saving treatment for numerous diseases. This survey shows that there is a great importance towards stem cell therapies among college students.This study is done to create awareness on therapeutic potential of stem cells among college students. The present study consists of self structured questionnaire administered to 100 college students through online google forms link. The data was collected and statistically analysed using SPSS software. The majority of the study population was aware of stem cell therapies. 56.4% of the respondents have therapeutic potential knowledge on stem cells and 54.4% of the respondents have knowledge on existing uses of stem cells. From the survey we may conclude that most of the college students were aware and have prior knowledge of the therapeutic potential of stem cells in health and disease.

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INTRODUCTION

A stem cell is a cell with an ability to develop into specialised cell types in the body (Persia, 2017). In future, they may be used to replace cells and tissues that have been damaged or lost during diseases (Schilling, 1984; Persia, 2017). The self renewed properties of stem cells activate them to undergo numerous cycles of cell divisions while they maintain an undifferentiated form and also the function to proliferate and differentiate into various multiple mature cell types (Liew and Brien, 2012; Sahni and Kessler, 2010). Many students have done research on melanoma cells and cervical cancer cells (Ke, 2019; Wu, 2019).

Recent advances in stem cell biology have defined a significant differentiation plasticity of stem cell types in human tissues (Liew and Brien, 2012). Many researchers are happy and excited about the knowledge that they could gain from studying human stem cells (Owczarczyk-Saczonek, 2018). Stem cells are primitive unspecialised cells that are able to divide and become any specialised cells such as liver cells, muscle cells, blood cells etc (Nowreen, 2019). These stem cells are referred to as undifferentiated cells because they have not attained a particular functional property of their own. The process

of changing into a specific cell type is called differ-

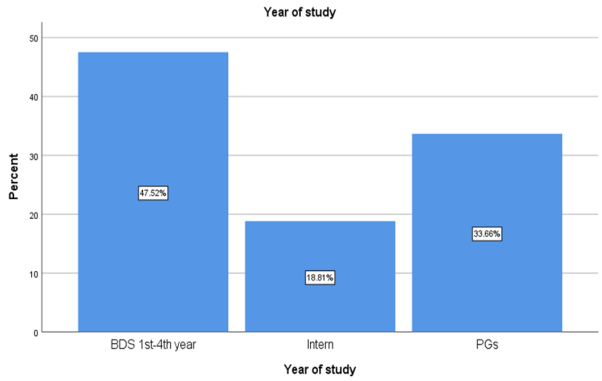

Figure 1: Bar-graph showing percentage distribution of year of study.

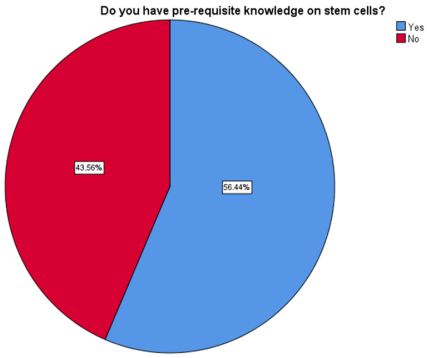

Figure 2: Pie-chart showing percentage distribution of responses on prior knowledge on stem cells.

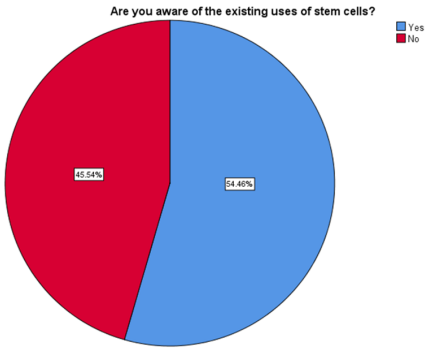

Figure 3: Pie-chart showing percentage distribution of responses about awareness on existing uses of stem cells.

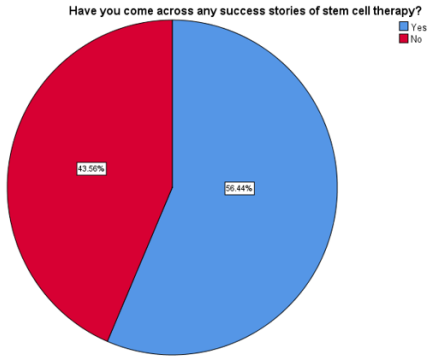

Figure 4: Pie-chart showing percentage distribution of responses about success stories of stem cell therapy.

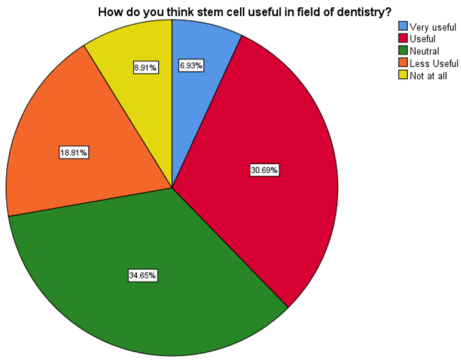

Figure 5: Pie-chart showing percentage distribution of responses about awareness on the use of stem cells in field of dentistry.

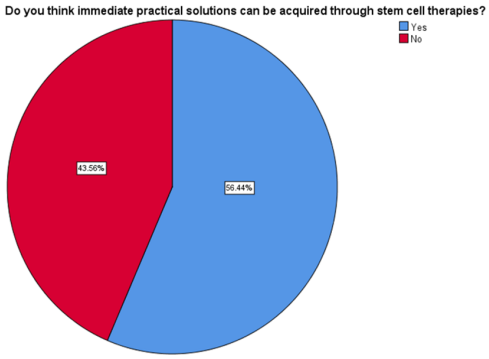

Figure 6: Pie-chart showing percentage distribution of responses about awareness on immediate practical solution through stem cell therapies.

entiation (Ma, 2019). Many students have done on insilico modelling, nanoparticles, oxidative stress, carcinomas (Jainu *et al.*, 2018; Menon *et al.*, 2016; Ponnulakshmi *et al.*, 2019; Li, 2020; Chen, 2019; Wang, 2019).

Based upon extensive stem cell research findings, many researchers have claimed that the cells could be generating cures and treatment for diseases including cancers (Gan, 2019), cardiac diseases and igniting hopes in achieving stem cell based replacement therapy in the field of medicine. The gastrointestinal tract and bone marrow are examples of areas in which stem cell functions to renew and repair tissue. Research has been done on human oral epidermal carcinoma KB cell lines (Rengasamy, 2018). Some documental resources of adult stem cells include umbilical cord, blood, amniotic fluid,

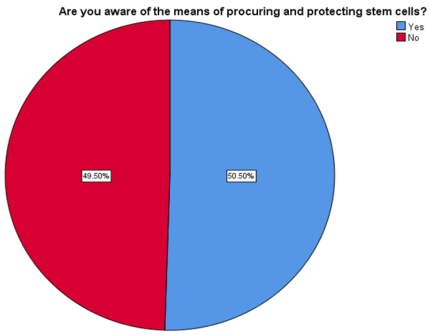

Figure 7: Pie-chart showing percentage distribution of awareness on procuring and protecting stem cells.

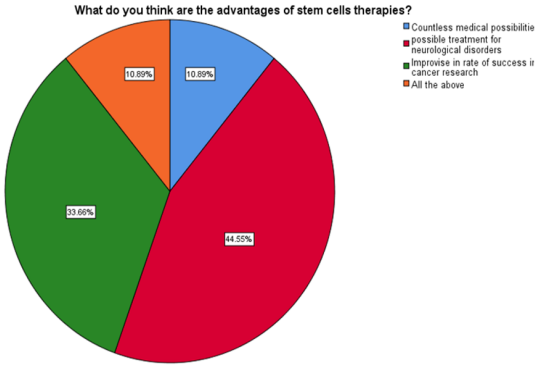

Figure 8: Pie-chart showing percentage distribution of responses about awareness on advantages of stem cell therapies.

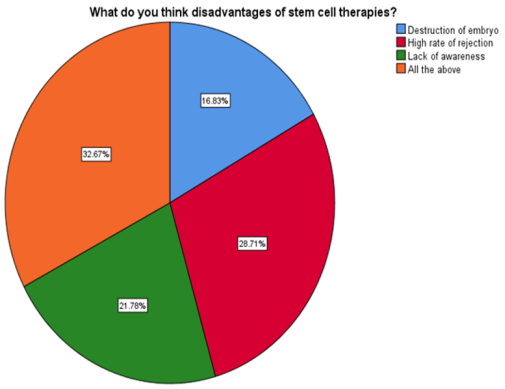

Figure 9: Pie-chart showing percentage distribution of responses about awareness on disadvantages of stem cell therapies.

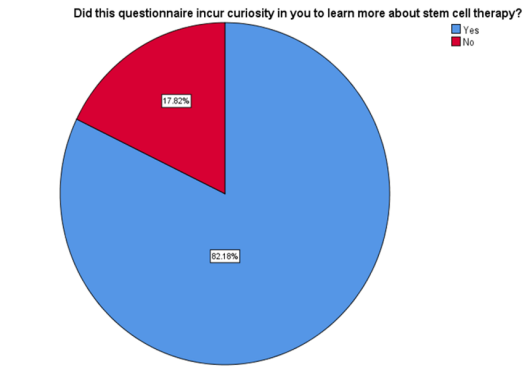

Figure 10: Pie-chart showing percentage distribution of responses about awareness on questionnaire which incur curiosity to learn about stem cell therapy.

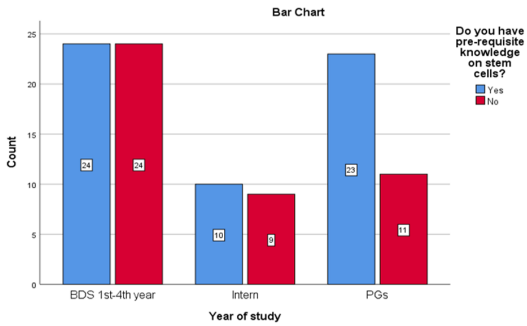

Figure 11: Bar-graph showing correlation between year of study (X axis) and responses to prior knowledge on stem cells (Y axis).

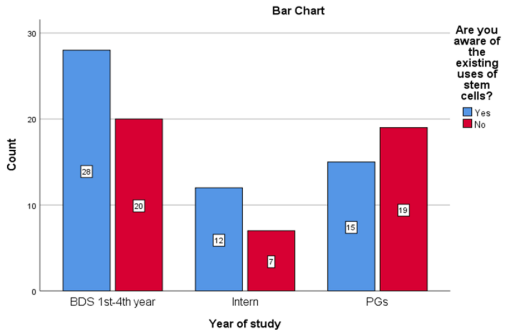

Figure 12: Bar-graph showing correlation between year of study (X axis) and responses to awareness on existing uses of stem cells (Y axis).

bone marrow, adipose tissue etc (Ramya, 2018). This current study is to create awareness on the therapeutic potential of stem cells among college students.

Dental stem cells from tooth structure are adult stem cells that have acquired lots of attention over the past decade among scientists and researchers. Embryonic stem cells are undifferentiated cells, they are yet to be programmed into specific cells. Embryonic stem cells are fundamental in finding cures for Parkinson's, Alzheimer, spinal cord injury and cardiovascular diseases.

Some students have done research in hepatic carcinoma (Jainu *et al.*, 2018). An analysis done on cytotoxicity potential of pineapple extract on oral cancer cell line was of much interest (Menon *et al.*, 2016). Recent updates on stem cells will be a cutting edge research as well.

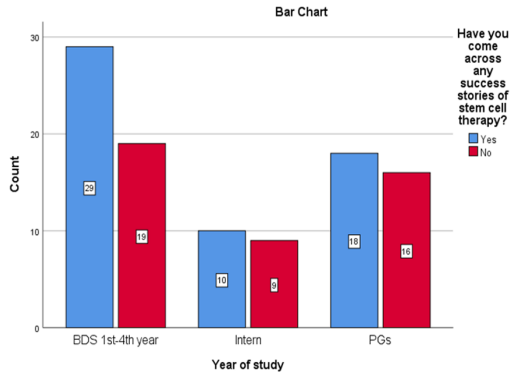

Figure 13: Bar-graph showing correlation between year of study (X axis) and responses of success stories of stem cell therapy (Y axis).

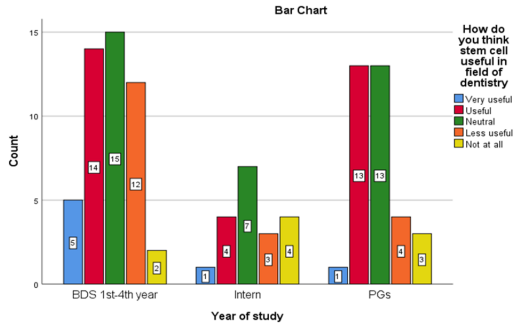

Figure 14: Bar-graph showing correlation between year of study (X axis) and responses of use of stem cells in the field of dentistry (Y axis),

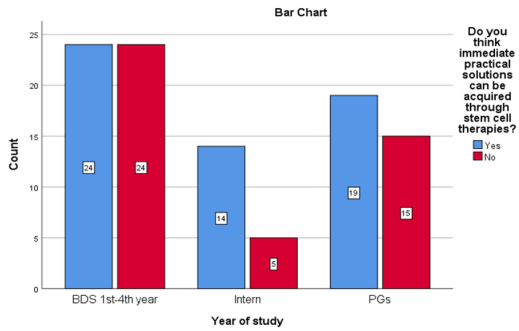

Figure 15: Bar-graph showing correlation between year of study (X axis) and responses of immediate practical solutions can be obtained from stem cells (Y axis).

MATERIALS AND METHODS

The present study is a well-structured questionnaire consisting of 12 questions. Google docs are used to distribute questions and collect responses. The questions were distributed to 100 students from different years of study. The institutional ethical committee has approved the study. The sampling technique used was administered through an online link

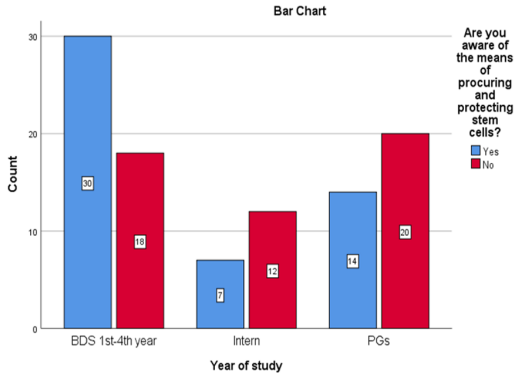

Figure 16: Bar-graph showing correlation between year of study (X axis) and responses of awareness on existing uses of stem cells (Y axis).

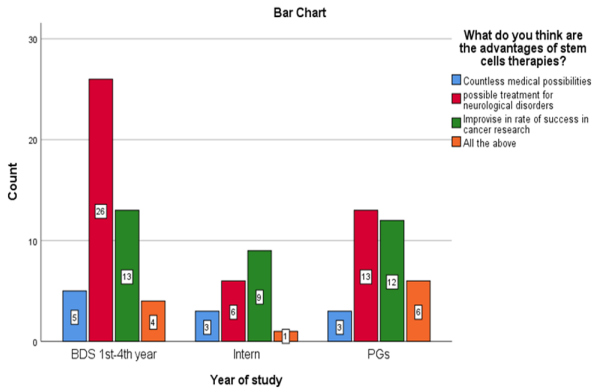

Figure 17: Bar-graph showing correlation between year of study (X axis) and responses of advantages of stem cell therapy (Y axis).

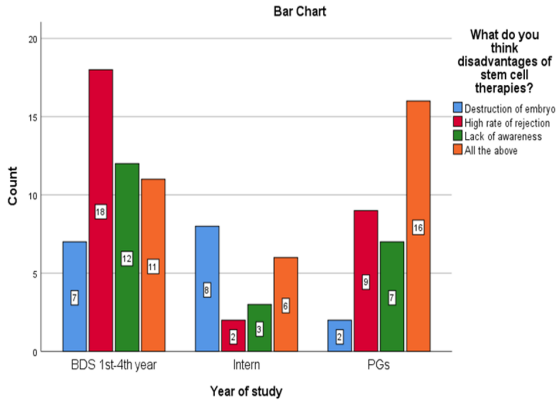

Figure 18: Bar-graph showing correlation between year of study (X axis) and responses of disadvantages of stem cell therapy (Y axis).

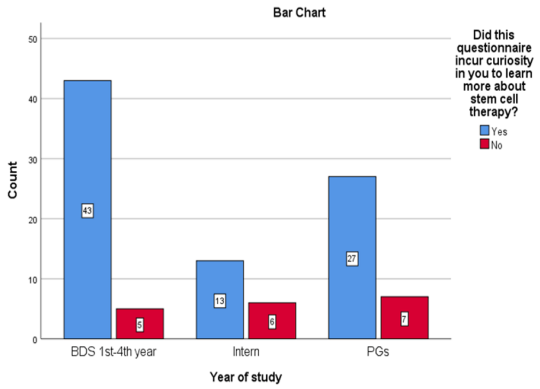

Figure 19: Bar graph showing correlation between year of study (X axis) and responses of questionnaire which incur curiosity to learn about stem cell therapy (Y axis).

to the participants sampling. The questionnaire was used as a study tool. The SPSS software was used for statistical analysis.

RESULTS AND DISCUSSION

The results of the current study concluded that the majority of the study population were aware and have prior knowledge of the therapeutic potential of stem cells.

In total of 100 students 47.5% are BDS Students (first to final year students)[Figure 1]. 56.4% of the student population had prior knowledge on stem cells [Figure 2]. 54.4% of the student Population were aware of existing uses of stem cells[Figure 3]. 56.4% of the student population agreed that stem cell therapy could be a cutting edge in treatment of diseases [Figure 4]. 34.6% of the student population were aware of Stem cells useful in the field of dentistry [Figure 5]. 56.4% of the student population thought that immediate practical solutions can be acquired through stem cell therapies [Figure 6]. 50.5% of the student population were aware of procuring and protecting stem cells[Figure 7]. 44.5% of the student population responded to 'possible treatment for neurological disorder' as an advantage of stem cell therapies [Figure 8]. 32.6% of the student population responded that there are minimal disadvantages of stem cell therapies[Figure 9]. 82.1% of the student population responded that questionnaire incurring curiosity to learn more about stem therapies [Figure 10].

Figure 1 shows, X-axis represents the year of study and Y-axis represents Percentage distribution of responses. 47.5% of the respondents are first to final year dental students, 18.8% of the respondents are Interns and 33.6% of the respondents are post graduates.

Figure 2 depicts, 56.4% of the study population has responded Yes and 43.5% of the study population responded No.

Figure 3 represents, 54.4% of the study population has responded Yes and 45.5% of the study population responded No.

Figure 4 depicts, 56.4%% of the study population has responded Yes and 43.5%% of the study population responded No.

Figure 5 shows, 6.9% of the study population has responded Very useful, 30.6% has responded Useful, 34.6% has responded Neutral, 18.8% has responded Less useful and 8.9 responded not at all.

Figure 6 represents, 56.4% of the study population has responded Yes and 43.5%% of the study population responded No.

Figure 7 depicts, 50.5%% of the study population has responded Yes and 49.5%% of the study population responded No.

Figure 8 represents, 10.8% of the study population has responded to countless medical possibilities, 44.5% has responded as possible treatment for neurological disorder, 33.6% has responded as to improvise rate of success in cancer research and 10.8% has responded as all of the above.

Figure 9 shows, 16.8% of the study population has responded as Destruction of embryo, 28.7% has responded as High rate of rejection, 21.7% has responded lack of awareness and 32.6% has responded All the above.

Figure 10 depicts, 82.1%% of the study population has responded Yes and 17.8%% of the study population responded No.

Figure 11 represents, where Blue colour denotes Yes and Red colour denotes No. Group A with a count of 48 persons having prerequisite knowledge on stem cells is 50% and the persons with no prior knowledge on stem cells is 50%. Group B with a count of 19 persons having prerequisite knowledge on stem cells is 60% and the persons with no prior knowledge on stem cells is 40%. Group C with a count of 34 persons having prerequisite knowledge on stem cells is 70% and the persons with no prior knowledge on stem cells is 30%. Pearson chi square value=2.659. (p)= 0.265 statistically not significant.

Figure 12 depicts, where Blue colour denotes Yes and Red colour denotes No. Group A with count of 48 are aware of existing uses of stem cells is 65% and persons not aware of uses of stem cells is 35%. Group B with count of 19 are aware of existing uses of stem cells is 70% and persons not aware of uses

of stem cells is 30%. Group C with count of 34 are aware of uses of stem cells is 40% and persons not aware of uses of stem cells is 60%. Pearson chi Square value=2.336. (p)= 0.311 statistically not significant.

Figure 13 shows, where Blue colour denotes Yes and Red colour denotes No. Group A with count of 48 had heard success stories of stem cells therapy is 65% and persons who haven't heard success stories of stem cells therapy is 35%. Group B with count of 19 had heard success stories of stem cells therapy is 55% and persons who haven't heard success stories of stem cells therapy is 45%. Group C with count of 34 had heard success stories of stem cells therapy is 55% and persons who haven't heard success stories of stem cells therapy is 45%. Pearson chi square value=0.590. (p)= 0.296 statistically not significant.

Figure 14 depicts, where Blue denotes Very useful, Red denotes Useful, Green denotes Neutral, Orange denotes Less useful and Yellow denotes Not at all. Group A with count of 48 are thinking uses of stem cells in the field of dentistry is neutral (30%) and person thinking uses of stem cells in the field of dentistry is not at all useful(5%). Group B with count of 19 are thinking uses of stem cells in the field of dentistry is neutral(35%) and person thinking uses of stem cells in the field of dentistry is Very useful(10%). Group C with count of 34 are thinking uses of stem cells in the field of dentistry is neutral(35%) and person thinking uses of stem cells in the field of dentistry is useful(35%). Pearson chi square value=9.576. (p)= 0.774 statistically not significant.

Figure 15 depicts, where Blue colour denotes Yes and Red colour denotes No. Group A with a count of 48 are thinking immediate practical solutions can be acquired is 50% and persons thinking immediate practical solutions cannot be acquired is 50%. Group B with count of 19 arethinking immediate practical solutions can be acquired is 75% and persons thinking immediate practical solutions cannot be acquired is 25%. Group C with a count of 34 are thinking immediate practical solutions can be acquired is 60% and persons thinking immediate practical solutions cannot be acquired is 40% . Pearson chi square value=3.112. (p)= 0.211 statistically not significant.

Figure 16 depicts, where Blue colour denotes Yes and Red colour denotes No. Group A with a count of 48 are aware of procuring and protecting stem cells is 70% and persons not aware of procuring and protecting stem cells is 30%. Group B with count of 19 are aware of procuring and protecting stem cells is 40% and persons not aware of procuring and protecting stem cells is 60%. Group C with count of 34 are aware of procuring and protecting stem cells is 45% and persons not aware of procuring and protecting stem cells is 55%. Pearson chi square value=5.365. (p)= 0.068 statistically not significant.

Figure 17 depicts, where blue colour denotes countless medical possibilities, red colour denotes possible treatment for neurological disorders, green colour denotes improvise in rate of success in cancer research and orange colour denotes all the above. Group A with a count of 48 many have answered that possible treatment for neurological disorders(55%). Group B with a count of 19 many have answered that improvise in the rate of success in cancer research(50%). Group C with a count of 34 many have answered that possible treatment for neurological disorders(40%). Pearson chi square value=6.550. (p)= 0.364 statistically not significant.

Figure 18 depicts, where blue colour denotes destruction of embryo, red colour denotes high rate of rejection, green colour denotes lack of awareness and orange colour denotes all the above. Group A with a count of 48 have answered that high rate of rejection(35%). Group B with a count of 19 have answered that destruction of embryos(40%). Group C with a count of 34 have answered that all the above(45%).

Pearson chi square value=17.438. (p)= 0.008 statistically significant.

Figure 19 depicts, where Blue colour denotes Yes and Red colour denotes No. Group A with a count of 48 are interested in learning more about stem cells is 90% and persons not interested in learning more about stem cells is 10%. Group B with count of 19 are interested in learning more about stem cells is 65% and persons not interested in learning more about stem cells is 35%. Group C with count of 34 are interested in learning more about stem cells is 80% and persons not interested in learning more about stem cells is 20% . Pearson chi square value=4.430. (p)= 0.109 statistically not significant.

We have seen the association between year of study and responses to prior knowledge on stem cells [Figure 11], responses to awareness on existing uses of stem cells [Figure 12], responses to awareness on success stories of stem cell therapies [Figure 13], responses on uses of stem cells in the field of dentistry [Figure 14], responses on immediate practical solutions can be acquired through stem cells [Figure 15], responses on aware of procuring and protecting stem cells [Figure 16], responses to awareness on advantages of stem cell therapy [Figure 17], responses to awareness on disadvantages of stem cell therapy [Figure 18], Responses to this question-

naire incur curiosity to learn more about stem cells and its applications [Figure 19]

As we can see from the responses that the most of the students have prior knowledge of stem cell therapies, even most of the student population have prior knowledge on stem cells. The convalescent plasma therapy is an experimental treatment that some doctors are using for people with severe coronavirus diseases 2019 (Geetha and Seshadri, 2020; Koh, 2020). This also indicates the lack of knowledge on convalescent plasma therapy and lack of awareness on uses of stem cells in wide aspects. Many students on Nonalcoholic steatohepatitis, obesity and industrial detergents are done in our department (Mohan and Jainu, 2014; Shukri, 2016; Rengasamy, 2016) I had a keen interest to study the possible therapeutic applications of stem cells in health and disease.

CONCLUSION

Stem cell therapies are used to identify new treatments. Stem cell therapies are used to find new possible cures. Stem cell therapies are hoped for non curable diseases.From the study we can conclude that most of the dental students are aware of the therapeutic potential of stem cells. But still there are some inappropriate responses which shows some are not aware of several settings related to stem cell therapies. This study is basically to determine and to create awareness among the college students to have better knowledge on stem cell therapies. More awareness workshops may be conducted to create awareness on the therapeutic applications of stem cells.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

Funding Support

The authors declare that they have no funding support for this study.

REFERENCES

Chen, F. 2019. 6-shogaol, a active constituents of ginger prevents UVB radiation mediated inflammation and oxidative stress through modulating NrF2 signaling in human epidermal keratinocytes (HaCaT cells). *Journal of Photochemistry and Photobiology B: Biology*, page 111518.

Gan, H. 2019. Zingerone induced caspase-dependent apoptosis in MCF-7 cells and prevents 7,12-dimethylbenz(a)anthracene-induced mammary carcinogenesis in experimental rats. *Journal of Biochemical and Molecular Toxicology*.

Geetha, M., Seshadri, L. 2020. COVID-19: A 'Violent' pandemic for health care workers in India. *COVID-19 Special Issue*, 1(2):32–40.

Jainu, M., Priya, V., Mohan, S. 2018. Biochemical evidence for the antitumor potential of Garcinia mangostana Linn. On diethylnitrosamine-induced hepatic carcinoma. *Pharmacognosy Magazine*, 14(54):186.

Ke, Y. 2019. Photosynthesized gold nanoparticles from Catharanthus roseus induces caspase-mediated apoptosis in cervical cancer cells (HeLa). *Nanomedicine, and Biotechnology*, pages 1938–1946.

Koh, G. 2020. Faculty Opinions recommendation of Effectiveness of convalescent plasma therapy in severe COVID-19 patients. Faculty Opinions - Post-Publication Peer Review of the Biomedical Literature.

Li, Z. 2020. Apoptotic induction and anti-metastatic activity of eugenol encapsulated chitosan nanopolymer on rat glioma C6 cells via alleviating the MMP signaling pathway. *Journal of Photochemistry and Photobiology B: Biology*, page 111773.

Liew, A., Brien, T. 2012. Therapeutic potential for mesenchymal stem cell transplantation in critical limb ischemia. *Stem Cell Research and Therapy*, pages 28–28.

Ma, Y. 2019. Sesame Inhibits Cell Proliferation and Induces Apoptosis through Inhibition of STAT-3 Translocation in Thyroid Cancer Cell Lines (FTC-133). *Biotechnology and Bioprocess Engineering*, pages 646–652.

Menon, A., Priya, V. V., Gayathri, R. 2016. Preliminary phytochemical analysis and cytotoxicity potential of pineapple extract on oral cancer cell lines. *Asian Journal of Pharmaceutical and Clinical Research*, page 140.

Mohan, S. K., Jainu, M. 2014. Effect of Pioglitazone, Quercetin, and Hydroxy Citric Acid on the Lipid Profile and Lipoproteins in Experimentally Induced Non-alcoholic Steatohepatitis (NASH). *Indian Journal of Pharmaceutical Education and Research*, 48(1):32–38.

Nowreen, D. N. 2019. Hepatitis B awareness and vaccine coverage among students of a north Indian medical College. *Journal of Medical Science And clinical Research*.

Owczarczyk-Saczonek, A. 2018. Therapeutic Potential of Stem Cells in Follicle Regeneration. *Stem Cells International*, pages 1–16.

Persia, R. A. 2017. Awareness of advance stem cell therapy among students- a survey. *International Journal of Current Advanced Research*, pages 3023–3025.

Ponnulakshmi, R., Shyamaladevi, B., Vijayalakshmi, P., Selvaraj, J. 2019. In silico and in vivo analysis to identify the antidiabetic activity of beta sitosterol in adipose tissue of high fat diet and sucrose induced type-2 diabetic experimental rats. *Toxicology Mechanisms and Methods*, 29(4):276–290.

Ramya, G. 2018. Cytotoxicity of Strawberry extract on oral cancer cell line. *Asian Journal of Pharmaceutical and Clinical Research*, page 353.

Rengasamy, G. 2016. Characterization, Partial Purification of Alkaline Protease from Intestinal Waste of Scomberomorus Guttatus and Production of Laundry Detergent with Alkaline Protease Additive. *Indian Journal of Pharmaceutical Education and Research*, 50(2):59–67.

Rengasamy, G. 2018. Cytotoxic and apoptotic potential of Myristica fragrans Houtt. (mace) extract on human oral epidermal carcinoma KB cell lines. *Brazilian Journal of Pharmaceutical Sciences*.

Sahni, V., Kessler, J. A. 2010. Stem cell therapies for spinal cord injury. *Nature Reviews Neurology*, 6(7):363–372.

Schilling, L. H. 1984. Postcoital Contraception: Awareness of the Existence of Postcoital Contraception among Students who have had a Therapeutic Abortion. *Journal of American College Health*, 32(6):244–246.

Shukri, N. M. M. 2016. Awareness in childhood obesity. *Research Journal of Pharmacy and Technology*, 9(10):4. A & V Publications.

Wang, Y. 2019. Synthesis of Zinc oxide nanoparticles from Marsdenia tenacissima inhibits the cell proliferation and induces apoptosis in laryngeal cancer cells (Hep-2). *Journal of Photochemistry and Photobiology B: Biology*, page 111624.

Wu, F. 2019. Biologically synthesized green gold nanoparticles from Siberian ginseng induce growth-inhibitory effect on melanoma cells (B16). *Nanomedicine, and Biotechnology*, pages 3297–3305.