Research Article

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Evaluating Awareness on Dental Pulp Stem Cells and its Applications amongst Graduating Dental Students of Ahmedabad and Gandhinagar District: A Cross-Sectional Survey

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ABSTRACT

Aim: The next decade of dentistry is speculated to see unparalled advances in the field of stem cell tissue engineering. The discovery of stem cells in the pulp of deciduous teeth raised intriguing possibility of using dental pulp stem cells for various life threatening disorders. This novel therapy has been proved to be a huge scope in dentistry and currently has large-scale clinical applications. The WHO recommends dentists should encourage following evidence based literature in order to educate patients about the collection, storage and use of stem cells. There is a need to assess graduating dental care professionals, which would help in understanding awareness on this topic.

Materials and Methods: Four dental colleges from Ahmedabad and Gandhinagar districts participated in the study. A structured questionnaire containing 13 questions was prepared and distributed to the participants. Data was analyzed after all the participants submitted their questionnaire.

Results: Out of 372 students, 231 reverted back for the study. Majority of the graduating interns were ignorant about the canine being the best deciduous tooth for the extraction of stem cells. 24.84 % students believed dental pulp stem cells as best source for therapeutic use whereas almost 30% considered as bone marrow or umbilical cord. Majority of participants had no idea regarding the optimal root length to get the vital stem cells post extraction.

Conclusion: Updating ourselves in medical profession is key to clinical success. In recent years due to influence of media, patients have become aware of latest innovations in medical and dental science. Therefore it has become necessary for the dental professionals to keep themselves updated to new world of dentistry.

Keywords: Dental pulp, Regeneration, Stem cells.

INTRODUCTION

Stem cells are the cells capable of dividing essentially without limit to replenish other cells as long as the person is alive[1]. They have a great scope in treatment of various diseases such as Parkinson's, Alzheimer's disease, spinal cord injury, stroke, burns, heart diseases, diabetes, osteoarthritis and rheumatoid arthritis[2]. These multipotent mesenchymal stem cells (MSCs) can differentiate into specialized cells under physiologic or experimental conditions[3]. They can differentiate

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Table 1: Sample of participating interns from four different colleges.

Colleges	Total Interns	No. of Interns Participated
Karnavati School of Dentistry	100	75
Ahmedabad Dental College	100	60
AMC Dental College	86	51
College of Dental Sciences and Research Centre, Bopal	86	45

into various cell lineages like osteogenic, chondrogenic, adipogenic[4]. Most of these MSCs are derived from bone marrow or umbilical cord.

However, advanced researches on stem cells in the past decade have led to the discovery of various other sources of MSCs, from which MSCs of dental pulp are found to have an equivalent potential of differentiation known as post natal Dental Pulp Stem cells (DPSCs). Furthermore, 3 more sources of MSCs of dental origin were isolated: Stem Cells from Human Exfoliated Deciduous Teeth (SHED), Apical Papilla and PDL[4].

On comparing the potential of these dental origin stem cells with Bone Marrow Mesenchymal Stem Cells (BMMSCs), the DPSCs were found to have equivalent differentiation potential compared with the later one (BMMSCs). With this remarkable ability of stem cells of dental origin, they have a great scope in the field of repair and regenerative medicine.

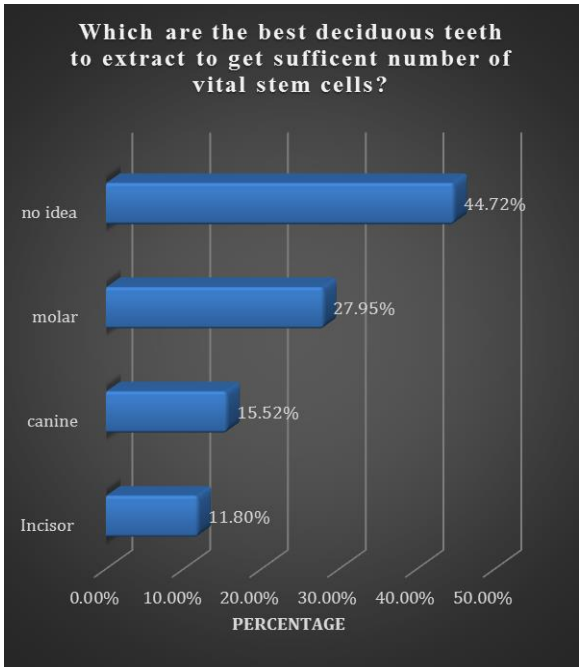
In the field of dentistry, owing to these, various researches have been going on for finding novel treatments for periodontitis, dental caries, dental pulp, regeneration of craniofacial tissues , engineering of whole human temporomandibular joint, alveolar ridge augmentation and reconstruction of a resected mandible[5]. They can be useful in combating various diseases.

OBJECTIVE

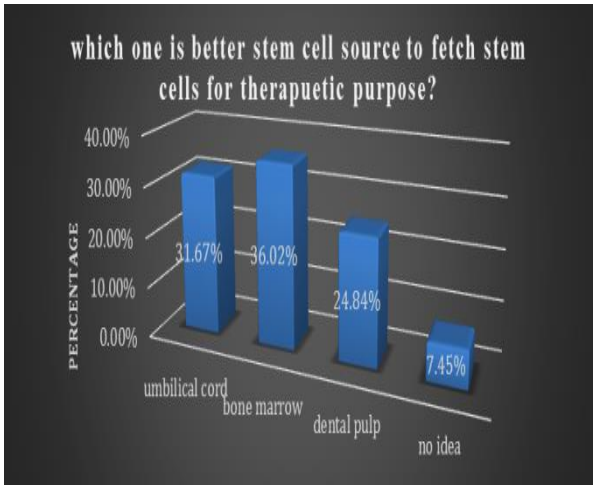
To collect data about level of knowledge, awareness and opinions about stem cells and its present clinical status among the interns of dental colleges.

MATERIALS AND METHOD

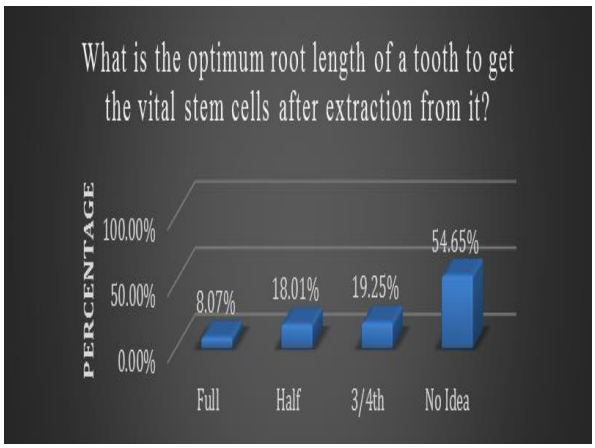
Four colleges from Ahmedabad and Gandhinagar districts, India were considered for the study. A structured, self-administered questionnaire containing 13 questions was prepared. After a brief introduction on the purpose and intent of the study, informed consent was obtained from the interns and the questionnaire was circulated. The questionnaire contained 3 parts, first part discussed fundamentals of stem cells, second was about clinical application and last was for perception towards stem cells.



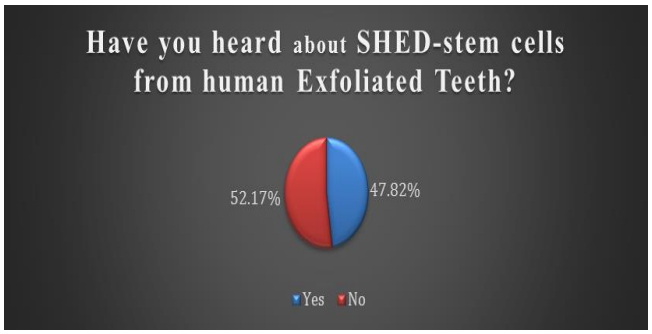
Graph 1: Response to the best deciduous tooth for getting sufficient stem cells.



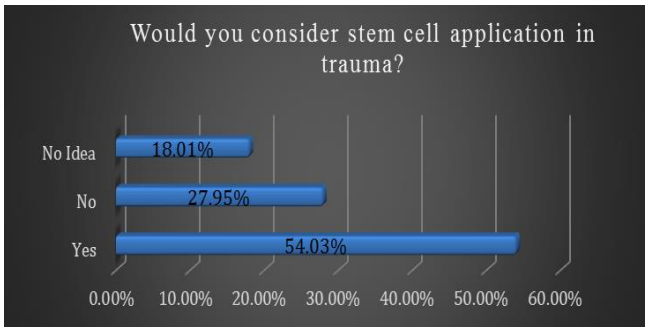
Graph 2: Response to stem cell sources.



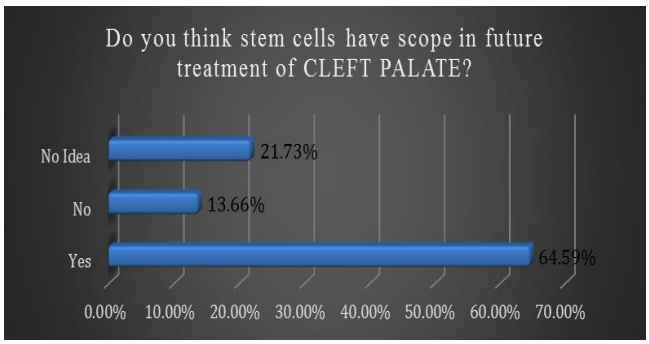
Graph 3: Response to required optimum root length for vital stem cells post extraction.



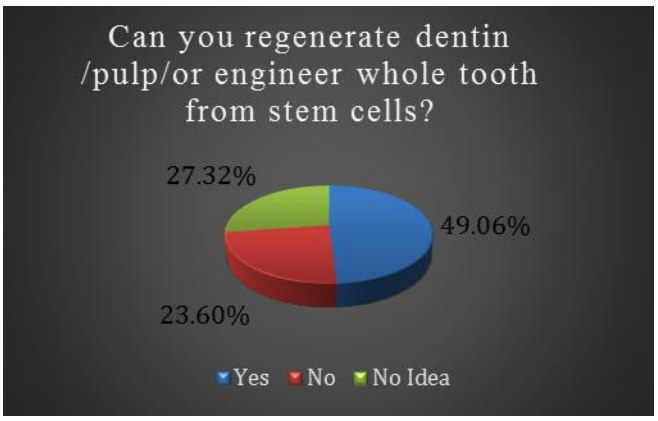
Graph 4: Response to knowledge about SHED stem cells.



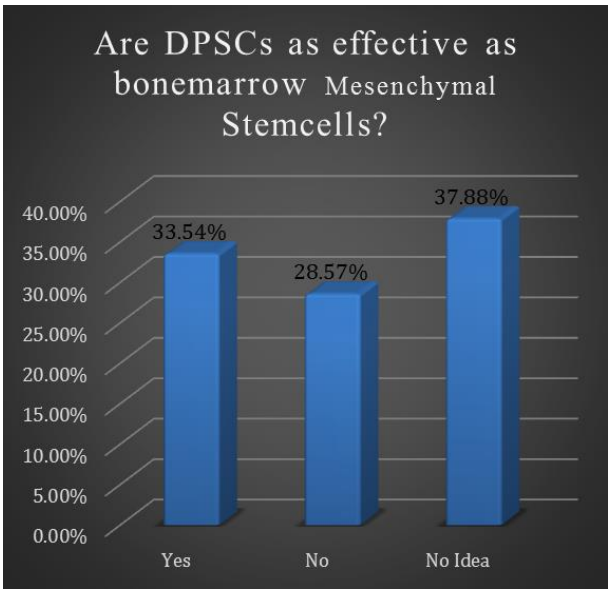
Graph 5a: Response to application of stem cells in trauma.



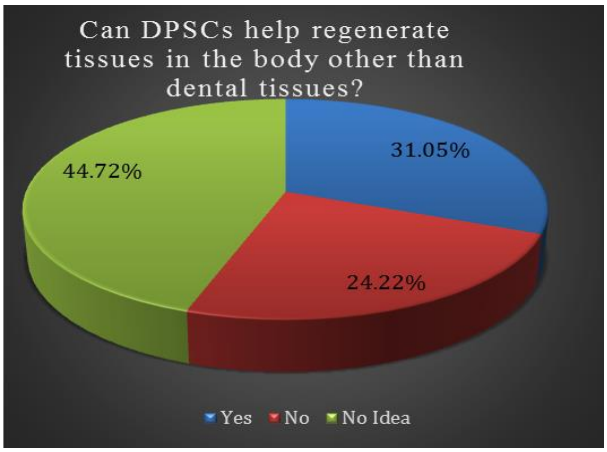
Graph 5b: Response to scope of stem cells in treatment of cleft palate.



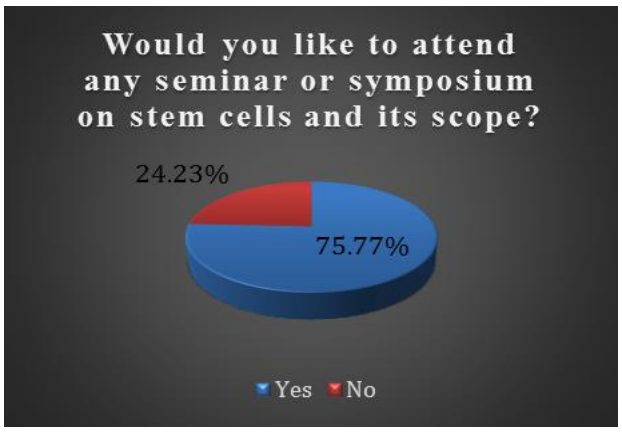
Graph 6: Response to possibility of regenerating dentin / pulp / or engineering whole tooth from stem cells.



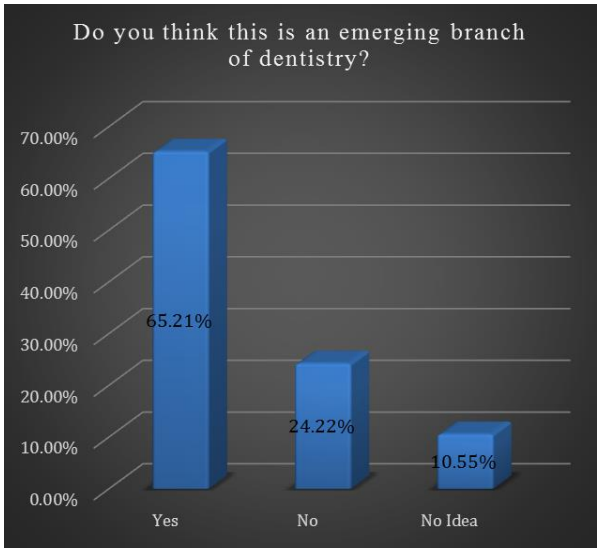
Graph 7: Response to effectiveness of DPSC in comparison to bone-marrow stem cells.



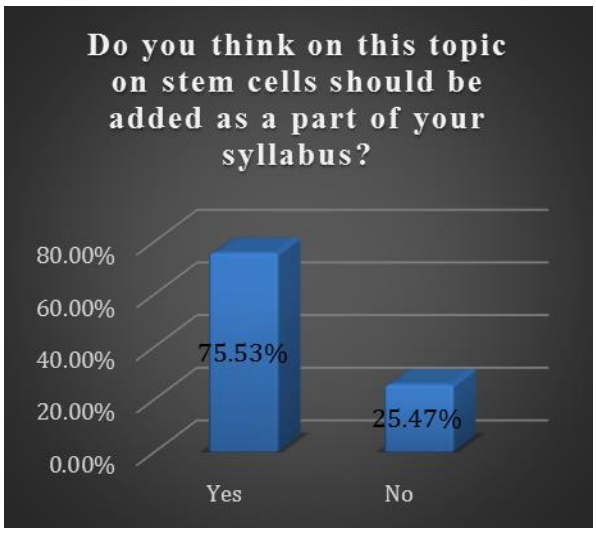
Graph 8: Response to scope of DPSC in regenerating tissues in body.



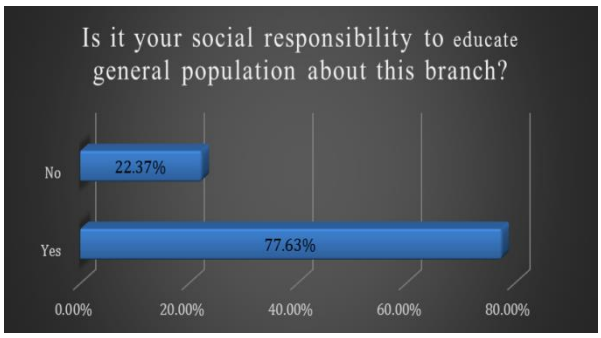
Graph 9: Response to future interest for attending seminars on this topic.



Graph 10: Response to whether DPSC is an emerging branch of dentistry.



Graph 11: Response to inclusion of stem cell topic in syllabus.



Graph 12: Response to educating general population about this branch.

RESULTS

372 questionnaires were circulated among the students, out of which 231 reverted back. 135 students did not take part in the study. When questioned about the best deciduous tooth to get sufficient number of stem cells, majority of the graduating interns were ignorant while 15.52% were aware about the canine being the best deciduous tooth for the same (Graph 1). To check the approach of aspiring dentists towards clinical application of stem cells, they were asked as to which stem cell sources were considered best for therapeutic purpose. To this, 24.84 % students believed the source as dental pulp stem cells whereas almost 30% thought as bone marrow or umbilical cord and 7.45 % students did not have an idea about the same (Graph 2). Furthermore, to check their knowledge regarding the clinical application, they were asked about the optimum root length to get the vital stem cells post extraction. The result demonstrated that majority of interns had no idea about the optimum root length whereas about 20% of them knew the optimum root length to be 3/4th of the root (Graph 3). Regarding knowledge about SHED only 50% of them were aware (Graph 4). For the clinical implication of stem cells in treatment of trauma and cleft palate more than 50% of them showed a positive response (Graph 5a and 5b). Almost 50% of the interns felt it was possible to regenerate dentin/pulp or engineer a whole new tooth with stem cells (Graph 6). Satisfactory results were not obtained when interns were asked about the effectiveness of DPSCs as compared to bone marrow mesenchymal cells.

Majority of the students had no idea where as some of them believed DPSCs were equally

effective as bone marrow mesenchymal stem cells while the rest did not agree to that (Graph 7). Majority of students were clueless about the role of DPSCs in regeneration of other body tissues (Graph 8).

The results showed that a thumping majority of almost 80% of students were found interested in attending seminars on DPSCs (Graph 9).

It was found that 65.2% of the students considered DPSCs to be an emerging branch in dentistry (Graph 10) and 75% of the graduating interns wanted stem cells to be added as part in their syllabus (Graph 11). 77.63% interns thought it was their social responsibility to educate general population about this branch and that no one should be deprived of the knowledge of dental pulp stem cells and its value (Graph 12).

DISCUSSION

In this study, the participants were graduating interns of 4 dental colleges from Ahmedabad and Gandhinagar district. Only 24.84% of the students knew about dental stem cells. Majority of the students had no idea about the optimum root length to get vital stem cells after extractions and the best deciduous tooth source for sufficient number of vital stem cells, which further stresses on the lack of knowledge in the field of dental stem cells.

Section B was on clinical applications and scope of dental pulp stem cells where a very positive approach towards the future prospects dental stem cells in trauma, in treatment of cleft palate was seen. Almost 50% of students were open to the idea of regeneration of dentin or pulp and engineering of whole teeth with the help of stem cells. But at the same time, they were ignorant about the regeneration of the other body tissues with the help of DPSCs and their relative potential with the BMMSCs.

Questions in section C aimed towards the perception of students on stem cells lead to various findings where they encouraged the concept of seminars or symposium and even the inclusion of DPSCs in syllabus as it was suggestive of an effective way of learning about DPSCs. More than 80% of the students perceived this as an emerging branch of dentistry.

The results from the above survey convey lack of knowledge about the fundamentals of stem cells. DPSCs[6] have a great therapeutic potential of treating various lesions of dental origin. Some studies also show that congenital and acquired intra and extra oral soft and hard tissue defects can be additionally treated with stem cell based approach.

Similar researches were carried out in the field of dental implants and today this concept has reached to common man. It took years of researches, knowledge and awareness for the dental implants to become a part of routine dental practice. Even today implants are being evolved and upgraded. Dental lasers were a breakthrough in dentistry to overcome the tedious age old mechanical and chemical techniques which had a few limitations. It is now used commonly in various dental procedures such as dental caries, root canal treatments and also facilitates wound healing. This has been possible through the awareness and education of the dental professionals who chose to maintain an edge with the upcoming trends of dentistry. Likewise, if the concept of dental origin stem cells is encouraged, then the above anticipated goals can be achieved.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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