

# AWARENESS REGARDING DENTAL STEM CELLS AMONG PEDIATRIC DENTIST: A QUESTIONNAIRE BASED STUDY

## ABSTRACT

**Introduction:** The subject of dental stem cells (DSCs) research is advancing at a rapid rate. Several studies have indicated that oral tissues are a good source of stem cells, and so dentists can play an important role in the field of regenerative therapies. Dentists should be familiar with fundamental biology as well as stem cell storage and processing to investigate the various applications of oral stem cells. This study aimed to assess the knowledge, attitude, and practice regarding the applications of stem cells among pediatric dentists.

**Materials and methods:** The present cross-sectional study was a questionnaire-based survey. The study included 105 study participants. The mean age of the participants was  $32.5619 \pm 7.73096$  years. The age of the participants ranged from 23 years to 50 years. The study was conducted using Google forms. For each question, the results were expressed as a number and percentage of responses, and inferential statistical analysis was done using the chi-square test.

**Results:** In this survey, 95% of participants were aware of the DSCs, 91% were aware of all types of DSCs, 84.8% were aware of all DSCs applications, and 89.55% were aware of non-DSCs uses. 97% of those who took part in the survey said they were interested in learning more about DSCs.

**Conclusion:** Dentists are supportive of employing stem cell-based regenerative treatments in their practice and are eager to learn more about them.

**Keywords:** Dental stem cells (DSCs), Dental pulp stem cells (DPSCs), Regeneration.

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J Ind Dent Assoc Kochi 2021;3(3):4-9.

## INTRODUCTION

The regeneration of the dental-pulp complex with stem cells has been a keen area of research since the last decade (Ishimatsu et al. 2009, Kadar et al. 2009). Stem cells are defined as clonogenic unspecialized cells which are capable of both self-renewal for long periods and multilineage differentiation, contributing to the regeneration of specific tissues.<sup>1</sup> Stem cells have been isolated from many tissues and organs.<sup>2</sup> Dental stem cells (DSCs) have been widely studied due to their easy accessibility, and less invasive harvesting time. The main characteristics of these stem cells are their potential for multipotential differentiation and self-renewal ability. DSCs offer a very promising therapeutic approach to restore structural defects and this concept is extensively being evaluated.<sup>3,4,5</sup>

The DSCs isolated are dental pulp stem cells (DPSCs), stem cells from exfoliated deciduous teeth, stem cells from the apical papilla, periodontal ligament stem cells, and dental follicle progenitor cells. Stem cells are capable of differentiating into a variety of cells, such as neural cells, osteoblasts, chondrocytes, adipocytes, and myocytes (Miura et al. 2003, Kerkis et al. 2006, Wang et al. 2010).<sup>2</sup> Primary incisors and canines with no pathology and at least one-third of root length remaining are ideal candidates for stem cell isolation and harvesting.<sup>6, 7, 8</sup> Stem cells can be stored for a very long period and can be used in the treatment of many diseases including certain malignancies.<sup>9,10,11,12</sup>

Previous studies have found varying levels of DSC knowledge and attitude, as well as their prospective uses, among health professionals and students in health science colleges around the world. In India, for example, general dentists had a favorable attitude toward the use of DSCs in dentistry; however, their knowledge was inadequate (Katge et al., 2017)<sup>13</sup>. Students in other health disciplines, such as nursing students in Malaysia, demonstrated a modest level of understanding and a good attitude regarding therapeutic uses of DSCs (Lye et al., 2015).<sup>14</sup> A recent study conducted by Mohamed and Azzay et al found that a sample of nursing students had little awareness of DSCs, but had a favorable attitude towards stem cell therapy.<sup>15</sup>

To our knowledge, there are no published

reports assessing knowledge and/or attitude regarding stem cells and their therapeutic potential applications among pediatric dentists in India. Hence this study was planned to assess the knowledge and awareness concerning DSCs among pediatric dentists.

## METHODOLOGY

The present cross-sectional study was a questionnaire-based survey conducted from February to March 2020. The survey carried out was a knowledge, attitude, and practice study. The questions were formulated after going through similar studies and articles published in academic journals related to DSCs.<sup>16, 17, 18, 19, 20</sup> The questionnaire was subjected to a pilot study on 20 dentists which included postgraduate students as well as teaching faculty of Royal Dental College, Chalissery, Kerala. The suggested points were incorporated depending on their merits concerning the mentioned study. The final questionnaire consisted of 32 questions.

The questionnaire link was sent through email and via WhatsApp group which comprised of pediatric dentistry postgraduates residing in India, which included pediatric dentistry postgraduate students/ practitioners/ faculty/ practitioner and faculty. A total of 105 consenting dentists responded to the survey. The questionnaire was close-ended, self-administered, and conducted using Google forms.

The initial 11 questions pertained to socio-demographic variables. The socio-demographic variables included age, gender, area of work, qualification, and years of experience. The next set of questions assessed the awareness regarding stem cells, source of knowledge, tooth banking procedure, applications, ethical concerns, barriers toward the use of stem cells, and methods of increasing awareness regarding the same.

The data was entered into the excel sheet. The data were analyzed using SPSS (Statistical Package for Social Sciences) 20.0 version. Descriptive statistics were performed. The comparison between the groups was done using the Chi-square test. A P-value less than 0.05 was considered statistically significant. The confidence interval was set at 95%.

## RESULTS

The study included 105 study participants. The mean age of the participants was 32.5619± 7.73096 years. The age of the participants ranged from 23 years to 50 years. The number of female participants was more as compared to male participants. Most of the participants of the survey were second-year postgraduate students followed by the dentist who was working as both faculty and practitioner.

Amongst the dentists (non-student) maximum were found to have working experience of fewer than 5 years. The response to any question did not differ significantly between the male and female dentists (p value>0.05).

The response to all the questions except for one question did not differ significantly between the students/practitioners/faculty/practitioners and faculty group. The response to the question- "Are you aware of DSC banks in India?" differ significantly between the participants having different work profile.

A substantially higher proportion (84.6% ) of dentists working as both 'practitioners & faculty' know about stem cell banks in India. However, only a lower proportion (36.8% ) of dentists working solely as practitioners know about stem cell banks (Chi-square value- 11.914, df-3, p value<0.008).

The response to the question "Are there any ethical concerns regarding the use of stem cells in dentistry" was found to differ significantly from the experience of the dentist. A significantly greater proportion of dentists (75.0%) working for 5-10 years believe that there is no ethical concerns regarding the use of stem cells in dentistry whereas a significantly greater proportion (75.0%) of dentists working for more than 10 years believe that there are ethical concerns regarding the use of stem cells in dentistry (Chi-square value- 13.515, df-6, p value<0.036).

The perception of dentists regarding the preservation or storage of DSCs also varied significantly with the experience of dentistry. A significantly greater proportion (100.0%) of students believe that preservation or storage of DSCs should be done whereas a significantly lesser proportion of dentists having experience of 5-10 years believe that preservation or storage of DSCs should be done (Chi-square

Gender	Number	Percentage
Male	47	44.8
Female	58	55.2
Total	105	100.0

Table 1. Gender-wise distribution of study participants.

Work	Number	Percentage
Student	52	49.5
Practitioner	19	18.1
Faculty	8	7.6
Practitioner & Faculty both	26	24.8
Total	105	100.0

Table 2. Frequency distribution of study participants based on work.

Experience of practice	Number	Percentage
Not applicable	28	26.7
Less than 5 years	35	33.3
5-10 years	22	21.0
More than 10 years	20	19.0
Total	105	100.0

Table 3. Frequency distribution of study participants based on experience of practice.

value- 10.425, df-3, p value<0.015). The response to other questions did not vary significantly between the dentists with different experiences (p value>0.05).

## DISCUSSION

In this survey, 95% of participants were aware of the DSC, 91% were aware of all types of DSCs, 84.8% were aware of all DSC applications, and 89.55% were aware of non-DSC uses. This finding is consistent with a relevant study performed on dentists in South Africa (Basson et al., 2016).<sup>21</sup> whereas the same is contrary to a

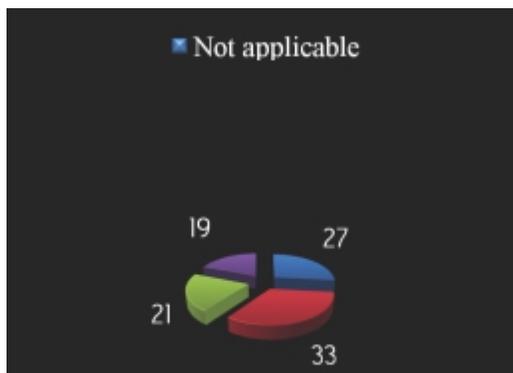


Figure 1. Frequency distribution of study participants based on experience of practice.



Figure 2. Frequency distribution of study participants based on the year of study

conducted in Italy that concluded two-thirds of participated physicians had no specific knowledge about stem cells (Frati et al., 2014).<sup>22</sup>

Participants had a reasonably good understanding of teeth being used for DSC banking, ethical considerations regarding the preservation of DSC, and how long DSC can be preserved (52%). Postgraduates had a better understanding of DSC because these are covered in postgraduate courses. The presence of DSC banks in India was unknown to more than half of the participants. The postgraduate participants were more aware of these procedural details. However, only around a quarter of the other faculties knew the procedures involved in DSC harvesting. When given the opportunity, 94.7% of participants said they would like to harvest DSCs in their professional practice if they were given the opportunity. High prices and a lack of patient information were highlighted as barriers to DSC banking by the participants. Other characteristics mentioned, such as a lack of operator skills and process competence, imply

that, while theoretical understanding has increased in recent years, practitioners still lack practical knowledge and abilities.<sup>23,24</sup>

The primary barriers to seeking therapy with DSCs, according to 74.3% of dental professionals are the high cost, lack of awareness, ethical difficulties, and insufficient knowledge of DSC among dental practitioners. A report published by Chitroda et al,<sup>25</sup> and Goyal et al<sup>19</sup> agreed that the high cost, lack of awareness, and lack of sufficient understanding were preventing patients from receiving DSC treatment. These obstacles can be solved by raising public awareness through public seminars and talks, which will help to dispel common misconceptions about stem cells.<sup>20</sup>

Almost 53.3% of people are uninformed of the Indian Council of Medical Research's guidelines on DSCs. There is a need to raise knowledge of these recommendations among dental professionals which may assist them to improve the safety of procedures and treatments involving DSC.

Despite their lack of in-depth knowledge of DSC banking, isolation, and storage, the majority of dentists were eager to brush up on their skills and advise their patients to store their DSCs. This may be because dental professionals are recognizing that this is an emerging and rapidly growing area with advantages such as ease of extracting dental cells and the ability to differentiate into several cell lineages. 97% of those who took part in the survey said they were interested in learning more about DSCs. Conferences, journal articles, and the internet were all used to gather information and increase awareness about DSCs.

## CONCLUSION

According to the findings of this study, there is a high level of knowledge about DSC. However, the dentists who took part in the survey lacked knowledge about procedural details and ethical concerns of DSCs. Postgraduates had a higher level of knowledge, which could be attributed to the revised and research-oriented curriculum. The respondents showed a constructive attitude toward upgrading their awareness of DSCs. This can be accomplished by integrating this topic into the college curriculum in greater

detail. Discussions on the topic in conferences, lectures, and scholarly journals will help with this. It's critical for dental professionals to keep their knowledge updated on DSC research and technology.

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