



Research Article

KNOWLEDGE AND ATTITUDE REGARDING STEM CELLS AMONG DENTAL PRACTITIONERS

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ABSTRACT

Background: Stem cells research, methods of harvesting, controversies and utilisation of stem cells has been explored worldwide for the enhancement of health in medicine and dentistry. Nevertheless, currently there is still need of understanding of the stem cell knowledge and attitude among dentists. The aim of this study was to investigate the awareness, knowledge and attitude toward stem cell application and its association with the level of education.

Methods: This observational, cross sectional study (n=80) was conducted using self administered questionnaire that consisted of demographic information, stem cell knowledge and attitude statements. Data was analysed using Statistical Package Social Software (SPSS) version 20.

Results: Among 80 dentists 76 (95%) of dentists returned the filled self administered form while 5% did not participated. Majority of participants were in the age group of 25-35 years, females, possessed a basic graduate qualification and had practised more than 2 years. In this study, 47(61%) reported awareness related to stem cells use in dentistry which was significantly associated with the qualification. And most of the respondents had low 19 (25%) to moderate 24(31.5%) regarding the use of stem cells. About more than half of the respondents exhibited positive attitude towards stem cells utilisation. Poor correlation between knowledge and attitude ($r=0.04$) indicated non-significant relation between knowledge and attitude.

Conclusion: From this study data depicted high level of awareness, poor knowledge and positive attitude among dentists. Consequently, it suggests that several educational programs for stem cells should be executed to encourage more positive knowledge and attitude which can facilitate dentists to incorporate it in their practices.

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INTRODUCTION

Current advancements in stem cell science has proved major differentiation plasticity of many types of stem cells in human tissue (1). Stem cells gives prospects to learn about development of diseases, cytopathology, prevention or treatment of diseases at cellular level. Stem cells are immature, primitive cells capable of self replication and can differentiate in particular type of cells and tissues. Stem cells have self renewal characteristic which allows them to undergo cell division which therefore, gives them ability to proliferate and differentiate while having the capability to maintain their undifferentiated state (2).

There are two types of stem cells adult stem cells (ASCs) and embryonic stem cells (ESCs) and these can be multipotent, totipotent or unipotent. Sources of adult stems include amniotic fluid, umbilical cord, bone marrow, brain, teeth and

adipose tissue. Whereas, embryonic stem cells are obtained from embryos, ESCs line was first developed in 1998 by Thomsan et al since then it is being used in therapeutics and regenerative medicines (3). And they have the capacity to regenerate and differentiate into many cell lineages (4). These different types of cell lineages could possibly be used for replacement of cells and tissues in the treatment of certain conditions like heart disease, diabetes, spinal cord injury,

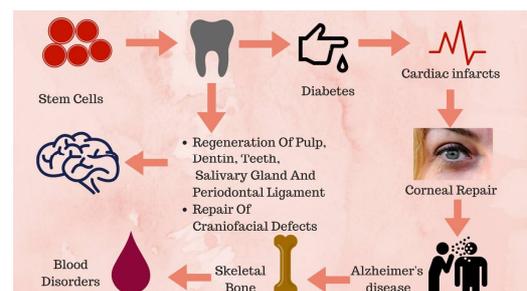


Figure 1 Depicts Stem Cells Medical And Dental Applications

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Alzheimer’s disease, Parkinson disease, spinal cord injury, for reversing blindness (5–7). Potential uses are being investigated on lupus, crohn’s disease, graft versus host disease and screening of anti cancer drugs (8) Figure 1.

Dental stem cells (DSCs) are adult stem cells derived from tooth structures easily accessible and can be stored for future use and is cost effective (9,10). Extra oral sites can also be utilised for regeneration of dental tissues such as periodontal ligaments, roots of teeth (11). Enamel and dentine production from mesenchymal stem cells of pulp and follicle of third molars are under investigation (12,13) Moreover, several clinical studies were conducted on generation of human shaped temporomandibular joint, reconstruction of resected mandible, and alveolar ridge augmentation. Furthermore, Umbilical cord blood (UCB), once thought to be a waste material is a source of hematopoietic stem cells, and is essential for stem cell transplantation (SCT) and in regenerative medicine(14-16). SCT is currently being used in chronic myeloid leukemia (CML), multiple myeloma and more than 40,000 SCT cases are being carried out every year around the world (17,18)

Despite the facts of potential advantages of stem cells research in medical and dental field, the mainstay of controversies persists in terms of harvesting and utilisation of stem cells. Reason being the restrictive approach of embryonic stem cells due to cultural, religious, ethical and historical issues(19). Other concerns include lack of basic knowledge, and possibility of human cloning, destruction of embryo and egg donors. And field of dentistry through literature search also suggests lack of knowledge in information and use of stem cells. Major research projects on stem cells are being approved by Higher Education Commission (HEC) and Pakistan Science foundation (PSF) (3)and many research institutes are currently working on it with dedicated labs and facilities. The objective of this study was to investigate attitude, knowledge and awareness of use of stem cells and availabilities of stem cell centres in dentistry and medical field among dentists. Understanding of stem cells is essential for dentists to improve the risk and treatment of diseases. Whereas, there is yet no complete knowledge and attitude of stem cells among dentists. During the literature review, no current papers from Pakistan were found, that suggests the more local need for research for the determination of knowledge and attitude to address the gap in Pakistan’s research.

MATERIAL AND METHODS

This study was a cross sectional study focused on investigation of knowledge and attitude among the graduate dentists in suburbs of Karachi Pakistan towards stem cells application and research.

Sampling, Participants and Ethical Consideration

In this study random sampling method was used, a total of 80 participants were randomly chosen from the population. A self developed instrumentation tool was formulated by the literature review on stem cells origin, applications and original research articles. Moreover, a self administered questionnaire was distributed among dental graduates. Ethical approval for the conduction of this study was obtained by Baqai Medical University. Participants were explained about the objective and purpose of study and informed consent was

taken for their willingness to participate. And all the respondents were assured of maintaining confidentiality.

Validity and Reliability

For the validation of accuracy and reliability of the questionnaire developed in this study, content was validated and reviewed by the expert panel and was followed by a pilot study by selecting 30 dentists at Baqai Medical University, Karachi Pakistan. And results from the pilot study confirmed the reliability by measuring the scores from questionnaire which ultimately reduced the problems during actual collection phase. Although there were limitations of study having the smaller sample size due to lack of logistics and support.

Data Collection

After ethical approval data collection was resumed by using the structured questionnaires in dental graduates of Baqai Medical University. Each respondent was given an envelope which had questionnaire, research information, respondent details, purpose of the study and voluntary nature of response. Approximately 20-30 minutes was given to complete the questionnaire. The questionnaire consisted of 3 sections. Section A included demographic data consisted of age, sex, highest level of education. Section B was the knowledge of stem cells based on 07 questions was attempted by respondents through encircling the correct answer. Section C was comprised of 07 questions based on the response of Yes and No, to know the attitude and awareness of respondents towards stem cells applications in medical dental and research field.

Data Analysis

Data collected was entered and analysed through Statistical Package Social Sciences (SPSS) software program version 20.0. Demographic data was analysed with descriptive statistics using number (n) and percentages (%). The number of correct answers and positive response were quantified in frequency and percentages. Chi square test was performed to analyse the awareness among dentists in association to their level of education (p>0.05). Pearson correlation was used to establish the relation between knowledge and attitude score. Significance level was set at p <0.05 and all the tests were two tailed.

RESULTS

Demographic data

A total of 76 questionnaires were completed by respondents 76(95%) and received. Table 1 shows the demographic

Table 1 Demographic Characteristics of Graduate Dentists

Variables (N=80)		Frequency (n)	Percentage (%)
Sex	Male	29	38
	Female	47	62
Age	25-35	60	79
	35-45	16	21
Years After Graduation	<2	29	38.1
	>2	47	61.8
Level of Education	BDS	59	78
	Master’s/Mphil	17	22
Total	Respondants	76	95

characteristics including age, sex, years after graduation and level of education. Majority of dentists were females 47(62%), with most of them were from the age group 25-35 about 60(79%). Maximum level of educated dentists were just graduation but more than 2 years of experience 47(61.8%) and postgraduates were only 17(22%). And among 76 dentists 19(25%) of dentists fall in low category of knowledge, while 24(31.5%) and 47(61.8%) scored moderate and high level of knowledge for stem cells (Table 2)

Table 2 Category of Knowledge among Dentists

Knowledge of Dentists	Variables(n=80)	Frequency(n)	Percentage(%)
	Low	19	25
	Moderate	24	31.5
	High	47	61.8
	Total	76	95

Stem cell knowledge and attitude score

Among 76 respondents, 47(61%) gave the correct answer, whereas, the information about “Dental Stem cells can be used in the treatment of what disease” was answered incorrect by most of respondents 19(25%). While many of them knew about the origin of stem cells 34(44.7%) as shown in Table 3

Table 3 Dentists Knowledge about Stem Cells Application And Research

Sr.No	Knowledge Question	Frequency of correct answer (n)	Percentage (%)
1	What comes in your mind on hearing the term stem cell?	47	61.8
2	What is the origin of stem cells?	34	44.7
3	What is the origin of dental stem cells?	29	38.1
4	From which organ/tissue you can harvest stem cells?	24	31.5
5	Dental Stem cells can be used in the treatment of what disease ?	19	25
6	Stem cells can be used in the treatment of what disease?	32	42.1
7	In which research centres of Pakistan stem cells research is being conducted?	35	46

Table4 shows Among the 7 questions majority of respondents showed highest positive response towards “regenerative dental treatment will be a better treatment option than tooth implant placement” 57(75%) and “contribution of stem cells in regenerative dentistry and medicine” 56(73.6%).

Table 4 Dentists Attitude Towards Stem Cells Application And Research

Sr.No	Attitude question	Frequency of positive response (n)	Percent age (%)
1	Do you think Dental stem cells have any contribution in regenerative dentistry and medicine	56	73.6
2	Do you have knowledge regarding isolation of stem cells from embryos, tissues, and umbilical cord?	38	50
3	Would you be willing to save teeth and dental tissue for future regenerative dental treatment?	55	72.3
4	Can dental stem cells be used to develop non dental tissues/organs?	45	79
5	Do you think that regenerative dental treatment will be a better treatment option than tooth implant placement?	57	75
6	Do you support stem cell banking?	51	67
7	Do you think treatment related to stem cell is cost effective?	45	59.2

While regarding isolation of stem cells from embryos, tissues, and umbilical cord was unknown and got the least positive response in terms of applications 38(50%).

Knowledge and Attitude Association

Awareness of dentists regarding stem cells in relation to level of education was analysed through chi square test and p value came out to be insignificant (Table 5).

Table 5 Awareness of Dentists Regarding Stem Cells In Relation To Level of Education

Characterisitics	Low/Moderate	P value	High	P value
Level of education	BDS	59(77.6)	17(22.3)	0.07
	Master’s/Mphil	47(61.8)	29(38.1)	

As there were marked differentiation between low to moderate level of knowledge among BDS graduates 59(77.6%) and Postgraduates 47(61.8%) (p = 0.24). And in the same way, high level of education was also different amongst the graduates 17 (22.3%) and post graduates 29(38.1%) (p=0.07).

The pearson correlation between knowledge and attitude score was poor (r=-0.04) and p value came out to be 0.7 which indicated the correlation was not significant. Figure 2 in a scatterplot describes the insignificant association of knowledge and attitude among dentists.

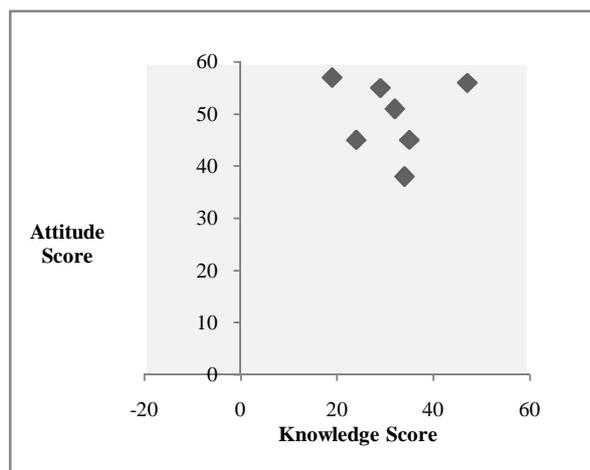


Figure 2 Correlation Between Knowledge And Attitude Score Among The Dentists (0.04)

DISCUSSION

In this study, majority of dentists were aged 35 years or less, females, and possessed basic graduate qualification, practiced more than 2 years which depicted the dominant status of experienced practicing dentists in suburbs of Karachi, Pakistan. In medical and dental fields, stems cells have great potential of permanent cure of many diseases. Acquired and congenital extra oral hard and soft tissues can be treated with stem cells and a natural tooth development from this approach also doesn’t seems unrealistic (2).

Reported knowledge in this study on the use and research of stem cells came out to be 47(61%). This shows that more than half of the dentists had knowledge but still mainstream of dentists didn’t know much regarding stem cells and 19(25%) knew very little about it. And high cost was thought to be one of the major reason 45(59.2) of not approaching to the field

among dentists. At the same time, findings show that all of the dentists had positive responses towards gaining the knowledge specifically getting to know about regenerative dental treatments and tooth implant placements through stem cells about 56(73.6%) and 57(75%) respectively. And postgraduate dentists seemed to have significant more knowledge than just graduate dentists. Moreover, the correlation coefficient, $r=0.04$ indicated the weak association between knowledge and attitude of dentists and no linear graph was achieved.

Therefore, educational programs, conferences/seminars, undergraduate training, taught courses, scientific journals, discussions might help in seeking stem cells therapy into clinical practice. High cost and lack of sufficient knowledge is considered to be the chief aspect of dentists being hesitant. Authorities consideration towards stem cells awareness and positive attitudes of dentists will make remarkable revolutionary change and enable them to advocate and improve clinical treatments in future date.

CONCLUSION

In this present study, data revealed a moderate level of knowledge and awareness while high level of positive attitude towards the use of stem cells. The results warrant a need of promoting stem cells knowledge and application to create awareness through professional training, lectures, academic courses and visits to the major centres to realise its importance. Adequate knowledge will make an impact in the quality of treatment of patients. Therefore, further improvements in awareness can impart knowledge and use of stem cells application in dentistry can be achievable. And it is concluded that stem cells use is acceptable among dentists.

Ethics approval and consent to participate

Attached in supplementary files

Availability of data and materials

Questionnaire and consent forms (attached in supplementary files)

Competing interests

Authors declared that they have no competing interests.

Author's contribution

First two authors start this idea with extraction of supporting papers from electronic databases and formation of questionnaire and collection of data. 3rd and 4th author equally contribute with first two authors in the compilation and designing the table and figures.

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