

Evaluation of parents' knowledge about the stem cells' importance of primary teeth in Isfahan

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ABSTRACT

Context: Stem cells (SCs) present in the pulp of primary teeth can be used for the treatment of many diseases as well as regeneration and renovation. This study investigated the parents' awareness of the importance of primary teeth SCs in Isfahan. **Aims:** The aim of the study was to understand the level of parent's knowledge about primary teeth SCs and the source of their knowledge. **Settings and Design:** It was a descriptive research that was done in university clinics of Isfahan city. **Subjects and Methods:** This descriptive-analytic, cross-sectional study was carried out on 384 parents referring to the clinics and dental offices of Isfahan using a self-administered questionnaire. **Statistical Analysis Used:** Data were analyzed by one-way ANOVA and Pearson's correlation coefficient ($\alpha = 0.05$). **Results:** The mean age of the parents was 37.55 years. The mean score of knowledge in the whole sample was 4.85 ± 3.83 . The knowledge score was higher in the mothers (5.8 ± 3.91) than in the fathers (4.28 ± 3.54). Spearman's correlation coefficient showed a significant difference between the mean scores of parents' knowledge and the number of children ($r = -0.1, P = 0.05$), residence ($P = 0.001$), economic status ($r = 0.442, P < 0.001$), education ($r = 0.556, P < 0.001$), job status ($P < 0.001$), and frequency of dental referrals ($r = -0.337, P < 0.001$). However, no significant relationship was found between the mean score of knowledge and age ($r = -0.7, P = 0.176$). **Conclusion:** Data from this study revealed that parental knowledge about primary stem cells is inadequate.

Key words: Knowledge, parents, primary tooth, stem cell

INTRODUCTION

Stem cells (SCs) are able to reproduce and differentiate into at least two types spontaneously.^[1] The self-renewal potential of SCs enables them to be present in multiple cell division cycles while retaining the ability to proliferate and


differentiate into different types of adult cells.^[2] There are two types of SCs: embryonic SCs (ESCs) and adult SCs (ASCs).

Generally, ESCs are derived from the four-old embryos (the blastocyst stage), and their acquisition is morally controversial since access to these cells requires the removal of fetus.^[3] The ESCs are actually the most powerful SCs that are highly able to proliferate and differentiate.^[4] However, if proliferation and differentiation of these cells are not well controlled, there

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is a potential for neoplastic changes in these cells. There is no need to destroy embryo to obtain ASCs. Although they are less capable than their fetal counterparts, they are successfully used for the treatment of diseases.^[5,6] Some sources of ASCs include umbilical cord blood, amniotic fluid, bone marrow, brain, teeth, skin, and urine.^[7,8] Dental SCs (DSCs), which are derived from the dental structure, especially dental pulp, are one of the ASCs that can be obtained by minimal invasive methods.^[9,10] In 2000, dental pulp SCs (DPSCs) were first discovered by Gronthos *et al.* in the pulp of impacted third molar teeth.^[7] Later, the Shi *et al.* obtained other types of DSCs from the SCs from human exfoliated deciduous teeth,^[11] SCs from apical papilla,^[12] and supernumerary tooth-derived SCs.^[13]

According to the recent dental studies, the DPSCs have characteristics such as self-renewal ability,^[14,15] high proliferative activity,^[14] as well as the ability to renovate the tissue, including reconstruction of the dentin/pulp complex,^[7,13] root reconstruction,^[12] and osteoporosis.^[16,17,18]

Since SCs maintain their differentiation ability after freezing and melting, banking these cells is useful for future therapies.^[19,20] On the other hand, there are many challenges to the use of SCs in the society, and the supporters and opponents of this domain have their own attitudes.^[21]

Unfortunately, most studies have shown that lack of information about the potential applications of SCs in treating various types of diseases leads to the loss of millions of primary teeth, rather than saving them for future use. Dentists, pediatricians, and other community health professionals are at the forefront of this and should inform their patients about the maintenance of primary teeth.

In 2012, Lyssikatos^[22] studied 107 parents and concluded that 97.7% of them did not know about the presence of SCs. In 2014, Goomer *et al.*^[23] evaluated 250 parents and showed that 62% of the subjects did not know about the presence of SCs and only 18.8% were aware of the presence of SCs in the pulp of primary teeth. In 2015, Saran *et al.*^[24] studied 1009 parents of Indian primary schoolchildren and concluded that awareness of SCs and DSCs was generally poorly understood. Sede *et al.*^[5] showed that despite the high awareness between 200 Nigerian dentists, they had poor knowledge about using SCs. In 2016, Nourbakhsh^[25] carried out a study on 308 general dentists and 82 periodontists in Isfahan and revealed that participants had insufficient knowledge about the use of SCs in spite of their relatively good knowledge and positive attitude.

Unfortunately, many families neither keep their children's umbilical cord nor keep DSCs of their children due to knowledge deficit about curing ability of the primary teeth SCs. Therefore, it is important to inform various strata of society about banking of SCs. Since parents have a major role

in their children's dental health, and there is no information about parents' knowledge of importance of primary teeth SCs in Iran, the aim of the study was to understand the level of parents' knowledge about primary teeth SCs and the source of their knowledge.

SUBJECTS AND METHODS

This descriptive-analytic, cross-sectional study was done on 384 parents using a self-administered questionnaire. The mean score of knowledge was estimated at 95% confidence interval and maximum error of 0.2. The criterion for inclusion consisted of parents of children aged 6–12 years who were referred to the clinics and dental offices in Isfahan city and completed the informed consent forms. The exclusion criteria were the questionnaires that parents did not complete. Ethically, the responsiveness and collaboration of the parents were optional, and the questionnaires were monitored in a strictly confidential manner with all due process steps being carried out.

Sampling was carried out in the dental clinics of Isfahan in autumn and winter in 2015. Among various areas of Isfahan, four areas were selected as clusters according to the selection criteria. Then, in the clusters (different regions of the city), the clinics and dental offices were randomly selected by allocating a number. For each clinic, 1 day of the week was selected randomly, and the samples were randomly selected among the visitors of the dental clinics and dental offices. This was continued until the completion of an appropriate sample size for that clinic or office.

Questionnaire

The questionnaire contained 13 single-answer questions in Persian language based on the published articles about usage of SCs and internet resources.^[22-26] After filling questionnaires, a pamphlet was distributed between parents to raise their awareness. The face and content validity of the questionnaire was confirmed by five expert pediatricians of Isfahan dentistry faculty. The experts were asked to score 1–3 for the relevance of every question and comment on them if they had specific suggestions. Questions that were scored 2 or 3 were deleted (4 questions) or corrected (10 questions) according to the experts' opinion. The final questionnaire included 12 questions about knowledge and one question about the source of information. The items were reconfirmed by the experts. In the end, the opinion of the experts was obtained regarding the face validity of the questionnaire.

The items related to the parents' knowledge were scored "0: uninformed" or "1: informed." The 5-point Likert scale was used for questions about satisfaction (1: very weak to 5: very well).

To assess the reliability, 15 questionnaires were randomly distributed among 15 parents as a pilot. According to the

Kappa coefficient (0.7–1) calculated for the questions, the validity of the questions was confirmed.

The final questionnaire consisted of two parts: First part about demographic information (age, sex, religion, residency, parent literacy and job, economic status, number of children, and number of dental visits) and the second part including 12 questions about DSCs parent's knowledge, with a minimum score of 0 and a maximum score of 12.

SPSS-22 software was used for data analysis. Independent *t*-test, Spearman's and Pearson's correlation coefficients, one-way ANOVA, and Tukey's test were applied. $P = 0.05$ was considered statistically significant.

RESULTS

The study sample consisted of 384 parents referring to the dental clinics in Isfahan city. Of them, 279 were female (72.7%) and 105 were male (27.3%). The mean age of the sample was 37.55 years, with a maximum age of 60 and a minimum age of 23 years. Among the 384 parents participating in the study, 383 (99.7%) were Muslim and one was Jewish (0.3%). 332 people were living in Isfahan (86%), 45 people were living in the cities of the province (11.7%), and six people were living in the villages (1.6%).

As for the education of the parents participating in the study, 20 (2.5%) had primary education, 27 (7%) had junior high school education, 130 (39.9%) had high school diploma, 47 (12.2%) had associate degree, 132 (26.6%) had bachelor degree, 33 (8.6%) had master degree, and 25 (6.6%) had Ph.D. degree.

With regard to the job status of the parents participating in the study, 125 (32.6%) were employees, 10 (6.2%) were workers, 9 (2.3%) were retired, 31 (8.1%) were self-employed, 2 (0.5%) were unemployed, 179 (46.6%) were homemakers, 4 (1%) had home jobs, and 24 (6.3%) had other jobs.

The mean score of knowledge in the whole sample was 4.85 ± 3.83 , based on the mean of 0–12. The mean scores of knowledge for the mothers and fathers were 5.8 ± 3.91 and 4.28 ± 3.43 , respectively. The results of *t*-test showed a significant difference between the mothers and fathers in the mean scores of knowledge ($P = 0.048$), being higher in mothers. The relationship between the mean score of knowledge and information sources was also evaluated which is as shown in Figure 1.

The total mean score of knowledge was 4.3 ± 7.5 . The details are shown in Tables 1 and 2. The least significant difference test showed a significant difference between the mean scores of the inhabitants of Isfahan and the residents of the cities ($P < 0.001$) and the residents of the villages ($P = 0.002$), which was higher in the residents of Isfahan. There was no significant difference between the city dwellers and villagers in the mean score of knowledge ($P = 0.481$).

Table 1: Score of knowledge of participants according to residency

Residency	Score of knowledge, mean \pm SD	One-way ANOVA test result (<i>P</i>)
Isfahan	5.4 \pm 3.16	0.001
Cities	1.77 \pm 1.78	
Villages	0.66 \pm 1.63	
Total	4.3 \pm 7.5	

SD: Standard deviation

Further, the results of Pearson's correlation coefficient showed no significant correlation between the parents' mean score of knowledge and their age ($r = -0.7$, $P = 176$).

Moreover, Spearman's correlation coefficient showed a significantly inverse correlation between the mean score of knowledge and the number of children ($r = -0.1$, $P = 0.05$) so that knowledge was reduced as the number of children increased.

In addition, this test showed a direct and relative correlation between the parents' mean score of knowledge and their education ($P = 0.556$, $P < 0.001$). The mean score of knowledge in parents with higher education (Ph.D. and above) (9.36 ± 2.45) was higher than that of the parents with lower education (elementary) (1.55 ± 2.84).

Finally, Tukey's test showed a significant difference between the mean score of knowledge between employees and workers ($P < 0.001$), employees and homemakers ($P < 0.001$), and employees and other jobs (university professor, doctor, dentist, etc.) ($P = 0.005$). The knowledge score of those who selected the option other jobs (8.37 ± 3.16) was the highest and the knowledge score of the workers was the lowest (2.70 ± 2.8).

DISCUSSION

Based on the results of this study, the mean age of the parents participating in the study was 37.55 years, and most of them were residents of Isfahan. The number of participants in the study was 384, of which 279 (72.7%) were mothers and 105 (27.3%) were fathers, which was lower than that of the study of Saran *et al.*^[24] that was done on 1009 parents. However, the sex distribution of the parents in the above study (37.3% men and 62.7% women) was almost the same as the present study. However, compared with the participants in the studies of Lyssikatos^[22] (107 mothers) and Goomer *et al.*,^[23] this study employed more participants.

In this study, the parents' knowledge of the SCs of the primary teeth was poor, which was consistent with the results of Saran *et al.*,^[24] Lyssikatos,^[22] and Goomer *et al.*^[23]

People living in Isfahan were more aware rather than ones in villages of Isfahan. This may be because of more access to information resources in cities, rather than villages

Table 2: Frequency distribution of responses and comparison of mean score of responses on application of stem cells in primary teeth

Frequency-mean awareness components	Frequency of responses (%)		Mean±SD
	Correct	Incorrect	
1. Knowledge of the term SCs	233 (8.60)	150 (2.39)	49.0±61.0
2. Knowledge of the benefits and applications of SCs	256 (3.56)	168 (8.43)	50.0±56.0
3. Knowledge of the sources and collection methods of SCs	174 (3.45)	208 (2.54)	73.0±49.0
4. Knowledge of contradiction of SCs with religion	207 (9.53)	177 (1.46)	50.0±54.0
5. Knowledge of contradiction of SCs with law	217 (5.56)	167 (5.43)	50.0±56.0
6. Knowledge of the presence of SCs bank	209 (4.54)	175 (6.45)	50.0±54.0
7. Knowledge of the presence of SCs in the primary teeth	157 (9.40)	227 (1.59)	49.0±41.0
8. Knowledge of easy extraction of dental SCs compared to other methods	89 (2.23)	295 (8.76)	42.0±23.0
9. Knowledge of the presence of SCs in the primary teeth in Iran	26 (8.6)	357 (3.93)	25.0±07.0
10. Knowledge of inexpensive extraction of dental SCs compared to other methods	67 (4.17)	317 (6.82)	38.0±17.0
11. Knowledge of noninvasive extraction of dental SCs compared to other methods	83 (6.21)	301 (4.78)	41.0±22.0
12. Tendency to keep the children's SCs of primary teeth	171 (6.44)	212 (4.55)	50.0±45.0
Total score of knowledge			83.3±85.4

SD: Standard deviation, SCs: Stem cells

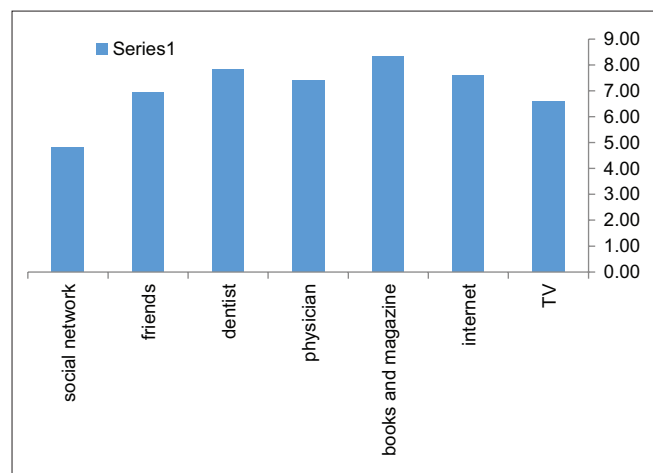


Figure 1: The relationship between the mean score of knowledge and information sources

and the need for increased awareness, especially in the villages' health centers. The present study also showed an inverse relationship between the number of children and the mean score of knowledge. The more the children, the less knowledge of the parents exists. It may be because of less chance of studying by parents who were busy due to numerous children.

In the present study, it was shown that parents with higher education were of SCs. However, in the study of Goomer *et al.*,^[23] both educated and uneducated parents had poor knowledge about SCs in the primary teeth. Moreover, in the present study, there was a significant relationship between knowledge score and family's economic status. Hence, with improvement of economic status, the level of awareness was increased.

In this research, SCs' information sources were from television (TV), the internet, and books, while Goomer *et al.*,^[23] reported the internet, friends and acquaintances, and TV as the sources of getting information. In the study

of Saran *et al.*,^[24] parents reported internet access as the first, family's doctor as the second, and TV as the last source of access to information. In the study of Lyssikatos,^[22] TV was the first source and internet was the second source of access to information, which was the same as the results of the current study. Since the majority of parents in the present study reported TV as the first source of information, it is beneficial to raise the awareness of people through TV programs.

In the present study, the parents who referred to dentists every 6 months and once a year had a higher level of awareness about the presence of DSCs than the parents who referred when their children had toothache. This might be due to the information the dentists provided to the parents who referred to a dentist in a periodic manner. In the study of Lyssikatos^[22] and Goomer *et al.*,^[23] the frequency of referral to a dentist was asked, but its effect on the parents' knowledge was not measured.

In the present study, the parents had the highest level of knowledge about the concept of SCs. Of them, 233 respondents answered the question correctly, and the lowest level of knowledge was related to the existence of SCs bank for the primary teeth. In the study of Goomer *et al.*,^[23] the highest level of awareness was reported for the concept of SCs, which was consistent with the findings of the present study. The second rank of knowledge was about the forensic applications of SCs and the lowest level of awareness was about the presence of SCs. However, in this study, 40% of the parents were aware of the presence of SCs in the primary teeth. In the study of Lyssikatos,^[22] from 107 parents who participated in the study, 104 were unaware of SCs. Further, Saran *et al.*,^[24] found parents had poor knowledge and low access to SCs, and they had the lowest level of knowledge about the noninvasiveness of using SCs and presence of DSCs banks, confirming the results of the present study.

Huge advances have been made in application of SCs in recent years, which has led to the development of specialized

knowledge and skills in this field. On the other hand, it is important to know the attitudes and knowledge of various sectors of society in this field. In developed countries, with establishment of DSCs bank, this technology has been increasingly used. Most researchers believe that SC therapy will be conducted in 2020. However, this process is at its early stages in developing countries, and there is limited information about it.

Considering the results of this study and importance of SCs for the treatment of diseases, parents' knowledge is suggested to be improved through TV programs and the internet. Further, it is advised to train the dentists and pediatric physicians and to prepare educational pamphlets about the use of SCs. A similar study is also recommended to be conducted on dental students and pediatricians.

CONCLUSION

The results of this study showed that the parents referring to the dental clinics and dental offices in Isfahan had poor knowledge about the SCs of primary teeth.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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