



Awareness among the Public and Pharmacists on Storage Media for Avulsed Tooth and the Availability of the Same in Pharmacies of a Metropolitan City in India - A Survey

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Authors' contributions

This work was carried out in collaboration between both authors. Author KB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author GM managed the analyses of the study and literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

It's always important to save and preserve the natural tooth rather than fix a replacement for it. The aim of the study was to assess the awareness of transport media for avulsed teeth among public and pharmacists, and the availability of the same in pharmacies in a metropolitan city in India. Two separate structured questionnaires consisting of demographic details, and questions to assess the knowledge and attitude of the general public and the pharmacies were distributed. From the study it was elicited that the awareness among the general public as well as the pharmacists regarding transport media for avulsed teeth is inadequate. In most of the pharmacies the transport media for avulsed teeth was not available and the awareness among the pharmacists regarding the same was found to be inadequate. Within the limits of the study, it was found that inadequate availability and lack of awareness regarding transport media for avulsed teeth was noticed.

Keywords: Dental trauma; pharmacies; storage media; tooth avulsion.

1. INTRODUCTION

Dental avulsion caused owing to trauma is one the severe cases as it causes the displacement of the tooth from the socket in the alveolar bone. This usually occurs in children which usually involves the maxillary incisors [1]. It's always important to save and preserve the natural tooth rather than fix a replacement for it. On the avulsion of a permanent tooth, the treatment will be reimplantation of the tooth which should be done as early as possible. On the other hand, for deciduous teeth, re-implantation may cause damage to the permanent tooth germ as the tooth might be ankylosed [2]. The tooth can be saved if the cells of the root are vital. This can be achieved by using a storage media which has an environment similar to that of the alveolar socket. The transport media has an environment with proper osmolality, pH, glucose and nutritional metabolites. These have been prepared scientifically to maintain the environment. There are different types of storage media such as saliva, milk, saline, Hanks Balanced Salt Solution (HBSS), propolis and Viaspan. Media such as water and ice damage the root cells of the tooth and hence are not recommended [3]. Saliva is the media which is present at the scene of the incident hence easily available [4]. Saline has physiological osmolality and pH, but it does not contain essential ions and glucose, which are fundamental for the cells and for this reason has been suggested as an interim storage medium for up to 4 hours. Milk is also a widely used storage media as it can be easily accessed and is affordable. It is an isotonic solicator with optimum pH and osmolality but is deficient of the required enzymes and bacteria. Low fat milk is preferred as a storage medium [5]. Propolis is a wax-like substance obtained from bee hives, which is the most efficient storage media which has been studied recently [6]. HBSS is a salt solution with balanced pH, with all the necessary metabolites for the maintenance of the cells. The vitality of the cells can be maintained upto an average of 24 hours. Also, there is less root resorption when the tooth is kept in this solution [7]. These are available in the pharmacies. Usage of transport media has increased the success rate of replanted knocked out teeth when used with suitable apparatus and devices. The success of re-implantation of the avulsed to a large extent depends on the storage media and the time taken for its re-implantation into the alveolar socket. Avulsion causes a potential

threat to the vitality of PDL cells and these cells are essential for the healing of replanted avulsed teeth. Also, replantation of a tooth within 5 min usually ensures prompt return of the PDL cells to normal function. However, after more than 15 min of dry storage, the precursor, progenitor or stem cells are no longer able to differentiate into fibroblasts. After 30 min of dry storage, virtually all of the PDL cells remaining on the tooth root are likely to have become necrotic. The extra-alveolar storage medium affects the viability of the PDL cells. Thus, an efficient storage medium is recommended before reimplantation of the tooth. According to the recent study, HBSS is the most ideal medium for storage of an avulsed tooth after a dental trauma [8]. The awareness of the public and the pharmacists on this storage media is very important.

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years [9–27]. With this inspiration we planned to pursue research in evaluating the awareness of transport media for avulsed teeth among public and pharmacists, and the availability of the same in local pharmacies.

2. MATERIALS AND METHODS

2.1 Data Collection

A cross sectional study was conducted among the general public and the pharmacists. It was a questionnaire based study, conducted to assess the awareness of transport media for avulsed teeth among public and pharmacists, and the availability of the same in pharmacies in Tamil Nadu. The study consisted of 300 participants.

2.2 Survey Instrument

A pretested, self administered, closed ended questionnaire comprising the following sections formed the survey instrument. Two different structured questionnaires containing 10 questions each which was adopted from a validated questionnaire developed by the World Health Organisation were circulated. One of them was provided to the general public and the other was provided to the pharmacists. The goal of developing this questionnaire was to know about the knowledge and awareness of transport media for avulsed teeth among public and pharmacists, and the availability of the same in pharmacies.

2.3 Data Analysis

The data collected was entered in an Excel sheet and subjected to statistical analysis using SPSS software. Chi square test was done. The independent variables are age and gender while dependent variables are awareness of transport media for avulsed teeth among public and pharmacists, and the availability of the same in pharmacies. The level of significance was set at $p < 0.05$.

3. RESULTS AND DISCUSSION

Of the 300 people surveyed, 40% of the population were undergraduates and 30% postgraduates and only 30% were non-graduated. It was found that about 62% of the general public and 86% of the pharmacists knew that the reimplantation of the avulsed tooth was possible. Though many knew this procedure, not many were aware of the time which was required to reimplant a tooth back into the socket. Only about 4% of the population felt that the tooth should be placed back into its original position to be very urgent. It was also found that the storage media which they seem to know of was mostly that which is available at home, like milk. Only 6% of the 169 people were aware of storage media HBSS or save a tooth. Among pharmacists, only a handful of them sell commercial storage media in their pharmacies which is about 16.1%. These pharmacists have also recommended other storage media which are natural such as milk (18.3%), saline (37.2%) and water (24.6%) majorly. It is also to be noted that only about 16 pharmacies have had the general public approaching them for a storage medium for an avulsed tooth.

In the previous studies that were conducted, it appears that tooth avulsion is most common among school children. The awareness among the teachers has been significantly very less and even worse in the rural areas [28–30]. In a study by ND Shashikiran in the year 2006, only about 39.5% in rural and 53.9% in urban areas would immediately seek help from a professional. Also, many people in the rural areas believe that it's impossible to replace an avulsed tooth back into its original position in the oral cavity. This indicates the lack of knowledge among them and the need to create awareness among them by holding campaigns and posters [31]. In 1990, according to a study by Gregory and Raphael, only 38.6% of the people felt that the replacement of the permanent avulsed tooth was very urgent [32]. Studies on the medium of

transportation showed that only 2% opted water as the transport medium and most of them in the rural areas chose paper [31]. These results are similar with the one that was presently studied. Also in a study by P Prathyusha *et al.* in 2015, about 40.7% of the school teachers in Bangalore chose water as the transport medium and 22.8% opted milk. It was also found that only 38.2% would seek immediate help after avulsion [33]. Although it is very essential for the teachers to have knowledge about dental trauma it was found that there is a lack of first-aid components in the training curriculum in rural as well as urban areas [34]. According to a survey conducted in Chennai in the year 2014, on parent's attitude to tooth avulsion, it has been studied that almost 90% of the parents were ready for re-implantation of the avulsed tooth. In this study, it was also found that the female parents had higher knowledge [35]. The present study shows lack of awareness on commercial storage media even among the educated public who are undergraduates and postgraduates. The usage of conventional and natural storage media instead of chemically synthesized efficient storage media shows their lack of knowledge on it. This might be due to the unavailability of HBSS in pharmacies and lack of programs to create awareness among the public. The people have also shown increased interest in knowing about tooth avulsion and its management. This will make sure that the re-implantation process is easier. If the tooth is replaced using partial denture, then the tooth might get corroded over longer periods of time and it will be difficult for the patient as well.

There has been no previous survey or study on the awareness of transport media for an avulsed tooth among pharmacists. In this survey that was conducted among pharmacists, it was studied that, about 72% of the 180 surveyed were aware of the transport media used for avulsed teeth. Among these, only a meagre population of pharmacists knew of HBSS or "save a tooth". These pharmacists, however, have suggested a transport media when approached. The transport media suggested majorly has been saline and milk. The unavailability of the same in the pharmacies has been mainly due to the less demand, greater cost and also lack of knowledge. The awareness among pharmacists should be increased so that they can suggest the public on HBSS for successful re-implantation of the avulsed tooth. This can be done by holding awareness programmes or through advertisements.

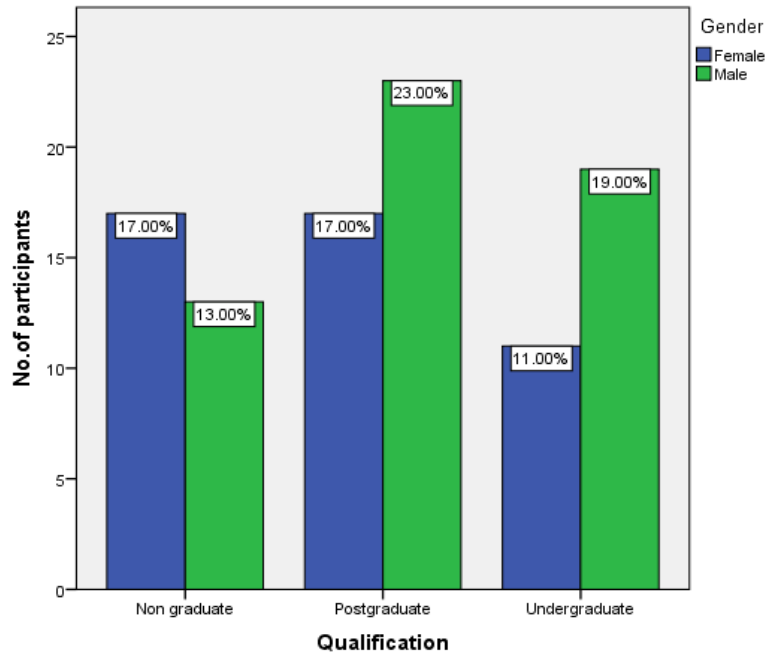


Fig. 1. Bar graph showing association between qualification and gender of the participants. X axis denotes qualification of the participants and Y-axis shows the number of participants in each gender. Males(green) with post graduation were more than females (blue). Chi square test was done and p value was found to be 0.254, hence statistically not significant

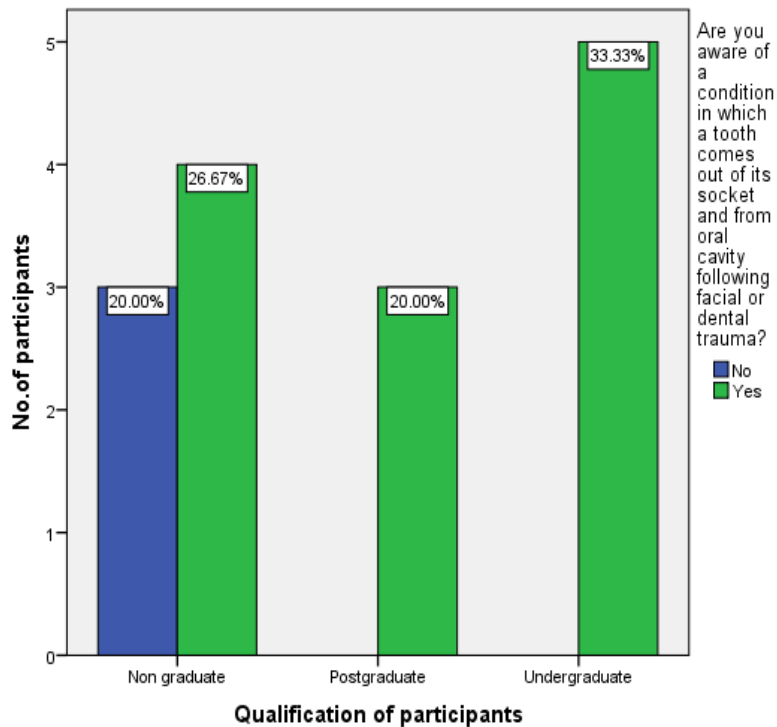


Fig. 2. Bar graph showing association between qualification and awareness of the participants of a condition in which a tooth comes out of its socket and from oral cavity following facial or dental trauma. X-axis denotes qualification of the participants and Y-axis shows the number of participants. Non-graduates most commonly answered yes (green) than no(blue). Chi square test was done and p value was found to be 0.117, hence statistically not significant

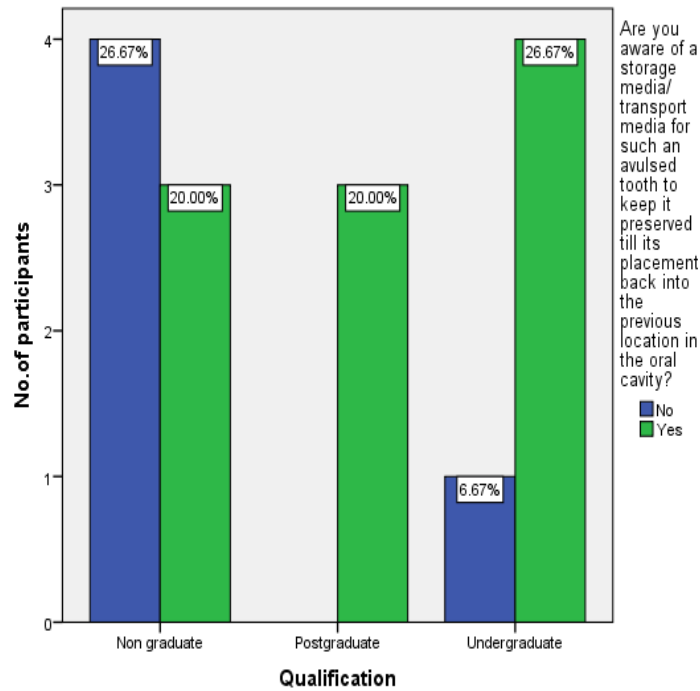


Fig. 3. Bar graph showing association between qualification and awareness of the participants of a storage media/ transport media for such an avulsed tooth to keep it preserved till its placement back into the previous location in the oral cavity. X-axis denotes qualification of the participants and Y-axis shows the number of participants. Non graduates most commonly answered no(blue) than yes(green). Chi square test was done and p value was found to be 0.158, hence statistically not significant.

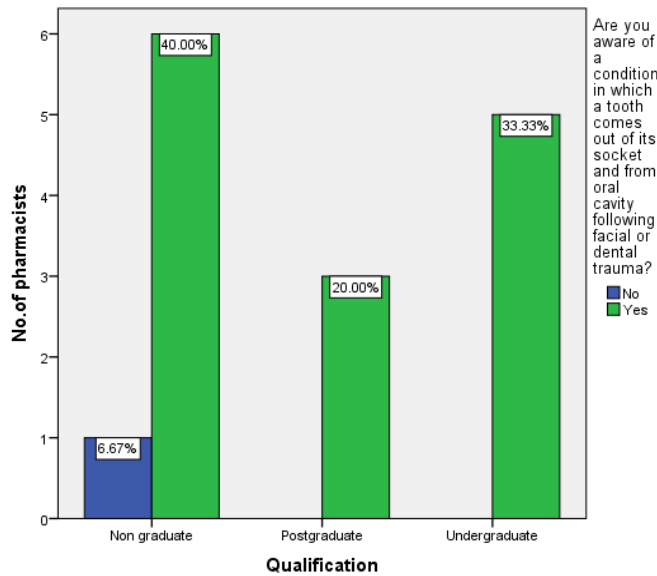


Fig. 4. Bar graph showing association between qualification and awareness of the pharmacists of a condition in which a tooth comes out of its socket and from oral cavity following facial or dental trauma. X-axis denotes qualification of the participants and Y-axis shows the number of pharmacists. Non-graduates most commonly answered yes (green) than no(blue). Chi square test was done and p value was found to be 0.542, hence statistically not Significant.

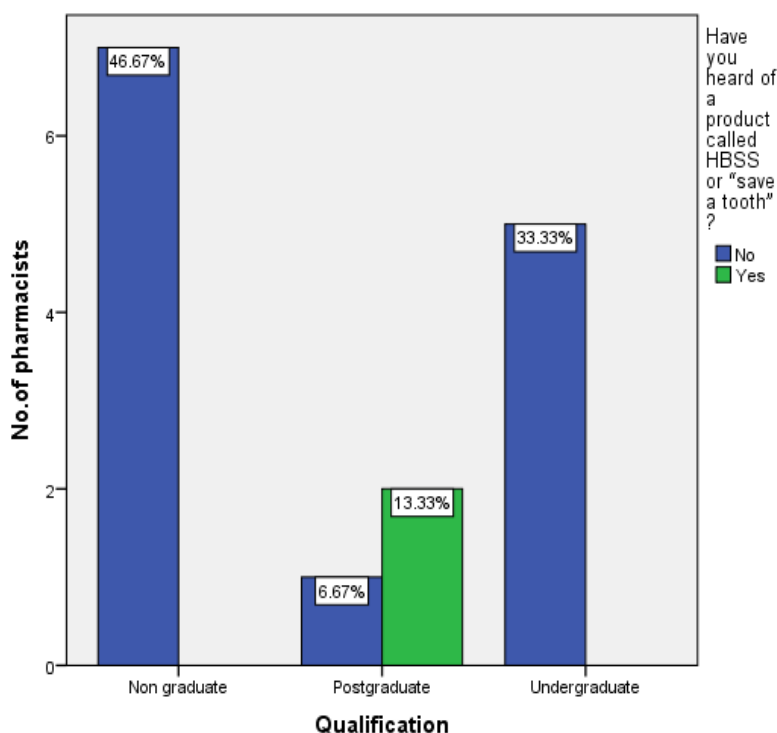


Fig. 5. Bar graph showing association between qualification and awareness of the pharmacists on HBSS or “Save a tooth”. X-axis denotes qualification of the participants and Y-axis shows the number of pharmacists. Post graduates most commonly answered yes (green) than no (blue). Chi square test was done and p value was found to be 0.010, hence statistically significant.

Table 1. Response to the questionnaire among general public

Questions	% of response
1. Are you aware of a condition in which a tooth comes out of its socket and from oral cavity following facial or dental trauma?	Yes- 98% (294) No- 2% (6)
2. Are you aware that such a tooth can be successfully placed back into its original position in the oral cavity?	Yes- 62%(186) No- 38% (114)
3. In case of such an incident what will be your response?	Will try to keep the tooth back into its position and visit a dentist- 18.2% (34) Will keep the tooth wrapped in plastic or in paper – 32.2% (60) Will keep the tooth in milk or saliva and visit a dentist- 30.1% (56) Don't know what to do- 18.2% (34)
4. How fast do you think the tooth should be kept back in its natural position?	Immediately- 4.6% (14) Within one hour- 10.3% (31) Within 24 hours – 21.3% (64) Time doesn't matter- 25.6% (77)
5. Are you aware that the time elapsed and the medium in which the tooth is kept can affect the success of treatment of such a condition?	Yes- 31.6% (95) No-68.3% (205)

Questions	% of response
6. Are you aware of a storage media/ transport media for such an avulsed tooth to keep it preserved till its placement back into the previous location in the oral cavity?	Yes- 56% (168) No-44% (132)
7. If yes have you ever approached a medical pharmacy for a storage medium for avulsed teeth?	Yes, and it was available- 2% (6) Yes, but it was not available- 4% (12) No or was not aware of a storage medium – 82.33% (247)
8. In case of such an injury if the following media are available which one will you choose for storing the tooth?	HBSS- 6% (18) Milk- 10.66% (32) Saliva- 8% (24) Saline-6.3% (19) Fruit juice-2.3% (7)
9. Have you heard of a product called HBSS or “save a tooth”?	Yes-7.6% (23) No-92.33% (277)
10. Are you interested in improving your knowledge about management of avulsed teeth and about dental traumatic injuries management?	Yes- 95% (285) No-5% (15)

Table 2. Response to the questionnaire among pharmacists

Questions	% of response
1. Are you aware of a condition in which a tooth comes out of its socket and from oral cavity following facial or dental trauma?	Yes- 96.6% (174) No- 3.3% (6)
2. Are you aware that such a tooth can be successfully placed back into its original position in the oral cavity?	Yes – 86.6% (156) No- 13.4% (24)
3. Are you aware of a storage media/ transport media for such an avulsed tooth to keep it preserved till its placement back into the previous location in the oral cavity?	Yes –72.7% (131) No- 27.3% (49)
4. Is there any such commercial storage media products available in your pharmacy?	Yes- 16.1% (29) No-83.9% (151)
5. If available please mention the product	HBSS
6. If a product is not available, what do you think is the reason for its unavailability?	Was not aware of such a product –16.6% (30) Not available from dealers- 10% (18) Due to its cost – 14.4% (26) Less demand for the product-13.3%(24) All of the above – 7.7% (14)
7. Have you heard of Hank's Balanced salt solution (HBSS) commercially known as save a tooth?	Yes-21.6% (39) No-78.3% (141)
8. Have the general public ever approached you after any dental trauma asking for storage media or transport media for avulsed teeth?	Yes-8.8% (16) No-91.2% (164)
9. Have you ever suggested any storage media for avulsed teeth to the general public?	Yes-40.5% (73) No-59.4% (107)
10. In case of such an injury if the following media are available which one will you choose for storing the tooth?	Milk-18.3% (13) Saliva-16.1% (12) Saline- 37.2% and (27) Fruit juice- 2.2% (1) Water- 24.6 (18)

4. CONCLUSION

Within the limitations of the study, it was found that the awareness of transport media for tooth avulsion was inadequate among the general public and pharmacists. The unavailability of the transport media in the pharmacies was noticed and it is a matter of concern. This can be enhanced by holding campaigns and advertising as posters in various social media platforms on the importance of saving a permanent tooth and replacing it back into the oral cavity with the help of an efficient storage medium.

CONSENT

As per international standard or university standard, respondents' written consent have been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical approval was obtained from the Institutional Ethical Committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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