Acceptance or rejection of biological restoration: An educational interventional study

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Abstract

Background: The quest for an ideal restorative material has led to the discovery of biological restoration that is, the use of natural tooth as a restorative material. Thus, the aim of the present study is to evaluate the knowledge about biological restorations and efficacy of health education. Materials and Methods: It was a questionnaire-based pre- and post-educational interventional study. Around 386 parents reported to the department and willing to participate were included in the study. Data were collected through a self-administered questionnaire. The study was carried out in three phases where the second being the health education by individual approach. The data were further subjected to statistical analysis. Results: Our study comprised of 117 (30.3%) fathers and 269 (69.7%) mothers. When enquired about the awareness of biological restoration and tooth banks 96.6% and 95.3% of the parents were unaware of it respectively. About the acceptance of biological restoration treatment before the intervention, only 26% of parents accepted the treatment. However, after the educational intervention, the acceptance increased to 93%. Conclusion: A lacuna exists as per the knowledge and awareness of biological restorations was concerned. Health education can be considered as a pioneering approach in the creation of awareness and there is an increased need to conduct such educational interventions to improve parents’ attitudes.

Keywords: Acceptance, biological restorations, children, interventional study, oral health education, rejection

Introduction

According to the global burden of disease, 3.9 billion people throughout the world were affected by oral diseases.¹ The oral disease burden on Indians is very high and the most affected age group are the children. This can be explained due to lack of awareness among parents as most of them believe that the deciduous teeth will exfoliate as time progresses, lack of education, socioeconomic factors, inaccessibility to dental care, and a low number of pedodontist, cultural factors, and lack of oral health policies.² Therefore, they have the highest-burden although their level of care is the lowest.

Dental caries and trauma are the two main reasons that necessitate the need for treatment in children.³ On the other hand, the procedures turn out to be expensive and technique sensitive and further involves the expertise of operators. As lack of awareness, education, and low socioeconomic status are the major concerns,⁴,⁵ there is a need to overcome these misbelieves and create awareness among the parents and to introduce treatment approaches with lesser cost as well as with superior properties. Among the wide range of materials present in restorative dentistry, no material has proved to be as efficient as the natural structure, considering the mechanical and biological properties. One of the advances which are economical with properties like natural teeth would be the biological restorations.

Chosack and Eideman in 1964 were the first to report biological restorations. The expression “biological restoration” was coined...
in 1991 by Santos and Bianchi. It is characterized by its primary restorative material being the dental substrate, dentin and enamel, to designate fragment bonding to both anterior and posterior teeth.

Health education is a part of primary care, plays a foremost role in health promotion and disease prevention. Oral health education can be considered as an effective means to improve the knowledge and the attitudes of the children as well as parents which can be applied at both individuals as well as community level. Thus, oral health education is a potential primary care tool which has competence in reducing the prevalence of oral diseases.

Therefore, the aim of the present study was to evaluate the knowledge and acceptance of parents about the biological restorations and to evaluate the efficacy of individual health education approach concerning the same and the hypothesis tailored being the null hypothesis. The primary outcome of the study is to evaluate the knowledge and acceptance of biological restorations while the secondary outcome is to assess the efficacy of health education by the individual approach in the creation of awareness.

**Materials and Methods**

**Ethical clearance**
The study was carried out after the approval by the institutional ethics committee of AME’s dental college and hospital (AME/DC/23/18-19) Date of approval: 28 Aug 2018.

**Study place and period**
The study was conducted in the Outpatient Department of Pedodontics and Preventive Dentistry, AME’s Dental College and Hospital, Raichur, Karnataka, India from September 2018 to October 2018.

**Study design**
The present study was a self-administered structured questionnaire-based education interventional study with pre and post-study design.

**Sample size determination**
A total of 386 samples were determined based on the previous pilot study by taking 95% power and 5% margin of error into consideration.

**Methodology**
The inclusion criteria being the parents who gave informed consent. The present study was conducted in three phases

Phase I: Assessment of preexisting knowledge
Phase II: Informative lecture session through an individual approach
Phase III: Evaluation of acceptance or rejection after health education

**General description of the questionnaire**
The questionnaire consists of a total of 15 questions that are self-administered which was prepared both English and the local language (Kannada). The initial phase was to assess the existing knowledge of parents regarding their attitude towards the restoration of primary teeth inclusive of knowledge on restorative materials and biological restoration which consisted of 12 questions. The questions were explained to the respondents and then ask to mark. In the second phase, an informative lecture of 30 min duration was given individually in the language preferred by the parents by using audiovisual aids with an emphasis on the importance of oral health, necessity for treatment of deciduous teeth, different materials used by the dentist to restore teeth, newer treatment approaches principally the biological restoration.

After the lecture, time was allotted for discussion and clarification of doubts. In the third phase, a follow-up survey was done to assess the outcome of the informative promotion on the knowledge of parents using a set of three questions. The other parameters assessed were socioeconomic status of the parents by using Kuppswamy scale and number of children.

**Statistical analysis**
The data obtained were entered by Microsoft Excel Spread Sheet 2010. The categorical data were statistically analyzed using the Chi-square test. The *P* value was set at 0.05 (*P* < 0.05).

**Result**

**Demographic data**
The present study comprised of 117 (30.3%) fathers and 269 (69.7%) mothers. Majority of respondents, that is, 126 (32.6%) were in the age group of 26–30 years and when number of children were considered, most of them have two children i.e. 156 (40.4%). Parents have educational qualification of graduate and intermediate or diploma 124 (32.1%) and 92 (23.8%), respectively and with an occupation of skilled workers and shop and market sales workers 116 (30.1%) and elementary occupation being 108 (28.0%). Socioeconomic status of the parents was as follows upper middle 122 (31.6%), lower-middle 114 (29.5%), upper lower class 112 (29.0%), lower (6.7%), and upper class (3.1%) [Table 1].

**General elaboration of the questionnaire**

**Interpretations of Phase I**

When analyzed, 99% of the parents believed that their child’s oral health is important and 76.7% of parents desire for treatment of deciduous teeth. A total of only 37.6% of parents gave correct responses when enquired about the different restorative materials used by a dentist to restore their child’s tooth. On
Table 1: Demographic data

### Distribution of study participants according to age

| Age (in years) | Number | Percentage | Mean±SDa |
|----------------|--------|------------|----------|
| 21-25          | 52     | 13.6       |          |
| 26-30          | 120    | 32.6       |          |
| 31-35          | 78     | 20.2       |          |
| 36-40          | 72     | 18.6       |          |
| 41-45          | 46     | 11.9       |          |
| 46-50          | 12     | 3.1        |          |
| Total          | 386    | 100.0      |          |

### Distribution of study participants according to gender

| Gender | Number | Percentage |
|--------|--------|------------|
| Father | 117    | 30.3       |
| Mother | 269    | 69.7       |
| Total  | 386    | 100.0      |

### Distribution of study participants according to number of children

| Number of Children | Number | Percentage |
|--------------------|--------|------------|
| One                | 90     | 23.3       |
| Two                | 156    | 40.4       |
| Three              | 108    | 28.0       |
| Four               | 26     | 6.7        |
| Five               | 06     | 6.7        |
| Total              | 386    | 100.0      |

### Distribution of children according to order of birth

| Child   | Minimum Age (in years) | Maximum Age (in years) | Mean±SD |
|---------|------------------------|------------------------|---------|
| First   | 0.25                   | 20                     | 8.32±5.12 |
| Second  | 0.08                   | 18                     | 7.23±4.22 |
| Third   | 0.25                   | 15                     | 5.93±3.70 |
| Fourth  | 0.8                    | 13                     | 5.61±3.50 |
| Fifth   | 02                     | 08                     | 06±1.55  |

### Distribution of study participants according to education of head of the family

| Education                          | Number | Percentage |
|------------------------------------|--------|------------|
| Profession or Honours              | 26     | 6.7        |
| Graduate                           | 124    | 32.1       |
| Intermediate or diploma            | 92     | 23.8       |
| High school certificate            | 68     | 17.6       |
| Middle school certificate          | 32     | 8.3        |
| Primary school certificate         | 06     | 1.6        |
| Illiterate                         | 38     | 9.8        |
| Total                              | 386    | 100.0      |

### Distribution of study participants according to occupation of head of the family

| Occupation                          | Number | Percentage |
|-------------------------------------|--------|------------|
| Legislators, Senior Officials & Manager | 18    | 4.7        |
| Professionals                       | 64     | 16.6       |
| Technicians and Associate Professionals | 24    | 6.2        |
| Clerks                              | 16     | 4.1        |
| Skilled Workers and Shop & Market SalesWorkers | 116 | 30.1 |
| Skilled Agricultural & Fishery Workers | 06    | 1.6        |
| Craft & Related Trade Workers       | 18     | 4.7        |
| Plant & Machine Operators and Assemblers | 16    | 4.1        |
| Elementary Occupation              | 108    | 28.0       |

### Distribution of study participants according to socioeconomic status

| Socioeconomic status | Number | Percentage |
|----------------------|--------|------------|
| Upper (I)            | 12     | 3.1        |
| Upper Middle (II)    | 122    | 31.6       |
| Lower Middle (III)   | 114    | 29.5       |

Contd...
the topic of the awareness of biological restoration including fragment reattachment and tooth banks, 96.6% and 95.3% of the parents were unaware of it. About the acceptance of biological restoration treatment before intervention only 26% of parents were ready [Table 2].

Interpretations of Phase III
After educational intervention the acceptance of biological restoration treatment increased to 93.8%. Furthermore, most of the parents preferred to accept attachment of their own child’s tooth material rather than others i.e. 92.7% and 63.5%, respectively [Table 2].

Efficacy of educational intervention
When analyzed by Chi-square nonparametric test, highly statistical significance ($P < 0.001$) was obtained regarding the acceptance of biological restoration [Table 2].

Gender-based interpretations
In the present study, based on gender before education intervention, both father and mother did not have knowledge about a different type of restorative materials ($P < 0.01$) and biological restoration ($P = 0.01$). After educational intervention parents of both genders accepted the biological restoration treatment equally but statistically insignificant ($P = 0.2$) [Table 3].

Child number-based interpretations
Based on several children, parents with 4 children were aware of the different restorative materials ($P = 0.02$). None of them was aware of tooth banks ($P = 0.04$). After phase II irrespective of total children, parents were ready to accept biological restorations but statistically insignificant ($P = 0.1$) and highly statistical significance was established about the acceptance of another child's tooth ($P < 0.01$) [Table 3].

Socioeconomic status-based interpretations
Based on socioeconomic status parents of all status accepted that their child’s oral health is important which is statistically significant ($P = 0.01$) and they also need the primary teeth to be treated ($P = 0.02$) but some of the lower middle-class parents are not willing to accept treatment for deciduous teeth (33.3%). Upper class and upper middle-class parents were aware of the different materials used by the dentist ($P < 0.001$) and none are aware of the term biological restoration ($P < 0.01$) and tooth banks ($P = 0.02$). After phase II, all the classes of different socioeconomic parents are willing to accept biological restorations but statistically insignificant ($P = 0.1$) and except upper class, all others are ready to accept others tooth as biological restoration ($P = 0.01$) [Table 4].
Parents who had a greater number of children accepted the biological restorations as they would prefer less cost approach treatment options. Lower middle-class parents accepted for other's tooth fragment to be placed in their child's mouth maybe because it is less costly.

To our knowledge, this is the first study conducted on acceptance of biological restoration despite of the presence of several case reports and literature review in databases that have clinically shown the advantages of biological restoration like better sealing, long-term esthetics\(^{[12]}\) good cervical adaptation\(^{[13]}\) successful, cost-effective alternative esthetic treatment for restoration of severely mutilated primary anterior teeth,\(^{[14]}\) excellent biocompatibility, as well as maintaining the characteristics of tooth structure such as smoothness, surface brightness, texture, hardness, size, shape, color, resistance, and consequently, functionality and esthetic.\(^{[15-19]}\) Other advantage of biological restorations includes less treatment time and single appointment procedure when compared with traditional procedures.\(^{[20,21]}\)

### Table 3: Comparison of knowledge of parents before health education intervention based on gender and number of children

| Questions | Response | Father (%) | Mother (%) | P  | One (%) | Two (%) | Three (%) | Four (%) | Five (%) | P  |
|-----------|----------|------------|------------|----|---------|---------|-----------|---------|----------|----|
| **PHASE I** |          |            |            |    |         |         |           |         |          |    |
| BQ1       | Yes      | 98.3       | 299.3      | 0.588 | 100.0   | 100.0   | 96.3      | 100.0   | 100.0    | 0.064 |
| No        | 1.7      | 0.7        | 0.0        | 0.0   | 3.7     | 0.0     | 0.0       | 0.0     | 0.0      |    |
| BQ2       | Yes      | 79.5       | 75.5       | 0.390 | 77.8    | 79.5    | 74.1      | 69.2    | 66.7     | 0.680 |
| No        | 20.5     | 24.5       | 22.2       | 20.5  | 25.9    | 30.9    | 33.2      |         |          |    |
| BQ3       | Yes      | 27.4       | 42.0       | 0.006** | 32.2    | 37.2    | 38.9      | 61.5    | 0.0      | 0.025* |
| No        | 72.6     | 58.0       | 67.8       | 62.8  | 61.1    | 38.5    | 100.0     |         |          |    |
| BQ4       | Yes      | 69.2       | 69.5       | 0.955 | 73.3    | 67.9    | 64.8      | 76.9    | 100.0    | 0.265 |
| No        | 30.8     | 30.5       | 26.7       | 32.1  | 35.2    | 23.1    | 0.0       |         |          |    |
| BQ5       | Yes      | 12.0       | 13.8       | 0.633 | 21.1    | 10.3    | 19.3      | 23.1    | 0.0      | 0.030* |
| No        | 88.0     | 86.2       | 78.9       | 89.7  | 90.7    | 76.9    | 100.0     |         |          |    |
| BQ6       | Yes      | 0.0        | 4.8        | 0.012* | 5.6     | 3.8     | 1.9       | 0.0     | 0.553    |    |
| No        | 100.0    | 95.2       | 94.4       | 96.2  | 98.1    | 100.0   | 100.0     |         |          |    |
| BQ7       | Yes      | 3.4        | 96.6       | 0.368 | 7.8     | 6.4     | 1.9       | 0.0     | 0.213    |    |
| No        | 96.6     | 5.9        | 94.4       | 97.4  | 98.1    | 100.0   | 100.0     |         |          |    |
| BQ8       | Yes      | 4.3        | 4.8        | 0.811 | 11.1    | 2.6     | 3.7       | 0.0     | 0.047*   |    |
| No        | 95.7     | 95.2       | 89.9       | 97.4  | 96.3    | 100.0   | 100.0     |         |          |    |
| BQ9       | Yes      | 0.0        | 4.1        | 0.039* | 5.6     | 2.6     | 1.9       | 0.0     | 0.529    |    |
| No        | 100.0    | 95.9       | 94.4       | 97.4  | 98.1    | 100.0   | 100.0     |         |          |    |
| BQ10      | Yes      | 2.6        | 4.1        | 0.566 | 8.9     | 2.6     | 1.9       | 0.0     | 0.096    |    |
| No        | 97.4     | 95.9       | 92.1       | 97.4  | 98.1    | 100.0   | 100.0     |         |          |    |
| BQ11      | Yes      | 33.3       | 33.1       | 0.962 | 44.4    | 35.9    | 24.1      | 23.1    | 0.008**  |    |
| No        | 66.7     | 66.9       | 55.6       | 64.1  | 75.9    | 76.9    | 100.0     |         |          |    |
| BQ12      | Yes      | 29.1       | 24.9       | 0.394 | 21.1    | 28.2    | 27.8      | 15.4    | 66.7     | 0.080 |
| No        | 70.9     | 75.1       | 78.9       | 71.8  | 72.2    | 84.6    | 33.3      |         |          |    |
| **PHASE III** |       |            |            |    |         |         |           |         |          |    |
| AQ1       | Yes      | 91.5       | 94.8       | 0.211 | 91.1    | 94.9    | 96.3      | 84.6    | 100.0    | 0.151 |
| No        | 8.5      | 5.2        | 8.9        | 5.1   | 3.7     | 15.4    | 0.0       |         |          |    |
| AQ2       | Yes      | 89.7       | 94.1       | 0.134 | 91.1    | 92.3    | 96.3      | 84.6    | 100.0    | 0.244 |
| No        | 10.3     | 5.9        | 8.9        | 7.7   | 3.7     | 15.4    | 0.0       |         |          |    |
| AQ3       | Yes      | 41.9       | 34.2       | 0.150 | 63.3    | 71.8    | 53.7      | 46.2    | 100.0    | 0.003** |
| No        | 58.1     | 65.8       | 36.7       | 28.2  | 46.3    | 53.8    | 0.0       |         |          |    |

\(^{5,6}\) Percentage, SD = Standard Deviation, \(* = P < 0.05\) statistically significant, \(** = P < 0.01\) high statistically significant, \(28-02-2020 = P < 0.001\) very high statistically significant

### Discussion

The study was planned, conducted and reported based on the CONSORT guidelines. The present questionnaire prepared was closed-ended that fit into statements with tick box category.\(^{[4,5]}\)

The questionnaire studies facilitate to evaluate the knowledge from the population point of view.

One of the astonishing findings of this study is that irrespective of the acceptance and rejection of biological restoration, most of the parents prefer to accept their own not of the others. Lack of awareness and socioeconomic status plays a major role in the increased prevalence of dental caries among children.\(^{[11]}\) The present study supports that socioeconomic status was the fundamental determinant in several aspects of awareness and selection of treatment options among the parents.

The explanation the parents quoted for the increased knowledge of different restorative materials is, as the number of children increases, more chances of visiting a dentist.
This study also proves the importance of health education intervention in raising the knowledge and attitudes of the general population. Hence, health education can be considered as an efficient tool that could raise the standards of the parents such that the children can receive prevention strategies to early oral healthcare. This necessitates the need for the parents to receive knowledge about this cost-effective treatment option. Hence, the communication between dental professionals and parents is necessary to educate them about the importance of treatment to their children's teeth and awareness about the new treatment options such as biological restorations.

### Conclusion

Based on this study's results, the following conclusions can be made:

1. There is a lack of knowledge and awareness among parents regarding the different treatment approaches, restorative materials, and biological restorations.
2. After the educational intervention by individual approach, irrespective of the gender, most of the parents were ready to accept biological restoration but were acceptable only to their child's own tooth.
3. The parents with a greater number of children, low socioeconomic status was ready to accept the biological restorations in terms of its cost-effectiveness.
4. Educational intervention can be considered as an effective means to create awareness among the general population irrespective of their education and socioeconomic determinants.
5. Finally, socioeconomic status plays a vital role in the prevention of increased prevalence of dental caries among children.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.
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Conflict of interest
There is no conflict of interest.

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