



Institute-Based Strategies for Oral Health Education and Examination of Teen-Age

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Abstract

Dentists have traditionally been in charge of oral health teaching and screenings in academic settings. Strategies depending on teacher peer leaders and learners themselves have been used in light of the high cost and restricted availability of this expert-led approach. There were a total of 377 Institutes evaluated, 124 public and 253 private. Where various Institutes are located. For the public school system, there were 75 boys and 49 girls' Institutes. Co-ed lessons were offered in all private Institutes, although grades 6-10 were split evenly between male and female classrooms. The standards were strict enough that 312 institutes did not make the cut, leaving only 65 institutes that did. To conduct the research, twenty public Institutes were selected at random. Ten Institutes catering to females and ten to boys were included. Each of these institutes had one sixth-grade class included at random. This research aimed to evaluate the effectiveness of a streamlined oral examination conducted by teachers and peer leaders, as well as compare and contrast dentist-led (DL), teacher-led (TL), peer-led (PL), and self-learning (SL) OHE approaches. There was no statistically significant difference in the mean OHK and OHS scores among the three educator-led strategies. However, the OHB score for the peer-led strategy was considerably higher than the corresponding score for the teacher-led strategy ($p < 0.05$). Adolescents' oral health knowledge and oral hygiene status can be improved just as effectively by dentist-led, teacher-led, and peer-led oral health education initiatives.

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Introduction

An oral health educator is a very important part of a dental office. They help keep patients from getting oral diseases and make sure they get the dental care they need. Health education can help improve health on both the individual and population levels because it works with new ideas and

technologies in the real world, where these ideas and technologies are understood and used. Experts have a lot of information and tools they can use to help students learn how to act in ways that are good for their health and the health of their families and communities. So, everyone is responsible to society for making sure their own health and the health of



their community is good. Health education can also be seen as any type of education that encourages people to change their behavior in a way that is good for their health [2]. It has steps that help people learn about how health problems happen, including risk factors and ways to protect their health and change their behavior with the help of experts [3]. Any effort to make health better should be seen as a chance to teach [4]. During the process of promotion, prevention, diagnosis, treatment, and rehabilitation, both health care providers and patients/communities can learn from and teach each other. Ideas like these could change the course and results of the healthcare industry in a big way, making patients more involved in society and helping to build new health systems. So, if we want to improve people's health, we need to give them the tools they need to figure out what they want out of life, make the right changes to their environments, and take control over the things that affect their health in the long run [5]. Putting educational actions into daily academic and professional practice and setting up educational practices that focus on health promotion are not easy tasks. By design, health education programs teach laypeople specialized information from professionals while ignoring or devaluing the laypeople's own expertise in everyday matters. It's likely that non-experts will have to forget a lot of what they already know in order to learn what they need. During the education process, patients are told what to do too often [6,7], instead of being given the information they need to make their own decisions. Health education has traditionally been used as a way to control people who have a dominant knowledge attitude. The goal is to give people the tools they need to take care of their own health and reduce risks to it. "Hegemonic" health education hasn't done much to improve health in general and hasn't made any big changes to the way healthcare is provided [4,8]. Even though most people agree that educational efforts are important, the health care industry still puts a lot of value on patient-centered care that puts too much emphasis on clinical activities, especially those that are meant to heal. This puts too much stock in the use of procedures and techniques as the only way to deal with oral health problems [9]. It is hard to make sure that people will learn from health education programs and change the way they act. It has been shown that giving people information about how

their bodies work and what illnesses look like, along with a set of hygiene habits, is not enough to get people to live a healthy life. It is important to "teach" about health by taking into account all the things that affect a person's habits and views in their daily lives [10]. The current study tried to find answers to these 12 questions by looking at the research on "oral health education" and analyzing its topics, methods, and ways of measuring success.

Oral Health- an integral part of general health

Even though there isn't a single, agreed-upon definition of health, most people agree that it is a valuable asset that helps people improve their quality of life (WHO 1984). "Quality-of-life issues" are more important than even the most important dental and oral health issues when it comes to a person's quality of life (Sheiham & Watt 2000).

Health Education and Health Promotion

Every person has a right to the core elements of the Primary Health Care (PHC) envisioned by the Alma Ata declaration (WHO 1978). These include, but are not limited to, information about common health problems and how to deal with them. Health education is basically any set of lessons that are meant to get people to make healthier choices on their own (Tones & Tillford 1994). Without health education, there is no way to improve health. The goal of health education is to help people make informed decisions about their own health and the health of others (Brown 1994, Horowitz 1979). The goal of health promotion is to make it easier for people to make healthier choices (Milio 1986). Health education can start the process of health promotion by changing policy and social norms to make the environment healthier by drawing attention to local health problems (Fisher et al., 1986). The institute is a good place for classes on health. Institutes are great places to teach kids about their oral and overall health (OHE) because they are long-lasting public buildings (Horowitz 1979). Many kids in these areas wouldn't be able to get dental care if they didn't live there (Hawkins & Catalano 1990). They are the main place where people spend most of their time with other people (Dunning & Dunning 1978). The Institute says that children can learn about health in a place where they feel at ease. Children's OHE can learn a lot from the persuasiveness, stamina, and pedagogical examples of institute teachers (Justh 1990). Positive peer group norms about health



choices can create a supportive environment, which in turn can make it easier for children to adopt healthy behaviors (Walsh, 1985). Because of this, it would make sense to use the Institute's health education program to improve kids' and teens' dental health.

So, programs for health education that were started at the Institute have been used in many places around the world to deal with a wide range of health and social problems. There is also some evidence that the Institute's health education programs can be used to spread health education messages outside of the Institute (Macnab & Kasangaki 2012).

Aim of the Study

To identify and make suggestions for effective oral health education and examination procedures for adolescents in developing countries.

Objectives of the Study

The main purpose of this study was to

1. Compare and contrast the effectiveness of dentist-led, teacher-led, peer-led, and self-learning approaches to OHE in an Institute setting, and draw a conclusion about the best way to deliver OHE.
2. To compare the accuracy of a simplified oral exam done by teachers and peer leaders to the accuracy of a standard oral exam done by a dentist.
3. To compare the effectiveness of repeated and reinforced oral health education at the Institute with that of a single session of education.

Literature Review

Mouth and throat diseases happen often, but they are easy to avoid. Sixty to ninety percent of school-aged children and most adults in industrialized countries have dental caries. In some Asian and Latin American countries, this number is even higher. Severe periodontitis is a complication of periodontal disease that affects 5–15% of the world's population and is strongly linked to diabetes and immune suppression [1, 2]. According to the National Oral Health Survey, 63.1% of 15-year-olds in India have dental caries and as many as 80.2% of 35-44-year-olds do as well. Periodontal disease affects 67% of 15-year-olds and up to 89.6% of 35-44-year-olds. In some places, it is common for older people to not have any teeth [2]. Oral cancer rates have been going

up in Europe and other industrialized countries. It is now the eighth most common type of cancer in the world (third most common in South-central Asia). About 15% of school-aged children in different Latin American countries have dental trauma, while the rate for children ages 6 to 12 in the Middle East is 13% between 5-12%. Oral problems cause people all over the world to lose millions of hours of work and school every year. Also, the mental and social effects of chronic illnesses often have a terrible effect on the quality of life of the people who have them. If a society cares about the health and happiness of its people, it should put an emphasis on preventing illness, disability, and pain. Community or population-level prevention is the most cost effective and has the biggest impact, whether it's in a school, a neighbourhood, or a country. A community prevention program is a well-thought-out plan to stop an epidemic from spreading through a population. There are many ways to avoid dental problems, but health education has been found to be the most cost-effective. A health education program could be anything that teaches people how to make their own healthy choices. People, families, groups, and whole communities can all be to blame for these kinds of actions. So, health education can include efforts to teach not only children, but also parents, policymakers, and health care workers. Correct health information or knowledge does not always lead to healthy behaviors. This has been shown in dentistry and other areas of health care. But the information learned could be used to give underserved communities reliable information about health and health care technologies, which would help them better protect their members' health. People with oral health problems have more ways to get help in the developed world, but many still don't have the money or insurance to pay for the procedures they need. In places where people are poor, it is hard to get medical care. The effects of craniofacial complex diseases on diet, function, and mental health are very important. Also, people from all socioeconomic backgrounds in both developed and developing countries have to pay a lot of money for oral disorders.

Personnel imparting Oral Health Education

In the past, dentists and dental hygienists have taught OHE in universities more than anyone else. On the other hand, this kind of plan makes me



very worried about how well it will work and how much it will cost (Watt & Marinho 2005). Using teachers to spread and reinforce OHE messages has worked well in a number of situations (Petersen et al 2004). It has been pointed out, though, that teachers' ability to teach students about oral health is limited by things like lack of time and heavy workloads at Institutes (Nyandindi et al 1994).

Students who have been trained by the Institute are also a good resource that has been suggested (WHO, 2003) and used in health education projects. Research shows that Institute-based peer-led health education works better than teacher-led health education (Mellanby et al., 2000) and at least as well as expert-led health education (Mellanby et al 2000). But there isn't much information in the dental literature about how the three approaches compare to each other in terms of how well they work.

Oral Diseases

Craniofacial disorders are diseases that affect the mouth, teeth, and jaw as a whole (Petersen 2003). Oral tissues can be hurt by a number of diseases and conditions, but dental caries, periodontal disease, and oral cancer are the most common. There are big effects of these diseases on society as a whole. They are common and have negative effects on people's physical, social, and mental health in almost every community. They are expensive to treat and have far-reaching financial consequences for both individuals and society as a whole (Sheiham 2005). These conditions have a big effect on people's mental health because they make it hard for them to do basic things like talk, laugh, eat, swallow, and smile (Petersen 2003). Oral disorders can cause problems at home, at school, and at the workplace. Every year, they cause production losses worth millions of dollars and ruin economies all over the world (Gift et al 1992).

Oral health education

Oral health education is mostly about diseases of the teeth and gums (OHE). When we talk about someone's oral health, we don't just mean their teeth, but also their gums, tongue, lips, palate, chewing muscles, facial expression muscles, and salivary glands (WHO 2003). Oral disease risk factors are affected by many social, cultural, and political factors (Sheiham & Watt, 2000), but they can also be changed by changes in lifestyle and behavior.

Even though oral health education can't change how teens act because of their environment, it can help them understand health problems and encourage them to look for solutions (Craft et al 1984). Oral health education has always pushed for people to do things that are good for their teeth, like get regular dental checkups, use fluoride, and keep up good eating habits. Extensive scientific and epidemiological research has shown that non-milk extrinsic sugars (NMES) are strongly linked to an increased risk of dental caries (Sheiham 2001). NMES are sugars that aren't found in natural foods but are in processed foods like candy, cookies, cake, fruit juices, honey, soft drinks, and table sugar. When adolescent patients eat more than 60 grams of sugar every day, the number of dental caries goes through the roof (Sheiham 2001). The amount of sugar you eat and how often you eat it are closely related. When people eat sugar more than four times a day, their chances of getting dental caries go through the roof (Sheiham 2001). Tooth decay is also linked to drinking carbonated and sugary drinks in a big way (Jones et al 1999, Levine et al 2007). Dental caries are much more likely to happen if you eat a lot of refined carbohydrates, like those in baked goods and chips, as well as sugary and carbonated soft drinks (Moynihan & Petersen 2004).

Institute: Ideal setting for Health Education of Adolescents

People spend a big chunk of their lives interacting with others in schools, colleges, and universities (Dunning & Dunning 1978). Students' health, self-esteem, life skills, and behavior can all improve a lot if they go to an institute. Institutes are great places to teach kids about oral health (OHE) who might not have access to dental care elsewhere. This is because institutes are permanent parts of the community (Hawkins & Catalano 1990). Institutes for health promotion are useful from economic, educational, social, and political points of view (Dunning & Dunning 1978). With the Institute's set, children can learn about health in the comfort of their own homes. Because of these things, health education programs based at the Institute have been sent to other parts of the world to help solve a wide range of health-related problems (Hali 2021). Institute students, young and old, are a great target audience because they are open to learning and eager to pick up tips and tricks that will help them



live healthier lives. People can take an active role in their own health care if they have the knowledge and tools to do so. With these skills, they might be less likely to give in to peer pressure to do dangerous things (WHO 2003). Through OHE's Institutes, about a billion students and their families and communities can be reached directly (WHO 2003). These settings are great for getting the most out of what teachers can do to help their students in the classroom. Institutions like these can be very important for making sure that good public policy is made. Children who take part in group activities are more likely to grow up to be active, responsible adults who use their voices to advocate for social change at home and in their communities (WHO 2003).

Materials and methods

377 schools, including 124 public and 253 private, were looked at to see if they qualified. Spreading out of educational centers. In the public school system, there were a total of 75 Institutes for boys and 49 Institutes for girls. But in all of the private schools we looked at, grades 6–10 were separated by gender, even though they were coed. There were 312 Institutes that didn't make it, leaving only 65 that did. Randomly, twenty public institutes were chosen for the study, ten of which were for girls and ten for boys. Sixth-grade students from each

school were chosen at random to take part in the study. Out of the private schools that met the requirements, twenty were chosen at random. From ten of the Institutes, a sixth-grade class of boys was chosen at random, and from the other ten, a sixth-grade class of girls was chosen at random. Institutes 15 were used as the randomization units because the goal was to interfere as little as possible with how Institutes normally work and to stop the spread of potentially infectious OHE techniques. A teacher who wasn't part of the study gave each of the selected public, private, boys', and girls' schools a random number. Then, the teacher used a lottery system to pair up the boys and girls in each of the five groups with different public and private Institutes. At the start of the study, the study population was made up of institute students in Karachi, Pakistan's Liaquatabad and Gulberg neighborhoods who were 10 and 11 years old. These places were chosen because they have a lot of Muhajirs (people who speak Urdu) and other people from the same ethnic background (Ali 2012). For the study, institutes were chosen by applying the following criteria to the list of institutes given by the Education Department, Government of Sindh.



Results and Data Analysis

Table 1: Oral Health Knowledge: Adjusted mean scores

| Question | ICC | Dentist-led (n=303) | Teacher-led (n=307) | Peer-led (n=325) | Self-learning (n=292) | Control (n=290) |
|---|-------|---------------------|---------------------|---------------------|-----------------------|---------------------|
| Knowledge about dentition (K-Dent) | | | | | | |
| Number of milks teeth ¹ | 0.14 | 0.18 (0.10-0.26) | 0.24 (0.15-0.34) | 0.16 (0.08-0.23) | 0.11 (0.05-0.18) | 0.11 (0.05-0.15) |
| Number of permanent teeth | 0.07 | 0.67 (0.56-0.76) | 0.72 (0.64-0.80) | 0.68 (0.60-0.77) | 0.67 (0.55-0.74) | 0.77 (0.66-0.85) |
| Age of eruption of 1st molar | 0.06 | 0.42 (0.34-0.52) | 0.35 (0.25-0.45) | 0.36 (0.26-0.46) | 0.37 (0.32-0.49) | 0.25 (0.14-0.34) |
| K-Dent (Score: 3) | 0.08 | 1.24 (1.05-1.42) | 1.34 (1.16-1.53) | 1.24 (1.06-1.41) | 1.16 (0.99-1.34) | 1.11 (0.96-1.31) |
| Knowledge about dental caries (K-Caries) | | | | | | |
| Essential content of tooth paste ² | 0.15 | 0.36 (0.27-0.43) | 0.46 (0.35-0.55) | 0.32 (0.23-0.43) | 0.44 (0.35-0.55) | 0.53 (0.43-0.62) |
| Most important sign of dental caries ³ | 0.07 | 0.07 (0.03-0.10) | 0.11 (0.07-0.15) | 0.14 (0.11-0.16) | 0.10 (0.06-0.14) | 0.07 (0.02-0.08) |
| Eatables harmful to teeth | 0.01 | 0.01 (0.01-0.02) | 0.02 (0.01-0.01) | 0.01 (0.01-0.01) | 0.02 (0.01-0.01) | 0.01 (0.01-0.02) |
| Measures to prevent caries | -0.01 | 0.00 (0.00-0.01) | 0.00 (0.00-0.01) | 0.00 (0.00-0.01) | 0.00 (0.00-0.01) | 0.02 (0.01-0.02) |
| K-Caries (score:4) | 0.05 | 0.41 (0.33-0.51) | 0.56 (0.46-0.66) | 0.48 (0.41-0.59) | 0.57 (0.48-0.68) | 0.61 (0.51-0.71) |
| Knowledge about gingivitis (K-Gingivitis) | | | | | | |
| Cause of gum disease | 0.07 | 0.33 (0.27-0.41) | 0.27 (0.23-0.33) | 0.25 (0.20-0.31) | 0.21 (0.14-0.23) | 0.27 (0.23-0.33) |
| First sign of gum disease | 0.03 | 0.06 (0.06-0.12) | 0.08 (0.05-0.11) | 0.12 (0.08-0.15) | 0.10 (0.06-0.15) | 0.06 (0.03-0.11) |



| | | | | | | |
|---|--------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| K-Gingivitis (Score:2) | 0.01 | 0.41 (0.35-0.47) | 0.36 (0.31-0.42) | 0.38 (0.32-0.44) | 0.30 (0.28-0.38) | 0.36 (0.28-0.40) |
| Knowledge about oral cancer (K-Cancer) | | | | | | |
| Tobacco-containing things | 0.03 | 0.08 (0.05-0.12) | 0.14 (0.10-0.18) | 0.10 (0.07-0.14) | 0.10 (0.06-0.13) | 0.07 (0.04-0.11) |
| Hazards of betel-nuts | 0.00 | 0.01 (0.00-0.03) | 0.02 (0.00-0.03) | 0.03 (0.01-0.04) | 0.02 (0.00-0.04) | 0.01 (0.00-0.02) |
| Hazards of tobacco ⁴ | 0.10 | 0.10 (0.07-0.14) | 0.13 (0.09-0.17) | 0.10 (0.06-0.13) | 0.21 (0.16-0.26) | 0.13 (0.08-0.17) |
| K-Cancer (score: 3) | 0.02 | 0.21 (0.15-0.26) | 0.29 (0.24-0.35) | 0.24 (0.19-0.29) | 0.33 (0.28-0.39) | 0.22 (0.16-0.27) |
| Oral Health Knowledge (OHK-Composite) | | | | | | |
| OHK-Composite Index (score: 12) | 0.054 | 2.29 (2.05-2.54) | 2.59 (2.34-2.83) | 2.36 (2.12-2.60) | 2.40 (2.15-2.64) | 2.31 (2.07-2.56) |

ICC: Intra-class correlation coefficient

All values were adjusted for gender, type of institute, and clustering effect using GEE: 1 TL > CL; 2 CL > DL, PL; 3 PL > DL, CL; 4 SL > DL, PL at p 0.05 (>: statistically better than). Table 1 shows that the percentage of TL teens who knew the total number of milk teeth at the start was much higher than that of CL teens (p0.05).

Knowledge about dental caries (K-Caries)

At the start of the study, between 33 and 54 percent of the participants knew that fluoride was the main ingredient in tooth paste or miswak (Table 1). Only 6–15% of the teenagers in the study groups could correctly name the main sign of dental caries (a hole in the affected tooth). At the start of the trial, participants knew very little about cariogenic foods (like cookies and crisp chips) and ways to prevent cavities (like cutting back on sugar and using fluoride twice a day).

Table 2 shows that, compared to the DL and PL groups, a much higher percentage of teens in the CL group knew right away that fluoride was an important part of dental paste or a miswak (chewing stick) (p0.05). The number of people in the PL group who correctly named tooth decay as the most important sign of dental caries was significantly higher than in the DL and CL groups (p=0.43 and p0.05, respectively).

Knowledge about gingivitis (K-Gingivitis)

Twenty-four percent to thirty-four percent of kids got the reason (dental plaque) and the first indicator (bleeding gums) right, and seven percent to thirteen percent got both right (Table 1).

Knowledge about oral cancer (K-Cancer)

About 7–14% of the kids in the study could name tobacco-containing products (Gutka and Mainpuri), and 10–21% knew right away that smoking was bad for you (cancer and gum disease). At the start of the study, only about 3% of all participants were aware of the possible risks of using items with betel nut in them, such as bad dental health and trouble speaking (Table 2). Table 1 shows that, compared to the DL and PL groups, there are a lot more teens in the SL group who know that TCPs are bad for their health.



Table 2: Attitudes towards Oral Hygiene Maintenance

| Questions | ICC | Dentist-led (n=303) | Teacher- led (n=307) | Peer-led (n=325) | Self- learning (n=292) | Control (n=290) |
|---|-------|------------------------|----------------------------|---------------------|------------------------------|---------------------|
| Adjusted Mean Scores | | | | | | |
| Tooth cleaning as a part of general cleanliness | 0.002 | 0.98 (0.97-1.02) | 1.02 (0.97-1.02) | 0.98 (0.96-1.01) | 0.97 (0.93-0.98) | 0.97 (0.93-0.98) |
| Readiness for cleaning teeth while feeling sleepy | 0.006 | 0.97 (0.94-0.97) | 0.96 (0.96-0.98) | 0.94 (0.94-0.97) | 0.96 (0.96-1.03) | 0.96 (0.97-1.01) |
| Attitudes (Score: 2) | 0.003 | 1.92 (1.88-1.98) | 1.98 (1.92-1.97) | 1.88 (1.85-1.91) | 1.92 (1.88-1.97) | 1.92 (1.91-1.91) |
| Adjusted Mean Scores at Final Evaluation | | | | | | |
| Tooth cleaning as a part of general Cleanliness | 0.043 | 1.00 (0.95-1.01) | 1.00 (0.98-1.01) | 1.00 (0.96-1.01) | 0.98 (0.95-1.00) | 0.98 (0.96-1.00) |
| Readiness for cleaning teeth while feeling Sleepy | 0.028 | 0.99 (0.97-1.01) | 0.98 (0.97-1.00) | 0.99 (0.97-1.01) | 0.97 (0.95-1.00) | 0.97 (0.96-1.00) |
| Attitudes (Score: 2) | 0.007 | 1.95 (1.92-1.97) | 1.97 (1.95-1.99) | 1.95 (1.93-1.98) | 1.95 (1.94-1.99) | 1.95 (1.93-1.98) |
| Percentage Change in Adjusted Mean Scores* | | | | | | |
| Tooth cleaning as a part of general cleanliness | | 1 | 0 | 1 | 0 | 0 |
| Readiness for cleaning teeth while feeling sleepy | | 3 | 2 | 3 | 1 | 1 |
| Effect Sizes** of Different OHE Strategies at Final Evaluation | | | | | | |



| | | | | | | |
|---|--|---------------------|---------------------|---------------------|---------------------|-----|
| Tooth cleaning as a part of general cleanliness | | 1.02 (0.98-1.06) | 1.03 (0.99-1.07) | 1.01 (0.98-1.04) | 1.00 (0.98-1.03) | N/A |
| Readiness for cleaning teeth while feeling sleepy | | 0.99 (0.97-1.01) | 1.00 (0.97-1.02) | 0.99 (0.97-1.01) | 1.01 (0.99-1.03) | N/A |

ICC: Intra-class correlation coefficient; N/A: Not applicable

*The group differences were statistically non-significant for questions and cumulative scores at baseline and final evaluation; ** the control group was used as the reference group.

At the start, 95–100% of teens in all five groups said they thought oral hygiene was important. There were no statistically significant differences between the groups (Table 2)

Table 3: Oral Health Behavior: Adjusted mean scores.

| Question | ICC* | Dentist-led (n=303) | Teacher-led (n=307) | Peer-led (n=325) | Self-learning (n=292) | Control (n=290) |
|---|------|---------------------|---------------------|---------------------|-----------------------|---------------------|
| Behavior towards prevention of gingivitis (OHB-Gingivitis) | | | | | | |
| Tooth cleaning frequency | 0.01 | 0.46 (0.44-0.54) | 0.53 (0.47-0.61) | 0.50 (0.45-0.56) | 0.54 (0.51-0.60) | 0.55 (0.50-0.61) |
| Tooth cleaning method ¹ | 0.09 | 0.33 (0.26-0.36) | 0.44 (0.35-0.50) | 0.43 (0.37-0.48) | 0.31 (0.24-0.37) | 0.35 (0.29-0.41) |
| Looking for fluoride in toothpaste/miswak | 0.01 | 0.25 (0.15-0.33) | 0.32 (0.21-0.36) | 0.26 (0.19-0.33) | 0.22 (0.15-0.27) | 0.25 (0.18-0.32) |
| Cleaning cervical areas of teeth | 0.02 | 0.16 (0.13-0.24) | 0.16 (0.12-0.22) | 0.16 (0.10-0.21) | 0.11 (0.06-0.12) | 0.16 (0.10-0.21) |
| Thoroughness of tooth cleaning | 0.02 | 0.13 (0.05-0.15) | 0.12 (0.07-0.17) | 0.13 (0.08-0.17) | 0.16 (0.12-0.21) | 0.10 (0.05-0.14) |
| Avoiding peers with bad breath | 0.01 | 0.16 (0.13-0.22) | 0.15 (0.12-0.21) | 0.15 (0.10-0.20) | 0.16 (0.10-0.22) | 0.14 (0.09-0.19) |
| Cumulative OHB-Gingivitis (score: 6) | 0.05 | 1.55 (1.35-1.75) | 1.74 (1.56-1.93) | 1.62 (1.44-1.80) | 1.53 (1.34-1.72) | 1.55 (1.37-1.74) |



| Behavior towards prevention of oral cancer (OHB-Cancer) | | | | | | |
|---|------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Not consuming betel-nuts | 0.03 | 0.13 (0.08-0.17) | 0.13 (0.08-0.18) | 0.10 (0.06-0.15) | 0.13 (0.07-0.18) | 0.09 (0.05-0.13) |
| Not consuming tobacco | 0.06 | 0.96 (0.93-0.99) | 0.93 (0.90-0.96) | 0.97 (0.94-1.00) | 0.99 (0.96-1.01) | 0.98 (0.95-1.01) |
| Not buying betel nut products | 0.04 | 0.15 (0.10-0.19) | 0.15 (0.11-0.19) | 0.13 (0.09-0.17) | 0.14 (0.08-0.19) | 0.09 (0.05-0.12) |
| Not sharing betel nut products | 0.01 | 0.17 (0.12-0.22) | 0.17 (0.12-0.22) | 0.14 (0.09-0.18) | 0.20 (0.15-0.26) | 0.14 (0.10-0.19) |
| Avoiding peers using betel nuts | 0.01 | 0.24 (0.20-0.29) | 0.24 (0.20-0.29) | 0.27 (0.22-0.32) | 0.22 (0.16-0.28) | 0.23 (0.08-0.19) |
| Persuading peers to avoid betel nuts | 0.01 | 0.19 (0.14-0.25) | 0.19 (0.13-0.24) | 0.16 (0.11-0.21) | 0.20 (0.15-0.26) | 0.14 (0.10-0.20) |
| Cumulative OHB-Cancer (score: 6) | 0.02 | 1.84 (1.62-2.05) | 1.83 (1.62-2.05) | 1.78 (1.57-2.00) | 2.01 (1.79-2.23) | 1.70 (1.48-1.92) |
| OHB-Composite Index (score: 12) | 0.04 | 3.39 (3.30-3.69) | 3.59 (3.29-3.89) | 3.42 (3.12-3.71) | 3.54 (3.24-3.85) | 3.26 (2.95-3.57) |

*ICC: Intra-class correlation coefficient

¹TL, PL>SL at $p<0.05$ (>: Statistically better than); All values adjusted for gender, type of Institute and clustering effect using GEE.

Only about 10–17% of teenagers were able to prove that they had cleaned all of their teeth well, including the back areas. 14–18% of the teens in the study groups didn't talk to other students because their breath smelled bad. Table 3 shows that at baseline, there was a statistically significant difference between the percentage of teens in the TL and PL groups who used the recommended tooth cleaning tools (a toothbrush/miswak and toothpaste) and the percentage of teens in the SL group who used the same tools ($p0.05$).

Oral health behavior towards prevention of oral cancer (OHB-Cancer)

At the start of the study, only 9–15% of the teens said they had never bought or used BNPs. Eighty to eighty-six percent of teens said that they gave these things to their friends. Almost the same number of people in the study didn't try to get their friends to stop using these goods or use them less at first. One-fourth of the people who took part in the study said they tried to stay away from people who used BNPs (Table 3).

Domain- and OHB-Composite Index Scores

Table 4 shows that the baseline OHB-Gingivitis, OHB-Cancer, and OHB-Composite index scores were not statistically different across the study groups.

Oral Health Status

In this analysis, the researchers looked at several signs of oral health, such as how often and how bad dental caries were, if there was plaque on the teeth, how much the plaque made the gums bleed, and if there was



calculus. In the last three measures, how well people took care of their teeth showed how healthy they were overall. As part of the people's overall oral health, the amount of oral submucous fibrosis was also estimated.

Table 4: Oral Health Knowledge (OHK): Effect Sizes of different OHE strategies at final evaluation

| Domain | Question | Effect Size | | | |
|--|--------------------------------------|---------------------|---------------------|-------------------|-----------------------|
| | | Odds Ratio (CI)* | | | |
| | | Dentist-led (n=303) | Teacher-led (n=307) | Peer-led (n=325) | Self-Learning (n=292) |
| Knowledge about dentition (K-Dent) | Number of milk teeth | 4.01 (2.42-6.86) | 9.02 (3.88-16.67) | 5.92 (2.63-10.71) | 1.45 (0.63-2.62) |
| | Number of permanent teeth | 1.14 (0.72-1.85) | 2.35 (1.33-3.97) | 1.01 (0.63-1.62) | 0.59 (0.38-0.93) |
| | Age of eruption of 1st molar | 3.32 (1.68-5.69) | 5.64 (2.82-9.86) | 4.84 (2.45-8.45) | 2.54 (1.31-4.37) |
| | K-Dent | 1.45 (1.18-1.75) | 1.73 (1.44-2.08) | 1.57 (1.40-1.89) | 1.16 (0.94-1.37) |
| Knowledge about dental caries (K-Caries) | Essential content of tooth paste | 1.87 (1.03-3.27) | 3.47 (1.80-5.97) | 3.77 (1.93-6.56) | 0.86 (0.73-0.95) |
| | Most important sign of dental caries | 1.47 (0.71-2.69) | 4.06 (2.13-7.02) | 1.97 (0.99-3.52) | 2.13 (1.05-3.83) |
| | Eatables harmful to teeth | 1.36 (1.32-1.46) | 1.17 (1.11-1.20) | 1.27 (1.17-1.38) | 1.01 (0.91-1.01) |
| | Measures to prevent caries | 1.01 (0.97-1.01) | 1.01 (1.00-1.01) | 1.00 (0.98-1.01) | 1.00 (0.88-1.02) |
| | K- Caries | 2.75 (1.84-3.82) | 2.11 (1.51-2.77) | 2.79 (1.87-4.15) | 1.07 (0.75-1.56) |
| Knowledge about gingivitis (K-Gingivitis) | Cause of gum disease | 3.84 (1.73-6.86) | 2.74 (1.65-4.93) | 4.32 (1.95-7.94) | 0.75 (0.20-1.52) |
| | First sign of gum disease | 2.45 (1.17-4.49) | 2.15 (1.14-4.05) | 3.07 (1.46-5.51) | 0.57 (0.31-1.65) |
| | K- Gingivitis | 2.18 (1.96-2.43) | 2.15 (1.92-2.342) | 2.37 (2.13-2.64) | 1.34 (1.06- |



| | | | | | |
|---|---------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | | | | | 1.31) |
| Knowledge about oral cancer (K-Cancer) | Tobacco-containing things | 4.35 (2.57-7.25) | 3.81 (2.27-6.33) | 5.68 (3.38-9.47) | 1.45 (0.78-2.26) |
| | Hazards of betel-nuts | 25.14 (7.76-49.15) | 6.79 (1.10-14.11) | 17.68 (5.43-33.60) | 2.47 (0.74-5.03) |
| | Hazards of tobacco | 4.35 (2.59-7.30) | 2.28 (1.34-3.89) | 3.18 (1.89-5.34) | 1.41 (0.71-2.47) |
| | K- Cancer | 1.67 (1.44-1.95) | 1.47 (1.21-1.74) | 1.58 (1.40-1.79) | 1.21 (1.11-1.41) |
| OHK-Composite Index | | 1.90 (1.53-2.36) | 1.90 (1.53-2.36) | 1.99 (1.61-2.47) | 1.11 (0.77-1.46) |

* The control group was used as the reference group; CI: 95% Confidence Interval; All values adjusted for gender, type of school, clustering effect and baseline values using GEE.

At the end of the assessment, there was no clear difference between what the PL group knew about how to prevent caries and what the SL and CL groups knew. But the TL group did much better than the CL group in knowing what the most important sign of dental caries is (p0.05). The TL and PL techniques had a big effect on how much people knew about the most important part of toothpaste/miswak (OR: 3.48, CI: 1.80–5.98) and the most important sign of dental caries (OR: 4.07, CI: 2.12–7.02), respectively (Table 8).

Knowledge about gingivitis (K-Gingivitis)

At the end of the test, there were no statistically significant differences in what students knew about gingivitis's causes and early warning signs (Table 7). The PL method, on the other hand, had a bigger effect on these parameters than either the DL or TL methods (Table 8). Compared to the SL and CL groups, the three educator-led groups did a better job of finding the cause of gingivitis and early warning signs than the SL and CL groups (p0.05). The study found that the DL, TL, and PL strategies of oral health education were nearly 2 times more likely to improve the teens' knowledge of the cause and first sign of gingivitis than the SL and CL strategies, even though there were no statistical significant

differences between the three educator-led groups (Table 4).

Knowledge about oral cancer (K-Cancer)

Table 3 shows that the DL method did better than the TL method when testing knowledge about the risks of chewing betel nuts (p0.001) and smoking tobacco (p0.05). Teenagers in the PL group knew more about the health risks of BNPs than those in the TL group (p0.05). Also, compared to the TL group, the PL group had a slightly (but not significantly) larger number of participants who knew the truth about how dangerous TCPs are to health. In the final evaluation, there wasn't a big difference between DL and PL in how well people knew about different types of cigarettes and the risks of BNPs and TCPs. When it came to BNPs (OR: 25.14, CI: 7.76–49.15) and TCPs, the effect sizes for the DL group were bigger than those for the PL and TL groups (OR: 4.35, CI: 2.59-7.30). (Table 4). Compared to the DL (OR: 4.35, CI: 2.57-7.25) and TL (OR: 3.81, CI: 2.27-6.33) strategies, the PL (knowledge of tobacco-containing items) approach had a bigger effect size (OR: 5.68, CI: 3.38-9.47). At the end of the study, the DL, TL, and PL groups knew a lot more about tobacco-containing products than the SL and CL groups (p0.05 and p0.001, respectively) (Table 3). Teenagers in the DL and PL



groups knew more about the dangers of chewing betel nuts than those in the SL and CL groups ($p < 0.001$). In the same way, more people in the DL ($p < 0.001$), TL, and PL groups knew about the dangers of TCPs than in the PL group ($p < 0.05$). There were no statistically important differences between the SL and CL groups on three questions about oral cancer. There was a statistically significant difference between the groups that got the DL, TL, PL, and SL oral health education methods and the group that got the control oral health education method in how much they knew about oral cancer ($P < .05$). (Table 4)

Discussion

The study that was discussed about had three main parts that worked together to reach its goals. In a cluster-randomized design, multiple OHE methods were tested, the importance of drill and practise was evaluated, and the reliability of a streamlined oral exam that was given by teachers and students was found. The CRT took place between January 2004 and February 2006. Forty secondary schools from Karachi's two cities took part. (Haleem et al 2012a). Based on what we found when we looked online, this clinical trial is the first one we know of that compares four different OHE approaches. The trial had a strict experimental design that fixed most of the problems with earlier OHE evaluation studies that kept them from being able to be used in statistical analysis (section 2.8.6.2). Even though the idea for the experiment came up in 2003, its most important parts were in line with the 2004 CONSORT (Consolidated Standards of Reporting Trials) criteria for cluster randomised trials. (Campbell et al 2004). At six and twelve months, participants in the trial were checked up on to see how their knowledge, behaviour, and oral health had changed as a result of repeated teaching and reinforcement. As part of the study, a simplified oral test given by teachers and student leaders to check the quality of OHE programmes in schools was tested for its reliability (Haleem et al 2012b). First, a simplified oral exam with a wooden tongue depressor and a tooth pick was compared to the traditional oral exam with a dental mirror and a metal probe. This was done to see how reliable teachers and classmates are as examiners (Haleem et al 2009a, Haleem et al 2009b).

First, we'll talk about the most important parts of how the research was done. Then, we'll talk about what each of the three parts of the study found.

Conclusion

The results suggest that educator-led OHE strategies may be a practical and almost as effective as the typical dentist-led strategy for oral health education, even though the three educator-led OHE strategies had a small effect on the outcome variables in the study.

Teachers in this study were better at teaching their students about oral health than teachers in other OHE programmes. But a peer-led strategy was more successful at changing the oral health habits of teens, as measured by objective criteria and as they related to their social environment.

iii. The effects of an OHE programme that relies on repetition and reinforcement are stronger and last longer than a one-and-done version of the programme (at least a year).

No matter if the OHE programme is taught at school by a dentist, a teacher, or a peer leader, repetition and reinforcement are very important.

v. There is a good chance that educators and peer leaders can find cavitated carious lesions, plaque, and calculus when they do a dental exam. But the research showed how important it is for teachers and peer leaders to take refresher courses to keep their oral examination skills sharp.

Recommendations for future research

i. It's important to be careful about generalising the study's results, since the limited resources didn't allow for a random selection of different towns in Karachi, Pakistan, which has many different ethnic and economic groups. This could have given the study a selection bias and put its external validity at risk. So, it is suggested that a large-scale community trial be done to confirm the results of the study and find out how well the oral health education strategies in question work in real life.

ii. Relying too much on the self-reported behaviour questions in the questionnaire could have hurt the results of the study. This is especially important in the trial because the kids had been told so many times about the socially acceptable ways to take care of their teeth. Also, the fact that the same



questionnaire was used five times during the project might have made the people who filled it out bored. For future research on the subject, it is suggested that different ways of collecting data be used.

iii. The results of the study didn't show how OHE strategies affect dental caries in a clear way. The length of the study may not be long enough to notice any changes in the caries experience of teenagers in the study population, who had very low rates of the disease during the study. People who don't have a lot of tooth decay should be studied over a long period of time.

iv. Despite the impressive results, the applicability of the present study's findings about teacher- and peer-leader examination should be seen in the context of the study's goal, which was to find out how well teachers and peer-leaders could spot cavitated carious lesions, plaque, and calculus in order to motivate school children and keep an oral health education programme under control. The goal was not to check if teacher/peer exams were valid so that epidemiological data could be gathered or screening could be done. If that's the case, these non-dental workers should be trained, and then they should be calibrated, which was not done in this study.

v. Since this study didn't do the cost-effectiveness and cost-benefit analyses that were done as part of the study, it's not clear if the benefits would be worth the cost of implementing any of the OHE strategies that were looked at in the study in real life. Because of this, these analyses should be a part of any future school-based trials of OHE interventions.

vi. Based on the results of this study, a mix of teacher-led and peer-led strategies can be suggested for OHE and exams of teenagers in schools. But because the study was a two-year trial to see if it worked, the conditions were controlled and good for involving teachers and peer leaders in oral health education and exams. It needs to be looked into how to keep these people interested in OHE activities that happen on a regular basis.

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