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Assessment the Performance of Oral Health Education Programs on Secondary School Students in Mosul City

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Abstract

Background: Upgrading of oral health for children is very important and can be achieved through school based education program which is considered a specialized scope within the spacious path of education, so the main reason for conducting this research was to eradicate dental caries before the need for more aggressive treatment. The aim of study: to assess the effectiveness of school based education programs on oral health ,as well as to find out the relation between oral health and education programs using clinical indices and salivary parameters. Materials and Methods: Ninety secondary school female pupils from two government secondary school in Mosul city were included in this experimental study has been conducted from 3 to 28 April 2022 . The study included oral health education that recording plaque index (PI), gingival index (GI), measuring salivary pH, Alban caries activity test (CAT) (modified Snyder test) for assessment of caries activity. The data were recorded at zero phase in the first visit before the beginning of the education and at day 15 of education 50 pupils were educated and considered as test group to be compared with 40 pupils who didn't receive any oral education as control group. Data was analyzed by IBM SPSS statistic version 25 software using nonparametric Paired t-test (Mann-Whitney U Test) and Wilcoxon signed rank sum test for data comparisons. P value ≤0.05 was considered statistically significant. Results: The results showed significant effect of oral health education programs on saliva pH, Alban CAT, PI and GI. when comparing between test group at base line (0 time) and at day 15 (pre and post education) and between test group when compared with control. While no differences between pre education and control groups. Conclusion: Oral health program used in the present study revealed a significant effect at p value ≤ 0.05 amelioration in the oral health parameters used in the study .

Keywords
Alban test, Caries activity, Gingival index, Plaque index

The oral cavity can be considered as hell gate since it's the site for the most commonly distributed, chronic oral diseases which are dental caries and periodontal diseases particularly among small age individuals, as well as have great impact on systemic health [5]. The oral health education is a one of the major human rights. Upgrading of the oral health by oral health education programs should be a fundamental goal that must reach all the individuals in the society without distinction, so school based education program is one of the ways to achieve this goal [9]. At an international level, the rates of dental caries and periodontal disease have changed greatly during the last two decades[11]. In some developing countries where school based

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oral health programs are substandard high caries prevalence are noticed among school age individuals [15]. Achievement of an integral dental health education to develop a powerful preventive weapon required instructions & effective plaque elimination methods[5]. Dental caries is a dynamic multifactorial chronic disease, one of the major health problems that need to be confine [6]. Initial carious lesion is reversible that can be prevented before cavitation will take place therefore oral health education is an effective method for caries prevention and treatment of early carious lesions to embed the lesion progression to irreversible state [2]. From microbiological point of view caries activity tests are reliable methods for assessing individual caries risk. Different tests can be used for detection of caries activity as counting of saliva or plaque cariogenic bacteria that have acidogenic metabolic activity [10]. Prediction of future caries development is known as caries risk assessment (CRA) it's the probability that caries will occur not only how much current caries are present, salivary pH and the buffering capacity of saliva are useful tools in this aspect [1]. They are based on evaluating of the causative and preventive factors that play a role in caries development and prevention that directly affect the clinical decisions, it must be involved in a treatment plan to help the clinician to choose the perfect decision for diagnosis, treatment and recall appointments, Many of CRA tests are already available and usable in most developed countries , but is not currently used for Iraqi people [15].

Materials and Methods

This study was carried out in Mosul city at the University of Mosul department of basic dental science. It can be consider one of the oral health education trial in our city conducted on two government secondary school, most if not all the students included in the test group even the education staff were greatly interested during the presentation they participated in the discussion and asked important question, so this study can be considered one of few studies that can provide a thorough summery of validation and performance of oral health education programs[7]. Ethical approval were taken from Nineveh education directorate. 90 females students their age range (12 to 17) years, gathered from different classes and divided them to two groups 50 students represent test group who received oral health education programs and 40 students considered as control group who didn't receive any oral health education programs. Both the test and control groups were examined clinically and microbiologically at base line visit before the beginning with any type of health education program then examinations were carried out at day 15 after two weeks of oral health education. Oral health education comprised 30 minutes presentation about the nature and pathogenesis of the most abundant oral diseases dental caries and periodontal disease in this study we concentrated on dental caries, which is mainly caused by dental plaque and clarify the scientific name (dental biofilm) with discussion about biofilm composition, examination by the individual himself and by the dental staff. Training on correct teeth brushing techniques, the frequency and duration of effective teeth brushing, consumption of low carbohydrates diet including both frequency and consistency of carbohydrate intake.

Individual examination

The amount of plaque for each examined student were detected using plaque index introduced by [8]. Four surfaces of six teeth were examined each surface were scored 0-3, then the mean score, first for each individual then for total participants of each group were calculated. The teeth were dried, examined visually and tested with probe and graded as showed in Table (1).

Table (1) Criteria for Plaque Index

Score	Criteria
0	No plaque in gingival area.
1	A film of plaque adhering to the gingival margin and adjacent area of tooth. recognized by running the probe a cross the tooth surface.
2	Moderate accumulation of soft deposits with in the gingival margin . can be seen by naked eye.
3	Heavy accumulation of plaque with in gingival pocket or on the tooth and gingival margin.

The condition of gingival tissue was assessed by Bleeding on Probing−BOP As in the PI all four surfaces of all teeth are assessed with regard to whether probing elicits bleeding (1) or not (0). Salivary examination were carried out by allowing each student to expectorate directly in

tubs containing prepared sterile Alban test agar (modified Snyder agar) to be incubated for 72 hours for result interpretation. Simultaneously 2 ml of un stimulated midmorning saliva were collected in another sterile tube for pH detection using graduated pH indicator strip[13].The only limitation encountered by the researchers was the absence of some of the students in the control group during the second visit that forced us to exclude them from the study.

Preparation of Culture Media

The preparation of Alban test agar is the same as Snyder medium composition with very little modifications. Its consist of the following ingredients gm/1L: Peptone 20.000 ,Dextrose (Glucose) 20.000, Sodium chloride 5.000, Bromocresol green 0.020 agar 20.000 and pH adjusted 4.8±0.2 at 25°C. Suspending 60 gm/1L. then the mixture was boiled. Distribute 5ml into each test tubes instead of 10 ml test tubes as in Snyder test therefore didn't require to melt the agar, sterilize by autoclaving, cooling the tubes in an upright position, avoid overheating. Ask each individual to expectorate un stimulated saliva to just cover the medium in the tube. Incubate the tubes at 35°C along with non-inoculated control tube . The tubes were examined daily for 72 hours by interpretation of color change and compared with the control tube Table (2) . Detecting the color change from green to yellow and by detecting the depth of color change indicate the amount of acid production [3].

Table (2) Scoring criteria of Alban's test

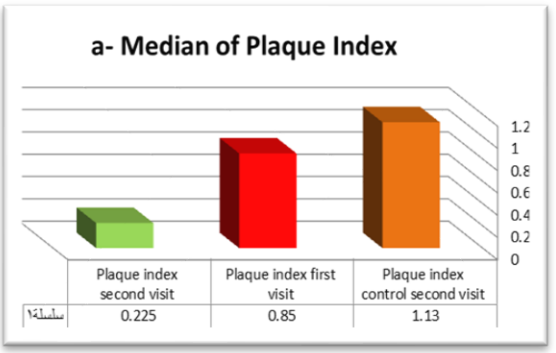
Level of color change	Score
No color change	0
Beginning color change (from top medium down)	+
One-half color change (from top down)	++
Three-fourths color change (from top down)	+++
All the tube color change (from top down)	++++
0,+,++,+++,++++ Level of color change of Alban's agar medium	

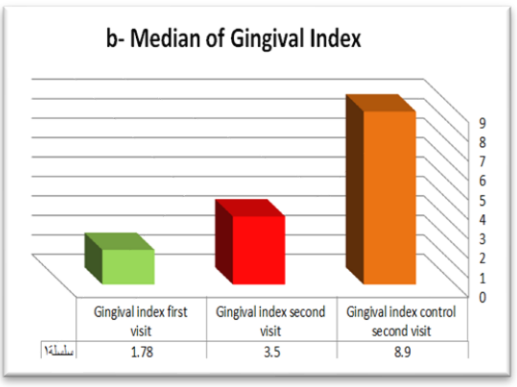
Statistical analysis

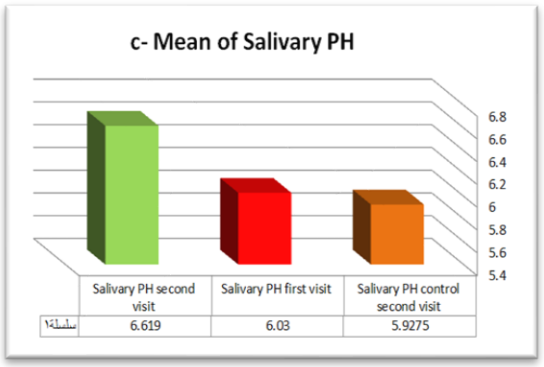
Data was recorded in an excel work sheet descriptive statistics including Mean, Mode, median, were carried out, data were analyzed by IBM SPSS statistic version 25 software using nonparametric Paired t-test (Mann-Whitney U Test) and Wilcoxon signed rank sum test for data comparisons. P value ≤0.05 was considered statistically [5].

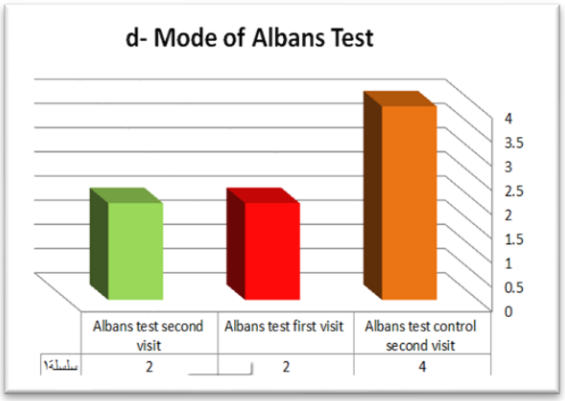
Results

In this type of experimental study school based oral health education was used as a factor that may have influence on different oral health assessment indices (saliva PI,GI, pH and CAT). 90 secondary school females were divided in to two groups test group (50) received oral health education by dental staff and control group (40) individuals who were forbidden from oral health education both groups were examined at the base line (zero time) then after 15 days of concentrated oral health education (for test group), samples were collected for both groups, examined clinically and microbiologically at base line time and after 15 days Figure(1) a.b.c.d showed the descriptive analysis comparing (a) the median of PI (0.22,0.85,1.13) (b) the median of GI (1.78,3.5,8.9) (c) the mean of salivary pH (6.619, 6.06, 5.927) (d) the mode of Alban's (CAT) (2,2,4), before education (base line), post education after 15 days and control groups respectively.









Figure(1) Descriptive analysis results for first visit, second visit, and control groups(a: median of PI, b:median of GI, c: Mean of salivary pH, d: Mean of Alban test)

Alban (CAT) results were shown in (Figure 2)

which depend on the level of color change of Alban's agar medium the greater level of color change indicating for more acid formed by cariogenic bacteria. Normality test was carried out using The Kolmogorov-Smirnov test which were non-normally distributed Mann -Whitney U Test was used to compare between the data of control group and test group before Table (3)and after education Table (4).Table(3) showed that there was no significant differences at P value ≤ 0.05 between control group and test group before education for all parameters used in the study (mean PI, mean GI saliva pH, CAT,) in which the significance of Mann-Whitney U Test for each index respectively were (.231, .172, .705, .140).

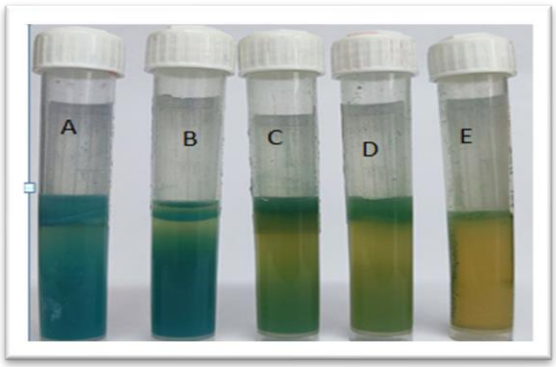


Figure (2) Alban test results A negative, B +, C ++,D +++, E ++++

Table (3) Mann-Whitney U Test for pre education and control groups

Groups	No.	Mann-Whitney −U	Asymp. Sig. (2-tailed)
PI(0 time) pre education test	50	852.500	.231
PI control	40		
GI (0 time)pre education test	50	834.500	.172
GI control Alban	40		
Saliva pH (0 time)pre education	50	954.500	.705
Saliva pH control	40		
Alban (CAT) (0 time)pre education	50	824.000	.140
(CAT) control	40		

Different results were obtained from Table (4) Mann-Whitney U Test revealed significant differences between post education and test groups at P value ≤ 0.05 in which significance were (0.000, 0.001, 0.000. 0.001) for (PI, GI, saliva pH, CAT) respectively.

Table (4) Mann-Whitney U Test for post education and control groups

Groups	No.	Mann-Whitney −U	Asymp. Sig. (2-tailed)
PI(0 time) pre education test	50	462.500	.000
PI control	40		
GI (0 time)pre education test	50	614.500	.001
GI control Alban	40		
Saliva pH (0 time)pre education	50	272.500	.000
Saliva pH control	40		
Alban (CAT) (0 time)pre education	50	620.000	.001
(CAT) control	40		

Simultaneously table (5) Wilcoxon Singed Ranks Test showed the results of comparing between pre and post treatment groups were differ significantly(0.000, 0.004, 0.000, 0.005) for

(mean PI, mean GI, saliva pH, CAT) respectively.

Table (5) Wilcoxon Singed Ranks Test for post and pretreatments groups

Groups	No.	Wilcoxon Z[a]	Asymp. Sig. (2-tailed)*
PI(day 15) post education	50	-5.436[c]	.000
PI (0time)pre education	50		
GI (day 15)post education	50	-2.897[c]	.004
GI (0 time)pre education	50		
Saliva pH (day 15)post education	50	-5.322[b]	.000
Saliva pH (0 time) pre education	50		
Alban (CAT)(day 15)post education	50	-2.835[c]	.005
Alban (CAT)(0time) pre education	50		
a.Wilcoxon Signed Ranks Test			
b. Based on negative ranks.			
c. Based on positive ranks.			

Discussion

Statistically the study showed significant effect of oral health education program on all clinical indices and salivary parameters. Table (3) Mann-Whitney U Test comparing pre education and control groups didn't show significant effect between mean ranks of control and test group at 0 time before education for (PI, GI, saliva pH, CAT), since test group was not yet receive education . Simultaneously Table (4) Mann-Whitney U Test for post treatment and control groups showed significant effect of oral health education on test group after 15 days of education when compared with control group. Wilcoxon Singd Ranks Test Table (5) comparing between post and pretreatment groups revealed significant effects of training and education on each index used in the study. A study trying to analyze mean plaque scores that showed significant($P=0.000$) with ($p< 0.005$), reduction of mean plaque index after tooth brushing training when compared with control group and no significant difference on plaque score of treatment group before education with p-value = 0.127 ($p>0.05$) [14]. A direct impacts of brushing technique activities were highly detected in a study that showed no significant effect detected between pre-training test and control groups scores $p=0.606$ with ($p<0.05$), while showed significant difference $p= 0.000$ with ($p<0.05$)between the post-training test scores of the children in the study group and control group, the same study revealed that the scores of post-training test group children were significantly higher than pre-training test score, these results were compatible to our study results [11]. Caries activity tests like Alban's test has been used in this study as a microbiological parameter to detect the salivary acidogenic potential, which reflect the metabolic activity of cariogenic bacteria like Streptococcus mutans and lactobacilli. This test uses less amount of prepared culture medium if compared with Snyder test its considered a simple substitute for the Snyder test where both of them are colorimetric interpretation tests, but Alban's test result can assess caries activity at various observation time points. Different color result was interoperated(Figure 2) in to different grade which were tabulated and analyzed statistically. A great positive relation between caries risk assessment for treatment (CRAFT) scores and Alban's test (Spearman's Rho = 0.874) was found [13]. In athletes after incremental running field test (IRFT) and at maximum workload salivary flow rates reduced ($P = 0.001$ stimulated; $P = 0.01$ unstimulated) with significant increase of saliva pH($P = 0.003$) as well as statistical correlation between caries prevalence and the cumulative weekly training time was significant ($r = 0.347$, $P = 0.04$) [4]. A study assessed different oral health parameters: (saliva flow rate, salivary viscosity, gingival index) that showed improvements in test group, un stimulated salivary flow rate increased significantly in group l and ll after 6 months of preventive protocol($p = 0.001$). Reduction of salivary viscosity was also statistically significant ($p = 0.02$).Simultaneously gingival index score showed significant reduction ($p = 0.02$) in group I from 1.07 ± 0.35 to 0.20 ± 0.23 and in group II from 1.04 ± 0.28 to 0.85 ± 0.25,which was agreed with our results, this result revealed the impact of oral health education to use correct tooth brushing technique and clarify the role of plaque in the pathogenesis of oral diseases. Finally buffering capacity of saliva showed improvement in the two groups, in group l

elevated from 3.07 ± 2.64 to 10.40 ± 0.82 and in group II, it increased from 3.20 ± 1.47 to 9.33 ± 1.44, which was statistically significant and agreed with this study that revealed significant effect of oral health education on salivary pH parameter between both pre and post-education groups, also between post-education and control group [12].

Conclusion

Education during our program on secondary school was effectively enhanced and improved both clinical and microbiological criteria used in this study, in our country more studies are required to educate students to improve their oral habits .

Recommendations

Different forms of school oral health education programs by lectures or discussion for both students and teachers considered as an effective way to improve oral health and eradicate oral disease from the beginning and must be popularizes for all school in cities of our country

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Conflict of interest: Researchers reported no any conflict of interest.

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