THE EFFICACY OF SCALING IN THE FIRST-YEAR STUDENTS WITH GINGIVITIS AT HANOI MEDICAL UNIVERSITY

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Abstract

Objectives: evaluate the gingival status in the first-year students in Hanoi Medical University and the effectiveness of treating gingivitis by scaling. **Materials and Methods:** This research was designed as two cross-sectional surveys before and after a clinical intervention. Subjects included 71 first-year students at Hanoi Medical University who were chosen randomly. After the first examination, there were only 46 cases of moderate gingivitis prescribed to take tartar and continuously checked again after three months. **Results and Conclusions:** The rate of gingivitis in the group of students was high at 80%; however, the results in three months later saw 72% of cases having no anymore gingivitis among 46 intervened students. The improved status of gum occurred in both genders on the post-intervention as Gingival Indexes at good level rocketed from 0% to 60% of cases, mainly in incisors on both jaws. The rate of Oral Hygiene Index-Simplified in moderate and poor declined simultaneously by a half in both genders showed in the very low level of debris in both jaws and in the high level of the Calculus Index in good accounting for over 98% on the whole teeth regions.

Keywords: Gingivitis, Gingival Index, Debris Index Simplified, Calculus Index Simplified, Oral Hygiene Index Simplified.

1. INTRODUCTION

Gingivitis is a serious problem belonging to the oral disease group in several regions globally [1, 2]. The World Health Organization (2007) estimated that approximately 5-15% of world population having severe gingivitis that is the majority cause of tooth loss and significant impairment of the quality of life [1]. In Vietnam, some researches on the rate of gingivitis in student-aged showed alarming numbers, although the rate tended to decline slightly in recent years. Accordingly, the ratio of gingivitis students nationally in 2001 was recorded at approximately 93.53% compared with 98.33% in the previous 10 years in the similar age groups [3-5].

Various causes of gingivitis have assessed in researches, of which tartar has found out as the most popular one in Vietnam. The percentage of people who needed to be taken tartar in the age of 15 in 2001 was nearly 83,4% nationally [4]. In addition, in the smaller scope of studies, the proportion of cases having tartar was also noteworthy. In 2013, among 86% gingivitis cases in a school in Hanoi, the proportion was 89% in which most Calculus indexes were in moderate and high level [6].

In order to prove effectiveness of the method treating gingivitis by scaling, some researches were conducted in Vietnam. The results of an assessment on 122 gingivitis patients in the 20-44 age group at the National Hospital of Odonto-Stomatology in 2003 revealed that the rate of patients who had normal gingival index increased gradually from 0% before to 33% after four weeks of treatment. However, the research indicated that the treatment could not prevent the development of plaque and tartar completely as Plaque Index at level 0 (no plaque) declined from 49.18% in one week to 21.69% in four weeks after the treatment [7]. Similarly, in 1994, an interventional study on 71 gingivitis cases in the 15-24 age group at the Hanoi Institute of Odonto-Stomatology also illustrated that the best improvement on gums was in one month after the intervention with 92.3% in male and 100% in female, but it was not remained in a long time, especially in three months after scaling, the status of healthy gums went down to 72.7% in male and 80% in female [8].

Hanoi Medical University's students were not exceptions of gingivitis as the proportion was 87.7% according to a study in 2007, of which the

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Received: 30/3/2015; Revised: 13/5/2015; Accepted: 20/5/2015

majority is mild inflamation (76.8%) and the level of inflammations in the mandible more serious than in the maxilla that concentrated in the mandibular incisors (89.2%) [9]. In general, although medical students have trained on dental care, but the skills and attitude in terms of oral hygiene practices are still many shortcomings, leading to periodontal disease including tartar, gingivitis has not much difference with the same age group of subjects in other studies. While researches on gingivitis in student groups at Hanoi Medical University are hardly with incomprehensive results, the dental care combined with the study of these students is set out as an urgent need.

As a consequence, the study was conducted with the aim of evaluating the gingival status in the first-year students in Hanoi Medical University and the effectiveness of treating gingivitis by scaling.

2. MATERIALS AND METHODS

This research was designed as two cross-sectional surveys before and after a clinical intervention.

The study was conducted at the Dental Clinic, School of Odonto-Stomatology from January 2013 to November 2013. This clinic placed in the Hanoi Medical University that was convinient for participants to take part in the exmination. It also had enough hygiene conditions and professional machines to implement the research.

Selection criterias of the subjects in the first examination was first-year-students who were strong and voluntary to participate the research, at Hanoi medical University in 2013. They must have not any systemic diseases or immunological diseases that might confoud the research's results.

Applying the formula for determining the sample size in health studies according to WHO [10], the number of students should be seen as follows:

$$n = Z^{2}_{(1-\alpha/2)} \frac{p.(1-p)}{(\varepsilon.p)^2}$$

n: sample size

α: level of statistical significance (0.05)

Z = 1.96 for 95% confidence level

p: percentage picking a choice, expressed as decimal [4]

1 - p : predicted percentage without gingivitis (15%)

ε : relative accuracy of the model parameters and population parameters (0.1)

The result was n = 68 with p = 85% [4]. In order to reserve case study subjects refused to participate, we took the extra 5% on the sample size. So the sample size of the study was 71 cases. The whole first-year students at Hanoi Medical University in 2013 were numbered, arranged in random sampling table [10], then we drew to randomly select 71 students to participate in research.

All these students were examined and evaluated gingival status according to World Health Organization score level. Studied variables included Gingival Index (GI), Oral Hygiene Index Simplifed (OHI-S), Calculus Index Simplified (CI-S) and Debris Index Simplified (DI-S). The levels of assessment these indexes were as follows:

- Gingival Index (GI):
  - Level 0: GI is very good
  - Level 0.1-0.9: GI is good
  - Level 1.0-1.9: GI is moderate
  - Level 2.0-3.0: GI is poor
- Calculus Index Simplified (CI-S), Debris Index Simplified (DI-S):
  - Level 0: CI-S and DI-S is very good
  - Level 0.1-0.6: CI-S and DI-S is good
  - Level 0.7-1.8: CI-S and DI-S is moderate
  - Level 1.9-3.0: CI-S and DI-S is poor
- Oral Hygiene Index Simplifed (OHI-S): was calculated from CI-S and DI-S
  - Level 0: OHI-S is very good
  - Level 0.1-1.2: OHI-S is good
  - Level 1.3-3.0: OHI-S is moderate
  - Level 3.1-6.0: OHI-S is poor

After diagnosing, moderate gingivitis cases among 71 these students continuously that had to be caused by tartar only, not by other causes such as systematic diseases or immunological diseases, were prescribed to take off tartar.

The instrument of scaling included:

- The standard dental examination chairs, full of light
- A specialist tool tray, dental mirror, gripping, explorer
- Gloves, cotton, gauze, sterilizing instruments
- Ultrasonic scaler: Cavitron Bobcat pro

Examiners were dentists in some governmental hospitals in Hanoi who were accepted by the Ethic Council of the School and the University.

The progression of scaling was as follows:

- Preparation of instruments: an examination tray; ultrasonic scaler, an ultrasonic insert; Rubber and polishing powders; Nupro

vanish; and mouthwash with fluoride.

- Preparation of patient and doctor: patients lay on dental examination chair, reclining seat back 45 degrees, the patient's head can turn right or left, back or bending depending on the position to remove tartar. Dentist used the saliva suction of dental chair, glasses, masks and gloves.
- Process:
  - Select the appropriate sterile ultrasonic insert
  - Open water supply valves throughout the system.
  - Turn on the ultrasonic scaler.
  - Set the appropriate speed.
  - Set the highest adjustable water.
  - Turn the handle up on, press foot pedal until seeing water appear and hold on about 2 minutes for the water spilling out.
  - Lubricate the O-ring at the top of the insert by water before placing in the handpiece slightly.
  - Adjusting the system to ensure adequate the flow of water
  - Set the speed depending on the position scaling.
  - Place the insert into the patient's mouth and ensure that lips, cheeks, tongue are not touched to avoid accidents when operating machinery.
  - Start around the tooth, press the foot pedal about 10 seconds, then stop for 5 seconds alternatively.
  - Polish the surface and sides of tooth using polishing powder and Nupro vanish by slow hand drill.
  - Pump to wash the tooth with 3-6% hydrogen peroxide and mouthwash.
  - Guide dental hygiene

Data were entered and processed using SPSS v.15.0 software.

For ethical issues, all personal information of participants will be kept confidential; the proposal of this research was accepted by the Ethic Council of the School and the University before conducting; researchers explained to the participants rights and risks when joining the research that were accepted before examining and treating; and the research's result was defended successfully and accepted by the Hanoi Medical University's science council in February 2014.

However, some limitations existed in the research when due to the limited funding, the study was conducted only on the limited number of students; the subject group was not expanded, or in-depth studies were not been implemented on the environmental factors or personal habit involved gingvitis in communities.

3. RESULTS AND DISCUSSIONS

3.1. Gingival status

Generally, after the first examination, the gingivitis status in the first-year student group at Hanoi Medical University concentrated mainly in moderate, at 65% and in mild, at 15% without any severe cases. Therefore, there were 14 no-inflamed cases who were unnecessary to intervene, 11 cases needed to be instructed oral hygiene care and 46 cases precribed to take tartar in combination with training oral hygiene care (Table 3.1).

Table 3.1. Distribution gingivitis levels by gender before the intervention

Level	Prescription	Account (Acc.) and Percentage (Per.) (n=71)					
		Male		Female		Sum	
		Acc.	Per.	Acc.	Per.	Acc.	Per.
No gingivitis	No intervention	4	16	10	22	14	20
Mild gingivitis	Instruct oral care	5	20	6	13	11	15
Moderate gingivitis	Scale, instruct oral care	16	64	30	65	46	65
Sum		*25*	*100*	*46*	*100*	*71*	*100*

The rate of gingivitis in the research was similar to results of the national evaluation in 2001, at 83.4%, and other studies of Cao Ngoc Quyen in 2003, at 86% as well as Nguyen Thi Nhu Trang, Le Long Nghia's study in 2007, at 87.7% in the same age group in Hanoi [4, 6, 9]. Though studies had deployed on different subjects with different account, all of them contributed meaningfully to describe the gingivitis ratio in the student-aged in Hanoi.

The verification test showed that differences in the level of intervention between sexes had not statistical significance.

3.2. The effectiveness of scaling

3.2.1. Gingival Index (GI)

Three months after the intervention, the Gingival Index had the most dramatical improvement in comparison with other indicators using in the research on all teeth groups. This improvement was statstical significance with $p < 0.001$.

Among 46 intervened cases, the Gingival Index in large maxillary molars at the good level was over 93%, meanwhile the highest Gingival Index at moderate level in the teeth areas was only 6.5%. There was no cases in poor (Table 3.2).

Table 3.2. Changes in GI in both jaws before (bef.) and after (aft.) intervention

Level	Percentage (n=46)													
	Teeth group 16		Teeth group 12		Teeth group 24		Teeth group 36		Teeth group 32		Teeth group 44		Sum	
	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft
Good	96	93.5	46	96	6.5	98	6.5	91	6.5	74	26	93.5	0	67
Moderate	4	6.5	50	4	82.5	2	82.5	9	76	26	65	6.5	89	33
Poor	0	0	4	0	11	0	11	0	17.5	0	9	0	11	0
Sum	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*

Hence, the Gingival Index at good level in this research was over double results of Hoang Kim Loan and Do Quang Trung' study in 2011, at 67% and 33% respectively; however, the period of time for assessment after the intervention was quite different between the two researches, by three months and one month respectively [7].

Combining to findings of Le Thi Thom and Hoang Kim Loan, a rule of gum disease progression after scaling was revealed that the fast improvement was remarkable in 4 weeks after the treatment; however, there was only Le Thi Thom's study having further reassessment after three months [7, 8]. Consequently, the data of studies related to gingivitis on longer period after scaling still needs contribution from more researchers so that can be represented results for Hanoi students.

It was also seen that the region having the most severe gingivitis was mandibular incisors with 74% in good which was ten times higher than the rate before the intervention, at just 6.5%. The Gingival Index in moderate of this area decreased more than three times, from 76% to 26%, but being still higher than other regions.

In fact, the difficulties of praticing oral hygiene in mandibular incisor region are often problematic much more than other regions in both jaws because they do not depend only on the habit or behavior, but also on the tooth anatomy, eating habit, etc that can not be adjusted immediately just by scaling.

There are not statistically significant differences between the genders with $p=0.44$.

3.2.2. Oral Hygiene Index-Simplified (OHI-S)

Oral Hygiene Index-Simplified was calculated on Debris index simplified (DI-S) and Calculus index simplified (CI-S).

The Debris Index-Simplified of most teeth areas were also improved at the different levels by three months, especially positive changes of the large molars group 16 from 62% in moderate and poor before the intervention to only 6.5% at moderate level and 93.5% at good level. Other teeth groups also saw a slight increase by more or less 35% in moderate. More noticable, the Debris Index-Simplified of mandibular incisors had no improvement when the rates of moderate level and good level are the same (table 3.3).

Table 3.3. Changes in DI-S in both jaws before (bef.) and after (aft.) intervention

Level	Percentage (n=46)													
	Teeth group 16		Teeth group 12		Teeth group 24		Teeth group 36		Teeth group 32		Teeth group 44		Sum	
	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.
Good	38	93.5	61	98	70	100	39	93.5	50	65	52	91	15	54
Moderate	60	6.5	39	2	30	0	61	6.5	48	35	48	9	85	46
Poor	2	0	0	0	9	0	0	0	2	0	0	0	0	0
Sum	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*

On the whole, the DI-S after the intervention had improved considerably that was proved by the fall of moderate and poor levels from 85% to 46% and the climb of good level from 15% to 54%. The growth was lower than that of the GI, but being still statistically significant with p <0.001.

According to Table 3.4, at the point of three months after the intervention there was little tartar with only 2% at moderate level in large maxillary molars. It was similar status in the lower jaws as the ratio of the good CI-S was over 98% of cases.

Table 3.4. Changes in CI-S in both jaws before (bef.) and after (aft.) intervention

Level	Percentage (n=46)													
	Teeth group 16		Teeth group 12		Teeth group 24		Teeth group 36		Teeth group 32		Teeth group 44		Sum	
	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.
Good	68	98	72	100	74	100	9	98	41	98	41	98	4	96
Moderate	30	2	26	0	26	0	82	2	56	2	55	2	92	4
Poor	2	0	2	0	0	0	9	0	4	0	4	0	4	0
Sum	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*

Compared with DI-S, CI-S index showed more remarkable recovery. The general CI-S in moderate after the intervention had shrunk from 92% to just 4%. This may be caused by the faster existence and recurrence of plaque than that of tartar.

The difference between before and after the intervention of the CI-S was also statistically significant with p <0.001.

The Oral Hygiene Index-Simplified was calculated on DI-S and CI-S after the intervention. The poor OHI-S score was no longer, whereas the moderate was 46% and the good accounted for 54% (Table 3.5). In male, the percentage of OHI-S score in moderate was more than the good level, at 56% and 44% respectively. In contrast, the proportion of good OHI-S score in female at 60% higher than the moderate level at 40%.

Table 3.5. Changes in OHI-S distributed by gender before (bef.) and after (aft.) intervention

Level	Percentage (n=46)					
	Male		Female		Sum	
	Bef.	Aft.	Bef.	Aft.	Bef.	Aft.
Good	0	44	0	60	0	54
Moderate	100	56	97	40	98	46
Poor	0	0	3	0	2	0
Sum	*100*	*100*	*100*	*100*	*100*	*100*

The difference in the OHI-S index after the intervention between two genders through testing by Fisher's test was not statistically significant. However, the difference of OHI-S index between before and after scaling was a statistical significance with p <0.001.

In order to compare the difference between levels of GI, DI-S, CI-S, OHI-S, cross table and Chi squared test were used. As the result, there was not any specific classification level of GI, DI-S, CI-S and OHI-S existing statistically significant difference between the sexes.

In summary, the results of the assessment after three months on a group of 46 intervented students could be seen clearly through this research that the general improvement of gingivitis was very good. Gingivitis levels saw a considerable reduction from 100% in moderate to 72% having no gingivitis (Table 3.6).

Table 3.6. Changes in gingivitis level ditributed by gender before and after the intervention

Level	Account (Acc.) and Percentage (Per.) (n = 46)							
	Before				After			
	Male	Female	Sum		Male	Female	Sum	
	Acc.	Acc.	Acc.	Per.	Acc.	Acc.	Acc.	Per.
No gingivitis	0	0	0	0	12	21	33	72
Mild gingivitis	0	0	0	0	3	8	11	24
Moderate gingivitis	16	30	46	100	1	1	2	4
Sum	*16*	*30*	*46*	*100*	*16*	*30*	*46*	*100*

In terms of genders, results of the research corresponds to the rate in the study of Le Thi Thom (1994), with 72.7% of men and 80% women achieved better status of gum after 3 months of the similar interventional method [8].

This improvement can be explained by the good awareness of first year students at Hanoi Medical University with oral hygiene care trained by doctors at the first time of examination.

The difference in the level of gingivitis before and after scaling was statistically significant with $p<0.001$, although the difference between the sexes was not with $p>0.001$.

4. CONCLUSIONS

4.1. Gingivitis status

The proportion of gingivitis of the first year student group at Hanoi Medical University in 2013 was high, at 80%, which accounted for 15% in mild, 65% in moderate and 20% in good.

In cases of gingivitis, tartar was prescribed to take off in 46 cases in moderate level (equiv. 65%); other 11 cases (equiv. 15%) had mild inflamation that only needed to give oral hygiene instructions.

Checking 46 cases of gingivitis after scaling three months, there were only 24% in poor and 4% in moderate.

4.2. Gingival Index

After 3 months, the GI at good level had risen over twice in the upper incisors, from 46% up to 96%, and increased eleven times in the mandibular incisors, whereas the status of gums in other teeth regions had good rate at over 90%.

The good level of both genders jumped to the rate of 67% compared with 0% in the first examination.

4.3. Oral Hygiene Index-Simplified

The OHI-S in moderate and poor were simultaneously reduced by a half in both sexes. The proportion of moderate level in male was higher in female.

The level of debris on upper jaws was a very low, at just under 6.5%, but the proportion in the mandibular incisors was still 35%.

The Calculus index at good level from 98% to 100% on all teeth regions.

Most significantly, the calculus index were improved dramatically from 92% at moderate level before the intervention to 96% in good in three months after that, in which the ratios of good level in men and women were equal at nearly 96%.

4.4. The effectiveness of the intervention

In general, through the research's results as above, it can be confirmed the effectiveness of scaling on the group of first-year students at Hanoi Medical University who had gingivitis in moderate and severe on the whole indicators such as Gingival Index, Oral Hygiene Index-Simplified consisting Debris index simplified and Calculus index simplified, gingivitis rate, although the levels of progression were different. The improvement of gingivitis among students on post-intervention compared to pre-intervention was statistically significant with $p<0.001$.

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