A CLINICAL STUDY ON INCIDENCE OF GINGIVITIS AMONG ORTHODONTIC PATIENTS

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ABSTRACT

The present study determines the incidence of gingivitis among orthodontic patients of the Department of Orthodontics, College of Dentistry, University of the Philippines, Manila. A nonintervention cohort study on a total number of 36 subjects with fixed orthodontic appliance was carried out to examine the clinical symptoms of gingivitis. Change in color, contour, surface texture, and consistency of the gingiva were observed during the period of one month. The Gingival Bleeding Index was employed for the objective qualitative analysis of the gingival status. The questionnaire used in the study, collected information on oral hygiene habits, educational attainment, and monthly family income of the patients and these variables were correlated with the age and sex of the patients. The results showed an increase in the incidence of gingivitis based on the development of clinical symptoms observed during the examination period. However, there was no significant difference in the mean bleeding index between the first and second examinations (a=0.05).

KEY WORDS

Inflammation, Gingivitis, Plaque, Fixed orthodontic treatment, Incidence

OBJECTIVE OF THE STUDY

To investigate the incidence of gingivitis among orthodontic patients who have undergone fixed orthodontic treatment for a minimum of two months. Also, to analyze the data obtained from Gingival Bleeding Index, and correlate the bleeding index with age, sex, oral hygiene methods, educational attainment and socioeconomic status of the patient.

REVIEW OF LITERATURE

The inflammatory reaction in the human gingiva is same as that of other regions of the body, and is explained as a response to tissue injury. Thomas et al[1] explained the local defense mechanism of the gingival tissue to the bacteria present in the adjacent sulcus or in periodontal pockets. They demonstrated that globulins in the tissues are present in varying amounts in different areas. The attraction of the bacteria to the gingival tissue was always in an area of globulin concentration and plasma cells being the site of bacterial attraction.

The sequence of events in the development of gingivitis is differentiated in three stages,[2] starting from the initial lesion lasting 2-4 days, featuring increased gingival fluid flow; then the early lesion lasting 4-7 days marked with erythema, bleeding on probing and finally, the established lesion lasting 14-21 days marked with changes in color, size, texture, consistency.

The pathologic changes in gingivitis are associated with the presence of microorganisms in gingival sulcus. These organisms are capable of synthesizing various products (e.g., collagenase, hyaluronidase, protease, chondroitin sulfatase, or endotoxin) that cause damage to epithelial and connective tissue cells and to intercellular constituents, such as collagen, ground substance, and glycocalyx (cell coat). The resultant widening of the spaces between the junctional epithelial cells during early gingivitis may

permit injurious agents derived from bacteria to gain access to the connective tissue. Microbial products activate monocytes and macrophages to produce vasoactive substances such as prostaglandin E2, interferon, tumor necrosis factor or interleukin-1.

Flieder, Sun & Schneider[3] through histopathologic study revealed that the characteristic pattern of inflamed human gingiva consist of chronic inflammation involving lymphocytes, fibroblasts, and blood vessels. Long-standing lesions showed large numbers of plasma cells, and in yet older lesions, Russell bodies were found within the plasma cells. Polymorphonuclear leucocytes are regularly found in saliva and are known to migrate through the junctional epithelium, during gingival inflammation. Onset of gingivitis has been associated with an increase in the number of PMN's in saliva or in washings of the marginal gingiva.

Huser et al[4] studied the microbial flora in patients undergoing orthodontic treatment and they observed an increase in the level of plaque accumulation and gingival inflammation after tooth banding as compared to controls. The report showed that the placement of orthodontic bands is associated with the establishment of microorganisms usually found in periodontal diseases (spirochetes, motile rods, filaments, and fusiforms), however a decrease in cocci was noted. Sinclair et al[5] noted no significant increase in the number of highly pathogenic Gram-negative anaerobic organisms, which have been strongly implicated in gingivitis and periodontitis in adults but an increase in the percentage of Streptococci and a decrease in the percentage of Actinomyces in the subgingival plaque was noted. Gingivitis was seen primarily on the bonded incisors, rather than on the banded molars, and it was particularly marked on the labial surfaces.

Carter & Barnes[6] reviewed gingival bleeding as an early indication of gingivitis, which is easily detectable clinically. Meitner et al[7] investigated whether visual inflammation of gingival bleeding on probing is the earlier indicator of gingivitis. The data suggested that the surfaces changed since the first examination, as there was significantly greater number of surfaces, which bled after probing compared to either a color change alone, or combination of both color change and bleeding. It was concluded that substantial changes in healthy gingival surfaces occurred in as brief a period as one month. The findings supported an emphasis on gingival bleeding indices for detection of early deviations from health.

Ainamo & Bay[8] reviewed the history of periodontal index system as started with the subjective determination of the periodontal condition as poor, medium or good in the late 30's. The PMA index was modified by Parfit (1957), Periodontal Index (Russel, 1956), OHI Index (Greene & Vermillion, 1960), Debris Index of the Oral Hygiene Index (Quigley and Hein, 1962), combined gingival and periodontal indices of Russel and Ramfjord, Plaque Index (Silness and Loe 1963, 1964) were reviewed.

Carranza & Newman[9] states that normal gingival color is 'coral pink' and is produced by the tissue vascularity modified by the overlying epithelial layers. The gingiva becomes red when there is an increased vascularization or the degree of epithelial keratinization becomes reduced. In chronic inflammation, the gingiva is red or bluish red in color, owing to vascular proliferation and reduction in keratinization causing epithelial compression by the inflamed tissue, and venous stasis adds a bluish hue. Both chronic and acute inflammations produce changes in the normal firm, resilient consistency of the gingiva. The changes in gingival consistency can be puffy, soft and friable, or firm and leathery depending on the underlying pathological stages. Loss of surface stippling is an early sign of gingivitis. In chronic inflammation, the surface is either smooth and shiny or firm and nodular, depending on whether the dominant changes are exudative or fibrotic. Changes in gingival contour are often associated with gingival enlargement. Patients with greater gingival inflammation often experience more pain and discomfort from periodontal probing and

scaling.[10] A strong relationship of bleeding and inflammatory pain may indicate the importance of blood-born factors such as bradykinin and serotonin in gingival inflammation. The histopathological alterations that occur in gingival inflammation resulting in gingival bleeding are dilation and engorgement of the capillaries and thinning or ulceration of the sulcular epithelium.[11] Thus as the capillaries are engorged and thinned and degenerated epithelium becomes less protective; stimuli that are ordinarily innocuous cause rupture of the capillaries and gingival bleeding occurs.

Uncontrolled force may result in a proportion of false positive readings for the presence of gingival inflammation. According to Karayiannis et al,[12] periodontal probing for diagnosing gingival health or disease should not exceed 0.25N in order to minimize the risk for false positive readings. Caton et al[13] found that the probe penetration was significantly greater in the presence of visible inflammation but not with the bleeding after probing and this could have been due to the different degrees of inflammatory change present in the gingival tissue.

Loe, Theilade, & Jensen's[14] withdrawal of all methods of oral hygiene in healthy persons with clinically normal gingiva in "Experimental Gingivitis in Man" resulted in gross accumulation of soft debris and development of marginal gingivitis in all subjects. The time necessary to develop gingivitis varied from10-21 days. Reinstitution of oral hygiene resulted in healthy gingival conditions and re-establishment of original bacterial flora. Listgarten & Ellegaard[15] observed similar result in experimental study in rhesus monkeys. Orban[16] mentioned that one of the most important curative measures in gingivitis is removal of irritants from the teeth and maintenance of good oral hygiene. Recognition of systemic factors as endocrine disturbances, nutritional factors, deficiencies are of great importance, however eliminating and correcting these factors without proper local treatment will not lead to any satisfactory results.

The degree of malalignment of teeth is of secondary importance for the occurrence of plaque and gingivitis.[17] Poorly aligned teeth may complicate oral hygiene procedures and lead to increased plaque accumulation and subsequent gingival inflammation. Also, it was found that girls generally had lower plaque and gingivitis scores than boys, and among the boys plaque levels were associated with social class. One of the problems encountered during orthodontic treatment is the maintenance of adequate oral hygiene by the patient. The placement of orthodontic bands and brackets increases the risk of plaque accumulation, caries, food impaction etc. However the patients who had received orthodontic treatment displayed superior oral hygiene to those patients who had not received orthodontic treatment.[18] The implication of this study was that orthodontic treatment provides a lasting improvement in oral hygiene, which could be due to the emphasis that the orthodontist places on good oral hygiene during treatment. Also the findings reported in the baseline study of Davies et al[19] showed that plaque and gingivitis in children with orthodontic treatment were lesser than in control subjects.

Yeung et al[20] investigated that, the experimental group receiving an oral hygiene program consisting of weekly sessions of oral health education, instruction on plaque-control techniques and reviews in plaque removal performance showed a general trend for improved gingival health. Similarly, the use of self-educational materials and personal instruction by dental personnel are equally effective in oral hygiene measures to patients in general dental practice.[21]

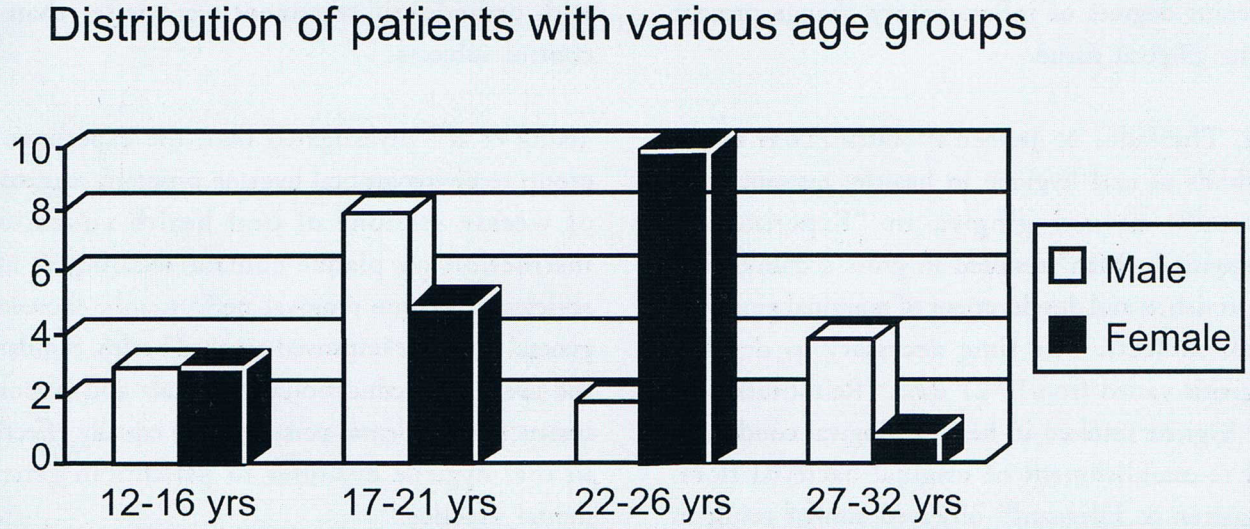
Fournier, Payant, & Bouclin[22] tested the affinity of *Streptococcus mutans* to orthodontic brackets made from metal, plastic, and ceramic. Results indicated that because of their lower affinity, metal brackets present a lower potential for bacterial accumulation than plastic and ceramic brackets. Trimpeneers, Wijgaerts, Grognard et al[23] compared the effectiveness of the types of electric toothbrushes

with a manual multitufted toothbrush in removing supragingival plaque and in preventing the development of gingivitis in adolescent patients with fixed orthodontic appliances. The results demonstrated that the manual toothbrush was the most effective. In another study, a comparison was made between orthodontic toothbrushes and conventional toothbrushes in eliminating microbial dental plaque from teeth and brackets and in the maintenance of periodontal health,[24] no statistically significant difference was found for plaque, sulcus bleeding, and pocket depth among the types of toothbrushes.

MATERIALS AND METHODS

Patient selection was done based on inclusion and exclusion criteria. Thirty-six patients including 17 males and 19 females undergoing orthodontic treatment with standard edgewise appliance or other straight wire appliances such as Roth, and MBT in both arches were included in the study. The duration of treatment was a minimum of two months and age of the patients ranged from 12 years to 30 years old (mean 21 years) at the time of the study. Patients with the history of systemic disease, bleeding disorders, metabolic disorders, pregnant and lactating mothers and patients under systemic antibiotic therapy for periodontal treatment or other generalized conditions were excluded from the study. Patients were not informed about the procedure prior to the survey. The subjects were evenly divided into four age groups ranging from 12 to 32 years of age with even class interval (Graph 1). The subjects were also divided according to educational attainment and monthly family income.

GRAPH 1: DISTRIBUTIION OF PATIENTS WITH VARIOUS AGE GROUP+



Gingival Bleeding Index[25] was recorded using Ramfjord's index teeth and the single highest bleeding score among buccal and lingual surfaces was determined. The partial scoring was done on Ramfjord PDI teeth i.e. 16, 21, 24, 36, 41, & 44. In case of missing first premolar due to orthodontic extraction, the index was modified to consider the second premolar for examination. The scores for each index teeth were computed for all samples and the mean was determined as the bleeding index in both first and second examinations. A blunt probe with gentle force was first inserted into the buccal then lingual side of each index tooth; the probe was then gently moved from mesial to distal within the sulcus

without applying apical pressure.

A questionnaire was used to obtain the data for oral hygiene maintenance methods including brushing, use of interdental cleaning aids, and visit to the oral hygiene procedure. The clinical examination for the research study was done by using sterile mouth mirror and probe under dental light in dental clinic set up. The patients were examined for change in color, contour, surface texture, and consistency of the gingiva to note the development of localized or generalized gingivitis. Two examiners performed the clinical examination; who are residents in the graduate school of orthodontics. Both the researchers examined patients separately, but the researchers applied single standard method to avoid the inter-observer bias. The examiners were calibrated for examination technique prior to the data collection to obtain the same result.

RESULTS

At the initial clinical examination, 80.5% of the subjects showed normal pink gingiva, which decreased markedly to 47.2% in the second examination. The male subjects showed more rapid increase in redness of the gingiva owing to inflammatory changes as compared to the females, which was 11.8% in first examination that increased to 64.7% in second examination. Regarding the contour of the gingiva, 91.7% of the total subjects showed normal scalloped gingiva in the initial examination. Among the patients, the females showed higher tendencies for non-scalloped contour (10.5%) as compared to the males (5.9%). On second examination, overall 83.3% of patients retained scalloped contour, with males showing 23.5% of non-scalloped area as compared to first examination (5.9%), while females remained unchanged during the examinations (Table 1).

Table 1
Clinical changes in color, contour, texture, & consistency of gingiva in examination 1 & 2

		Examination 1				Examination 2				Total			
		Male		Female		Male		Female		Exam. 1		Exam. 2	
		n	%	n	%	n	%	n	%	n	%	n	%
Color	Pink	15	88.23	14	73.68	6	35.29	11	57.89	29	80.55	17	47.22
	Red	2	11.76	5	26.31	11	64.70	8	42.10	7	19.44	19	52.77
Contour	Scalloped	16	94.11	17	89.47	13	76.47	17	89.47	33	91.66	30	83.33
	Non-Scalloped	1	05.88	2	10.52	4	23.52	2	10.52	3	08.33	6	16.66
Surface texture	Stippled	16	94.11	18	94.73	12	70.58	14	73.68	34	94.44	26	72.22
	Non-stippled	1	05.88	1	05.26	5	29.41	5	26.31	2	05.55	10	27.77
Consistency	Firm	17	100	16	84.21	11	64.70	12	63.15	33	91.66	23	63.88
	Edematous	0	0	3	15.78	6	35.29	7	36.84	3	8.33	13	36.11

The initial examination of the surface texture of gingiva revealed equal proportions of male and female showing normal stippled appearance (male 94.11% and female 94.73%). However, in the second examination, both the groups showed a tendency to develop non-stippled surfaces, i.e.; 29.4% among males and 26.3% among females showed non-stippled features of gingiva. Initial examination of the consistency of gingiva showed 91.66% of the total subjects showing normal firm gingiva, while only 63.88% showed firm consistency in the second examination. Results also suggest that the males showed higher susceptibility to undergo edematous changes rapidly, as evident

by the fact that none of the males reported edematous gingiva in the initial examination, which increased to 35.2% in the second examination as compared to only 2.3% rise in females (Table 1).

The results of the Gingival Bleeding Index showed the mean bleeding index score of 9.68 (Standard Deviation 0.2922) and 17.52 (S.D. 0.408) in the first and second examinations respectively. A statistical analysis was performed with Chi square test of homogeneity for the mean gingival bleeding index scores obtained from the first and second examinations in relation to age group and sex (Table 2 and 3). The hypothesis was set if the incidence of bleeding as obtained from bleeding point index was same between the first and second clinical examinations with respect to the age and sex. The test result showed no significant difference between two examinations in either category (a=0.05).

Table 2
X^2 test for mean Gingival Bleeding Index of 1st & 2nd examination in relation to age group

Age group	Mean of 1st exam. index	Mean of 2nd exam. index	Mean difference	Significance (α=0.05)
12 – 16	0.33	0.36	- 0.03	NS
17 – 21	0.27	0.58	- 0.31	NS
22 – 26	0.31	0.47	- 0.16	NS
27 – 32	0.30	0.43	- 0.13	NS

Table 3
X^2 test for mean Gingival Bleeding Index of 1st & 2nd examination in relation to sex

Sex	Mean of 1st exam. index	Mean of 2nd exam. index	Mean difference	Significance (α=0.05)
Male	0.31	0.54	- 0.23	NS
Female	0.28	0.44	- 0.16	NS

(NS: not significant)

When the relation between oral hygiene maintenance methods of all subjects were compared to mean Gingival Bleeding Index scores of the initial and second clinical examinations, the data depicted that, the subjects brushing once a day showed 0.57 and 0.64 mean scores in the first and second examinations respectively, with mean difference of 0.07. The subjects brushing two to three times a day showed 0.24 and 0.46 scores with mean difference of 0.22, and subjects using interdental brush showed 0.25 and 0.46 scores with mean difference of 0.21 between first and second examinations (Table 4).

Table 4
Relation between oral hygiene methods and mean Gingival Bleeding Index scores

Oral hygiene methods	Mean GBI score of 1st examinations	Mean GBI score of 2nd examinations	Difference
Brushing Once/day	0.57	0.64	- 0.07
Brushing 2-3 times/day	0.24	0.46	- 0.22
Interdental brush	0.25	0.46	- 0.21

The results showed; 86% of the total subjects had the habit of brushing two to three times a day, with only 13.9% of the subjects practiced the brushing once a day. No appreciable difference was found between males and females regarding the frequency of brushing habits. Overall, 66.66% of the subjects used interdental brush with higher percentage of females using it as an adjunct for oral hygiene maintenance, i.e. 73.68%. Use of mouthwash was limited to 25% of the total subjects, while 22% used both interdental brush and mouthwash. Also, a total of 30.5% subjects reportedly did not use any of the adjunctive oral hygiene aids other than toothbrush, this percentage was higher in males with 35.29%. Besides, 52.77% of the total subjects get their scaling done regularly once a year and 22% undergo scaling twice a year. However, 25% of the total sample was found to be irregular in performing scaling. This figure was high among the male samples, i.e. 35.29% of the males were irregular in scaling (Table 5).

Table 5
Distribution of patients according to oral hygiene maintenance methods

	Examination 1				Examination 2				Total			
	Once/day		2-3 times/day		Interdental brush		Mouthwash		Once/Yr		Twice/Yr	
	n	%	n	%	n	%	n	%	n	%	n	%
Pink	15	88.23	14	73.68	6	35.29	11	57.89	29	80.55	17	47.22
Red	2	11.76	5	26.31	11	64.70	8	42.10	7	19.44	19	52.77
Scalloped	16	94.11	17	89.47	13	76.47	17	89.47	33	91.66	30	83.33

With respect to educational attainment; 66.7% of the elementary school level students, 53.3% high school level students and 77.8% college graduates used interdental brush in addition to toothbrush. Whereas, 100% elementary school students, 80% high school students and 88.9% college graduates practiced tooth-brushing two to three times a day (Table 6).

Table 6
Relation of education attainment or oral hygiene measures

Educational attainment	No. of subjects	Tooth brush				Interdental brush	
		Once/day		2-3 times/day			
		n	%	n	%	n	%
Elementary	3	0	0	3	100	2	66.7
High School	15	3	20.0	12	80.0	8	53.3
College graduate	18	2	11.1	16	88.9	14	77.8
Total	36	5	13.9	31	86.1	24	66.7

Table 7
Relation of monthly family income to oral hygiene measures

Monthly income *(in ph. Peso)*	No. of subjects	Tooth brush				Interdental brush	
		Once/day		2-3 times/day			
		n	%	n	%	n	%
<10000	9	4	44.4	5	55.6	4	44.4
10000 - 20000	19	1	05.3	18	94.7	14	73.7
>20000	8	0	0	8	100	6	75.0
Total	36	5	13.9	31	86.1	24	66.7

(US $ 1 = Ph Peso 53 in Dec 2002)

DISCUSSION

Loe & Theilade's[14] study on experimental gingivitis in man showed development of gingivitis due to accumulations of soft debris when oral hygiene methods were withdrawn. Page et al[2] described the events in the development of gingivitis into initial lesion, early lesion, and established lesion marked with changes in color, contour, texture, and consistency. The clinical examination in the present study comprised the gingival examination for change in color, contour, surface texture and consistency observed during one month. Meitner et al[7] investigated whether visual inflammation or gingival bleeding on probing is the earlier indicator of gingivitis, they found significantly greater number of bleeding on probing and it was concluded that substantial changes in healthy gingival surfaces occurred in as brief a period as one month.

On clinical examination, a high percentage of subjects, i.e. 52.8% developed redness in gingiva in second examination as compared to 19.4% subjects in the initial examination. These data show that the clinical symptoms of gingivitis in terms of color; developed remarkably in fixed orthodontic patients with time. It may be attributed to the difficulties in plaque control measures or poor maintenance of the oral hygiene. As redness of gingiva is the first clinical symptom, probably the manifestation is more than other clinical parameters. The symptom however varies with time and dependent of many other factors including nutritional, hormonal or systemic factors, which are not considered in the present study.

The normal scalloped contour of the gingiva changed to non-scalloped contour from 8.3% in first examination to 16.7% in second examination. The data also showed that, female subjects with non-scalloped contour remained the same in the second examination while males developed 5.8% in first examination to 23.5% in second examination. The study of the surface texture of the gingiva, which is accounted by surface stippling of the attached gingiva showed an increase in loss of stippling as apparent more in second examination. The stippling increased from 5.6% in first examination to 27.8% in second examination in overall samples with no remarkable difference observed between males and females.

In the initial examination, none of the male subjects showed swollen or edematous gingiva, while it increased to 35% in the second examination. However, in females, the swelling increased only by 2.3% in the second examination. The data suggests the increased susceptibility of edematous gingiva in males as compared to females. The clinical observations also showed the edematous gingiva more locally at the site of molar bands and lower incisors, which may be due to plaque accumulation and difficulty in brushing at these sites.

According to Goaslind et al,[26] gingival bleeding persists as an earliest symptom of gingival inflammation, which precede established gingivitis. Gingival bleeding varies in severity, duration, and the ease with which it is provoked. Bleeding on probing is easily detectable clinically; therefore it is of great significance for early diagnosis of gingivitis.[6] Besides, bleeding is more objective sign in clinical examination as compared to other changes as color, contour, or texture of the gingiva, which generally varies in observation from one examiner to another.

The difference between first and second examinations of the mean Gingival Bleeding Index gave an insight of the occurrence of gingivitis among the samples studied. Among 36 individual samples, the bleeding index increased in 25 samples, remained the same in 7 samples and decreased in 4 samples. The mean Gingival Bleeding Index score was 9.68 (S.D. 0.2922) in the first examination, which rose to 17.52 (S.D. 0.4078) in the second examination. The statistical analysis, however, showed no significant difference between two examinations. The results are nevertheless very important from the clinical point of view as a fair number of fixed orthodontic patients developed the symptoms of gingivitis including gingival bleeding.

As the results suggest, a high number of subjects practiced brushing two to three times a day and used interdental brush. These data suggest the high level of oral hygiene awareness among fixed orthodontic patients, which can be attributed to the orthodontists' effort on the patient motivation during the regular appointments. However, more than 30% of the subjects did not use interdental brushes, and mouthwashes and 25% were reported to be irregular in scaling; which could be due to the fact that, these factors could be determined as of secondary importance in daily oral hygiene measures.

Interestingly with the increase in monthly family income, the tendency towards brushing and use of interdental brushes was found to be more, which can be attributed to the high level of economy and awareness in the oral hygiene practice. Among the subjects with various educational attainments; college graduates were among the highest motivated and high school students were least motivated towards brushing and in using interdental brush. These data suggest that, highly educated and mature college graduates are most motivated in oral hygiene practice, while high school level patients were least motivated probably because of their irresponsiveness behavior or junk food habits in their age group.

Davies et al[19] found a reduction in plaque and gingivitis in orthodontic treatment group as compared to control, which they attributed to attendance for regular care rather than to the orthodontic treatment. However the results of present study is not consistent with the findings of Davies. The problem cited by Feliu[18] during orthodontic treatment was the maintenance of adequate oral hygiene by the patient. The placement of orthodontic bands and brackets increase the risk of plaque accumulation, caries, food impaction etc. Proffit[27] also mentioned increased susceptibility of orthodontic patients to gingival inflammation. Gingivitis can develop into progressive periodontitis that may cause irreversible damage to the integrity of teeth & also hamper in orthodontic tooth movement during orthodontic treatment. The condition can also lead to consequences like unpleasant esthetics, gingival bleeding, masticatory inefficiency, difficulties in brushing, and oral malodor with socially unacceptable situations. Hence the patients receiving orthodontic treatment must practice strict plaque control measures to prevent periodontal diseases and for the success of orthodontic treatment.

CONCLUSION

The present study shows an increased incidence of gingivitis as observed clinically during the period of one month. All clinical parameters of gingivitis especially redness of the gingiva was observed in a large number of samples in the study. Male samples

developed the symptoms more rapidly as compared to females. The gingival bleeding was also observed among the subjects during the study, however the data not statistically significant between the observation periods. A high levels of oral health awareness was found among the orthodontic patients, which is evident by the fact that 86% of the total subjects brush two to three times a day, 67% use interdental brush in addition to regular tooth-brushing, and no subject was found to be irregular in brushing habits. Among the level of educational attainment, high school level students were the most irregular in brushing habits and maintaining the oral hygiene, while among the socio-economic status, less income group were the least successful in maintaining the oral hygiene.

RECOMMENDATIONS

The strict instructions to use meticulous oral hygiene measures to brush two to three times a day and/or brush every time after meals with adjunctive oral hygiene aids, such as interdental brush, dental floss, and mouthwash should be given to the orthodontic patients. The duties of orthodontists also comprise patient education and motivation for oral hygiene maintenance methods. The periodic periodontal screening, and referral for oral prophylaxis should also be reinforced.

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