

The study of possible factors related to Non-Carious Cervical Lesions

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Abstract: Non-Carious Cervical Lesions (NCCLs) are characterized by the loss of teeth structures in the cervical area that are not related to caries. The purpose of this study was to investigate factors related to NCCLs. The cervical areas of all the teeth of 150 patients who had referred to the Operative Department of Dental School, and were aged above eighteen were examined. During the examination process, such factors as age, tooth sensitivity, wear facet presence, para-functional habits, teeth prominence, tooth brush types, acidic drinks, and short frenum were evaluated and recorded in information sheets. 150 patients were examined (56 men and 94 women) with the average age of 30.4 ± 11.6 . Results showed that 77.3 % of patients had at least one case of NCCL. 94.3 % of these lesions were found in buccal surface. The most frequently affected teeth were the mandibular left canines. Lesions on the left side of dental arch were more frequent than the right side. There was a direct relation between aging and the occurrence of NCCL ($p < 0.05$). The prevalence of these lesions was not related to sex. There are not any significant relationships between the other examined factors and NCCL ($p > 0.05$). It seems that only aging was associated with NCCLs among other factors.

Keywords: NCCLs; Abrasion; Abfraction; Erosion.

1. Introduction

Non-carious cervical lesions are characterized with the loss of tooth structure in the cervical areas or CEJ without any relationships to caries. NCCL can be divided in three categories: erosion, abrasion, and abfraction[1-3]. Without any treatment, the progress and development of these lesions can cause esthetic problems, sensitivity, pain, caries, pulp exposure, and ultimately the death of tooth[4,5]. Erosion is the loss of tooth structure by chemical agents such as exogenous and endogenous acids that cause saucer shape lesions on teeth surfaces[6,7]. Abrasion is caused by those external mechanical agents that form wedge shape lesions, and often occur parallel to abrasive agent's direction.[6,8] Abfraction is the destruction of the surface structure of teeth that occurs after the concentration of bender forces in the cervical areas of teeth[6]. In recent years, there have been lots of debates on etiology and pathogens in NCCL; however, many uncertainties still exist in the field. The prevalence of these lesions is not quite clear yet. A reason might be the difference in methods of evaluation and diagnosis of such lesions. Different methods used for diagnosing these lesions in literature, make it difficult to compare the results of these research projects with each other[8]. Statistic studies emphasised that NCCL lesions are more prevalent from canine to first molar, specially premolars[8]. Moreover, it is stated that the prevalence of abrasion lesions in the upper canine is significantly more frequent than the mandible canine[9]. There are few epidemiologic studies regarding the prevalence of these lesions, and the obtained results are contradictory. Shulman reported 2 % [10], and Bergstrom reported 90 % [11] Due to the health problems resulting from these lesions and the

necessity of awareness towards the prevalence of these lesions in Iran, the purpose of this study was to evaluate the possible risk factors and awareness towards the prevalence of these lesions. The study of possible factors and knowing about the degree of prevalence of these lesions can be useful in finding ways for preventing and curing them.

2. Methods and Materials

In this descriptive-cross sectional research among people who referred to the Operative Department of Dental School of Tehran Islamic Azad University, 150 cases were selected randomly and examined. Sampling was performed in sequential ways, and continued until we reached the desired amount. Information was gathered by clinical examinations, interviews, and filling the informational forms. Patients younger than 18 years of age or those whose teeth had stains on them were excluded from the research. In addition, the third molars were excluded from research for being out of reach; likewise, teeth with crowns or caries as well as class V restoration were excluded from research. Firstly, the age and sex of patients were recorded in informational forms; then, an examiner who had been trained for diagnosing NCCLs performed clinical examinations. Finally, a specialist in the Operative Dentistry re-checked the overall examination process. Examinations were performed using the Explorer Sound (Aesculap DA4 70 Stainless Germany Exs), and dentistry mirrors in front of the unit light. First, the tip of the Sound was placed perpendicular to the cervical surface of the teeth, and, as far as possible, to the CEJ; then, the Sound would pass the height of the clinical crown half way to the top. The examination was performed separately on the buccal and lingual surfaces. If any unsmoothness or significant changes occur in the Sound's motion, NCCL

ensues. Further, the tooth surface in that area should be quite hard without any signs of caries such as softness or the case of the Sound sinking. The tooth number and engaged surfaces were recorded in the information forms. During examination, tooth sensitivity, abnormal frenum pull, the presence of wear facet as defined as the loss of occlusal enamel, the more buccal-inclined teeth out of the jaw as well as abutment-bound teeth used in partial prosthesis were considered and recorded with the tooth number if observed. The next part of the information form was, then, filled, and contained questions about the types and methods of health care, para-functional habits, stomach condition, and the diet of patients. Information gathered in this research was analyzed using the statistical test X², and the confidence coefficient of %95.

3. Results

Results showed that 77.3 % of the samples had, at least, one case of NCCL [Table 1]. It was a meaningful test with statistical calculations. The least and most percentages of NCCLs prevalence were 70.6 and 84 (p<0.05). 58.7% of patients suffering from NCCL were women and 41.3% were men. Men and women were almost equal as to the average number of teeth, but the average number of affected teeth was slightly higher in men (4.1 vs. 3.1). By statistical calculations, no relation was found between sex and the

prevalence of NCCL (p>0.05). Examined people were aged 18 to 56, with the average age of 30.4 ± 11.6. Statistical calculations using the Pearson Correlation showed a significant relation between the NCCL prevalence and age (p<0.05).

Table 1: NCCL Distribution Frequency among Patients Referred to the Operative Department of Dental School of Islamic Azad University.

Distribution		
Lesions	Numbers	Percentage
No	34	22.7
Yes	116	77.3
Total	150	100

In this study, a total of 3782 teeth were assessed and 139 of which were excluded because of having dental crowns, class V restoration, or caries in this area. Thus, a total of 3643 teeth were examined in search of NCCL lesions whose prevalence in buccal and lingual surfaces were respectively 94.3 % and 5.7 %. Furthermore, the most prevalence teeth with NCCL were left and right mandibular canines (15/5 % , 13 %). According to statistical calculations, there were not any links between the NCCL and probable agents, such as teeth types, wear facets, para-functional habits, tooth brush types, drinking acidic fluids and the like (p> 0.05), [Table 2].

Table 2:NCCL Distribution Frequency Separation Factors among Patients Referred to the Operative Department of Dental School of Islamic Azad University.

Lesion Risk Factors		no	yes	Results
Sex	Male	8 (23.5)	48 (41.3)	N.S.
	Femal	26 (76.5)	68 (58.7)	P>0.05
Age	18-30	25 (73.5)	61 (52.5)	S
	31-40	5 (14.8)	27 (23.5)	P<0.05
	41-50	3 (8.8)	16 (13.7)	
	50<	1(2.9)	12 (10.3)	
Wear Facet	N0	10 (29.4)	25 (21.5)	N.S.
	Yes	24 (70.6)	91 (78.5)	P>0.05
Para-functional habits	No	27 (79.4)	90 (77.5)	N.S.
	Yes	7 (20.6)	26 (22.5)	P>0.05
Type of tooth brush	Soft	9 (26.4)	28 (24.4)	N.S.
	Medium	19 (55)	66 (57.4)	P>0.05
	Hard	6 (17.6)	22 (19.2)	
Type of brushing	Horizontal	6 (17.6)	29 (25.4)	N.S.
	Perpendicular	9 (26.4)	21 (18.2)	P>0.05
	Rol	9 (26.4)	10 (8.6)	
	Concomitant	10 (29.6)	55 (47.8)	
Tooth position in arch	Normal	32 (94)	98 (84.4)	N.S.
	Buccal	2 (6)	18 (15.6)	P>0.05
Frenum pulling	Normal	32 (94)	114 (98)	N.S.
	High	2 (6)	2 (2)	P>0.05
Gasteroreflex	No	23 (67.6)	74 (63.7)	N.S.
	Yes	11 (32.4)	42 (36.3)	P>0.05
Acidic drinks	No	0 (10)	2 (2)	N.S.
	Yes	34 (100)	114 (98)	P>0.05
Number of using acidic drinks	Daily	18 (52.9)	61 (52)	N.S.
	2-3 in weeks	9 (26.4)	38 (32)	P>0.05
	1>in weeks	7 (20.7)	15 (13)	
The way acidic fluids are drunk	Pipe	2 (5.8)	9 (7.7)	N.S.
	Glass	32 (94.2)	107 (92.2)	P>0.05
Priority in the first quadrant brushing	Upper right	9 (26.4)	28 (24.3)	N.S.
	Lower right	3 (8.8)	2 (1.7)	P>0.05
	Upper left	20 (58.8)	78 (67.2)	
	Lower left	2 (6)	7 (6)	

Tooth sensitivity is one of the NCCL symptoms. It was studied among the patients, and the results showed that the teeth of 13.7 % of patients were sensitive to the Sound touch.

4. Discussion

This research was conducted to study the non-carious cervical lesions prevalent among patients who referred to the Operative Department of Dental School of Islamic Azad University. The results showed that NCCL prevalence is 77.3%. In the present study, NCCL forms (erosion, abrasion and abfraction) were generally considered, but in most research projects they were considered separately. Jiang in 2011 reported the NCCL prevalence of two groups, namely a group of patients aged 35-44, and another group of patients aged 65-74 years; the NCCL prevalence was respectively 38.8% and 56.6% [12]. Brandini and Sousa in 2011 in a research project on a group of young patients aged 22-23, stated that the NCCL prevalence was 53% [13]. Smith in 2008 performed a research project on 156 patients with the average age of 40.6. 62% of subjects had, at least, one case of NCCL [14]. Another reason for the existence of differences between the results of this research project and other research projects is related to research methods, sampling society, sample size, the sampling method and the consideration of some other probable agents in NCCL. In this research, like the research projects of Tar c., Telles, and Sangnes Bergstorm no links existed between sex and the NCCL prevalence [3,4,15,16], but Brandini stated that NCCL is more frequent in men. [13] In this research project, like the research projects of Telles, Bernhard, Smith, Brandini, Jiang, Hirata, and Borgig there was direct links between aging and the amount of NCCL [1,4,8,12,13,14,17]. In this research, like the research project of Sangnes, no link was found between the type of brushing teeth and NCCL. [15] But Bradely and Bergstorm stated a direct link between the type of brushing teeth horizontally and NCCL [16,18]. Present research, like that of Bergstorm, found no link between the type of tooth brush and NCCL [1], but Bradely and Brandini stated a direct link between using hard tooth brushes and the increase in NCCL prevalence [13,18]. In the present research, most of patients used medium tooth brushes that appear in the studied society, There are other significant factors such as the force exerted on the toothbrush, length, and the frequency of brushing in addition to different stiffness types of tooth brushes and different factors. In this research, the number of lesions in the protruded teeth was more than other teeth but no significant link was found between the protruded teeth and NCCL prevalence. This research results showed no significant links between the para-functional habits, wear facets, and NCCL prevalence that contradicts the findings of Smith and Pegoraro [14,19]. There was no link between acid reflux, stomach fluids, and NCCL prevalence. Smith found a direct link between acid reflux, stomach fluids, and erosion prevalence. [14] According to Oginni, NCCL cases were more evident in the left side of right-handed patients' jaw arch because they had brushed the left side of their jaw arches severely [20]. A small number of NCCL patients had sensitive teeth when examined with Sound. In the research projects conducted by Tar c., Lussi, and Sangnes sensitivity was respectively to air puff, brushing the teeth, and Probe touch [3,15,21]. The low number of sensitive teeth can be because of the sclerotic surfaces of the above-mentioned lesions. In this research, like Telles' research project, NCCL is often observed on buccal and on a lower level, on lingual and palatal surfaces [4]. Present studies show that the highest incidence of lesions are seen in different types of teeth, namely the left lower canine, the right lower canine, the right

upper canine, and the left upper canine respectively. In the studies of Hirata and Telles, premolars had the highest percentage of suffering [1,4,12]. Apparently, not following the principles of proper brushing in the sampling society can cause canine wear more than other teeth because of its special positioning on the jaw arch and being protuberant.

5. Conclusion

NCCL prevalence in the studied society was 77.3%. There was a direct link between aging and the occurrence of NCCL. In this study, the amount of lesion in the more buccal-inclined teeth out of the jaw arch was more than other teeth, but no significant links with the NCCL incidence frequency were observed. Right-handed patients had greater number and severity of lesions in the left side of the jaw arch, but no significant links. No significant links between other probable agents and the NCCL incidence frequency were observed.

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