

# Association between anxiety and the presence of non-carious dental cervical lesions

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• **Conflicts of interest:** none declared.

## ABSTRACT

**Objective:** This study evaluated the association between parafunctional anxiety, eating habits, systemic conditions and assessment of oral hygiene habits with dental non-carious cervical lesions (NCCL). **Material and Methods:** this quantitative, observational study included 100 patients between 20 and 58 years old (mean of 37 years) with NCCL evaluated by clinical examination and sample calculation. The data were collected with use of a questionnaire made by a previously calibrated researcher, which referred to medical, dental, social history and anxiety assessments. After obtaining the data they were tabulated and subjected to statistical analysis using Fisher's exact two-proportion binomial test, adopting a 5% significance level. **Results:** consumption of carbonated drinks (81.6%), citrus fruits (76.3%), tooth brushing frequency equal or higher than three times a day (100%) and abrasiveness of toothpaste (100%) were significantly associated with presence of NCCL ( $p=0.0001$ ). Gastrointestinal reflux, xerostomia, bulimia and anorexia showed negative association with NCCL ( $p=1.000$ ). Anxiety was not directly associated with NCCL in the study population (36.8%).

**Conclusion:** there was no direct association between the presence of non-carious cervical lesions and anxiety.

**Keywords:** Non-carious cervical lesions; Anxiety; Dental wear.

## Introduction

Non-Carious Cervical Lesions (NCCL) correspond to a condition characterized by the loss of tooth structure, usually at the gingival level and close to the cemento-enamel junction, showing no association with a carious process nor involvement with bacterial activity.<sup>1</sup> This type of lesion can affect both the coronary and the radicular portion, predominantly occurring in the cervical area of the tooth due to the thin layer of enamel and low resistance of dentin and cement in this region.<sup>2,3</sup>

Studies report that NCCL have a multifactorial etiology, which may originate from different factors, such as: biocorrosion, characterized by the chemical degradation of the dental structure caused by both extrinsic and intrinsic acids in the body; friction by excessive brushing force along with the action of abrasive toothpaste; and abfraction, resulting from excessive occlusal loads. All of these factors, isolated or combined, result in the genesis of NCCLs.<sup>4</sup>

The NCCL are some of the pathologies that most affect the dental element, afflicting about 25% of the population, mostly older adults<sup>6</sup>. This lesion has a higher prevalence in the posterior maxillary region, mainly affecting premolars<sup>3</sup>. It can lead to complications ranging from dentin hypersensitivity and aesthetic defects, to more severe progression states in which pulp calcification, bone resorption and mobility occur, which can result in tooth loss.<sup>7</sup>

In view of the multifactorial etiology of NCCL, the dentist must widely analyze the various factors associated with this

pathology. Therefore, when taking into account the change in society's lifestyle and the stress generated on a daily basis, raising pressure and anxiety levels, it is plausible to believe that some people are more vulnerable than others and that the psycho-emotional state is related to the appearance of NCCL, especially in cases of abfraction lesions. Patients who have nervous system disorders and/or prolonged emotional imbalance more easily acquire parafunctional habits and further subject their teeth to occlusal overloads. Therefore, in the presence of patients with such characteristics, one should always suspect the presence of these lesions.<sup>8</sup>

Tense people with high levels of anxiety due to the stress of the troubled daily life is a tendency in the globalized world. This in association with the consumption of acidic beverages and the increase in inappropriate oral hygiene habits establish a cycle of NCCL appearance in dentistry.<sup>9</sup>

Faced with this condition, part of the difficulty found by dentists in making the correct diagnosis is due to numerous causal factors involved in the formation of NCCLs<sup>9</sup>. Knowledge about anxiety and its therapeutics can help prevent the emergence of NCCLs.

Thus, the present study assessed the association between anxiety, parafunctional and eating habits, systemic conditions and assessment of oral hygiene habits with NCCL, characterizing the types and forms of NCCL injuries present and the association between the types of NCCL and the presence of anxiety, thus questioning whether anxiety is directly or indirectly related to the appearance NCCL.

## Material and Methods

### Study Design and Ethical aspects

This study was submitted for ethical assessment in Plataforma Brasil (CAAE: 20453919.7.0000.5046). After study approval, a cross-sectional, observational epidemiological study was performed with use of quantitative and qualitative parameters.

### Sample Size Calculation

The sample was calculated using the population base of the region of interest. Type  $\alpha$  error was 0.05 and type  $\beta$  0.20, with a power of 80% (0.08). When making this calculation, a sample value of 96 patients was reached, with 4 being added after considering a loss rate, totaling 100 patients obtained by sample size calculation.

### Study participants and data collection

A total of 100 patients between the period from November 2019 to March 2020 volunteered to apply for clinical examination and filling out the medical records, after signing an informed consent form. Those who did not present any type of NCCL were excluded from the study, their presence being the only inclusion criterion. Individuals who did not agree to participate in the research were also excluded.

The participants were approached at the clinic, before starting the attending routine, anamnesis and clinical examination were performed, together with the filling out of the medical record for the study, carried out by a previously calibrated researcher. The clinical examination was performed using a light focus, mouth mirror, an dental explorer, and a periodontal probe.

The primary outcome was the anxiety assessment using the Hospital Anxiety and Depression Scale (HADS), validated by Marcolino<sup>11</sup> *et al.* (2007); the secondary outcomes were: medical history (presence of gastrointestinal symptoms, xerostomia when using medication, bulimia, anorexia nervosa), dental history (previous orthodontic treatment, presence of gingival resection, occlusal conditions, premature or eccentric contacts and parafunctional habits), social history

(alcohol consumption, citrus fruits, juices, soft drinks), and the clinical aspects of the lesions were characterized in terms of their location (buccal or lingual), morphology (concave, wedge or mixed), depth and affected teeth, classification validated by Soares and Grippo<sup>10</sup>; and complementary outcomes regarding patient identification (initials, age, sex, address, and phone number).

### Statistical analysis

The data were tabulated using Microsoft Excel (2013), organized through tables. Subsequently, the statistical program BioEstat 5.0 was used for results related to fluid intake habits associated with NCCL, parafunctional habits associated with NCCL and evaluation of factors related to systemic conditions. The data were subjected to Fisher's exact two-proportion binomial test with a 5% significance level ( $p < 0.05$ ).

## Results

People aged between 20 and 58 years old participated in the research, with 87.9% having an income below 1 minimum wage and 13.1% higher, with 52.6% being males and 47.4% females.

Respondents were asked about fluid intake habits, wherein 81.6% responded having consumed soft drinks and 76.3% citrus fruits, demonstrating an influence on the appearance of NCCL. ( $p = 0.0001$ ). Vinegar intake did not show a statistically significant combination ( $p = 0.5000$ ). When comparing the intake of alcoholic beverages with the appearance of NCCL, 71.0% of participants did drink it, and it is thus not an influencing factor in the appearance of lesions ( $p = 0.0001$ ). These data are detailed in Table 1.

After questioning the patients regarding the practice of parafunctional habits, the acts of tightening muscles during sleep, tensioning muscles without the act of chewing, tongue interposition between the teeth, presence of facial pain or tiredness and biting objects, close results were obtained and all of the aforementioned factors were shown to not be directly related to the appearance of NCCL (Table 2).

**Table 1.** Fluid intake habits associated with non-carious cervical lesions

	Soft drinks	Vinegar	Citrus fruits	Alcoholic Beverages
Ingest	81.6 %	50.0 %	76.3 %	29.0 %
Do not ingest	18.4 %	50.0 %	23.4 %	71.0 %
<i>p</i> -value	0.0001	0.5000	0.0001	0.0001

The data were subjected to Fisher's exact two-proportion binomial test ( $p < 0.05$ )

**Table 2.** Parafunctional habits associated with non-carious cervical lesions

	Creaks or tightening teeth while sleeping	Tightens or tensioned muscles without chewing	Tongue interposition between the teeth	Presence of facial pain or tiredness	Bites objects
Yes	26.3 %	34.2 %	34.2 %	18.4 %	23.7 %
No	73.7 %	65.8 %	65.8 %	81.6 %	76.3 %
<i>p</i> -value	0.0001	0.0108	0.003	0.003	< 0.0001

The data were subjected to Fisher's exact two-proportion binomial test ( $p < 0.05$ )

When approached about factors related to systemic conditions, 100% of the patients did not have xerostomia, bulimia and anorexia nervosa, showing that these factors have no significant association with NCCL ( $p=1.0000$ ), whereas the absence of gastroesophageal reflux in 84.2% ( $p<0.0001$ ) showed no direct relationship with NCCL. Behaving distinctly to this, the data referring to the presentation of stress on the part of the individuals showed that 60.5% ( $p=0.0332$ ) suffered from this condition (Table 3).

As for the assessment of oral hygiene habits, the frequency of brushing three times a day or more and abrasive toothpaste use were performed by all participants, showing a direct relationship with the appearance of NCCL ( $p<0.0001$ ). Dental floss utilization did not show a significant relation to the presence of lesions ( $p=0.0843$ ). Regarding the types of bristles, 92.1% of respondents used soft bristles, showing a combination of these with the emergence of NCCL ( $p<0.0001$ ). Data specified in Table 4.

Most do not have the sensation of fear, such as “butterflies in the stomach” or tightness in the stomach, which generates a statistical difference concerning patients’ responses ( $p<0.0001$ ), but this factor was shown to not influence the presence of NCCL as most responses implied its absence. Regarding feeling tense and if these patients liked the same things as before, responses were similar and a statistical difference can be observed in both cases ( $p=0.003$ ), where the majority (65.8%) reported a negative answer for both, and therefore they were not associated to the presence of NCCL.

Participants were asked if they were constantly afraid of something bad going happening to them, and most

reported yes (55.3%), however the difference in answers did not represent a statistically significant difference ( $p=0.179$ ), so this factor is not shown to influence the presence of NCCL. Regarding the aspect of having the head full of concern, the majority replied no, generating a statistically significant difference between the response groups ( $p<0.0001$ ), which does not show a direct association between this aspect and the appearance of NCCL.

Regarding whether participants feel happy most of the time, most answered no, which shows that these patients have sadness associated with the emergence of NCCL ( $p=0.0007$ ). Regarding getting relaxed, most answered no, and a statistically significant difference was present ( $p<0.0001$ ), which shows that this aspect is correlated to the emergence of NCCL. Regarding the ability to quickly answer when thinking or doing everyday tasks, there was no statistical difference ( $p=0.0832$ ).

Patients were asked as to whether they lost interest in taking care of their own appearance and most answered no (78.9%). Regarding whether the patients feel restless to the point they could not stand still, most answered no (84.2%). Regarding patients’ excitability about good things to come, only 5.3% of this sample answered yes, and a statistically significant difference was present ( $p<0.0001$ ), which corroborates this aspect being related to the emergence of NCCL. When asked if they have feelings of panic, most answered no (86.8%). All data described are specified in Table 5.

The assessment of anxiety and depression by the sum of the scores of each questionnaire resulted in participants 63.2% with a sum of 0 to 8 scores and 36.8% with a score  $\geq 9$ , wherein the majority had no anxiety disorders.

**Table 3.** Evaluation of factors related to systemic conditions

	Is under stress	Gastroesophageal reflux	Xerostomia	Bulimia	Anorexia
Yes	60.5 %	15.8 %	0 %	0 %	0 %
No	39.5 %	84.2 %	100 %	100 %	100 %
<i>p-value</i>	0.0332	<0.0001	1.0000	1.0000	1.0000

The data were subjected to Fisher’s exact two-proportion binomial test ( $p<0.05$ )

**Table 4.** Assessment of oral hygiene habits

	Brushing frequency		Brush Type		Toothpaste		Dental floss utilization
<3 times a day	100 %	Soft	92.1 %	Abrasive	100%	Yes	57.9 %
>3 times a day	0 %	Not soft	7.9 %	Non-abrasive	0 %	Not	42.1 %
<i>P-value</i>	< 0.0001		<0.0001		<0.0001		= 0.0843

The data were subjected to Fisher’s exact two-proportion binomial test ( $p<0.05$ )

**Table 5.** Assessment of patient anxiety with presence of non-carious cervical lesions

	Do you feel fear, like "butterflies in the stomach" or tightness in the stomach?	Do you feel tense?	Do you still like the same things as before?	Are you afraid of something bad happening?	Do you laugh and have fun when seeing something funny?	Is your head full of concerns?	Do you feel happy most of the time?
<b>Yes</b>	18.4%	34.2%	34.2%	55.3%	13.2%	23.7%	31.6%
<b>No</b>	81.6%	65.8%	65.8%	44.7%	86.2%	76.3%	68.4%
<b>p-value</b>	<0.0001	=0.003	=0.003	=0.179	<0.0001	<0.0001	=0.0007
	Can you seat at ease and feel relaxed?	Are you slow to think and/or do tasks?	Did you lose interest in taking care of your own appearance?	Do you feel restless and cannot stand still anywhere?	Do you feel excited about good things to come?	Do you often feel panicked?	
<b>Yes</b>	18.4%	47.4%	21.1%	15.8%	5.3%	13.2%	
<b>No</b>	81.6%	52.6%	78.9%	84.2%	94.7%	86.8%	
<b>p-value</b>	< 0.0001	=0.0832	<0.0001	<0.0001	<0.0001	<0.0001	

The data were subjected to Fisher's exact two-proportion binomial test ( $p < 0.05$ )

## Discussion

Currently, there are no studies in the literature that investigate a direct relationship between anxiety and NCCL, and as such this paper is a pioneer. When searching for analyses reporting the existence of a cause/effect relationship between them, none were found. After the interpretation of the anxiety and depression scale in which odd items indicate the presence or absence of anxiety through the following assessment: 0 to 7 points means unlikely, 8 to 11 points possible (questionable or doubtful) and 12 to 21 points probable; the result was that 63.2% of the total were unlikely to have anxiety disorders, denying the hypothesis of the present study.<sup>11</sup>

Most of the existing literature correlates the triggering factors of NCCL, such as sleep bruxism and gastroesophageal reflux with anxiety, and this psychic disorder on the other hand has a bidirectional relationship that can cause dental clenching, among other parafunctions.<sup>12,13,14</sup>

Some authors report that the abfractions come from traumatic occlusal loads of flexion, shear and compression stress, as well as the parafunction is capable of causing fractures and wear of enamel and dentin. Senna *et al.*<sup>15</sup>, Grippo *et al.*<sup>4</sup> and Shah *et al.*<sup>16</sup> reported that the prevalence of NCCL in patients with and without bruxism was similar and found no association between them, which corroborates the results of the present study wherein no parafunctional habit was directly related to the presence of NCCL, since the target population did not carry them out significantly. However, even though few studies show such a relationship between bruxism and NCCL, Xiao *et al.*<sup>17</sup> reported that the presence of dental abrasion is related to a higher frequency of repetitive mandibular movements and greater muscle contraction. In the same direction, Modanese *et al.*<sup>18</sup> concluded that patients

with bruxism had a higher number of dental abfractions than those who did not have this condition. In addition to this data, this study addressed other possible etiological factors that may characterize the presence of NCCL in the sample of the studied population.

Of all respondents, the majority of NCCL patients were male, agreeing with Kaklamanos *et al.*<sup>19</sup> and Racki *et al.*<sup>20</sup> Differing from the studies carried out by Molena *et al.*<sup>8</sup>, Bernhardt *et al.*<sup>21</sup> and Marró *et al.*<sup>22</sup>, in which most participants were women, this can be due to the fact that men have more exacerbated deleterious habits than women, who are more careful with health in general, especially regarding oral health.

Regarding gastroesophageal reflux disease (GERD) and NCCL, Grippo *et al.*<sup>4</sup> mentions in their review that the stomach and pancreas have enzymes capable of degrading dentin and these can reach the oral cavity due to factors such as reflux, bulimia nervosa and regurgitation. Parkinson *et al.*<sup>23</sup> established a direct relationship between loss of tooth structure and gastroesophageal reflux disease that occurs due to repetitive episodes of contact between teeth and acids from the digestive system. It also corroborates Corrêa *et al.*<sup>24</sup> whose study analyzed oral changes by GERD, where 100 patients with gastroesophageal reflux disease had their oral cavity examined and 273 faces with erosive wear were found. In the present study, the presence of GERD was analyzed through questioning about past medical history, however, no relationship was found between GERD present in 15.8% and NCCL ( $p < 0.0001$ ).

The association between dietary factors and erosion/biocorrosion is still under investigation. It is reported in the literature that excessive consumption of carbonated drinks, dried fruit juices, and other specific foods mainly by



young people and adolescents has been an extrinsic factor of importance for the appearance of erosion<sup>25</sup>. The results of this study showed that the consumption of citrus fruits by 76.3% and soft drinks by 81.6% is associated with the presence of NCCL ( $p < 0.0001$ ). Such findings are in agreement with Yang *et al.*<sup>1</sup> who noted that the consumption of fruits with high acid pH causes biocorrosion and that those mainly associated with abrasion lead to accentuated cervical tooth wear. This was also verified by Li *et al.*<sup>26</sup> and Salas *et al.*<sup>27</sup> who found the consumption of soft drinks increases the risk of dental wear. Disagreeing with Amaral *et al.*<sup>28</sup> who in their research on dental wear in children found statistically significant unfavorable differences when it came to erosion.

Regarding oral hygiene habits and the presence of NCCL, dental wear resulting from hygienic procedures is a clinical factor to be considered<sup>1</sup>. Grippo *et al.*<sup>5</sup> report that brushing right after food intake accentuates the loss of tooth structure, as it is more likely that the friction caused by the toothbrush on a surface that has already been demineralized by a corrosive agent causes or progresses the wear of dental tissue. In the present study, the frequency of brushing proved to be a determining factor for the occurrence of NCCL (100%,

$p < 0.0001$ ) for all patients. In disagreement, the study by Teixeira *et al.*<sup>29</sup> (2018) reports no direct association regarding the formation of NCCL as an exclusive intensifying factor in the progression of injuries. In the study by Bartlett *et al.*<sup>30</sup> tooth brushing was evaluated after breakfast and there was no relevance between brushing and tooth wear, however, by delaying brushing in 44 minutes after the acid challenge, it was associated with greater dental wear.

The limitation of this study is the scarcity of papers on the matter in the literature. Other clinical evaluations with larger samples and a larger amount of time to increase the number of information on this topic should be conducted to determine the effect that anxiety causes on the appearance of NCCL.

## Conclusions

There was no association between existing cervical lesions and the presence of anxiety. However, a direct association was found regarding other habits such as the consumption of soft drinks, acid fruits, stress, frequency equal or higher than three times a day of brushing, and the abrasiveness of toothpaste, being considered probable risk factors for the presence of NCCLs.

## References

- Yang J, Cai D, Wang F, He D, Ma L, Jin Y *et al.* Non-carious cervical lesions (NCCLs) in a random sampling community population and the association of NCCLs with occlusive wear. *J Oral Rehabil.* 2016;43(12):960-966.
- Dursun E, Guncu GN, Dursun CK, Kiremitçi A, Karabulut E, Akalin FA. Nanofilled and conventional resin-modified glass ionomer fillings combined with connective tissue grafts for treatment of gingival recessions with non-carious cervical lesions. *J Oral Sci.* 2018;60(3):344-351.
- Machado AC, Soares CJ, Reis BR, Bicalho AA, Raposo L, Soares PV. Stress-strain Analysis of Premolars With Non-carious Cervical Lesions: Influence of Restorative Material, Loading Direction and Mechanical Fatigue. *Oper Dent.* 2017;42(3):253-265.
- Grippo JO, Simring M, Coleman TA. Abfraction, Abrasion, Biocorrosion, and the Enigma of Noncarious Cervical Lesions: A 20-Year Perspective. *J Esthet Restor Dent.* 2012;24(1):10-23.
- Grippo JO, Simring M, Schreiner S. Attrition, abrasion, corrosion and abfraction revisited: a new perspective on tooth surface lesions. *J Am Dent Assoc.* 2004; 135(8):1109-1118.
- Szesz A, Parreiras S, Martini E, Reis A, Loguercio A. Effect of flowable composites on the clinical performance of non-carious cervical lesions: A systematic review and meta-analysis. *J Dent.* 2017;65:11-21.
- Michael AJ, Kaidonis AJ, Townsend CG. Non-carious cervical lesions on permanent anterior teeth: A new morphological classification. *Aust Dent J.* 2010; 55(2):134-137.
- Molena CCL, Rapoport A, Rezende CP, Queiroz CM, Denardin OVP. Relationship between non-carious cervical injuries and habits. *Revista Brasileira de Cirurgia de Cabeça e Pescoço.* 2008;37(4):206-211. Portuguese.
- Garone FW, Silva VA. Non-carious injuries: The new challenge of dentistry. São Paulo: Santos; 2008. Portuguese.
- Soares PV, Grippo JO. Non-Carious Cervical Lesions and Cervical Dentin Hypersensitivity: Etiology, diagnosis and treatment. São Paulo: Quintessence; 2017. Portuguese.
- Marcolino JAM, Mathias LAST, Filho LP, Guaratini AA, Suzuki FM, Alli LAC. Hospital Anxiety and Depression Scale: Study of Criterion Validity and Reliability with Preoperative Patients. *Rev Bras Anestesiol.* 2007; 57(1):52-62.
- Firmani M, Reyes M, Becerra N, Flores G, Weitzman M, Espinosa P. Sleep Bruxism in Children and Adolescents. *Rev Chil Pediatr.* 2015;86(5):373-379. Spanish.
- Camoin A, Tardieu C, Blanchet I, Orthlied J-D. Sleep bruxism in children. *Arch Pediatr.* 2017;24(7):659-666.
- On ZX, Grant J, Shi Z, Taylor AW, Wittert GA, Tully PJ *et al.* The association between gastroesophageal reflux disease with sleep quality, depression, and anxiety in a cohort study of Australian men. *J Gastroenterol Hepatol.* 2017;32(6): 1170-1177.
- Senna P, Cury DB, Rosing C. Non-carious cervical lesions and occlusion: A systematic review of clinical studies. *J Oral Rehabil.* 2012;39(6):450-462.
- Shah P, Razavi S, Bartlett DW. The prevalence of cervical tooth wear in patients with bruxism and other causes of wear. *J Prosthodont.* 2009;18(5):450-454.
- Xiao Z, Yong W, Qiang D, Minxian M, Qin L, Jianguo T. Preliminary study on the correlation between the mandibular chewing exercise and the characteristics of nocturnal bruxism. *Hua Xi Kou Qiang Yi Xue Za Zhi.* 2020;38 (1):54-58.
- Modanese D, Caneve VA, Alessandretti R, Spazzin AO, Radaelli MTB. Fractional non-carious cervical lesions: prevalence and relationship with sleep bruxism. *Journal of Oral Investigations.* 2018;7(1):22-32.
- Kaklamanos EG, Menexes G, Makrygiannakis MA, Topitsoglou V, Kalfas S. Tooth Wear in a Sample of Community-Dwelling Elderly Greeks. *Oral Health Prev Dent.* 2020;18(2):133-138.
- Racki DNO, Nora AD, Comim LD, Zenkner JEA, Alves LS. Erosive tooth wear among South Brazilian adolescents, and its association with sociodemographic variables. *Braz Oral Res.* 2020;10(33):119.
- Bernhardt O, Gesch D, Schwann C, Mack F, Meyer L, John L *et al.* Epidemiological evaluation of the multifactorial a etiology of abfractions. *J Oral Rehabil.* 2006;33(1):17-25.
- Marró ML, Aránguiz V, Ramirez V, Lussi A. Prevalence of erosive tooth wear in Chilean adults, 2016: A cross-sectional study. *J Oral Rehabil.* 2020;47(4):467-472.
- Parkinson CR, Shahzad A, Rees GD. Initial stages of enamel erosion: an in situ atomic force microscopy study. *J Struct Biol.* 2010;171(3):298-302.
- Corrêa MCCSF, Lerco MM, Henry MACA. Study of changes in the oral cavity in patients with gastroesophageal reflux disease. *Arq Gastroenterol.* 2008;45(2):132-136. Portuguese.
- Carvalho T, Lussi A. Acidic Beverages and Foods Associated with Dental Erosion and Erosive Tooth Wear. In: *The Impact of Nutrition and Diet on Oral Health.* Karger Publishers. 2020;28:91-98.

26. Li H, Zou Y, Ding G. Dietary factors associated with dental erosion: a meta-analysis. *PLoS One*. 2012;7(8):e42626.
27. Salas MMS, Nascimento GG, Vargas-Ferreira F, Tarquinio SBC, Huysmans MCDNJM, Demarco FF. Diet influenced tooth erosion prevalence in children and adolescents: Results of a meta-analysis and meta-regression. *J Dent*. 2015;43 (8):865-875.
28. Amaral MA, Ruiz DT, Simm W, Pereira JS, Luiz MAF, Matsuo T. Dental Wear: Epidemiological Study in a Five-Year Population in Sarandi, Paraná. *Saúde e Pesquisa*. 2008;1(2):151-156. Portuguese.
29. Teixeira DNR, Zeola LF, Machado AC, Gomes RR, Souza PG, Mendes DC. Relationship between noncarious cervical lesions, cervical dentin hypersensitivity, gingival recession, and associated risk factors: A cross-sectional study. *J Dent*. 2018;76:93-97.
30. Bartlett DW, Lussi A, West NX, Bouchard P, Sanz M, Bourgeois D. Prevalence of tooth wear on buccal and lingual surfaces and possible risk factors in young European adults. *J Dent*. 2013;41(11):1007-1013.

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## Mini Curriculum and Author's Contribution

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