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Tooth Wear at the Neck: Non-Carious Cervical Lesion-Survey Study

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ABSTRACT

Non-carious cervical lesions (NCCLs) are increasingly recognized as a significant clinical condition affecting the structural integrity and longevity of teeth. These lesions result from multifactorial aetiologies, including abrasion, erosion, and abfraction, and they can lead to dentinal hypersensitivity, aesthetic concerns, and complications during restorative procedures. Despite their clinical importance, the true prevalence and predominant etiological factors of NCCLs vary widely in the literature, often influenced by geographic, behavioural, and demographic differences. A comprehensive survey aimed at assessing the prevalence, contributing etiological factors, and current treatment modalities for NCCLs is essential to better understand their distribution in the population. Such data will help clinicians identify risk factors more effectively and choose appropriate management strategies tailored to patient-specific needs.

Keywords- Neck of the tooth, Dental accessories, Dental erosion, Dental abrasion, Non-carious cervical lesions, risk factors, multifactorial aetiologies, survey study

INTRODUCTION

Non-carious cervical lesions (NCCLs) are increasingly recognized as a significant clinical condition affecting the structural integrity and longevity of teeth. These lesions result from multifactorial aetiologies, including abrasion, erosion, and abfraction, and they can lead to dentinal hypersensitivity, aesthetic concerns, and complications during restorative procedures. Despite their clinical importance, the true prevalence and predominant etiological factors of NCCLs vary widely in the literature, often influenced by geographic, behavioural, and demographic differences.

Furthermore, evaluating the current treatment preferences and success rates among dental professionals can reveal gaps in knowledge, inconsistencies in practice, and opportunities for improving clinical guidelines. This evidence-based approach will ultimately contribute to enhanced preventive and therapeutic protocols, improving patient outcomes and promoting long-term dental health.

Non-carious cervical lesions (NCCLs) are structural defects at the cemento-enamel junction of teeth, not caused by decay but rather by mechanical and chemical factors such as abrasion, erosion, and abfraction. These lesions can lead to tooth sensitivity, aesthetic concerns, and restorative difficulties. Despite their clinical significance, the prevalence, etiological factors, and treatment approaches for NCCLs vary widely among populations and practitioners. This survey aims to gather data on the occurrence, causes, and management strategies of NCCLs in order to better understand current trends and improve evidence-based dental care. NCCL is defined as “the pathological loss of hard tooth substance caused by biomechanical loading forces; such loss is the result of flexing and degradation of enamel and/or dentin at some location distant from the actual point of loading. Caused by the synergistic action of the etiological mechanisms: erosion, abrasion and abfraction. In addition to risk factors such as: decreased pH and salivary quantity, dental morphology, dietary habits and inadequate brushing. The prevalence of NCCL increases with age and they are found mostly on the vestibular surfaces, with premolars and canines being the most affected teeth. The treatment ranges from clinical preventive therapy that focuses on modifying eating habits, stimulating salivary flow, using an appropriate brushing technique and intervention with other branches such as nutrition and psychology. Whereas, clinical therapy is based on diagnosis and is focused on reducing hypersensitivity, improving aesthetics, and restoring lost dental tissue. Material and Methods: A search of the literature related to the aetiology, clinical characteristics will be developed. prevalence and treatment of NCCL in different databases. Conclusions: NCCLs are a frequent pathology of a multifactorial nature, where a correct diagnosis is essential for its therapeutic approach.

AIM OF STUDY

To assess the etiological factors, and evaluate the current treatment modalities of "Non carious cervical lesion" among a defined population, in order to enhance understanding and inform preventive and therapeutic strategies in clinical dental practice.

Research objectives

To evaluate the awareness and knowledge of dental student's regarding Non carious cervical lesion.
To identify and analyse etiological factors of Non carious cervical lesion.
To assess the preventive and therapeutic strategies for non-carious cervical lesion.

In this study questionnaire is been undertaken by the means of Google Forms. The google forms survey link with a set of 16 questions and distributed among the students of dental colleges of Western Maharashtra through official channels, social media, and direct emails, after the due approval of ethical committee.

Section A : Demographic Information
Section B : Oral Hygiene Habits
Section C : Dietary Habits
Section D : Parafunctional Habits and Stress
Section E : Clinical Signs and Dental History

A total of 170 students from Undergraduate of Dental colleges from Western Maharashtra are included in the study.

MATERIALS AND METHODS

This questionnaire study was undertaken by the means of Google Forms. The google forms survey link with a set of 16 questions will be distributed among the students of dental colleges of Western Maharashtra through official channels, social media, and direct emails, after the due approval of ethical committee.

Multifactorial Etiology: NCCLs are rarely caused by a single factor, but rather a combination of erosion (acids), abrasion (mechanical wear), and abfraction (stress from tooth flexure).

Prevalence: NCCLs are frequently encountered in clinical practice, with reported prevalence rates in studies ranging significantly, sometimes from 5% to over 85%.

Increased with Age: The presence and severity of NCCLs tend to increase with age.

Risk Factors:

Erosive Factors: Consumption of citrus fruits and other acidic foods contributes to erosion.

Abrasive Factors: Aggressive or improper toothbrushing, especially with hard bristles or abrasive toothpaste, can cause abrasion.

Abfraction: Tooth flexure under occlusal (biting) forces, both functional and parafunctional (like bruxism), can lead to abfraction at the cervical (neck) of the tooth.

Clinical Presentation: The morphology of NCCLs can vary depending on the primary etiological factor.

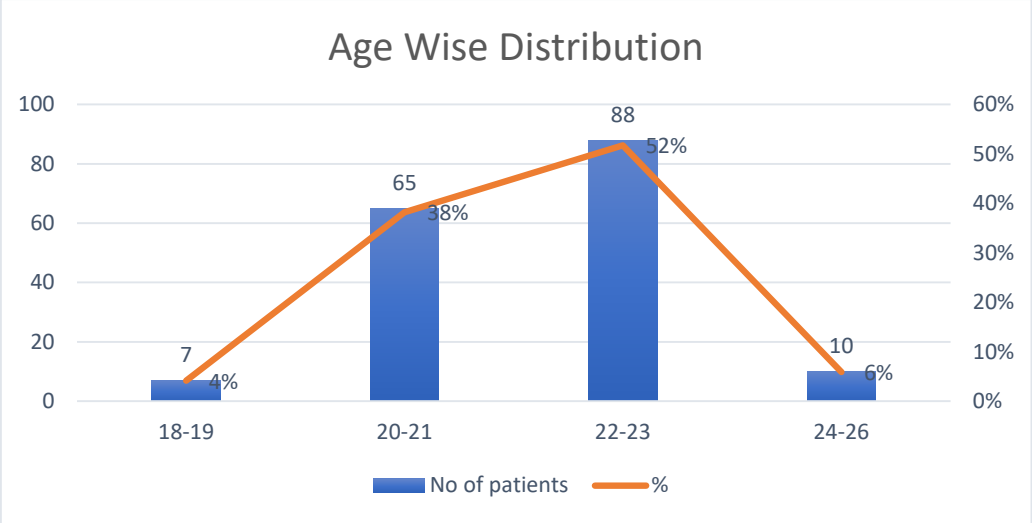
Clinical Significance

Prevention: Knowledge of the specific etiological factors is vital for preventing further lesion development and progression.

Treatment Challenges: Restoring NCCLs can be challenging, as the underlying factors causing the initial lesion may also cause premature failure of restorative materials.

OBSERVATIONS AND RESULTS

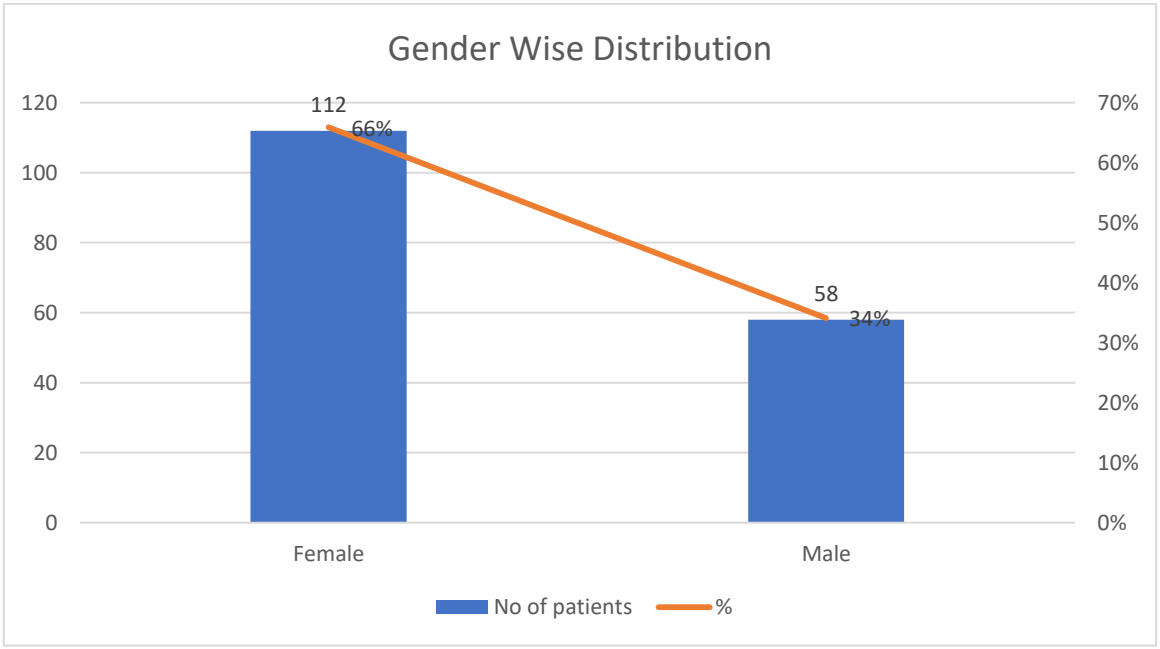
After systematic survey as described in materials and methods all collected information was recorded in Microsoft excel sheet and following observations and results were drawn.



Age	No of patients	%
18-19	7	4%
20-21	65	38%
22-23	88	52%
24-26	10	6%
Grand Total	**170**	**100%**

In this study maximum 88(52%) patients were from 22-23 years of age, 65(38%) patients were from 20-21 years of age, 10(6%) patients were from 24-26 years of age, 7(4%) patients were from 18-19 years of age.

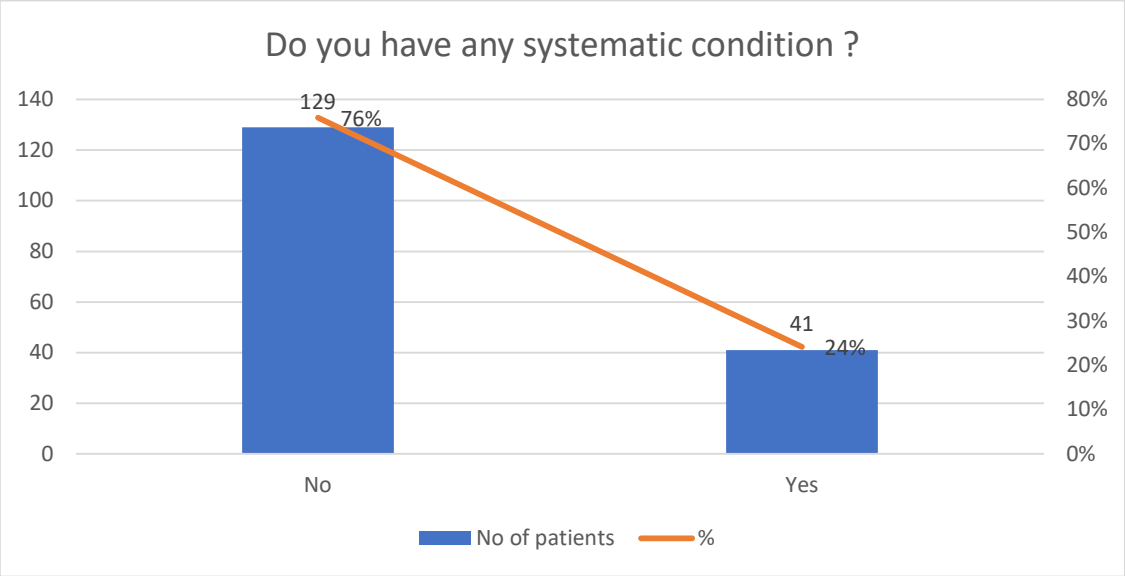
Gender wise distribution:



Gender	No of patients	%
Female	112	66%
Male	58	34%
Grand Total	**170**	**100%**

Maximum patients were female i.e. 112(66%) out of 170 patients. 58(34%) patients were male.

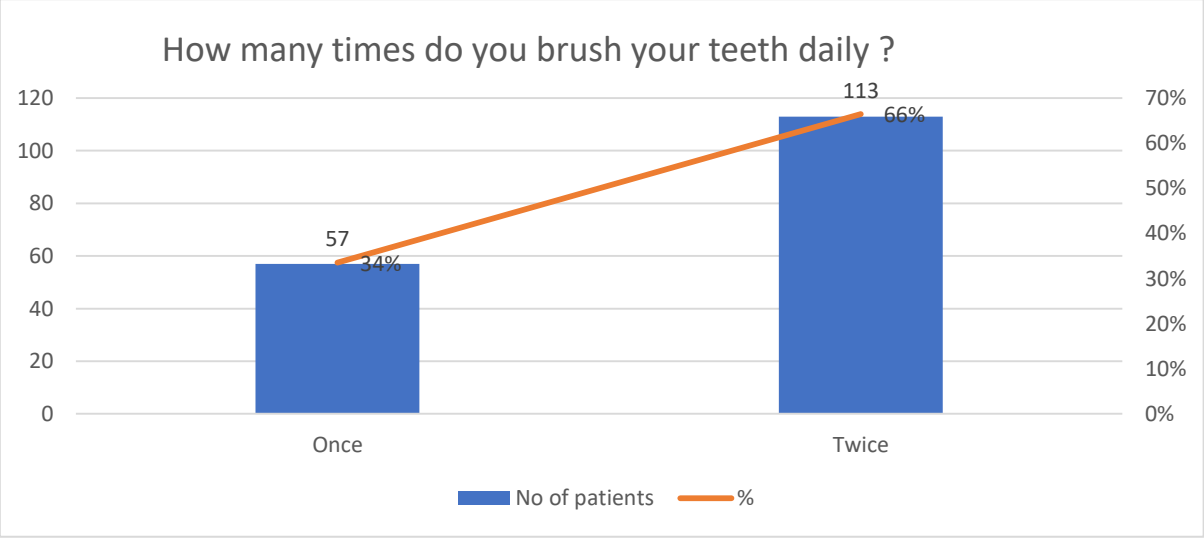
Do you have any systematic condition ?



Do you have any systematic condition ?	No of patients	%
No	129	76%
Yes	41	24%
Grand Total	**170**	**100%**

In the study questionnaire , 41 patients i.e. 24% said yes when question asked about Do you have any systematic condition ? and 129 patients i.e. 76% patients said No

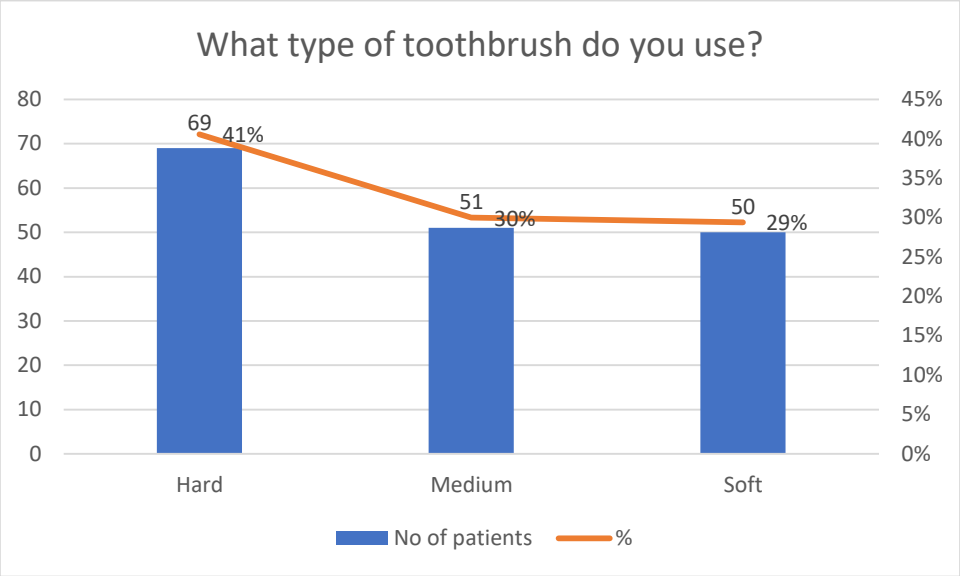
How many times do you brush your teeth daily ?



How many times do you brush your teeth daily ?	No of patients	%
Once	57	34%
Twice	113	66%
Grand Total	**170**	**100%**

In this study patients were asked about number of times they brush their teeth daily, in response, 57 patients (34%) said they brush their teeth once while remaining 133 (66%) patients said they do it twice in day

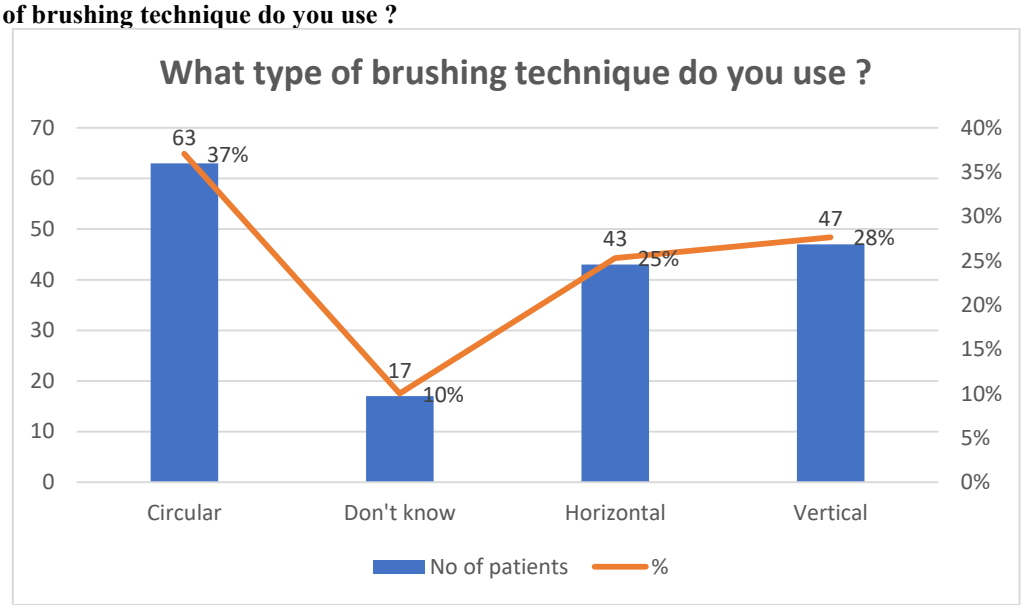
What type of toothbrush do you use?



What type of toothbrush do you use?	No of patients	%
Hard	69	41%
Medium	51	30%
Soft	50	29%
Grand Total	**170**	**100%**

The analysis of the study indicated that 41% i.e. 69 patients use hard type of tooth brush, 30% i.e. 51 patients use medium type of tooth brush and remaining 29% i.e. 50 patients use hard type of tooth brush.

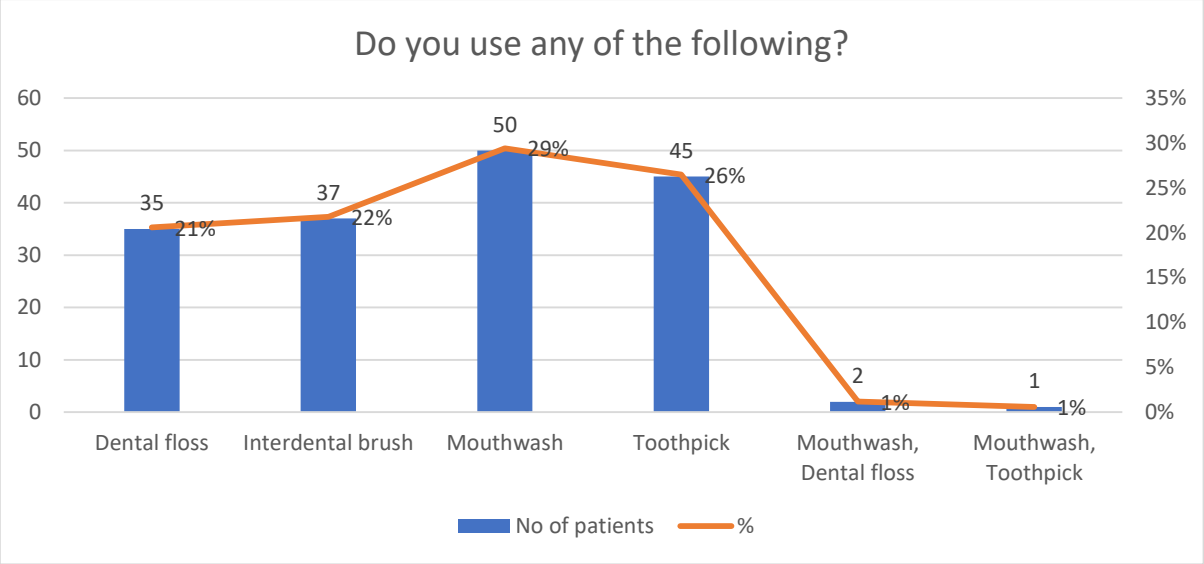
What type of brushing technique do you use ?



What type of brushing technique do you use ?	No of patients	%
Circular	63	37%
Don't know	17	10%
Horizontal	43	25%
Vertical	47	28%
Grand Total	**170**	**100%**

In the study it was founded that 63 patients i.e 37% patients use circular technique of brushing, 43 patients i.e. 25% patients use horizontal technique of brushing, 47 i.e. 28% patients use vertical use vertical technique of brushing while there were 17 i.e. 10% patients response as they don't know what technique they use while brushing there teeth.

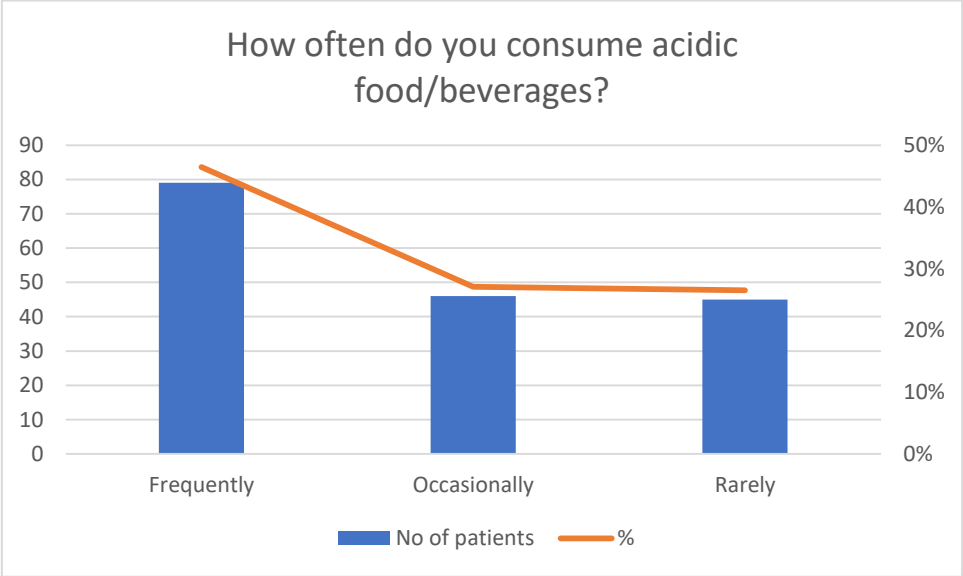
Do you use any of the following?



Do you use any of the following?	No of patients	%
Dental floss	35	21%
Interdental brush	37	22%
Mouthwash	50	29%
Toothpick	45	26%
Mouthwash, Dental floss	2	1%
Mouthwash, Toothpick	1	1%
Grand Total	**170**	**100%**

In the questionnaire patients were asked about if they use any teeth cleaning, rubbing accessories for example dental floss, mouthwash or toothpick and after analysis of results it was founded that 35 patients uses dental floss while 37 patients uses interdental brush, 50 patients uses mouthwash, 45 patients uses toothpick while 2 patients uses both mouthwash and dental floss while 1 patient use mouthwash and toothpick.

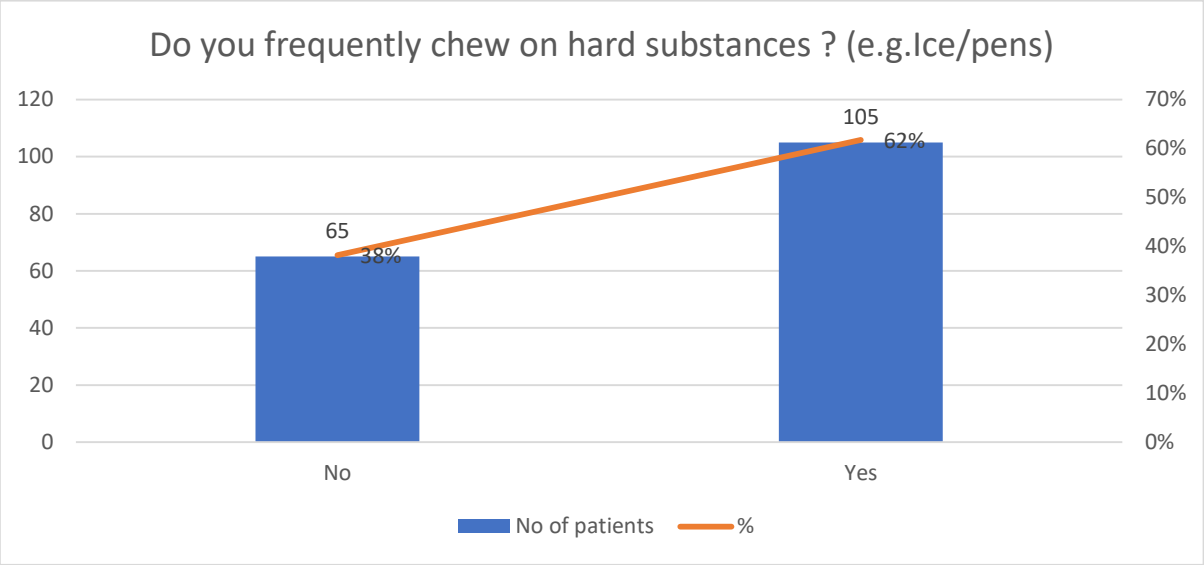
How often do you consume acidic food/beverages?



How often do you consume acidic food/beverages?	No of patients	%
Frequently	79	46%
Occasionally	46	27%
Rarely	45	26%
Grand Total	**170**	**100%**

In the study it was founded that 79 patients i.e. 46% patients frequently consume acidic food/beverages, 46 patients i.e. 27% patients occasionally consume acidic food/beverages, 45 patients i.e. 26% patients rarely consume acidic food/beverages

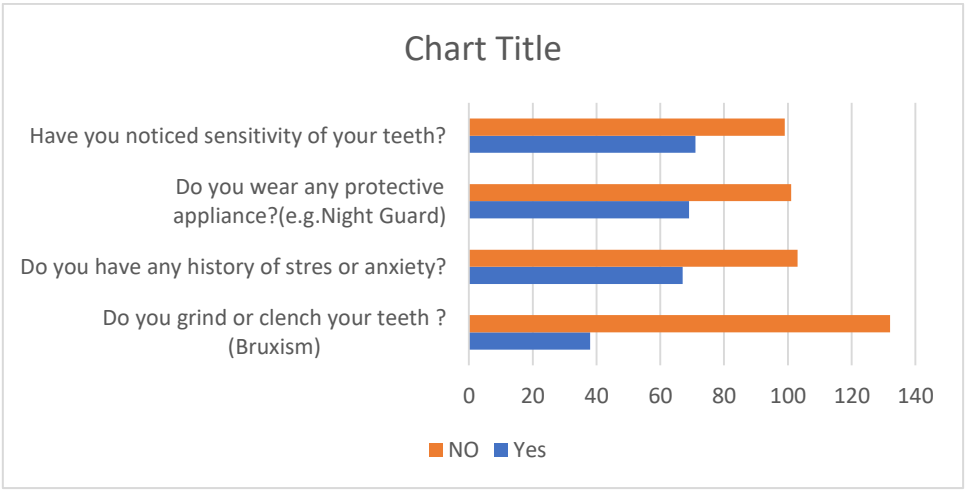
Do you frequently chew on hard substances ? (e.g. Ice/pens)



Do you frequently chew on hard substances ? (e.g. Ice/pens)	No of patients	%
No	65	38%
Yes	105	62%
Grand Total	**170**	**100%**

In the study questionnaire, 105 patients i.e. 62% said yes when question asked about Do you frequently chew on hard substance and 65 patients i.e. 38% patients responded negative on it.

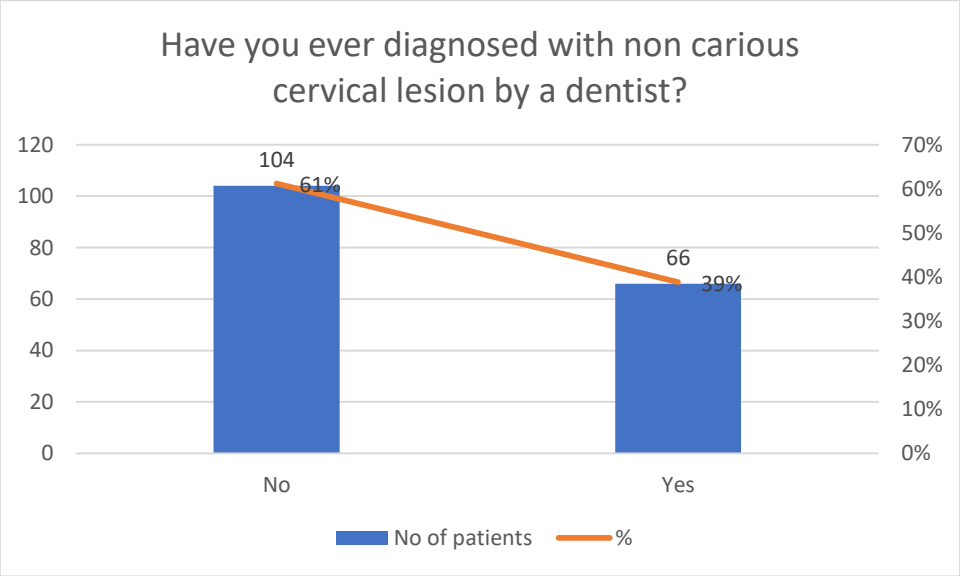
Yes/No questions from questionnaires



	Yes	NO
Do you grind or clench your teeth ? (Bruxism)	38	132
Do you have any history of stress or anxiety?	67	103
Do you wear any protective appliance?(e.g. Night Guard)	69	101
Have you noticed sensitivity of your teeth?	71	99

In the study patients were asked if they clench the teeth to which 38 patients responded as yes, while 67 patients has history of stress, 69 patients wear protective appliances e.g. night guard and 71 patients noticed sensitivity in their teeth.

Have you ever diagnosed with non-carious cervical lesion by a dentist?



Have you ever diagnosed with non-carious cervical lesion by a dentist?	**No of patients**	**%**
No	104	61%
Yes	66	39%
Grand Total	**170**	**100%**

In the study questionnaire , maximum i.e. 104 patients i.e. 61% responded as No when question asked about Do they ever diagnosed with non-carious cervical lesion by a dentist and 66 patients i.e. 38% patients responded as yes.

DATA ANALYSIS

chi-square Test

A chi-square test determines if a significant relationship or association exists between two or more categorical variables by comparing observed frequencies with expected frequencies, which are calculated assuming no relationship exists between the variables. It uses observed and expected data in contingency tables to calculate a chi-square statistic, which is then used with degrees of freedom to find a p-value that indicates if the observed deviations are likely due to chance or a genuine relationship.

In this study chi-square test is used to find relationship between Non-carious cervical lesions (NCCLs) and responses of patients on questionaries.

We used following responses of following question recorded

a. What type of toothbrush do you use?
b. What type of brushing technique do you use ?
c. How often do you consume acidic food/beverages?
d. Do you frequently chew on hard substances ? (e.g.Ice/pens)
e. Do you grind or clench your teeth ? (Bruxism)

Null Hypothesis- there is no relationship between 5 questionaries taken in below table and Non-carious cervical lesions (NCCLs)

Alternate hypothesis – there is significant relationship between 5 questionaries taken in below table and Non-carious cervical lesions (NCCLs)

The basic formula for a chi-square test statistic is:.

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

O represents the observed frequency in a category.
E represents the expected frequency in a category, assuming the null hypothesis (no difference or no relationship) is true

The level of "P" between 0.05 to 0.01 and P <0.001 was considered as statistically Significant and Highly Significant respectively.

Questionnaire	Alpha	df	X^2	P- value	Result
What type of toothbrush do you use?	0.05	1	12.47	0.002	significant
What type of brushing technique do you use ?	0.05	3	8.37	0.0389	significant
How often do you consume acidic food/beverages?	0.05	2	7.85	0.0198	significant
Do you frequently chew on hard substances ? (e.g. Ice/pens)	0.05	1	15.7	0.0001	significant
Do you grind or clench your teeth ? (Bruxism)	0.05	1	3.93	0.0475	significant

As p value of all 5 questions i.e. What type of toothbrush do you use?, What type of brushing technique do you use ?,How often do you consume acidic food/beverages?, Do you frequently chew on hard substances ? (e.g. Ice/pens) and Do you grind or clench your teeth ? (Bruxism) is less than 0.05 it can proved that they have significant relationship with Non-carious cervical lesions (NCCLs). The relative df and X^2 are given in the table. The highest co-relation is between chewing of hard substance and NCCLs.

DISCUSSION

Age: NCCLs are more prevalent in yonger individuals, with rates increasing with age due to prolonged exposure to potential etiological factors. In this study maximum 88(52%) patients were from 22-23 years of age, 65(38%) patients were from 20-21 years of age, 10(6%) patients were from 24-26 years of age, 7(4%) patients were from 18-19 years of age.

Gender: Some surveys report a higher prevalence of NCCLs in females compared to males, though this can vary by study population. Maximum patients were female i.e. 112(66%) out of 170 patients. 58(34%) patients were male.

Brushing your teeth daily-
In this study patients were asked about number of times they brush their teeth daily, in response, 57 patients (34%) said they brush their teeth once while remaining 133 (66%) patients said they do it twice in day.

Using **type of toothbrush-**
The analysis of the study indicated that 41% i.e. 69 patients use hard type of tooth brush, 30% i.e. 51 patients use medium type of tooth brush and remaining 29% i.e. 50 patients use hard type of tooth brush.

Type of brushing technique-
In the study it was founded that 63 patients i.e 37% patients use circular technique of brushing, 43 patients i.e. 25% patients use horizontal technique of brushing, 47 i.e. 28% patients use vertical use vertical technique of brushing while there were 17 i.e. 10% patients response as they don't know what technique they use while brushing there teeth.

Use any teeth cleaning, rubbing accessories –
In the questionnaire patients were asked about if they use any teeth cleaning, rubbing accessories for example dental floss, mouthwash or toothpick and after analysis of results it was founded that 35 patients uses dental floss while 37 patients uses interdental brush, 50 patients uses mouthwash, 45 patients uses toothpick while 2 patients use both mouthwash and dental floss while 1 patient use mouthwash and toothpick.

Consuming acidic food/beverages-
In the study it was founded that 79 patients i.e. 46% patients frequently consume acidic food/beverages, 46 patients i.e. 27% patients occasionally consume acidic food/beverages, 45 patients i.e. 26% patients rarely consume acidic food/beverages

Frequently chew on hard substances ? (e.g. Ice/pens)
In the study questionnaire, 105 patients i.e. 62% said yes when question asked about Do you frequently chew on hard substance and 65 patients i.e. 38% patients responded negative on it.

In the study patients were asked if they clench the teeth to which 38 patients responded as yes, while 67 patients have history of stress, 69 patients wear protective appliances e.g. night guard and 71 patients noticed sensitivity in their teeth.

Diagnosed with non-carious cervical lesion by a dentist?
In the study questionnaire , maximum i.e. 104 patients i.e. 61% responded as No when question asked about Do they ever diagnosed with non-carious cervical lesion by a dentist and 66 patients i.e. 38% patients responded as yes.

Location: The prevalence of NCCLs varies widely across different geographic locations and populations.

Importance of Surveys
Identification of Risk: NCCL surveys help identify individuals and populations at higher risk.

Prevention Strategies: Findings from these studies inform the development of public health strategies and patient education to reduce the prevalence of NCCLs.

Treatment Planning: A thorough understanding of NCCL aetiology aids in determining the most appropriate treatment approaches for patients.

CONCLUSION

This study concluded that premolars were most commonly affected by the NCCLs, whereas age seemed to contribute to the increased prevalence of NCCLs in adults undergoing orthodontic treatment.

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