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DEGREE OF ROUGHNESS IN THE DENTINE ASSOCIATED WITH THE CONSUMPTION OF ALCOHOLIC BEVERAGES IN THIRD MOLARS IN VITRO STUDY

Dental Science

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ABSTRACT

The dental erosion is produced by elements within the organism and by elements that come from the outside of it according to Cunibertial being the factor "diet" the exogenous element.

According to Castañeda the degree of roughness of the tooth enamel can be affected by bacterial and non-bacterial mechanisms; the bacterial mechanisms are acids that act as solvents on the dental enamel, caused by bacteria that are typical of these acids. While non-bacterial mechanisms can be extrinsic, which correspond to exogenous acids, medicines and diet. Cuniberti also associates intrinsic factors such as involuntary somatic, among which are voluntary gastrointestinal and psychosomatic disorders such as disorderly consumption of acidic foods, carbonated, energetic, alcoholic, citrus beverages and professional exposure to acidic environments. The purpose of this research was to evaluate through roughness the changes in the surface of the tooth emanel that occur after contact with alcoholic beverages of different alcoholic strength, for which 60 third molars were used. The experiment was performed for 8 hours, Group 1: Control, stored in artificial saliva; Group 2: Beer; Group 3: Tequila; Group 4: Whisky; Group 5: Ron. Afterwards, the analysis of roughness (µm) was performed, the results of which were statistically performed using the SPSS V22 software, by means of the ANOVA test. Through the statistical study, the research hypothesis is approved; that is to say that the higher the degree in alcoholic beverages, it causes roughness on the surface of the tooth enamel. When analyzing the degree of roughness between the different beverages whisky had a higher degree of roughness on the surfaces of the tooth, followed by rum, after Tequila and finally the beer proving that the higher alcohol level will be the degree of dental roughness and lower the hydrogen potential of beverages, generating an erosive effect on the tooth surface.

KEYWORDS

INTRODUCTION

According to Barrancos et al, (1) The enamel is a coating that covers the crowns of the dental organs mainly constituted by hydroxyapatite, is translucent white or bluish gray, mainly formed by inorganic substance in 95%, Organic substance at 1.8%, and water at 3.2%, as mentioned. In dentistry the term "erosion" or "corrosion" refers to the wear of the surface of dental structures caused by acidic or chelating agents and chelators do not involve the presence of bacteria (2). The dental erosion is produced by elements within the organism and by elements that come from the outside of it according to Cuniberti et al., (2) being the factor "diet" the exogenous element, which is becoming the most important since today there is an increase in The consumption of acid-type foods, liquors and gasified beverages. According to Castañeda et al., (3) the degree of roughness of the dentine may be affected by bacterial and non-bacterial mechanisms; the bacterial mechanisms are acids that act as solvents on the dentine, caused by bacteria that make up the same acids. While non-bacterial mechanisms can be extrinsic, which correspond to exogenous acids, medications and diet (2). Thus also Cuniberti et al., (2) associates intrinsic factors as involuntary somatics, among which are gastrointestinal disorders; and psychosomatic volunteers as the untidy consumption of acid food, carbonated beverages, energy drinks, alcoholic beverages, citrus drinks and professional exposure to acidic environments.

According to Garone et al., (4) An acid has properties that are determined by titratable acidity, that is, the amount of acid actually present (concentration of hydrogenies or PH) and the relative strength of the acid (the ease with which the acid will release ions H-pKa), can affect the erosive potential of beverages, so the erosive potential of a beverage is only "a potential". While Lussi et al., (5) suggests that real erosion, in vivo, depends on the practices of consumption and the habits of individuals. Pozzi, (6) indicates that saliva against acid erosion will fulfil functions, such as: dilution of erosive substances in the mouth, by means of the buffer capacity to neutralize the acids from the diet so that they do not damage the enamel This remineralizing capacity is presented by ions of calcium, phosphate and also by the formation of the salivary film, which becomes a protective layer against the action of acids. Studies According to Mandel, (7) show that when there is a pH less than 5.0 to 5.7 is caused a dissolution in the tissue of the dentine, therefore, foods and beverages with a previously mentioned ph could play an important role in dental erosion. Speaking of alcoholic strength Barbour et al., (8) shows what the higher alcohol content a beverage will be, the lower its hydrogen potential and vice versa.

Cuniberti al., (2) indicated that there is a high frequency of consumption of beverages of regular use in social gatherings by young people and older adults, as well as a significant acid diet that induces the formation of injuries that contribute to the Dissolution of enamel. As stated above, it is of great importance to provide data to inform and educate individuals about the problem of consumption of this type of beverage and the damage caused by alcohol graduation. These are the fundamentals of the study of an in vitro analysis of the actions that produce 4 alcoholic beverages on the dental structure by verifying changes in the roughness, whose analysis will be carried out by means of a roughness, and what you want to demonstrate Is that the higher the degree in alcoholic beverages, it causes roughness on the surface of the tooth enamel.

MATERIALS AND METHODS

The present study is experimental, in vitro, compared and descriptive which was carried out by dipping the samples in different alcoholic beverages (rum, whisky, beer and tequila) and then perform an analysis with the roughness. The collaboration was requested of the professionals of the dental clinic DENTOSALUD, for the collection of the third molars. Once extracted, the tooth pieces were stored in a properly disinfected glass jar, immersed in physiological saline, changing the serum every 2 days.

Prior to the experiment, meticulous cleaning was done to the 60 third molars donated, with ultrasound, jet water from the dental chair, with specific curettes for molars 11-12 and 13-14, prophylactic brushes, and micromotor, to perform Removal of tissue remnants or any organic material present on the surface of the teeth; The teeth will then be stored in physiological saline and at room temperature to keep them hydrated, while preparing the work table.

To start with the procedure we proceeded to completely dry each tooth piece with the help of the triple syringe. The samples were organized in a tray, forming 5 random groups as follows:

- Group 1: Artificial Saliva (control group), made up of 12 third molars.
- Group 2: Beer, formed by 12 third molars.
- Group 3: Rum, formed by 12 third molars.
- Group 4: Whisky, formed by 12 third molars.
- Group 5: Tequila, formed by 12 third molars

Each piece was placed with the occlusal face in contact with a small piece of plasticine to be manipulated and so applied 2 coats of nail varnish on the surfaces of the dental pieces that do not correspond to the enamel structure, ie from the neck anatómic Or to the apex, so that alcoholic beverages are only in contact with the enamel surface.

The groups were assigned with a different glaze color, as follows: Group 1-transparent; Group 2-Yellow; Group 3-Green; Group 4-Blue; Group 5-Red, it was expected a time of approximately 45 minutes to be completely dry before proceeding with the procedure, meanwhile prepare the 5 glasses of glass millimeters with 75 ml of Salivsol (artificial saliva), beer, rum, whisky, and tequila which were placed on the work table of a private dental office, designed strictly for the experiment. The pH is taken with pH-Fix strips 0-14 to each alcoholic beverage and artificial saliva.

Once the dental pieces were dry, the third molars were submerged in each vessel labelled respectively, and after the indicated time of 8 hours of alcohol exposure, they proceeded to remove them from the substances to be washed with physiological saline to Spray and subject to a drying with the triple syringe. Each molar was taken and placed in the metal base to begin the process of measuring the surface roughness, taking into account the more uniform side that has each tooth to perform the measurement.

Before starting with the measurements of the samples of the teeth it is verified that the roughness is calibrated, this procedure is done with the glass pattern of the equipment that has a reference measure of 1.64 (µm) of roughness Ra, with a precision Class 2. In addition, the Laboratory technician explained that there is a clay matrix in which the sample is placed, leaving one of the faces free to be analyzed in the roughness. The equipment used for the measurement of roughness was the one roughness Digital series N628306 of the laboratory metrologist measurements, which consisted of a LED display, a rechargeable battery, and a tracer point of diamond and a reference pattern of roughness.

For the measurement of the roughness the equipment was calibrated according to the distance or the sweep to be carried out, as the samples are very small it will be measured with Cut off of 0.25 mm. Then the samples were codified, enumerating the five groups from 1 to 12 and proceeded to place very carefully the diamond point of the Tracer of the roughness in the straight part of the tooth, making a stroke at a speed of palpation 0.135 mm/s with length 0.25 mm limit wave. Seven measurements were made for each sample and an average was determined, according to the indications of the roughness, obtaining the values corresponding to each sample, which were recorded in the respective data collection tables.

RESULTS

For the evaluation of changes in the surface of the dentine that occur after contact with alcoholic beverages of different alcoholic strength after 8 hours of exposure in them, through the roughness is necessary the processing and analysis of The results obtained, we support in the Excel calculation tool and statistical tests with SPSS V22 software. Firstly, the measurements made in the control test and the different alcoholic beverages and with different alcoholic strength are presented.

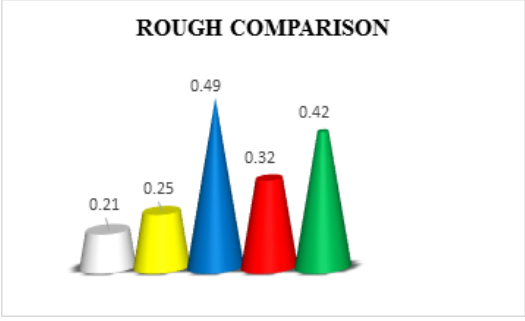

Figure 1 Roughness comparison between the control group and the other groups

In Figure 1, the average values with the different experimental alcoholic beverages and artificial saliva can be clearly seen, and the average values are differentiated by colors, in which the maximum roughness value is highlighted for the Experimental whisky.

A table of roughness of damage of the surface of the dentine associated to the consumption of alcoholic beverages was elaborated.

TABLE 1 roughness of the dental surface associated to the alcoholic degree

DRINK	Grade Of Alcohol	ROUGH LEVEL				Total
		N1 MINIMUM 0-0,25 µm	N2 MODERATE LOW 0,26-0,31 µm	N3 MODERATE 0,32-0,41 µm	N4 MODERATE HIGH 0,42-0,53 µm	
Artificial saliva	0	1	0	0	0	1
Beer	4,2°	1	0	0	0	1
Tequila	35°	0	1	0	0	1
Rum	37,5°	0	0	1	0	1
Whisky	40°	0	0	0	1	1
TOTAL	2	1	1	1	5	

Table 1 presents the data to establish the level of roughness produced, according to the alcoholic strength of the experimental beverage compared to the level of roughness generated on the dental surface, here it can be clearly determined that as Increases the alcoholic strength of the experimental beverage, likewise increases the level of roughness that occurs in the exposed dental pieces. It stands out as it has been analyzed that the experimental whisky that possesses the highest alcoholic strength also produces the highest level of roughness N4 which is high moderate and the beer that has the lowest alcohol, has the level N1 of roughness, which is the minimum.

	N	Half	Standard deviation	Standard error	95% of the confidence interval for the mean		Minimu m	Máximum
					Lower limit	Higher limit		
Control Artificial saliva	12	,2117	,01115	,00322	,2046	,2187	,20	,23
Beer	12	,2508	,01084	,00313	,2439	,2577	,23	,27
Tequila	12	,3208	,01505	,00434	,3113	,3304	,30	,34
Whisky	12	,4950	,02505	,00723	,4791	,5109	,44	,54
Rum	12	,4142	,02275	,00657	,3997	,4286	,36	,44
Total	60	,3385	,10651	,01375	,3110	,3660	,20	,54
	Sum of squares	gl	Quadratic mean	F	Sig.			

Between groups	,652	4	,163	505,016	,000			
Within groups	,018	55	,000					
Total	,669	59						

DRINK	GRADE OF ALCOHOL	pH	ROUGH LEVEL
ARTIFICIAL SALIVA	0	7	0,21
BEER	4.2	4	0,25
TEQUILA	35	3	0,32
RUM	37.5	3	0,42
WHISKY	40	2	0,49

DISCUSSION

At dental level the consequences of drinking alcohol in humans, specifically in the oral cavity, have almost not been taken into consideration, but studies by Grippo et al., (9) show that the consumption of these beverages cause alterations in dental structures, for this reason was raised this investigation in which identifies the variations of the roughness of the dentine of 60 third molars to be in the presence of the Beverages such as; Beer, rum, Tequila and whisky.

Through the statistical study, the research hypothesis is approved; where P-value is 0.000 less than the level of significance ($\alpha \leq 0.05$), implying that there is significant difference with a confidence level of 95% among the averages of study, ie the higher the degree in alcoholic beverages, causes roughness On the surface of the tooth enamel. These results coincide with the study of Grippo et al., (9) that the excessive consumption of alcoholic beverages causes enormous damage to the mouth, causing an alteration in the degree of roughness of the dentine and thus causing the dental erosion. Also Liñan et al., (10) who affirms that there are various forms of chronic degenerative processes such as: abrasion, attrition, infringement, resorption, and erosion caused by food or beverages and by mechanical stimuli, which affect the Dental structure, resulting in irreversible loss of dental tissue. Through the standard deviation is validated the results before exposed, this value for saliva (control) is 0.01115 and in the case of whiskey that has the highest degree of roughness and the standard deviation is 0.02275, ie the farther away from the deviation of The greater control sample is the difference between the averages and the greater the effect of the roughness, this reveals a change in the degree of roughness of the dentin in all study groups with different alcoholic beverages when compared with saliva. This behavior is similar to that mentioned by Fushida et al., (11) The higher the degree of alcohol and the lower the PH, the greater the erosion of the dentine depending on the time of permanence in the oral cavity. As demonstrated by Cuniberti et al., (2) who studied the non-carious lesions, among which is the erosion, stating that because of this lesion the enamel becomes an imperfect surface with a rough and smooth appearance, therefore the erosion of the enamel Dental is linked to the roughness of the dental pieces.

In addition, in the study of Moreno et al., (12) who reported that beverages with less degree of alcohol such as beer do not cause severe damage to the tooth enamel. As demonstrated in this research, whose alcohol level of beer is the lowest among the samples of study and presents the least degree of roughness, however not consistent with what was studied by Nogueira et al., (13) that concluded that beer was capable of Demineralize the dental structure and cause harmful effect on the teeth. Another study that is not the same as those obtained in this research, is the one performed by Correa et al., (14) that showed that carbonated beverages (beer) produce significant wear on dental pieces, With an important principle that is the time of exposure, because in this study the time of exposure increases progressively, ie that for each group increased the time and thus produced a significant difference in wear of the enamel in All groups.

Another additional point of the research is the established with the experimental results of ph depending on the degree of alcohol, where it is evidence that the higher alcohol level is the pH of the drink in study, ie are more acid, in this case the group whisky with higher volume of alcohol is found at level 2 of the hydrogen potential and the beer with lower alcohol level is located at the PH position 4. These results coincide with Barbour et al., (8) which mention that less erosive beverages have an average ph of 4.3 to 5.5 and a lower degree of alcohol and more erosive beverages have a low ph and a higher degree of alcohol. Thus they agree Moreno et al., (12) and Liñan et al., (10) which investigate that the progression of the erosion is affected by the alcoholic graduation, frequency of consumption and the pH of the beverages.

CONCLUSION

When analyzing the degree of roughness between the different beverages with different alcoholic strength, it was evident that the samples of third molars dipped in whisky had a higher degree of roughness on the surfaces of the dentine, followed by Rum, after tequila and finally beer; Proving that the higher alcohol level will be the degree of dental roughness and lower pH of beverages, generating an erosive effect over dental enamel. In addition, the alternative hypothesis is verified by means of the statistical study, where to a higher degree in the alcoholic beverages, roughness is provoked on the surface of the dentin. In such a virtue, because the alcoholic beverages submitted in the study are often used, dentists are advised to learn more about this subject, in order to disseminate the damage caused by alcohol not only at the systemic level but also at the level of the oral cavity. . In addition, for the roughness effect to decrease it is advisable to drink beverages with less alcohol and improve dental hygiene.

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