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Influence of Salivary Factors on Dental Caries in Pre-School Children of 4 Years of Age at iei. 442 Divino Amor. Cusco 2006

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Abstract

The present proposed research work aims to reflect a reality, being necessary to determine the influence of salivary factors in pre-school children of 4 years of age; with the purpose of establishing and objectifying the existing implications in the presence of dental caries, expressed through the ceo-d index, thus making it possible to improve the practice of dental professionals in the exercise of the activities of promotion, prevention and recovery of oral health.

This indicates that most of the preschoolers studied presented high salivary pH values, which corresponded to the Basic level with 93.3 %, being affected by the highest caries index with 6.2; followed by the group with Neutral level with 6.7 % and affected by the lowest caries index of 3.5. There was no evidence of any record corresponding to the group with an Acid pH level; with which it is inferred from the results that as the pH increased, the caries index also increased, and vice versa.

Keywords: *salivary glands, caries, vicosity.*

INTRODUCTION

Within the social and economic framework of a country, the existence of health problems affects the quality of life of individuals, mainly those related to oral health (dental caries); currently representing one of the biggest public health problems in preschoolers, despite the existence of preventive technologies capable of controlling, controlling and/or eradicating them. Saliva in normal values plays a central role in the maintenance of favorable conditions of the oral tissues, and especially of the dental pieces, favoring the cleaning of bacterial substrates and protecting the dental surfaces.

However, the presence of physicochemical salivary factors in abnormal values are conditioning factors for the presence of oral lesions; thus, the modification of the volume of salivary flow or its composition affects the concentration of many normal molecular constituents, favoring the decrease of the protective functions, promoting demineralization, and favoring the accumulation of cariogenic microorganisms in saliva. Contrary to the flow, there is an increase in salivary viscosity, which, by denoting a thick and viscous characteristic, favors less effectiveness for the clearance of carbohydrates, thus favoring the demineralization of the dental surface. Thus, the alteration in the values of salivary flow and viscosity, constitute negative factors of the oral cavity, due to the problems of autoclasis that derive from them, and given the ability to influence and

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denote concern in oral health, they constitute predisposing factors for oral diseases and especially dental caries.

Other salivary factors to consider are pH and buffering capacity. This is since a decrease in pH values (higher acidity) interferes with the remineralization process of the teeth, favoring the growth and metabolism of microorganisms. Similarly, when low levels of buffer capacity are present, the time of action of the acids on the enamel increases, thus decreasing the capacity to stop the pH drop and its subsequent reestablishment. In both situations, the possibility of dental demineralization and subsequent caries disease increases.

It is also important to determine the bacterial factors in saliva, since they are recognized as the main etiological agents in relation to dental caries, mainly Streptococcus mutans, whose increased presence and due to its pathogenic properties (resulting from the production of acids as a product of its metabolism), is a determining factor in the presence and development of the potential cariogenic risk in any population. In the same way, the increased presence of Lactobacillus, disfavors the recovery of physiological pH and with it the demineralization of the tooth, which increases the progression of the carious process.

In view of this problematic situation and due to the importance that the subject in question recognizes and in view of the fact that dental caries occupies the first place among the health problems in the world and in our country, and due to the variety of salivary factors involved in it, I am motivated to carry out this research aimed at determining the influence of salivary factors in the presence of dental caries in pre-school children of 4 years of age, since this is the most important stage of life in the development of the individual. In the same way, the research statement is: In what way the influence of Salivary Factors in Dental Caries in preschoolers of 4 years old of the Initial Educational Institution (IEI.) 442 Divino Amor. Cusco 2006? Without skimping on the specific statements: a) How do salivary physicochemical factors influence dental caries; b) How do salivary microbiological factors influence dental caries; c) Which of the two salivary microbiological factors influence dental caries? And c) Which of the two salivary factors has more influence on dental caries?

The study has originality, because the research background in our country to date does not have this particular approach, which will allow us to know the physicochemical characteristics and salivary microbiological factors or circumstances that are of importance, since being obvious to predict the occurrence of carious lesions, it will be possible to direct future preventive actions to people at risk of caries and/or the best use of available resources.

It is also of contemporary and scientific relevance, since it will provide a wealth of new cognitive points in the Pediatric Dentistry and Preventive Dentistry area. It also has a special originality, as there are no research antecedents of similar characteristics in the local environment, so it will effectively contribute to the improvement of the health conditions of the child population; it will also serve as a basis for future research.

MATERIALS AND METHODS

The technique of laboratory observation and clinical oral observation will be used to collect information on the variables (salivary factors and dental caries).

The following schematization corresponds to the above assertion:

VARIABLES	TECNICA
Factores Salivales	Observación Laboratorial

Caries Dental	Observación Clínica Bucal (Intraoral)

The study will be carried out in two stages:

Stage 01.- Clinical Dental Examination (Dental caries index).

Stage 02.- Examination of Salivary Factors (physicochemical and microbiological), determined through 02 saliva samples.

I.- CLINICAL DENTAL EXAMINATION

To carry out this task, a ceo-d data collection form (Klein, Palmer, Knutson 1938) will be used; following the next procedure:

1.- Once the sample has been selected, the children will be organized in the classroom in groups of 5 with the purpose of determining the degree of cooperation of the child, after explaining the test to be carried out.

The preschooler will be taken to the dental office and placed comfortably lying down in the dental chair with the investigator on the right side of the child.

3.- Hygiene of the dental pieces will be performed with prophylactic paste and brush.

The clinical dental examination of the dental pieces will be carried out with the help of the diagnostic instruments (mouth mirror, cotton forceps and explorer) previously sterilized.

5.- The dental examination will be performed under artificial light and with direct and indirect vision according to the case, checking the surfaces of each dental piece in the following order: occlusal or incisal, palatal or lingual, distal, vestibular and mesial.

6.- The examination will begin with tooth 5.5 on the right side (second molar) up to tooth 6.5 on the left side (second molar); continuing with tooth 7.5 lower left (second molar) and ending with tooth 8.5 on the right side (second molar).

7.- For the purposes of the examination the following clinical criteria shall be taken into account:

Carious

- Clinically visible caries

- Opacity of the enamel indicating carious lesion when in the pits and fissures it can be seen that there is softened dental tissue at the bottom.

- When there are fillings and some of the above criteria are present simultaneously.

- In case of single carious lesions that affect both the crown and the root, carious is recorded.

- In cases where the crown has been destroyed by caries, it is recorded as carious.

- In cases of root debris, it is recorded as decayed.

- Teeth filled with a non-definitive material

- When the same tooth is both filled and decayed, the more severe diagnosis (decayed) is considered.

Filled

- Dental crown with definitive restorations (amalgams, resins, ionomers) due to caries.

- Tooth restorations without recurrences, fractures or defects in peripheral adaptation.

- Teeth filled due to causes other than caries (trauma, esthetic factor) will be qualified as healthy.

Extracted

- Tooth that is not present at the time of the examination and has been extracted due to caries.

- Verification of the reason for tooth loss taking into account: tooth eruption, corresponding counterpart tooth, appearance of the alveolar ridge, interrogation of the examinee.

The time for conducting the oral examination will be a maximum of 15 minutes, for which the following criteria for classification and recording of clinical findings of ceo-d will be taken into account:

Carious: Red dot

Obturated: Blue dot

Extracted: Blue cross

9.- Each surface will be examined until the final diagnosis is reached and each diagnosis obtained will be registered in the odontogram of the FDI.

10. To obtain the total value of the ceo-d index, it will be done in the following way:

ceo-d index = Number of decayed + extracted + filled teeth.

$$\text{Índice ceo-d (grupal)} = \frac{\text{Cariados + extraídos + obturados}}{\text{Número de preescolares}}$$

II.- SALIVARY FACTORS

The salivary factors will be evaluated based on the taking of 02 saliva samples under the same conditions, preferably between four and six o'clock in the afternoon, in the following order:

1st sample.- it will be determined the realization of the study of:

1st. salivary flow

2nd. Streptococcus mutans and Lactobacillus cultures.

3rd Salivary pH

4th. Buffer capacity of saliva

2nd sample - to be determined:

5th Salivary Viscosity

Stimulated Salivary Flow

The following procedures will be considered to obtain the Stimulated Salivary Flow:

1.- When the child enters the laboratory environment, the questionnaire of requirements for the salivary test will be applied and once it is verified that the specific indications for the test are met, the corresponding code will be assigned and then we will proceed with the obtaining of the salivary flow.

For this purpose, the patient will be seated on a wooden bench in a straight and relaxed posture.

Next, the oral cavity will be previously rinsed with water, in order to eliminate any food residue.

4.- After 2 minutes, they will be asked to swallow the remaining saliva.

Next, the pre-schooler will be asked to chew a piece of kerosene for 30 seconds until it becomes soft, and will be instructed to swallow the saliva produced during this time.

6.- Subsequently, the preschooler will be instructed to chew the kerosene (on average 60 times per minute) and immediately start timing the time for a period of 5 minutes.

The saliva will be collected in short intervals during the chewing period, being the sample collected in a beaker to later measure the volume of saliva secreted by using a pipette.

8.- To establish the volume secreted, the foam formed during the collection is included.

9 .- Then the corresponding record will be made, which will be expressed as milliliters of saliva per minute, being represented by:

Flujo Salival Estimulado = ml de saliva recogidos durante 5 minutos

Streptococcus mutans and lactobacilli counts

The evaluation of the microbiological factor will be carried out simultaneously by using selective substrate for the counting of Streptococcus mutans and lactobacilli. This will be carried out by means of the registration of the Caries Risk Test (CTR bacteria) of the Vivadent factory.

For effects of the procedure, this will be in strict compliance with the instructions of use stipulated by the manufacturer; being these as follows:

1.- The stimulated saliva sample obtained in the salivary flow test shall be used.

2.- Next, the agar-holder shall be extracted from the test tube.

3.- A tablet of NaHCo3 is placed at the base of the tube.

Carefully remove the protective films from both surfaces taking care not to touch the surfaces of the agar.

5.- Both surfaces will be humidified completely with the help of a pipette, without scratching them.

6.- Allow the excess saliva to drip off.

7.- The agar-holder should be placed back in the tube, taking care to close it well.

8.- Use a pen to write down the date and code of the pre-school sample.

9.- The tube should be kept vertically for 48 hrs. and 37ºC in an incubator.

10. After 2 days, the tube will be extracted from the incubator, the density of the streptococcus mutans and lactobacilli colonies will be compared with the corresponding graphs of the model table.

11. To facilitate the evaluation, the agar slide should be kept tilted under a light source and a photographic record of each sample should be taken.

12. The evaluation of streptococcus mutans and lactobacilli in saliva will be carried out according to:

$\geq$ a 10^5 UFC	=	Alto recuento
$<$ a 10^5 UFC	=	Bajo recuento

pH

1.- Once the saliva sample is obtained, it will be deposited in a glass crystallizer.

2.- The salivary pH is then determined using a pH meter.

For this purpose, the bulb of the pH-meter should be completely inserted into the crystallizer containing the saliva collected in the flow test.

In case the volume of saliva is less than 3 ml, the child will be asked to continue secreting saliva until completing the required volume of 4 ml.

5.- The pH meter is calibrated, waiting a few seconds and then activate the pH meter, which will indicate the salivary pH value obtained.

6.- Next, the corresponding pH value will be recorded according to:

Acido:		pH	entre	0	a	7
Neutro:				pH		7
Básico:	pH entre 7 a 14					

Buffer capacity

The evaluation of the buffer capacity of the saliva will be carried out by means of the registration of the Caries Risk Test (CTR buffer) of the Vivadent factory.

For the purposes of the procedure, this will be in strict compliance with the instructions for use stipulated by the manufacturer; these are as follows:

1.- Once the saliva sample has been obtained, the test strip should be removed from the packaging without touching its yellow end.

Then the test strip should be placed with the active field facing upwards on a stable surface of blotting paper.

3.- The saliva collected in the salivary flow test should be withdrawn by means of a dropper.

Next, the entire active field should be moistened with the help of a dropper, allowing the saliva to drip without the dropper touching the active field and without air inclusions.

5.- After exactly 5 minutes of time of action of the saliva in the active field, it will be compared with the sample of colors to determine by comparison in the image and model picture the buffering capacity of the saliva, the same that will be in function of:

Azul	=	Alta
Verde	=	Media
Amarilla	=	Baja

6.- In cases of a stained coloration of the active field, the damping capacity shall be evaluated based on the unfavorable color that appears.

In case of doubt, the test shall be repeated.

Salivary viscosity.

1.- The pre-schooler will be comfortably seated on a wooden bench, previously the requirements form for the test will be filled out and the corresponding sample code will be assigned.

The child will be made to chew a piece of kerosene and it will be collected in a disposable cup with an approximate volume of 7 ml.

For this test a pycnometer of 5 ml. of capacity will be used, for this purpose the pycnometer will be previously weighed and registered under vacuum.

Then, on absorbent paper proceed to fill the pycnometer (free of bubbles) until the saliva overflows, using a 5 ml disposable syringe.

5.- The pycnometer shall be dried immediately with blotting paper.

6.- The pycnometer is weighed in a granatary balance.

7.- For the determination of the Density, this will be carried out according to:

$$Densidad = \frac{\text{Masa en mg}}{\text{Volumen en ml.}}$$

8.- After the density test, immediately, and using a disposable syringe, 5ml of saliva will be calibrated in the Ostwald Viscosimeter (pipette).

9.- Then it will be introduced in a glass vat with water for 3 minutes and at a constant temperature of 37º C, the same that will be controlled by using a laboratory thermometer.

Subsequently, with a suction pump, the saliva will be absorbed up to the upper limit of the bulb "A" of the pipette.

11.- The evaluation will consist of counting from this moment the time that the saliva takes to travel from the upper lobe (point "a") to the lower lobe (point "b") of the pipette.

12.- This measurement will be repeated 3 times, to estimate the average sliding time of the saliva through the Ostwald viscometer.

13.- Next, the same procedure will be carried out only once using water.

14.- Previously the pipette will be washed with water and alcohol of 97º.

15.- In the same way, the time of water flow in the glass column of the pipette will be measured three times and the average time will be estimated.

16.- The average of the saliva and water times will be used to calculate the Absolute Viscosity of the saliva, which will be a function of:

$$\text{Viscosidad Absoluta (cp)} = \text{visc. Agua } 37^{o} \times \frac{\text{Densidad saliva } x \text{ tiempo desliz. saliva}}{\text{Densidad agua x tiempo desliz. agua}}$$

1.2.- Instruments.

1.2.1.- Documentary Instruments.

The following documentary instruments will be used in this research:

Dental Clinical Record: to determine the ceo-d

Requirements sheet:

Nr. 01.- to determine the previous indications for obtaining the saliva sample corresponding to each child for the Flow test, pH, buffer capacity and microbiological cultures.

No. 02.- to determine the previous indications to obtain the saliva sample corresponding to each child for the viscosity test.

Laboratory Cards:

No. 01.- to determine salivary factors referred to Flow, pH, buffer capacity and microbiological cultures.

No. 02.- to determine water density in Cusco.

No. 03.- to determine the viscosity of saliva.

The model of the instruments is included in the annexes of the thesis.

1.2.2.-Mechanical Instruments.

The verification instruments will be based on the following laboratory instruments:

a) Clinical Dental Examination

- Dental unit
- Buccal mirrors
- Cotton forceps
- Double-ended explorers
- Air/water syringe
- Sterilizer

- Photographic camera

b) For the evaluation of Physicochemical Factors

Salivary flow

- Precipitation beakers or beacker
- Stopwatch
- Graduated pipettes (2 ml., 5 ml. and 10 ml.)
- Suction pump
- Sterilizer

pH

- Glass crystallizers for saliva collection
- Digital ph-meter
- Glass beaker

Buffer capacity

- Stopwatch

Salivary viscosity

- Two-digit precision grenatary balance
- 5 ml pycnometer
- Pizeta
- Disposable syringes
- Ostwald viscometer with 6 micron capillary diameter
- Electric stove
- Isothermal bath tank
- Tank for boiling water
- Stopwatch
- Laboratory thermometer
- Suction pump
- Disposable syringes
- Camera and film camera

a) For the evaluation of Microbiological Factors

Streptococcus mutans and lactobacilli count.

- Incubator
- Bacteriological chamber and refrigerator
- Magnifying glass
- Gas burner
- Light source (fluorescent)
- Metal tweezers
- Photographic camera and film camera

1.3.- Verification materials.

The verification materials will depend on the inputs for the 30 samples:

a) Clinical Dental Examination

- Cotton
- Prophylaxis paste
- Brushes for prophylaxis

b) Physicochemical factors

Salivary flow

- 30 pieces of kerosene
- Napkins
- Bibs

pH

- Water
- Napkins

Buffer capacity

- 30 Buffer indicator strips
- 30 Disposable pipettes
- Buffer paper
- One normal buffer color chart

Salivary viscosity

- 30 pieces of kerosene
- Blotting paper
- 90º alcohol
- Disposable cups
- Napkins

c) Microbiological factors

Streptococcus mutans and lactobacilli count.

- 30 samples of Caries Risk Test agars (CRT-bacteria)
- 30 $NaHCO_3$ tablets
- 30 disposable pipettes

- Table of bacterial values

RESULTS

FREQUENCY OF CASES ACCORDING TO AGE AND SEX

SEXO / EDAD	MASCULINO		FEMENINO		TOTAL	
	Nº	%	Nº	%	Nº	%
4 Años	12	40	18	60	30	100.00

Source: "IFSCDP - IEI 442 D.A. CUSCO 2006".

Personal elaboration

Table shows that the preschoolers under study showed a higher frequency corresponding to the female sex with 60%, in relation to the male sex which presented a frequency of 40%.

RELATIONSHIP BETWEEN SALIVARY FLOW AND THE DENTAL CARIES INDEX

Source: "IFSCDP - IEI 442 D.A. CUSCO 2006".

CARIES DENTAL			FLUJO SALIVAL (ml/5 min.)				
ÍNDICE	Nro	%	Promedio	S	Ls	Li	Rango
Sin caries (0)	4	13.3	7.10	2.00	10.0	5.5	4.5
Leve (1 a 3)	4	13.3	5.40	2.60	8.0	2.5	5.5
Moderado (4 a 6)	9	30.0	4.70	2.00	7.5	2.5	5.0
Severa (7 a más)	13	43.4	3.80	1.40	7.0	2.5	4.5
TOTAL	30	100.0	4.70	2.00	10.0	2.5	7.5

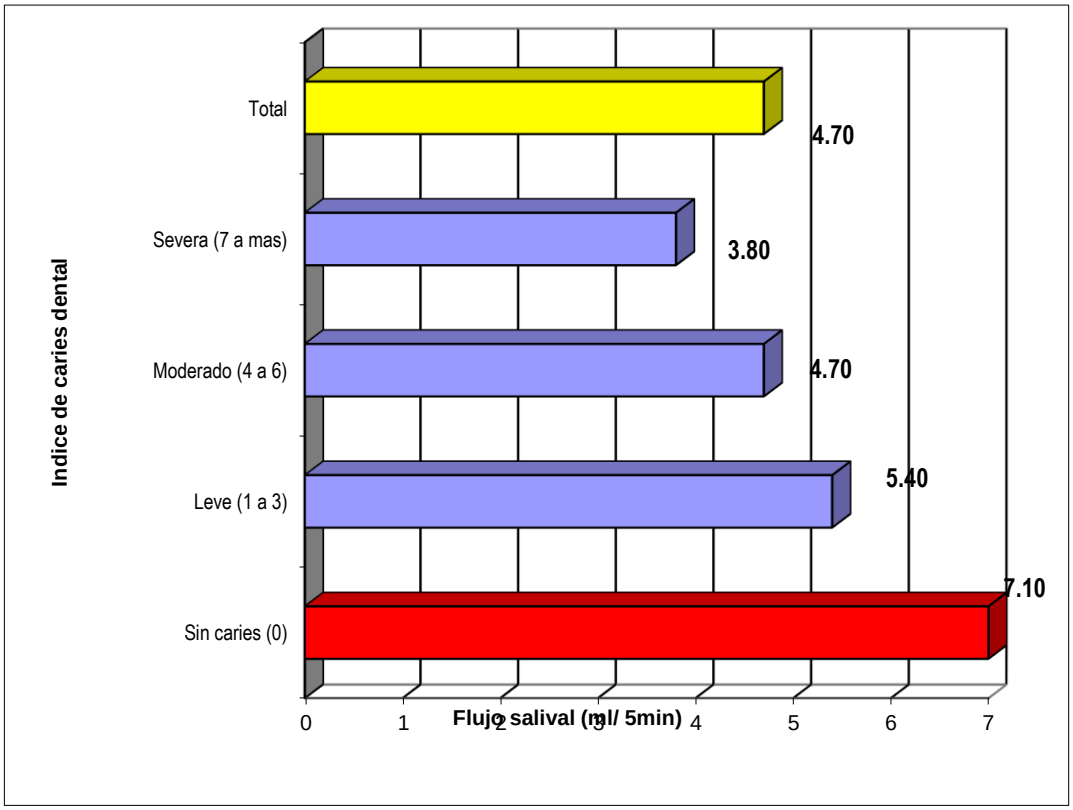
Source: "IFSCDP - IEI 442 D.A. CUSCO 2006".

Personal elaboration

It is observed that the preschoolers studied presented a total average salivary flow of 4.70 ml/5min; registering the highest average in the order of 7.10±2.00 ml/5min and 5.40±2.60 ml/5min, and being affected by the indexes No caries and Mild with 13.3%, each one of them; on the other hand the lowest average flow was registered in the order of 3.80±1.40 ml/5min. 80±1.40 ml/5min and 4.70±2.00 ml/5min, being mostly affected by Severe and Moderate caries indexes at 43.4% and 30.0 %, respectively; thus inferring from the results that, as the average salivary flow decreased, the caries index increased, and vice versa.

RELATIONSHIP BETWEEN SALIVARY FLOW AND DENTAL CARIES RATE

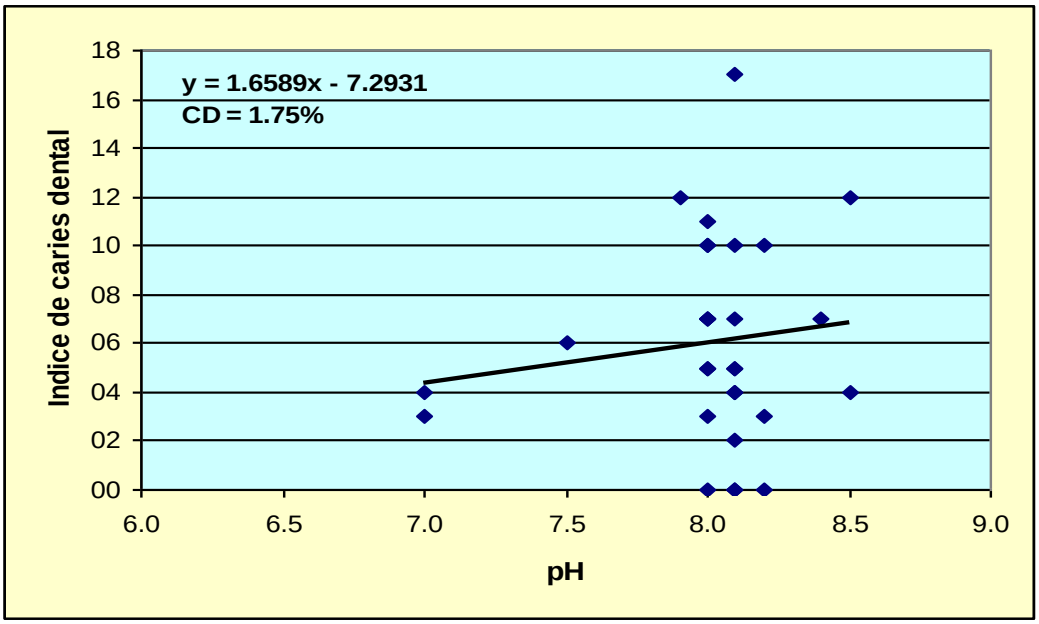
RELACIÓN ENTRE FLUJO SALIVAL E INDICE DE CARIES DENTAL



Source: "IFSCDP - IEI 442 D.A. CUSCO 2006".

Personal elaboration

CORRELATION AND REGRESSION BETWEEN pH AND DENTAL CARIES RATE



Ecuación de la regresión lineal simple : y = a + bx

Coeficiente de correlación (r) : 0.132143

Significación correlación (5%) : 0.361 NS.

Intersección eje (a) : -7.2931

Pendiente (b) : 1.6589

Coeficiente de determinación (CD) : 1.75%

The correlation indicates that there was no statistically significant difference in the influence of salivary pH on the dental caries index with 95% certainty, determining this variable at 1.75%, and indicating a directly proportional association (r = 0.132143).

RELATIONSHIP BETWEEN SALIVARY BUFFER CAPACITY AND DENTAL CARIES RATE

CARIES / BUFFER	Nro.	%	c	e	o	ÍNDICE
ALTO (azul)	13	43.3	37	-----	01	2.9
MEDIO (verde)	14	46.7	102	04	06	8.0
BAJO (amarillo)	03	10.0	28	01	01	10.0
TOTAL	30	100.0	167	05	08	$\overline{X}$ = 6.9

Source: "IFSCDP - IEI 442 D.A. CUSCO 2006".

Personal elaboration

Legend:

- c: carious
- e: extracted
- o: obturated

The observed results show that the highest percentage of preschoolers presented buffer capacity with Medium indicator in 46.7% and caries index of 8.0; closely followed by the group with High indicator with 43.3% and caries index of 2.9 and in lower percentage, the group with Low indicator with 10.0 % and the highest caries index record of 10.0; thus inferring from the results that the higher the buffer, the lower the caries index and vice versa.

DISCUSSION

The carious process implies that saliva is considered a system of multiple factors of physiological and biological characteristics that, when acting together, constitute concrete elements that make it possible to demonstrate its influence in the development of diseases that affect the oral cavity. It is therefore important to study this biological fluid, which in recent years has motivated an intense search for causal relationships and participation in

the formation of dental caries, since (Barbería, 2005) states: "saliva with its individual characteristics and intimate relationship with dental enamel is a fundamental element for the development of caries or its prevention".

The research was aimed at determining the physicochemical and microbiological characteristics of saliva, estimated in 30 preschool children, with the purpose of establishing the influence of these factors in dental caries; for this purpose, laboratory tests were carried out referring to salivary flow, stimulated by means of a piece of kerosene and collected for 5 minutes in a beaker; pH, established by means of a peachimeter; buffer capacity, determined by means of CRT-buffer indicator strips (Vivadent) and absolute viscosity, estimated by means of the Ostwald viscometer; likewise, observations were made by microbiological counting of cultures of Streptococcus mutans and Lactobacillus, carried out in selective agars of CRT-bacteria (Vivadent). Dental observation was also carried out through indirect clinical examination in order to determine the presence of dental caries, estimated by ceo-d index, and according to criteria established by the WHO.

The results of the study show in reference to the stimulated salivary flow, the total average value of 4.70 ml/5min; where, mostly 13 cases with severe caries index and the lowest salivary flow of 3.80 ml/5 minutes were presented. Being the group with 2.5 to 5.0 ml/5min of salivary secretion with 63.3%, the most predominant of the sample; and the correlation between the variables, had a statistically significant difference at 95% certainty and an inversely proportional association.

These data show the low average salivary flow obtained in the study sample (4. 70 ml/5min), in relation to the volume of secression in stimulated flow, which is 1 to 2 ml/min, and considering that the salivary flow is currently the most predictable factor, the results obtained in the sample are an aspect of concern; Since, the salivary flow is related to the formation and presence of caries, since, the deficient secretion originates a decrease of the salivary protective functions, restricting with it the autoclisis, and consequently it favors the persistence of food remains and the accumulation of acidogenic microorganisms, such as the S. mutans and lactobacillus, which increase the acidity of the oral environment, promoting the demineralization of the dental enamel and with it, the risk of dental caries.

In this regard, the results are related to what was found in the studies of (Ortega P., 1998), in young people aged 17 and 24 years, who concluded: "as salivary flow values decreased, the caries index was higher"; and where (KATZ S., 1982), in this regard stated: "salivary flow and salivary viscosity are important in the process of caries formation, considering that a deficient salivary secretion constitutes negative aspects, since they can influence a greater tendency to present caries". In turn, (Laguna, C) observed in university students "significant statistical differences in relation to the caries index, demonstrating that as salivary flow decreases, there is a greater incidence of dental caries".

Likewise, (Loyo M., 1999) in young people aged 15 and 20 years observed that "the stimulated salivary flow showed significant differences with caries activity" and finally in dental students aged 19 and 27 years (Sáenz MLP, 1996) concluded: "that as the caries index increased, the stimulated salivary flow decreased; the correlation factor between the stimulated salivary flow and the CPO-D index was negative and statistically significant".

From the data in reference we have that the values of salivary volume differ from our study; which in part, would be due to the variable age (our research was carried out in children of 4 years of age); This is an aspect to be considered in salivary secretion, depending on the size of the salivary glands and the more vigorous mastication, as is the case in young and adult populations; who, in turn, have a greater tendency to form dental caries, since they are generally subject to chronic conditions and drug treatment, which modify salivary secretion.

Thus, in the study of (Sánchez PL; Sáenz MLP. 1997) who established patterns of salivary production associated with the prevalence of caries in children from 7 to 12 years of age, they concluded that "the CPO-D index was 0.94±1.7; and the average stimulated salivary flow was 1.88±1.04 ml/min. No statistically significant association was established between the production of saliva and the caries index, with the volume of salivary secretion showing a behavior inversely proportional to the behavior of dental caries"; This would be attributed to the fact that the studies of salivary flow related to dental caries are sometimes not entirely conclusive, and even more so, considering that salivary flow is not an independent factor, since low salivary volume causes a decrease in the protective functions, promoting the demineralization of the enamel and favoring the accumulation of cariogenic microorganisms. Also, low flow determines low buffering capacity by exerting a low effect on pH, because although the amount of saliva, time, type and duration of the secretory stimulus are important, so is the quality of the saliva, due to the specific functions of its components, which influence the prevention or development of caries.

The measurement of pH was another criterion considered, and in this regard (Screenby, 1982; Nikiforuk, 1985) pointed out that "the measurement of pH can represent acidogenicity, but not necessarily cariogenicity", which is why pH is not considered to be a salivary factor of great predictability in the carious process.

In the research, 28 cases of Basic level were reported, and caries index of 6.2, and in a minority 02 cases of Neutral level, with 3.5 index; being the group with pH value 7.6 to 8.1 with 70%, mostly affected by Severe caries index in 33.3%; and in the correlation between the study variables there was no statistically significant difference at 95% certainty and indicating a directly proportional association.

The results show that the pH values correspond mostly to the basic level, not registering any case of acid pH; these figures could be related to the obtaining of the salivary sample by stimulation, since in (www.medicinaoral.com/medoralfree01/v11i5/medoralv11i5p449e. pdf) "the mechanical act of chewing can provoke a stimulus to the parotid gland, which produces a saliva rich in bicarbonate"; in addition to this, it would be attributed that children physiologically possess a high protective factor; since, due to their young age, they are not commonly affected by systemic diseases, radiations, stress and some medications, as young people and adults are, factors that in their presence and in association with other factors such as low salivary flow, buffer capacity, bacterial plaque, etc., would increase the risk of cariogenesis, would increase the cariogenic risk.

It should also be noted in the research that children with a basic pH have, in turn, a greater presence of dental caries, despite the fact that the oral cavity and especially the saliva have systemic and biological mechanisms of protection which are favored, such as the buffer system; This could be explained by (Llena P, Carmen) when stating that "pH recovery is not the same on all tooth surfaces, being more difficult in the middle interproximal areas, due to the difficulty of accessibility of saliva to them and consequently less dilution and buffering capacity of the acids of the plaque" (Llena P, Carmen).

This would also consider the existence of other factors associated with pH and related to dental caries, such as cariogenic diet; The high intake of carbohydrates and an excessive frequency of their ingestion, favored by poor oral hygiene, contribute to a decrease in the pH of the saliva, which increases the possibility of the teeth remaining exposed for longer periods of time to low pH levels from the saliva and plaque (due to high acid production by microorganisms), which means that the recovery of pH does not take place within the return time (20 or 30 minutes) and on the contrary, this takes place over longer periods of time; In this regard (Stephan, 1944), stated that: "when the intake of carbohydrates is repeated before normal levels are recovered, the low pH is accentuated and maintained

for a longer time (2 hours), by depletion of the salivary buffers (carbonates and phosphates)" and "if the acid action of the pH is frequent or continues for a long time, the enamel is totally decalcified, causing a rapid demineralization and degradation of the dentin" (http://www. labnutricon.cl/caries.htm).

Another criterion observed was the buffer capacity, which according to (Quintanilla P, 1969), "has the property of tolerating the addition of strong acids or strong bases, being able to notably buffer pH changes", which implies that the buffer is considered as an important salivary factor related to the formation and presence of the carious process.

In our study, the buffer corresponded mainly in 14 and 13 cases to the Medium and High indicators, with caries index 8.0 and 2.9, respectively, and as a minority in 03 cases to the Low indicator with index 10.0; being in turn, the group with Medium buffer, mostly affected by the Severe caries index in 30%; and in the correlation between the study variables, there was a statistically significant difference at 95% certainty and indicating an inversely proportional association. In this regard, our results are related to those found by (Loyo M. 1999), who found that: "the buffering capacity of saliva was high in the whole sample, independently of the cariogenic activity. There was no direct correlation between buffering capacity and cariogenic activity".

From the above and according to (Mendel ID 1974), "saliva has buffering and neutralizing capacity of the acids produced by the cariogenic microorganisms or ingested through the diet, allowing to maintain a relatively constant pH"; it is therefore considered that the buffer does not constitute an independent salivary factor, since it is associated to other factors, such as salivary flow, pH, plaque, diet, etc. Thus, in the presence of a constant stimulus such as sugar intake, which is frequent in children, causes saturation, with the consequent prolonged action of the acid pH on the tooth surfaces. Furthermore, according to (Llena P, Carmen), "the recovery of the buffer capacity is not the same on all tooth surfaces", which would explain why, despite the high buffer values obtained in the research, there are high records of dental caries index.

CONCLUSIONS

The salivary physicochemical factors referred to flow and buffer capacity have an influence on the presence of dental caries, in contrast to pH and absolute viscosity, which did not show significant differences.

The salivary microbiological factor referring to Streptococcus mutans has a greater influence than lactobacillus on dental caries.

The salivary physicochemical factors in their characteristics of flow and buffer capacity have a greater influence on the presence of dental caries, in contrast to the microbiological factors that only in the count of S. mutans express this relationship.

Consequently, the hypothesis proposed is partially fulfilled since it has been shown that the salivary factors in the variables studied influence the presence of dental caries indistinctly and to different extents.

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