



Prevalence, severity and risk factors of carious lesions in children aged 5 to 10 years and their relationship with the content of school lunchboxes at the republic of Argentina basic school.

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Abstract

The study analyzed the prevalence, severity and risk factors of dental caries in relation to the content of school lunch boxes in children aged 5 to 10 years at the República de Argentina school, in Amaguaña, Quito, Ecuador. With the aim of determining the prevalence, severity, risk factors of dental caries and analyzing their relationship with the nutritional content of school lunch boxes in children from 5 to 10 years old, in order to generate scientific evidence that guides intervention strategies in oral health and food education in the school environment. A study was carried out with 341 children aged 5 to 10 years, selected from a population of 790 students, applying inclusion and exclusion criteria. After obtaining informed consent, data on nutritional habits and lunchbox content were collected through a survey of representatives. Subsequently, an intraoral clinical examination was performed using the ICDASS II index, with prior removal of bacterial plaque, to diagnose the severity of caries lesions, the data were analyzed with SPSS. The results showed that 74.8% of the students had dental caries, with a predominance of severe and moderate lesions, associated with the high consumption of fermentable carbohydrates and sugars. In conclusion, there is a relationship between the nutritional content of the school lunchbox and the prevalence and severity of caries.

Keywords: Caries, School lunchbox, Eating habits, Relation, Severity, Risk factors.

Introduction

According to the World Health Organization (WHO), caries is a process that begins after tooth eruption, as a result of the imbalance between the surface of the tooth and the fluid of the surrounding biofilm, which added to time evolves until the loss of the mineral; it is multifactorial (host, microflora and substrate) ^[1]. Around 3,500 million people suffer from oral diseases worldwide, with caries predominating, of which 514 million are children, who make up 43% of the pediatric population ^[2]. Latin America has recorded a high consumption of fats and sugars in the diet, and a decrease in the consumption of fruits and vegetables, so consuming nutrient-poor foods has generated greater susceptibility of children to oral diseases such as dental caries ^[1]. In Ecuador, children between the ages of 3 and 11 have a caries prevalence of 62.39%, according to some articles, with children from indigenous communities being more prone to malnutrition and therefore to oral diseases ^[39]. This shows that the efforts made so far have not been able to intervene in the triggering factors that produce this disease, so there are no relevant data that need to be investigated ^[30]. The importance of the content of the school lunchbox is reflected in eating habits, the time spent preparing a healthy lunchbox, and above all the knowledge or not of the parents, which will have favorable or unfavorable consequences on oral health, as well as on the physical and mental development of the child ^[39]. Dental caries is considered the number one oral health disease worldwide, but the country does not have up-to-date scientific research ^[17]; To this end, it is important to know the prevalence and degrees of

severity in the different regions of the country and the causes that lead to these conditions ^[33]. In this case, the Republic of Argentina basic education school in Amaguaña has been chosen, with the intention of laying the foundations for future research ^[38]. This will allow the impact of the disease on the oral health of the population to be measured and; in addition, it will provide scientific evidence to support and facilitate the development of effective public policies for the prevention and control of these diseases ^[7]. It is worth mentioning that school-age children are more susceptible to tooth decay due to the type of food they consume at school; also, this is related to the frequency of exposure of the substrate and dental colonization with cariogenic bacteria ^[23], in this way the contents of the school lunchbox become an indication to predict the presence of carious lesions ^[1]. In addition, dental caries is diagnosed using a clinical scoring system called the International Caries Detection and Evaluation System ICDAS II ^[8]. As dental caries is a dynamic process, it is difficult to categorize it, so this system is based on visual signs that relatively reflect the caries process ^[8]. In other words, it is responsible for measuring the superficial changes and the possible histological depth of carious lesions based on the characteristics of the surface ^[39]. School lunch boxes are a determining factor in the daily diet of school-age children. Food choices have a direct impact on oral health, since children are around 6 hours a day in school, the foods consumed during school hours are rich in sugars and refined carbohydrates, which increase the likelihood of developing cavities ^[20]. A 2017 study found

that children who consume more sugary snacks at school are more likely to develop tooth decay than those who consume lunch boxes with healthier foods [25]. In addition, the frequency of consumption habits, such as frequent snacking between meals, is associated with a greater severity of caries [32]. This study seeks to establish the prevalence, severity and risk factors of caries and also the relationship with the content of school lunch boxes in children from 5 to 10 years of age at the República de Argentina basic education school, Amaguaña parish, Quito, Ecuador.

Material and Methods

A population made up of 790 students and their representatives, boys and girls of both genders between the ages of 5 and 10 years. A sample formula of 341 school children attending the República de Argentina basic education school, Amaguaña parish, Quito, Ecuador, was determined to be part of the study. The inclusion criteria were, School children of both genders, Children of all ethnicities, between 5 and 10 years of age, Children whose representatives have previously signed the informed consent, Children with teeth to observe fully erupted. The exclusion criteria were, Children with systemic disorders. Children whose representatives have a physical impediment that hinders their ability to sign, Children whose representatives have an intellectual impediment so that they are not able to read or understand what informed consent implies, nor what the data collection instrument represents; Children with representatives who have high-risk pregnancies or with an advanced pregnancy that prevents them from moving to school. After obtaining authorization from the ethics committee for research in human beings CEISH – UNIANDES, cod.2024-EXT-OB-0017, and the permission of the authorities of the school institution, the representatives of the children were summoned to inform them about the project and its implications; risks and benefits. Later, the representative's signature was requested on the informed consent document to authorize the evaluation of the children; To verify that the informed consents are duly signed, a data collection instrument was carried out, whose variables have been duly justified [36]. The data collection instrument was aimed at representatives of both sexes, of each of the participating children, which included questions about nutritional habits, demographic data, and the contents of the lunch box that their children bring to school [39]. The next step was that the children's teeth were brushed, this action was directed by researchers 1 (SR) and 2 (DC), with the help of a soft-bristled brush and fluoride toothpaste, the same that were provided free of charge to the children, with the indication of use to their representatives in terms of the amount of toothpaste, time of use of the brush, time of brushing and technique recommended by the literature; The fones technique or horizontal technique was used because it is the most appropriate for the age of the children in this study, and at this time the complete removal of bacterial plaque was performed in order to observe the caries lesions [27]. Afterwards, the intraoral examination was performed in the dental office of the educational center by an examiner previously calibrated for the diagnosis of caries, The diagnostic examination of the 341 patients was performed; All data records were executed by a secondary researcher as a notekeeper. The presence of caries was examined

according to the ICDAS II index, considering the codes 0 = for healthy surfaces, 1 = white or brown spot on dry enamel, 2 = white or brown spot on wet enamel, 3 = enamel loss (cavidad) less than 0.5 mm, 4 = dark dentin shadow seen through the enamel with or without surface enamel loss, 5 = loss of enamel and dentin greater than 0.5 mm, but less than 50% of the enamel, 6 = extensive cavity that covers more than 50% of the tooth surface following the previously established methodology, identifying whether the lesion is active or inactive (Dikmen, 2015). The data were collected in a file. Subsequently, codes were tabulated according to the following legend: ICDAS 0 = healthy, ICDAS 1-2 as the initial caries lesion, ICDAS 3-4 = moderate caries lesion, ICDAS 5-6 = severe caries lesion (Dikmen, 2015). The results were placed in an Excel data table (Microsoft Office Excel 2024) and then tabulated and analyzed using the SPSS program (Statistics (IBM)v30.00.

The study considered 341 participants, of which 187 were female and 154 were male, when considering the presence of caries according to ICDAS codes, the results considering each code independently show that about 86 participants were found with code 0, that is, healthy. Of the 255 participants who exhibited any signs of caries, the surfaces of their independent teeth, whether they were primary or permanent teeth, were considered in the analysis. In this way, 79 surfaces were found in code 1 and 2, in code 3 and 4 183 surfaces were found, i.e. with moderate severity, in code 5 and 6 there are 167 surfaces, i.e. with severe severity. When considering the severity of dental caries on surfaces and relating it to the age range, it is evident that in participants between 5 and 6 years of age, the ICDAS code is 5 (132 surfaces), code 3 (104 surfaces) as the most frequent. In participants aged 7 to 8 years, ICDAS code 5 is shown as the most frequent (155 surfaces), followed by code 3 (126 surfaces). When considering participants between 9 and 10 years old, code 5 is observed as the most prevalent (132 surfaces), followed by code 3 (92 surfaces) and code 2 (77 surfaces).

2.1. Relationship between the prevalence of caries and food. When considering the contents of the lunch box, the results show that 80% send fruits, a similar percentage vegetables. When considering the shipment of snacks, 10% do so, with doritos (4.7%) and fries (4.1%) being the most frequent. As for protein, 66% execute it and chicken (39.6%) is the favorite, followed by pork (14.1%). With respect to dairy products, these are sent by 65%, where milk is the preferred element by 41.6%. carbohydrates are sent by 59.8% of the participants, with bread being the preferred (34.9%). Sausages were considered independent of protein and are preferred by 59.9%, with sausages (24.6%) being the main option. Beverages are a component of 67.4% of lunch boxes where colas (42.2%) are preferred, followed by juices (13.5%) and chocolate (11.7%) When relating the presence of caries, considering from code 1 to 6 and the content of the school lunchbox, using the SPEARMAN relationship coefficient a value of 0.759 is obtained, which indicates a strong positive relationship between the presence of caries and the contents of the school lunchbox; However, when performing the analysis of the time available to prepare the lunchbox, who executes it and the presence of caries in the child, we did not find a significant statistical difference that associates these three variables (Table 1).

Table 1: Spearman's correlation

			Presence and severity of caries	Contents of the school lunchbox
Spearman's rho	Presence and severity of caries	Correlation Coefficient	1.000	.759**
		Sig. (2-tailed)	.	<.001
		N	341	341
	Contents of the school lunchbox	Correlation Coefficient	.759**	1.000
		Sig. (2-tailed)	<.001	.
		N	341	341

** . Correlation is significant at the 0.01 level (2-tailed).

Our findings showed an evident relationship with these two variables, where the presence of caries lesions in code 5 on the surfaces of the teeth of the participants, of all the ages analyzed, was the most prevalent ICDASS lesion and was related to the consumption of food in their lunchboxes according to the questionnaire applied to their parents. a finding that coincides with previous studies [25], for whom the rich intake of sugars in the school lunchbox causes a drop in oral pH and therefore produces a favorable environment for bacterial colonization. [39] This coincides with our findings where the preferred foods given were colas, milk, bread and fruits, whose sugar content is evidently large [33]. This study shows the need to raise awareness about healthy eating, as it helps not only physical development but also good oral health [27]. In Ecuador, caries prevalence studies show its high presence in schoolchildren and preschoolers, thus, data from the Ministry of Health indicate that from 3 to 11 years of age there is a prevalence of caries of 62.39%, coinciding with our findings. [39]. Despite the multiple efforts made by health agencies to control the disease, its prevalence is really worrying, hence the interest of this study and of analyzing such an important element as the diet, therefore the content of the school lunchbox, since students spend 8 hours a day in the educational institution, constituting a large part of the daily diet, [30]. The findings demonstrate the need to implement educational processes and health policies aimed at parents with specific hygiene and feeding instructions for their children. [30]. Diet is one of the determining elements of its appearance [5]. What was confirmed in our findings, however, what is even more worrying is the fact that although the lunchbox is considered necessary because it is a source of energy for children in school activities [30]. Another element that requires analysis is the fact that a large percentage of lesions have been detected in incipient ICDAS stages, which leads to the belief that there is still a possibility of reversing the lesion. [29]. Therefore, the direction and preventive intervention must be immediate. In Ecuador, studies report a greater presence of incipient lesion on the vestibular and occlusal surfaces of temporary and permanent molars when these are present [35]. This supports the need for follow-up to the population examined, with the execution of cohort studies, literacy for parents on healthy eating, application of fluoridated elements in high concentrations and topical action [35], in addition to supervised tooth brushing both at home and at school [37]. Measures that according to previous reports have managed to reverse the presence of dental caries. This study reveals the need to join efforts to control this disease and thus comply with the health policies and goals that world organizations have established

Conclusion

Under the conditions that this study was executed, we can conclude that there is a relationship between the nutritional content of the school lunchbox and the prevalence and severity of caries. We have a starting point to take actions or outline possible solutions for prevention in children. Author contributions: This is a text by the author's contribution.

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