

## The effectiveness of an oral health education program to prevent dental caries in pre-school children

Eficácia de um programa de educação em saúde bucal na prevenção de cárie dentária em pré-escolares

Efectividad de un programa de educación en salud bucal para prevenir la caries dental en niños en edad preescolar

Received: 06/23/2021 | Reviewed: 06/30/2021 | Accept: 07/05/2021 | Published: 16/07/2021

### **Suzely Adas Saliba Moimaz**

ORCID: <https://orcid.org/0000-0002-4949-529X>  
São Paulo State University, Brazil  
E-mail: [suzely.moimaz@unesp.br](mailto:suzely.moimaz@unesp.br)

### **Cléa Adas Saliba Garbin**

ORCID: <https://orcid.org/0000-0001-5069-8812>  
São Paulo State University, Brazil  
E-mail: [clea.saliba-garbin@unesp.br](mailto:clea.saliba-garbin@unesp.br)

### **Aretuza Marques Bottós**

ORCID: <https://orcid.org/0000-0001-7613-5487>  
São Paulo State University, Brazil  
E-mail: [aretuza.bottos@unesp.br](mailto:aretuza.bottos@unesp.br)

### **Fenando Yamamoto Chiba**

ORCID: <https://orcid.org/0000-0003-4406-405X>  
São Paulo State University, Brazil  
E-mail: [fernando.chiba@unesp.br](mailto:fernando.chiba@unesp.br)

### **Nemre Adas Saliba**

ORCID: <https://orcid.org/0000-0001-9608-1631>  
São Paulo State University, Brazil  
E-mail: [nemre.saliba@unesp.br](mailto:nemre.saliba@unesp.br)

### **Tânia Adas Saliba**

ORCID: <https://orcid.org/0000-0003-1327-2913>  
São Paulo State University, Brazil  
E-mail: [tania.saliba@unesp.br](mailto:tania.saliba@unesp.br)

### **Abstract**

The objective of this study is to assess the effectiveness of a program of oral health prevention and education to control dental caries in pre-school children. Transversal epidemiological studies were carried out in the years of 2006 (n=275), 2016 (n=258) and 2019 (n=508), and the data were compared. The sample comprised children from 2 to 6 years old of public schools that were part of the program. Data was collected using the dmft index analyzed in accordance with the distribution of its components and tooth types with more incidence of dental caries. The statistical analysis used the binomial test of two proportions, and the results were compared with previous studies in the same population. The prevalence of caries was of 29.13% and the average dmft was 1.0 + 2.13. From a total of 9,864 teeth that were examined, 94.82% were healthy, 4.17% had caries, 0.64% restored without caries, and 0.12% lost due to caries. The proportion of teeth with caries was higher in posterior teeth (p<0.05) and in the superior dental arch (p=0.02). The most recommended treatment was restoration of one surface (n=351). In this study, the proportion of healthy teeth was higher (p<0,05), while the number of teeth with caries or restorations was lower (p<0,05) in comparison with 2006. The conclusions are that the prevalence of caries was low, with a predominance of caries affecting superior posterior teeth; and that the actions of the oral health education and prevention program were effective to reduce and control dental caries.

**Keywords:** Health education dental; School health services; Epidemiology; Dental caries.

### **Resumo**

Objetivou-se avaliar a eficácia de um programa de prevenção e educação em saúde bucal no controle da cárie dentária em pré-escolares. Foram realizados estudos epidemiológicos transversais nos anos de 2006 (n=275), 2016 (n=258) e 2019 (n=508) e os dados comparados. A amostra foi composta por crianças de 2 a 6 anos de idade, de escolas públicas de educação básica, contempladas pelo programa. Os dados foram coletados empregando-se o índice ceo-d e analisados de acordo com a distribuição de seus componentes e grupos dentários mais acometidos pela cárie. A análise estatística foi realizada por meio do teste binomial de duas proporções e os resultados foram comparados aos

estudos anteriores na mesma população. A prevalência de cárie foi de 29,13% e o ceo-d médio foi 1,0 + 2.13. Do total de 9864 dentes examinados, 94,82% estavam hígidos, 4,17% cariados, 0,64% restaurados sem cárie, 0,25% restaurados com cárie, e 0,12% perdidos devido a cárie. A proporção de dentes cariados foi maior em dentes posteriores ( $p < 0,05$ ) no arco dentário superior ( $p = 0,02$ ). O tratamento com maior indicação foi a restauração de uma superfície ( $n = 351$ ). Neste estudo, a proporção de dentes hígidos foi maior ( $p < 0,05$ ), enquanto a de cariados e restaurados foi menor ( $p < 0,05$ ) comparado ao ano de 2006. Conclui-se que a prevalência de cárie foi baixa, com predomínio do componenteariado, afetando principalmente dentes posteriores superiores, e que as ações do programa de prevenção e educação em saúde bucal foram eficazes na redução e controle da cárie dentária.

**Palavras-chave:** Educação em saúde bucal; Serviços de saúde escolar; Epidemiologia; Cárie dentária.

### Resumen

Este estudio tuvo como objetivo evaluar la efectividad de un programa de educación-prevenición en salud bucal en el control de la caries dental en niños en edad preescolar. Se realizaron estudios epidemiológicos transversales en 2006 ( $n = 275$ ), 2016 ( $n = 258$ ), 2019 ( $n = 508$ ) y se compararon los datos. La muestra estuvo conformada por niños de 2 a 6 años, de escuelas públicas, amparados por el programa. Se aplicó y analizó el índice ceo-d según la distribución de sus componentes y grupos dentales más afectados por caries. La estadística se realizó mediante la prueba binomial de dos proporciones y los resultados se compararon con estudios previos. La prevalencia de caries fue del 29,13% con un ceo-d medio de 1,0 + 2,13. Del total de 9864 dientes examinados, 94,82% estaban sanos, 4,17% cariados, 0,64% restaurados sin caries, 0,25% restaurados con caries y 0,12% perdidos por caries. La proporción de dientes cariados fue mayor en los dientes posteriores ( $p < 0,05$ ) en la arcada superior ( $p = 0,02$ ). El tratamiento con mayor indicación fue la restauración de una superficie. En este estudio, la proporción de dientes sanos fue mayor ( $p < 0,05$ ), mientras que la de dientes cariados y restaurados fue menor ( $p < 0,05$ ) respecto a 2006. Se concluye que la prevalencia de caries fue baja, con predominio del componenteariado, afectando principalmente a los dientes posteriores superiores, y que las acciones del programa de prevención y educación en salud bucal fueron efectivas en la reducción y control de la caries.

**Palabras clave:** Educación en salud dental; Servicios de salud escolar; Epidemiología; Caries dental.

## 1. Introduction

Actions to promote oral health advanced significantly over the past decades in several countries, especially regarding dental caries (Jürgensen, & Petersen, 2013) however, this is still considered one of the main diseases of our time due to its high epidemiological dimension, being more common among children and teenagers (Petersen, & Kwan, 2004). Among the World Health Organization (WHO) goals for 2020, there is a proposal for having 80% of the children aged 6 to be free from caries (Hobdell, Petersen, Clarkson, & Johnson, 2003).

Dental caries is a multifactorial disease and its etiology is related to the association of several factors, taking as an example the physical and biological factors, such as saliva composition, anatomy and dental disposition, behavioral factors such as eating foods high in sugar and poor hygiene habits and especially social factors, considering that the social-economical aspects are directly related to this problem and are considered the main determinants in the distribution of oral diseases (Jürgensen, & Petersen, 2013; Moura, et al., 2021; Moimaz, Borges, Saliba, Garbin, & Saliba, 2016). Lack of knowledge about oral health and lack of access to preventive and educational programs may cause individuals to become more susceptible to the development of the disease (Santos, Garbin, & Garbin, 2012).

Even with the fall in the prevalence of caries in both developed and developing countries, countries with lower average incomes present a high prevalence of the disease among children (Anil, & Anand, 2017). In a systematical review, Congiu, Campus and Luglie (Congiu, Campus, & Lugliè, 2014) state that, in developed countries, the prevalence of dental caries in children is between 1 and 12%, whereas in underdeveloped countries, the prevalence is 70%.

The damages caused by dental caries are complex and affect the quality of life in terms of physiological matters as well as psychological ones, and this is considered a public health issue. In children, the pain caused by the progression of the disease may interfere with their eating and cause slow growth, underweight, and sleep disturbance, which, associated, may affect their school performance (Paisi, Plessas, Pampaka, Burns, & Witton, 2020).

The implementation of actions, such as water fluoridation, dissemination of fluoride toothpastes and other preventive

measures, have caused a change in the epidemiological profile of the disease (Narvai, Frazão, & Catellanos, 1999). Thus, it is necessary to analyze the severity and the distribution of the issue continuously, so that the resources can be adequately employed in health programs.

In this context, educating individuals allows them to adopt behavioral changes that will help them adapt to social changes, which will ultimately bring them autonomy over their own healthcare (Garbin, Soares, Dócusse, Garbin, & Arcieri, 2015; Zuge, Engers, Corrêa, Fernandes, Souza, & Copetti, 2020).

The development of educational and preventive programs at school is relevant to promote health and to identify the population reality. Such actions have broad coverage with minimum cost, and they can reach economically disadvantaged populations that are less likely to receive dental care (Alsumait et al., 2019).

The connection between school and family works as a facilitator to create the bond between health promotion and community. That process is an essential tool to disseminate technical and scientific knowledge applied to the daily context (Garbin, Soares, Dócusse, Garbin, & Arcieri, 2015).

Based on all that, the objective of this study is to assess the effectiveness of a program of oral health prevention and education to control dental caries in pre-school children.

## 2. Methodology

This is a transversal epidemiological study with pre-school children in public education in a mid-sized city in the state of São Paulo.

The city is in the Northwest region of the state with an estimated population of 195,874 inhabitants (IBGE/2018) and has provided fluoridated water, in the recommended concentrations (0.55 to 0.84 mg F/L), since 1972 (Moimaz, Santos, Saliba, Saliba, & Saliba, 2018)

The sample comprised 508 pre-school children aged 2-6 of both genders and regularly enrolled in Municipal Basic Education Schools located in the outskirts or in regions of social hazard in the city in 2019. All children that participated in the activities developed within an oral health education and prevention program were included; the activities were conducted by professors and students of the Odontology College of Araçatuba-UNESP. These whose legally responsible did not consent with their participation or those who were not present for data collection after three attempts were excluded.

The extension project called "Oral Health Promotion in Municipal Basic Education Schools in Araçatuba-SP" (in Portuguese: "Promoção de Saúde Bucal nas Escolas Municipais de Educação Básica de Araçatuba – SP") is a partnership between the City Government and the Municipal Education Secretariat; it has been active for over 20 years developing actions aiming at promoting, maintaining and motivating oral health among children (Araújo, Vettore, Garbin, Garbin, Reatto, & Arcieri, 2017).

The project takes place every two weeks and has 4 hours of active work during which playful activities take place to stimulate the cognitive and affective development as well as motor skills, supervised tooth brushing and preventive activities, such as highlighting the bacterial plaque in order to motivate brushing. The program is flexible, so the activities are defined based on the current needs, but always having in mind the basic topics: importance of oral and general health, hygiene, eating habits and undesirable habits (Santos, Garbin, & Garbin, 2012).

Data was collected using the dmft index to assess the prevalence of dental caries and by a single researcher who was previously calibrated according to the criteria recommended by the WHO (OMS, 2013). The intra-examiner Kappa coefficient, obtained through a pilot study, was 0.90. The exams took place in the schoolyards, in an airy place with natural light.

The analysis was done through the proportion binomial test, at a significance level of 5%, where the proportion of posterior and anterior teeth experiencing caries was compared, as well as between superior and inferior dental arches, and the

number of healthy teeth compared to previous epidemiological studies.

The data in this epidemiological study was compared to two other studies that used the same methodology in order to assess dental caries in the same location in the years 2006 (Garbin, Chiba, Garbin, & Arcieri, 2011) and 2016 (Garbin, Saliba, Teuel, Moimaz, & Garbin, 2019).

This study has been approved by the Human Research Ethics Committee (in Portuguese: Comitê de Ética em Pesquisa com Seres Humanos) in the Odontology College of Araçatuba - UNESP, São Paulo, Brazil, (CAAE protocol number 13168913.3.00005420) and conducted in accordance with the Declaration of Helsinki. The Free and Informed Consent Term was obtained from all the legally responsible of the participants.

### 3. Results

A total of 508 pre-school children were assessed, from which 248 (48.81%) were female and 260 (51.18%) were male. The prevalence of caries was of 29.13%, from which 14.56% of the children presented 3 or more caries breakdowns. The average dmft index was 1.0 + 2.13

From a total of 9,864 teeth that were examined, 9,353 (94.82%) were healthy, 411 (4.17%) had caries, 63 (0.64%) had been restored without caries, and 25 (0.12%) were lost due to caries.

It was observed that the proportion of deciduous teeth with caries was higher ( $p < 0.05$ ) in posterior teeth, representing 75.46% of the teeth with caries breakdown (Table 1). When analyzing the distribution by dental arch, it was observed that the proportion of deciduous teeth with caries was higher ( $p = 0.0239$ ) in the superior dental arch (Table 2).

**Table 1.** Absolute distribution and percentage of the dental elements, by dmft index component and tooth type. Araçatuba, SP, Brazil, 2019.

Tooth type	Dental condition										Total	
	Healthy		With caries		Restored with caries		Restored without caries		Lost due to caries			
	n	%	n	%	n	%	n	%	n	%	n	%
Central incisor	1832	19.59	53	12.90	0	0.00	4	6.35	3	25.00	1892	19.18
Lateral incisor	1953	20.88	32	7.79	0	0.00	3	4.76	2	16.67	1990	20.17
Canine	1992	21.30	21	5.11	1	4.00	3	4.76	2	16.67	2019	20.47
1 <sup>st</sup> molar	1838	19.65	144	35.04	9	36.00	27	42.86	3	25.00	2021	20.49
2 <sup>nd</sup> molar	1738	18.58	161	39.17	15	60.00	26	41.27	2	16.67	1942	19.69
Total	9353	100.00	411	100.00	25	100.00	63	100.00	12	100.00	9864	100.00

Source: Authors.

**Table 2.** Absolute distribution and percentage of the dental elements, by dmft index component and dental arch. Araçatuba, SP, Brazil, 2019.

Dental arch	Dental condition										Total	
	Healthy		With caries		Restored with caries		Restored without caries		Lost due to caries			
	n	%	n	%	n	%	n	%	n	%	n	%
Superior	4679	50.03	228	55.47	10	40.00	25	39.68	9	75.00	4951	50.19
Inferior	4674	49.97	183	44.53	15	60.00	38	60.32	3	25.00	4913	49.81
Total	9353	100.00	411	100.00	25	100.00	63	100.00	12	100.00	9864	100.00

Source: Authors.

As shown on Table 3, when treatment was needed, it was observed that the most recommended treatment was restoration of one surface (n=351).

**Table 3.** Absolute distribution and percentage of the dental elements, by recommended treatment. Araçatuba, SP, Brazil, 2019.

Treatment	n	%
None	9416	95.46
Restoration of one surface	351	3.56
Restoration of two or more surfaces	69	0.70
Pulp therapy and restoration	8	0.08
Extraction	8	0.08
No information	12	0.12
Total	9864	100.00

Source: Authors.

In comparison with the studies carried out previously, it was possible to notice that the proportion of healthy teeth was higher ( $p < 0.05$ ), while for teeth with caries and restored it was lower ( $p < 0.05$ ) in comparison with 2006 (Table 4).

**Table 4.** Absolute distribution and percentage of the dental elements, by dmft index component and year of the epidemiological study. Araçatuba, SP, Brazil, 2019.

Dental condition	Year					
	2006		2016		2019	
	n	%	n	%	n	%
Healthy	4787	90.30	4620	94.75	9353	94.82
With caries	403	7.60	181	3.71	411	4.17
Restored without caries	111	2.09	21	0.43	63	0.64
Restored with caries	0	0.00	50	1.03	25	0.25
Lost	3	0.00	4	0.08	12	0.12
Total	5304	100.00	4876	100.00	9864	100.00

Source: Authors.

#### 4. Discussion

In this study, it was observed that the prevalence of caries in pre-school children was of 29.13%, which is close to the WHO goal for children aged 6 for the year 2020 (Hobdell, Petersen, Clarkson, & Johnson, 2003).

The presence of dental caries in early childhood is a condition that requires attention and care, as its effects may cause severe damage to the children's quality of life. The results may vary, ranging from affecting the children's physiological development and causing future damage, to the development of bad occlusion and impact on the permanent teeth due to lack of space (Antunes, Ornellas, Fraga, & Antunes, 2018). Studies have observed that patients who present severe caries conditions during childhood tend to present worse oral conditions during adulthood (Jordan, Becker, Jöhren, & Zimmer, 2016).

In studies about oral health conditions related to dental caries during childhood, trauma and bad occlusions and their impact in the quality of life, it was observed that the presence of dental caries caused a negative impact for affecting the child's daily activities, such as eating, drinking and playing (Abanto, Carvalho, Mendes, Wanderley, & Raggio, 2011; Aldrigui et al., 2011).

The average dmft index found in this research was lower than the one presented by the most recent National Oral

Health Report (SBBrasil 2010), which states that a Brazilian child aged 5 would present an average of 2.43 teeth experiencing caries, with a prevalence of the component with caries representing more than 80% of the index. The worst conditions were observed in the North, Central-West and Northeast regions in comparison with the South and Southeast regions of the country (Brasil, 2012).

In the comparative analysis of the previous studies carried out in the same city, in the years of 2006 (Garbin, Chiba, Garbin, & Arcieri, 2011) (dmft index: 1.87) and 2016 (Garbin, Saliba, Teuel, Moimaz, & Garbin, 2019) (dmft index: 0.98), it was possible to notice a reduction of 46.52% in the dmft index after 13 years, which shows the importance and effectiveness of oral health educational programs to prevent and control oral diseases. In comparison with 2016, the dmft index had little variation. That may be because the dental caries index had already reached values that can be considered low and, therefore, it becomes more difficult to identify a significant reduction in the prevalence. We can also highlight that the three-year gap between both studies may be considered a short time for analyzing caries reduction.

When analyzing the distribution of the teeth with caries according to group and dental arch, there was a predominance of caries breakdowns on the posterior teeth and on the superior arch. This can be explained by the greater difficulty to clean those oral areas, as children in the studied age are still not skilled enough to handle the toothbrush because their motor system has not reached the maturation phase yet (Unkel, Fenton, Hobbs, & Frere, 1995).

Another factor that may contribute with the development of more dental caries on those tooth types is the natural anatomy of the posterior teeth. Because they present grooves, pits and fissures that may retain more residual food in comparison with the plain, incisal surfaces of the anterior teeth, molar teeth are more susceptible to developing caries breakdowns (Catão, Rodrigues, & Silva, 2012). We can add to that the fact that children at such age are frequently exposed to food with great amounts of fermentable sugars and with textures that lead to more residue retention in the ridges, such as cookies, milk with sugar or chocolate powder, and others (Anil, & Anand, 2017).

A study carried out with school children reveals that the motor skill for a satisfactory tooth brushing is only acquired after the age of 5, and it emphasizes that constant motivation is also critical to enhance the bacterial plaque control among children (Leal, Bezerra, & Toledo, 2002). In this sense, continuous and permanent oral health educational actions are extremely important.

It is also important to highlight that childhood is considered the optimal moment for educational actions, because it is the phase when the individual presents more learning capacity. It is the time when the human brain develops the most, so it is ideal for absorbing knowledge and acquiring healthy habits that will be carried throughout the next phases of the individual's life (Gaiarsa, 2008). Thus, we can see how important and timely it is to implement preventive and educational actions for pre-school children.

Oral health educational programs aimed at children propose activities that include supervised tooth brushing and guidance for a low-sugar diet, stimulating the development of healthy habits and, possibly, turning those children into information multiplier agents (Alsumait et al., 2019). By transmitting the learned information to their family environment, parents and other adults become direct actors in their children's oral health (Garbin, Soares, Dócusse, Garbin, & Arcieri, 2015).

The role of children educators and caretakers to promote oral health practices is key and should not be neglected, even though it is not an easy task (Ismail, 1998; Santos, Sousa, Oliveira, & Vidal, 2021). Activities such as supervised tooth brushing are harder to execute when the audience is children. A study carried out in a children education school in the state of Ceará (Rodrigues, Sousa, Joaquim, Benedito, Cruz, & Leite, 2016) states that, despite the difficulties, teachers understand the importance of health education practices and try to develop a specific methodology that meets the needs of each age group.

Public health strategies, such as water fluoridation and better primary care services, are also critical to prevent and control dental caries. The first measure, due to its reach, safety, efficiency and cost-effectiveness, presents positive results as an

individual protection factor to the dental caries risk (Yeung, 2008); and the second is a facilitator to actions of health promotion, prevention and rehabilitation, according to the principles of the Brazilian Unified Health System (in Portuguese: Sistema Único de Saúde (SUS)) (Brasil, 1990).

The analysis of the dmft index components shows that, even though the proportion of deciduous teeth with caries in this study is lower than the one in 2006, there was a predominance of the component with caries between the dental elements that experienced caries. It is possible to suggest that the persistence of teeth with caries without treatment, at this age group, can be the result of a low valorization of the deciduous teeth by the ones responsible for the children, as a consequence to the natural process of dental exfoliation and replacement for the permanent teeth (Feitosa, & Colares, 2004). Therefore, it is important to emphasize the importance of health education actions with all the children's caretakers in order to raise their awareness about the harmful effects of neglecting the need of dental treatment, in the short and long terms.

Because the schools were in the outskirts of the city, another factor to consider is the difficult access to health services. Most of the studied children are in a situation of social risk and, consequently, are more vulnerable to develop the disease.

Considering the situation of social exclusion, this population ends up concentrating high levels of dental caries, and it is possible to notice that the higher dmft values are concentrated in a reduced number of individuals. Such polarized distribution of the disease is a phenomenon that is often observed in countries that experience a fall in the prevalence of dental caries (Peres, Carvalho, Carvalho, Bastos, & Lauris, 2008), which highlights the importance of identifying the vulnerable groups in order to develop effective and targeted preventive measures.

Regarding the need for treating dental elements, it was observed that most of the cases were recommended the treatment of surface restoration, a low-complexity procedure that can be performed in primary care. Thus, the participation of parents/responsible is indispensable for the health education process; when we elevate their knowledge level, they become capable of identifying the problem before the consequences are irreparable.

The findings hereof reinforce the importance of epidemiological studies to identify the distribution and severity of dental caries, working as a compass for planning health promotion actions. In possession of this data, it is possible to define measures that will act directly on the root cause, thus improving the quality of the population's health.

Although the presented results are authentic, there are some limitations that must be considered for future studies. The sample did not include children that did not participate on the education and prevention program as a source to compare results; besides, the collected data was limited to dmft and did not follow some previously applied methodologies that use satisfaction questionnaires to complement the data.

## **5. Conclusion**

The conclusion is that the prevalence of dental caries in pre-school children is low, with a predominance of the component with caries affecting mainly the superior posterior teeth. Thus, oral health prevention and education actions have been effective to reduce and control dental caries.

## **Acknowledgments**

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001.

## References

- Abanto, J., Carvalho, T. S., Mendes, F. M., Wanderley, M. T. & Raggio, D. P. (2011). Impact of oral diseases and disorders on oral health-related quality of life of preschool children. *Community Dent Oral Epidemiol*, 39 (2), 105-114.
- Aldrigui, J. M., Abanto, J., Carvalho, T. S., Mendes, F. M., Wanderley, M. T., Bonecker, M., & Raggio, D. P. (2011). Impact of traumatic dental injuries and malocclusions on quality of life of young children. *Health and Qual Life Outcomes*, 9, 78.
- Alsumait, A., ElSalhy, M., Behzadi, S., et al. (2019). Impact evaluation of a school-based oral health program: Kuwait National Program. *BMC Oral Health*, 19 (1), 202. 10.1186/s12903-019-0895-1
- Anil, S. & Anand, P. S. (2017). Early Childhood Caries: Prevalence, Risk Factors, and Prevention. *Front Pediatr*, 5, 157. 10.3389/fped.2017.00157
- Antunes, L. A. A., Ornellas, G., Fraga, R. S. & Antunes, L. S. (2018). Oral health outcomes: the association of clinical and socio-dental indicators to evaluate dental caries in preschool children. *Ciênc. Saúde Coletiva [online]*, 23 (2), 491-500. 10.1590/1413-81232018232.21022015
- Araújo, P. C., Vettore, M. V., Garbin, C. A. S., Garbin, A. J. I., Reatto, D., & Arcier, R. M. (2017). Promoção de Saúde Bucal: 17 anos de experiência da FOA/UNESP. *Revista Eletrônica Acervo Saúde*.
- Brasil. Lei n.º 8.080, de 19 de setembro de 1990. Princípios e diretrizes do SUS. Brasília.
- Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Secretaria de Vigilância em Saúde. SB Brasil 2010: Pesquisa Nacional de Saúde Bucal: resultados principais. Brasília: Ministério da Saúde, 2012.
- Catão, M. H. C. V., Rodrigues, J. M. C. & Silva, A. D. L. (2012). Importância do selamento de fósulas e fissuras na prevenção da cárie dental: revisão de literatura. *HU Revista, Juiz de Fora*, 38 (1,2), 103-109.
- Congiu, G., Campus, G. & Lugliè, P. F. (2014). Early Childhood Caries (ECC) Prevalence and Background Factors: A Review. *Oral Health Prev Dent*, 12 (1), 71-76. 10.3290/j.ohpd.a31216
- Feitosa, S. & Colares, V. (2004). Prevalência de cárie dentária em pré-escolares da rede pública de Recife, Pernambuco, Brasil, aos quatro anos de idade. *Cad. Saúde Pública*, 20 (2), 604-609.
- Gaiarsa, J. A. Educação familiar e escolar para o terceiro milênio. Editora Ágora.
- Garbin, C. A. S., Chiba, F. Y., Garbin, A. J. I. & Arcieri, R. M. (2011). Prevalência de cárie dentária em pré-escolares de educação infantil de Araçatuba, São Paulo. *Revista Odontológica de Araçatuba*, 32 (2), 28-32.
- Garbin, C. A. S., Saliba, T. A., Teuel, G. P., Moimaz, S. A. S. & Garbin, A. J. I. (2019). Caries Experience in Preschool Children over a 10-year Period. *Oral Health Prev Dent*, 17 (3), 263-266. 10.3290/j.ohpd.a42661
- Garbin, C. A. S., Soares, G. B., Dócusse, F. R. M., Garbin, A. J. Í. & Arcieri, R. M. (2015). Oral health education in school: parents' attitudes and prevalence of caries in children. *Revista de Odontologia da UNESP*, 44 (5), 285-291. 10.1590/1807-2577.0097
- Hobdell, M., Petersen, P. E., Clarkson, J. & Johnson, N. (2003). Global goals for oral health 2020. *Int Dent J*, 53 (5), 285-288. 10.1111/j.1875-595x.2003.tb00761.x
- Ismail, A. I. (1998). Prevenção de cárie na primeira infância. *Community Dentistry and Oral Epidemiology*, 26, 49-61. 10.1111/j.1600-0528.1998.tb02094.x
- Jordan, A. R., Becker, N., Jöhren, H. P. & Zimmer, S. (2016). Early Childhood Caries and Caries Experience in Permanent Dentition: A 15-year Cohort Study. *Swiss Dent J*, 126 (2), 114-119.
- Jürgensen, N. & Petersen, P. E. (2013). Promoting oral health of children through schools-results from a WHO global survey 2012. *Community Dent Health*, 30 (4), 204-218.
- Leal, S. C., Bezerra, A. C. B., Toledo, O. A. (2002). Effectiveness of teaching methods for toothbrushing in preschool children. *Braz. Dent. J.*, 13 (2), 133-136.
- Moimaz, S. A. S., Santos, L. F. P., Saliba, T. A., Saliba, N. A. & Saliba, O. (2018). Heterocontrole do flúor nas águas de abastecimento público: resultados e experiência de 13 anos de vigilância. *Archives of Health Investigation*, 7, 262-268.
- Moimaz, S. A., Borges, H. C., Saliba, O., Garbin, C. A. & Saliba, N. A. (2016). Early childhood caries: epidemiology, severity and socio-behavioral determinants. *Oral Health Prev Dent*, 14 (1), 77-83. 10.3290/j.ohpd.a34997
- Moura, R. N. V. de, Zarzar, P. M. P., Ferreira, R. C., Mattos, F., Pinto, R. das S., Travassos, D. V. & Ferreira, E. F. e. (2021). Diferenças regionais na cárie dentária na primeira infância em crianças brasileiras de 5 anos e fatores associados. *Research, Society and Development*, 10 (1), e43510111946. 10.33448/rsd-v10i1.11946.
- Narvai, P. C., Frazão, P. & Catellanos, R. A. (1999). Declínio na Experiência de Cárie em Dentes Permanentes de Escolares Brasileiros no Final do Século XX. *Odontologia e Sociedade*, 1 (1/2), 25-29.
- OMS. (2013). Oral health surveys: basic methods – 5th ed. © World Health Organization 2013.
- Paisi, M., Plessas, A., Pampaka, D., Burns, L. & Witton, R. (2020). Effect of treating carious teeth on children's and adolescents' anthropometric outcomes: A systematic review of randomised controlled trials. *Community Dent Health*, 37 (1), 32-38. 10.1922/CDH\_4611Paisi07



- Peres, S. H. C. S., Carvalho, F. S., Carvalho, C. P., Bastos, J. R. M. & Lauris, J. R. P. (2008). Polarização da cárie dentária em adolescentes, na região sudoeste do Estado de São Paulo, Brasil. *Ciênc. saúde coletiva*, 13 (2), 2155-2162. 10.1590/S1413-81232008000900020
- Petersen, P. E. & Kwan, S. (2004). Evaluation of community-based oral health promotion and oral disease prevention – WHO recommendations for improved evidence in public health practice. *Community Dent Health*, 21 (Suppl 4), 319-329.
- Rodrigues, J. C., Sousa, T. B. P., Joaquim, D. C., Benedito, F. C. S., Cruz, G. S. & Leite, A. C. R. M. (2008). Percepção de professores quanto à aplicabilidade das ações de educação em saúde bucal. *Revista Diálogos Acadêmicos*. 2016;5(2).
- Santos, K. T., Garbin, A. J. I. & Garbin, C. A. S. (2012). Saúde bucal nas escolas: relato de experiência. *Rev Ciênc Ext*. (1), 161-169.
- Santos, T. D., Sousa, L. C. P., Oliveira, L. C. de. & Vidal, K. (2021). O papel da escola na saúde bucal de crianças em idade escolar: Estudo Piloto. *Research, Society and Development*, 10 (7), e22010715589. 10.33448/rsd-v10i7.15589.
- Unkel, J. H., Fenton, S. J., Hobbs, G. & Frere, C. L. (1995). A capacidade de escovar os dentes está relacionada à idade em crianças. *J Dent Children*, 5, 346-348.
- Yeung CA. A systematic review of the efficacy and safety of fluoridation. *Evid Based Dent*, 9 (2), 39-43. 10.1038/sj.ebd.6400578
- Zuge, B. L., Engers, P. B., Corrêa, S. L. P., Fernandes, T., Souza, M. B. de. & Copetti, J. (2020). Promoção de saúde na educação infantil e anos iniciais: possibilidades e desafios da Base Nacional Comum Curricular. *Research, Society and Development*, 9 (9), e387996634. 10.33448/rsd-v9i9.6634.