

## Prevalence of dental Biofilm in children aged 5-10 years old in the 2022 period at the faculty of dentistry of the University of Cuenca - Ecuador

Pablo Andrés Astudillo Pacheco, María Isabel Cordero Coronel, Manolo Esteban Bravo Encalada \* and Iván Andrés Palacios Astudillo

*Faculty of Dentistry, University of Cuenca, Ecuador.*

World Journal of Advanced Research and Reviews, 2023, 17(03), 1019–1024

Publication history: Received on 12 February 2023; revised on 21 March 2023; accepted on 24 March 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.17.3.0465>

### Abstract

Among the most common problems in Dentistry is the accumulation of dental biofilm in the oral cavity and this is generally the precursor of various pathologies such as: cavities, gingivitis, halitosis etc. Which is why it has been dedicated to investigate the amount of biofilm accumulated by children from 5 to 10 years old.

**Objective:** To establish specific results of the amount of dental biofilm that accumulates in teeth in children aged 5 to 10 years to avoid future oral alterations. Know the total percentage of biofilm on all dental surfaces. Determine the existing lack of hygiene. Identify which of the five ages taken has the greatest amount of biofilm.

**Materials and Methods:** Inclusion, exclusion, sex, age, home location and the Löe and Silness plaque index were considered.

**Results:** Prevalence according to sex: Male, Percentage of total biofilm: 1.19. Surface with the highest amount of biofilm: Vestibular, Prevalence according to age: 7.62 years.

**Conclusions:** The analysis showed us that the amount of supragingival biofilm in children aged 5 to 10 years using the Löe and Silness index presents a high cariogenic risk (1.19%), especially those with an age of 7.62 years.

**Keywords:** Dental biofilm; Pathologies; Löe and Silness; Prevalence; Dental surfaces

### 1. Introduction

Biofilms are a heterogeneous accumulation of a microbial community, surrounded by an intercellular matrix of polymers. These microorganisms can adhere to or deposit on the walls of the teeth, in the oral mucosa and in saliva, among others [1]. Some colonizers of teeth and promoters of oral biofilm formation are: *Streptococcus sanguis*, *S. Mitis* and *S. Oralis*, *Actinomyces Naeslundii*, *S. Mutans*, *S. Salivarius*, *S. Gordonii*, *S. Parasanguis*, *Neisseria spp*, *Prevotella loescheii*, *P. intermedia*, *Capnocytophaga spp*, *Fusobacterium Nucleatum*, *Porphyromonas Gingivalis* and others [2].

Bacterial plaque is a set of different bacteria, they are generally colonized by oral bacteria from saliva that contains more than 700 different bacterial species and food debris that accumulates on the surfaces of teeth and gums, as we know it is not visible to with the naked eye, unless there is a large accumulation, which if not controlled can trigger different oral disorders such as dental caries, periodontal diseases, or it mineralizes over time and forms dental calculus, and could even spread to other parts of the body by bacteremia and cause systemic diseases [3].

\* Corresponding author: Manolo Esteban Bravo Encalada

It is a soft, tenacious, adherent, colorless mass, formed by bacterial colonies (cariogenic and non-cariogenic), viruses, fungi, desquamated epithelial cells (of the mucosa), it presents a protein and polysaccharide matrix. It is translucent and therefore not very visible, it can change color due to the presence of tea, minerals, drugs, hemoglobin. It acts as a permeable membrane [4].

It is located in: teeth, tongue, gums, mucous membranes, dental prostheses and is formed by poor hygiene, so it is eliminated with good tooth brushing, dental floss and prophylaxis.

It is an etiological factor for the formation of caries and periodontal disease.

To diagnose the presence of biofilm, it can be done using plaque revealers, or with a ball-type periodontal probe at the gingival margin. One of the causes of the accumulation of biofilm is poor dental hygiene, therefore, there must be a correct education of parents so that in the same way they teach their children to have good oral hygiene, that is, encourage a correct technique. tooth brushing, use of small interproximal brushes or silk thread, periodic visits to the dentist [5].

The dental biofilm will be dominated by mainly gram-positive carbohydrate-fermenting bacteria that cause demineralization of teeth, dental caries, which can lead to inflammation and necrosis in the pulp and periapical region, i.e. pulpitis and periapical periodontitis. In addition, dental biofilm bacteria can spread to other parts of the body through bacteremia and cause systemic disease [5].

To eliminate dental biofilm, it can be done through different techniques such as mechanical removal (the most used form) with rotary instruments by dental health professionals, or with the use of homemade brushes.

## 2. Material and methods

This retrospective and descriptive study was approved by the dean of the University of Cuenca, Dr. Dunia Abad. The data was collected from the coordination office only for the year 2019, based on the bacterial plaque reports of the patients.

The inclusion criteria were considered the files of male and female patients, between the ages of 5-10 years and that mainly bacterial plaque was observed on the dental surfaces. As an exclusion criterion was access to the facilities of the faculty. Little information on the previous age range (5-7 years). Inconsistencies in the registration of plaque indices.

The variables that were studied: sex, age, housing location and the Loe and Silness plaque index.

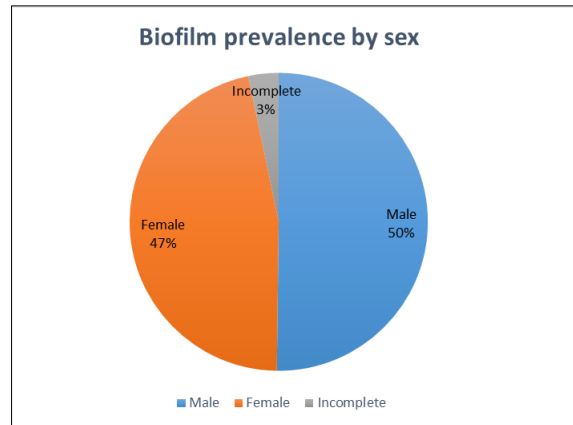
488 files were registered, which were recorded in an Excel spreadsheet, inconsistencies were corrected and a total of 472 complete files remained, then the information was analyzed and tabulated using the Epi info program.

## 3. Results

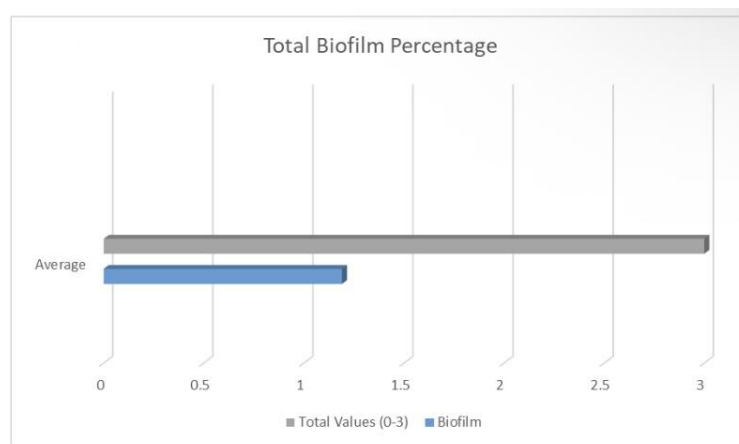
Between January 1, 2019 and December 31, 2019, a total of 488 patients with dental biofilm were observed in the faculty of Dentistry of the University of Cuenca, but only 472 registered the complete clinical record. The prevalence of biofilm was evaluated according to age, sex, total percentage, surfaces with greater or lesser amount and finally the locality of residence of the patient, both urban and rural.

**Table 1** Prevalence of dental biofilm on different dental surfaces, age and population

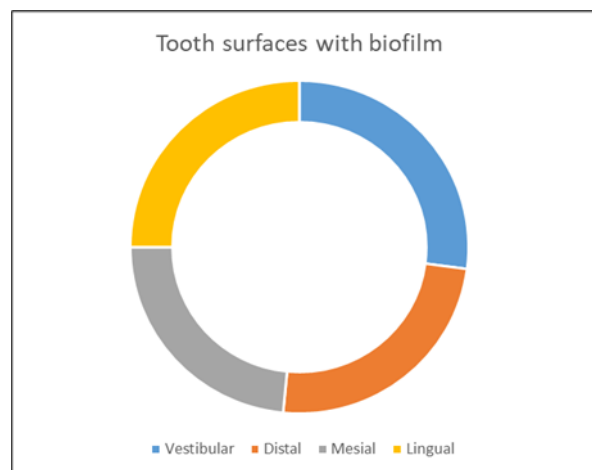
Variables	N (%)
1. Highest prevalence of biofilm (sex)	N=472 – 245M
Figure 2. Total percentage of Biofilm	N=472 – 1,19%
Figure 3. Surface with the highest amount of Biofilm	5,71% Vestibular
Figure 3. Surface with the lowest amount of Biofilm	4,94% Mesial
Figure 4. Prevalence of biofilm (age)	N=472 - 7,62 años
Figure 5. Prevalence of urban - rural areas	N=400U- 72R



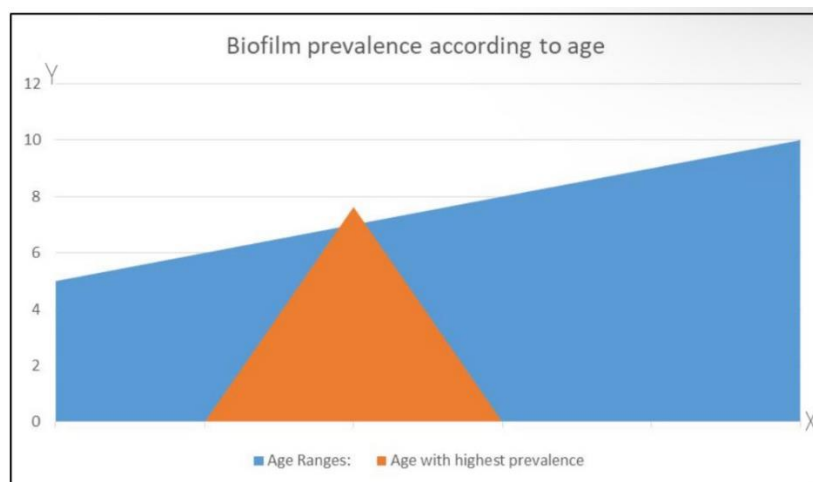
**Figure 1** There is a higher prevalence of dental biofilm in the male sex with n=245 (51%), while the female sex was n=227 (48%) and with a percentage of incomplete records of n=16 (3%)



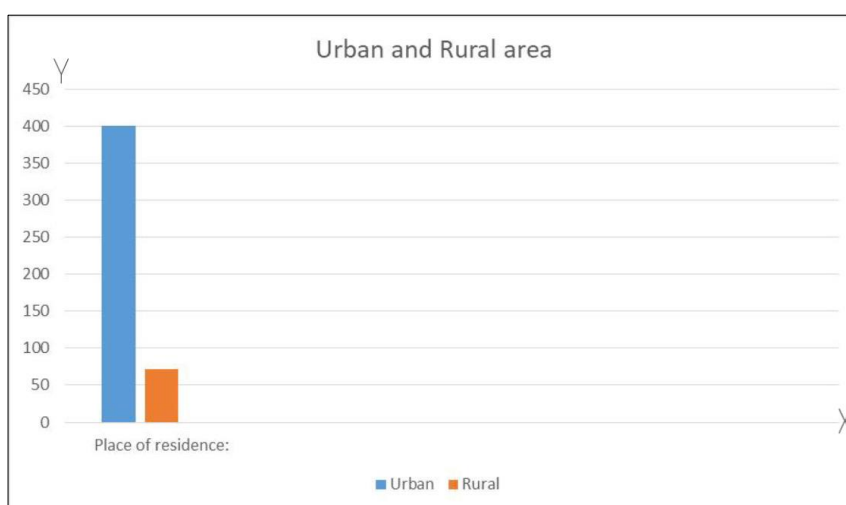
**Figure 2** The total percentage of the bacterial biofilm samples taken with the Loe Silness index was 1.19%, showing us that the rate is higher than 1%, therefore, there is a cariogenic risk



**Figure 3** Regarding the amount of biofilm accumulating on the dental surfaces, the most prevalent was the vestibular side with 5.71%, followed by the lingual side with 5.27%, distal side with 5.15% and finally the mesial side with 4.94%



**Figure 4** The age range taken for this sample was 5 to 10 years old, with the highest prevalence in the 7.62 years old group



**Figure 5** Most of the children resided in an urban area of the city of Cuenca - Ecuador with n=400 (85.12%), followed by the rural area n=72 (14.88%), there were specific cases of patients from Biblián and Machala that were attended in the clinic and correspond to the urban area in this field of study

#### 4. Discussion

The prevalence of dental biofilm in children from 5 to 10 years of age during that age is very frequent and can be easily removed by brushing techniques and the correct use of dental floss.

The present article was compared to the results of other scientific studies from different countries such as: Ecuador, Colombia, Mexico and England.

In a study carried out in the south of Mexico City [6]. by Olga Taboada-Aranza and Karen Rodríguez-Nieto, the patients had an age range of 6 to 13 years old with a total average of 9 years old, in comparison with the present study, the sex that obtained more dental biofilm was male with a percentage of 53% and females with 47%, in this study, all patients presented accumulation of biofilm on the dental surfaces, the O'Leary index was used and it was determined that the most affected teeth were first permanent molar and upper central incisor. Dental biofilm was found exclusively in 99.4% of the patients, while in the present article all the samples had 100% biofilm, according to O'Leary, if the patient accumulates more than 20% plaque, this shows that there is a cariogenic risk. In the male sex it had a higher prevalence of 89.2%, while in the female sex it was 82.6%.

The study carried out in Tulcán, Ecuador [7], used the Loe-Silness formula and showed that the greatest amount of dental biofilm was found on the vestibular surface with 0.17, followed by the lingual surface with 0.15, as in the present study (Figure 3) which had the greatest amount in the vestibular area 5.71% and then on the lingual surface 5.27%, although the age groups were of different ages.

According to Fernández Sencion JN, Veloso A, Viroles M, Guinot F of the International University of Catalonia-Spain [8]. carried out a study in which they used the Loe Silness index in 140 patients aged 6-12 years, in which the prevalence of dental biofilm in the first appointment was 34%, on making a second appointment, the prevalence decreased to 11.58%, however, there was no gender predilection. In this case the group with the lowest amount of biofilm was 7-8 years old, with a discrepancy with the current study, since that same age (Figure 4) was the one with the highest percentage of plaque, and there was also a male predilection (Figure 1), the amount of biofilm was higher in the first appointment and there was no control of the second appointment for plaque.

In an American study by ESTI DAVIDOVICH , RENZO ALBERTO CCAHUANA-VASQUEZ [9]. the amount of plaque accumulated in males and females from 8 to 11 years of age was compared, with an average age of 9, in which the male sex (Figure 1), as in the present study, has a greater amount of dental biofilm (51.2%) and the female sex an average of 51.2%. In addition, a different index was used to measure bacterial plaque known as the Turesky Modified Quigley-Hein Index, while the Loe Silness index used in this article is the most commonly used in Ecuador in pediatric patients.

---

## 5. Conclusion

There was a higher prevalence of dental biofilm in children aged 7.62 years old (n=472) (Figure4), the male sex (Figure1) was the one that accumulated the greatest amount of bacterial plaque on the vestibular surface (Figure3), while the mesial side was the one that stored the least biofilm. Finally, it should be pointed out that the total percentage of dental biofilm in pediatric patients was 1.19% (Figure2), which means a cariogenic risk. This should be complemented with hygiene techniques, motivation and frequent visits to the oral health professional.

---

## Compliance with ethical standards

### *Acknowledgments*

In the following section of thanks, we want to show a great sign of gratitude to Dr. Iván Andrés Palacios for his dedication in guiding us in the preparation of the article, in addition to the respective family of each of the authors.

### *Disclosure of conflict of interest*

The conflict of interest in this manuscript is that the information used randomly from the database of the University of Cuenca consists of the data of the authors of the following article.

### *Statement of ethical approval*

The present research work does not contain any studies performed on animals/humans subjects by any of the authors.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

---

## References

- [1] Núñez Picado, B. and Ulate Jiménez, J., 2020. Efficacy in the removal of dental biofilm with different abutments during dental prophylaxis in pediatric patients. *scielo.sa.cr*, [online] Available at: <[https://www.scielo.sa.cr/scielo.php?script=sci\\_arttext&pid=S1659-07752020000100071&lng=en&nrm=iso&tlng=es](https://www.scielo.sa.cr/scielo.php?script=sci_arttext&pid=S1659-07752020000100071&lng=en&nrm=iso&tlng=es)> [Accessed on March 2 of 2023].
- [2] Harris-Ricardo, J., Fang, L., Herrera-Herrera, A., Fortich-Mesa, N., Olier-Castillo, D., Cavanzo-Rojas, D. and González-Quintero, R., 2019. Profile bacterial growth of supragingival dental biofilm in children with deciduous and early mixed dentition using the next generation sequencing (HOMINGS) technique. Elsevier, [online]

Available at: <<https://www.sciencedirect.com/science/article/abs/pii/S0213005X18303732?via%3Dihub>> [Accessed 2 March 2023].

- [3] Larsen, T. and Fiehn, N., 2017. Dental biofilm infections - an update. *APMIS*, [online] 125(4), pp.376-384. Available at: <<https://www.onlinelibrary.wiley.com/doi/epdf/10.1111/apm.12688>> [Accessed 2 March 2023].
- [4] Díaz Mendoza, A., Domínguez Fuentes, J. and Delgado Torres, C., 2020. Relationship between dental plaque biofilm and exacerbations in patients with chronic obstructive pulmonary disease and non-fibrocystic bronchiectasis. Faculty of Health Sciences University of La Laguna, [online] Available at: <<https://riull.ull.es/xmlui/bitstream/handle/915/20312/Relacion%20entre%20biofilm%20de%20placa%20dental%20y%20exacerbations%20in%20patients%20with%20obstructive%20pulmonary%20chronic%20disease%20y%20bronchiectasis%20non%20fibrocystic%20.pdf?sequence=1>> [Accessed 2 March 2023]
- [5] Ardila Medina, C., Jiménez Gómez, R. and Álvarez Martínez, E., 2013. Systematic review of the effects of reverse smoking on the oral mucosa. [online] Available at: <[http://scielo.sld.cu/scielo.php?script=sci\\_arttext&pid=S1025-02552013000300015&lng](http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1025-02552013000300015&lng)> [Accessed 2 March 2023].
- [6] Taboada-Aranza, O. and Rodríguez-Nieto, K., 2018. Prevalence of dental plaque and dental caries in the first permanent molar in a school population in the south of Mexico City. [online] Scielo.org.mx. Available at: <<http://www.scielo.org.mx/pdf/bmim/v75n2/1665-1146-bmim-75-02-113.pdf>> [Accessed 2 March 2023].
- [7] Sanipatín Mora, J., 2017. Prevalence of supragingival and subgingival dental calculus and plaque level in children from 9 to 15 years of age in public and private schools and colleges in Tulcán - Ecuador. [online] Dspace.udla.edu.ec. Available at: <<http://dspace.udla.edu.ec/jspui/bitstream/33000/6738/1/UDLA-EC-TOD-2017-39.pdf>> [Accessed 2 March 2023].
- [8] European Archives of Paediatric Dentistry, 2020. Scientific Abstracts of the 15th Congress of the European Academy of Paediatric Dentistry (EAPD), Hamburg, Germany July 3–4, 2020. 21(6), pp.719-825.
- [9] Davidovich, E., Ccahuana-Vasquez, R., Timm, H., Grender, J., Cunningham, P. and Zini, A., 2017. Randomised clinical study of plaque removal efficacy of a power toothbrush in a paediatric population. *International Journal of Paediatric Dentistry*, 27(6), pp.558-567.