

HETEROCONTROL OF FLUORIDATION OF PUBLIC WATER SUPPLY IN ANÁPOLIS, GOIÁS.

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ABSTRACT

The addition of fluoride to water is one of the most effective methods for preventing dental caries at the population level. For water fluoridation to be effective in controlling and preventing caries, it is important that fluoride be maintained at adequate concentrations, which should range from 0.55 to 0.84 mg/L in daily water consumption. The following study aims to verify and map water distribution by observing the difference in fluoride concentration at selected collection points near and far from water treatment plants (ETAs) to inspect whether fluoride levels are being consistently maintained in the city of Anápolis.

Keywords: Fluoride; Water fluoridation; Public health; Control; Prevention

INTRODUCTION

The addition of fluoride to water raises important considerations regarding the prevention of dental caries, while also necessitating careful consideration of the risks associated with dental fluorosis. Dental caries is a multifactorial infectious disease characterized by the presence of microorganisms that promote demineralization of tooth enamel (NARVAI, 2000). On the other hand, fluorosis is defined as a "systemic effect resulting from daily fluoride intake during the period of amelogenesis, with an impact on the mineralized tissues of the body, especially dental enamel" (LIMA et al., 2019, p. 2910).

Due to the dual effects of fluoride in water—where excessive concentrations can cause fluorosis, while optimal levels effectively prevent dental caries—it is imperative to implement strict monitoring of fluoride levels as a key measure for preserving oral health (FRAZÃO et al., 2011).

In Brazil, dental caries is the most widespread oral disease, affecting individuals of all age groups and socioeconomic strata in an unequal manner. It affects between

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60% and 90% of the school-age population, with an increasing incidence as the population enters adulthood (RODRIGUES et al., 2020).

Numerous studies have corroborated that the ideal level of fluoride in water supplied to the population for the mitigation of dental caries, considering the risk-benefit ratio, varies within the range of 0.55 mgF/L to 8.5 mgF/L, especially when average maximum temperatures range between 26.3°C and 32.5°C (CECOL/USP, 2011).

Given the importance of strict control, the scope of this study is to conduct comprehensive monitoring of fluoride concentration levels in water at various points in the city of Anápolis.

METHODOLOGY

Sampling points were selected based on the division of the municipality into neighborhoods and districts, including high and low elevation areas. Considering the locations of the Water Treatment Plants (WTPs), schools with communal water use—where fluoride was added—were chosen as sampling sites.

Eight sampling points were selected: four near the water distribution outlets of the WTPs and four at more distant locations, in order to evaluate whether distance affects the fluoride concentration in water. The collection points were as follows: C1 - Colégio José Abdalla (Vila Esperança); C2 – CMEI - D. Íris (Morumbi), C3 - CMEI - Professora Rettie Tipple (Paraíso), C4 - PET Vila Mariana (Vila Mariana), C5 - CMEI - Casimiro de Abreu (Parque Iracema), C6 - EM Belisária Correa de Faria (Jardim Das Américas), C7 - CE Polivalente Frei João Batista (Maracanã), C8 - Colégio Estadual Virgínio Santillo (Maracanã). After defining these sampling points, water collection was carried out using plastic bottles with a capacity of 10 ml and screw caps, labeled according to the collection area.

The collection procedure was as follows: rinse the collection bottle three times with water; collect the sample without filling the bottle to the neck; immediately close the bottle; attach an adhesive label, number the bottle, and record the corresponding field on the spreadsheet using a ballpoint pen; document the bottle number, collection point address, date and time of collection, and the collector's name, in accordance with Ordinance No. 888, of (BRAZIL, 2021). The samples were taken to

C5	0.69	-	0.57	0.78	0.85	0.88	-	0.77	-	0.71	0.76	0.72
C6	0.78	-	0.72	0.75	0.77	0.69	-	0.97	-	0.79	0.86	0.83
C7	1.02	-	0.69	0.92	0.98	1.07	-	0.83	-	0.84	0.9	0.81
C8	0.87	-	0.99	0.97	0.88	0.93	-	0.84	-	0.75	0.68	0

Source: The authors, 2024.

Table 1. Qualitative analysis of fluoride concentration by location and month of collection.

Year	2022						2023					
Date	Jun	Jul	Aug	Sep	Oct	Nov	Dec-Jan	Feb	Mar	Apr	May	Jun
ETA 1	.	.	.	.	.	.	.	.	.	mg/L	mg/L	mg/L
C1	Green	White	Green	Green	Green	Yellow	White	Green	White	Green	Yellow	Yellow
C2	Green	White	Green	Green	Yellow	Yellow	White	Green	White	Green	Green	Green
C3	Green	White	Green	Green	Green	Green	White	Green	White	Green	Green	Green
C4	Green	White	Green	Green	Yellow	Green	White	Green	White	Green	Green	Green
ETA 2												
C5	Green	White	Green	Green	Yellow	Yellow	White	Green	White	Green	Green	Green
C6	Green	White	Green	Green	Green	Green	White	Yellow	White	Green	Yellow	Green
C7	Yellow	White	Green	Yellow	Yellow	Yellow	White	Green	White	Green	Yellow	Green
C8	Yellow	White	Yellow	Yellow	Yellow	Yellow	White	Green	White	Green	Green	Green

	Benefit cavities) (prevents	Risk (causing dental fluorosis)
	No collection	No collection
	Insignificant	Insignificant
	Minimal	Low
	Maximum	Low
	Maximum	Moderate
	Questionable	High
	Harmful	Very high

Source: The authors, 2023.

CONCLUSION

Regarding the results obtained from the samples, a wide variation in fluoride concentration (0.57 mg/L to 1.07 mg/L) was observed throughout the study period. According to the CECOL classification, 52 of the water samples had concentrations within the parameters considered adequate for fluoride levels (between 0.55 mg/L and 0.85 mg/L), promoting maximum benefits against caries, with an additional low risk of fluorosis. It is also worth noting that 20 of the samples presented levels that require caution, because, even though they provide maximum benefits in fighting tooth decay, these levels also pose a moderate risk of causing dental fluorosis. Seventy-two percent of the water samples had concentration values within the parameters, providing maximum benefits in terms of tooth decay prevention and low risk of dental fluorosis.

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