

Evaluation of Fluoride Content of Commercially Available Different Coffee Powder in Jaipur – An In Vitro Study

Anup N, Prateek Jain, Vikas Jeph, Gautam Biswas, Shravani G, Priyanka Sontakke, Amit Jhahharia, Himanshu Kumawat

Department of Public Health Dentistry, Jaipur Dental College, Jaipur, Rajasthan, India.

Address for Correspondence:

Dr. Prateek Jain, Post Graduate Student, Department of Public Health Dentistry, Jaipur Dental College, Jaipur, Rajasthan, India. E-mail: drprateek.jain88@gmail.com

ABSTRACT:

Background: Fluoride is an important anion, present in various environmental, clinical and food samples. Small amounts of fluoride are vital for the human organism, but it is toxic in larger amounts.

Purpose: The purpose of this study was to assess fluoride content in coffee available in the Jaipur area and also to determine if a difference exists among the different types of coffee powder.

Methods: Six different brands and types of coffee powder were obtained from the supermarket and specialty coffee stores available at Jaipur area. Coffee specimens were prepared by pouring the coffee samples in water. The resulting coffee was allowed to cool to room temperature and analyzed.

Results: Fluoride content in Coffee samples was found to be highest in filter coffee (0.27).

Conclusion: The low fluoride content of all of the types of coffee tested suggests that coffee is not a major contributor to total dietary fluoride intake. Since health professionals use fluoride content information to evaluate at risk populations for excessive fluoride consumption, continued monitoring and evaluation of foods and beverages is needed to provide current fluoride content data and labelling of the content on packaging.

Keywords: Coffee, Filter, Fluoride, Instant mix.

INTRODUCTION:

Fluoride (F⁻) is an important anion, present in various environmental, clinical and food samples. Small amounts of fluoride are vital for the human organism, but it is toxic in larger amounts. For adults the lethal dose is 0.20{0.35 g F⁻ per kg} body weight. Fluoride is widely used in various branches of industry and some fluoride compounds are formed as by-products in certain processes. Excessive amounts of fluoride in form of different compounds

can enter the human body by means of polluted air, water and the food chain. An additional source of fluoride for humans is toothpastes containing ca. 0.1% fluoride (NaF, SnF₂, Na₂PO₃F) and water fluoridation (adding fluoride in the form of NaF to drinking water). A small amount of fluoride is beneficial in the prevention of dental caries. Fluoride has also been used to treat osteoporosis. It is very characteristic that fluoride prevents tooth

decay at about 1 mg L⁻¹ but causes mottled teeth and bone damage at around 5 mg L⁻¹ when it is present in water. Fluorosis is caused by elevated intake of fluoride over prolonged periods of time. The high level of fluoride in tea has been known for years and has been suggested to have a potential impact on total dietary fluoride intake. Coffee is a popular beverage in India. Coffee consumption has been rapidly increasing in India in past few decades. The consumption of coffee in India in year 2000 was 60,000 metric tonnes which was increased by 1,15,000 metric tonnes in year 2011. Indian coffee industry has made rapid strides and earned a distinct identity in the coffee map of the world. In India almost every individual consume coffee the commonest people among them are information technology employees, multinational company individual and doctors also. These data could be useful in calculating total dietary fluoride intake for at risk populations. The purpose of this study was to determine levels of fluoride concentration in coffees available in the Jaipur area and also to determine if a difference exists among the different types of coffee.

AIM AND OBJECTIVES

Aim

To determine the fluoride content in commercially available (instant mix and filter) coffee powder.

Objectives

1. To determine the fluoride content in instant coffee powder sample.
2. To determine the fluoride content in filter coffee powder sample.

MATERIALS AND METHOD

An in vitro study has been conducted at B. Lal Institute of Biotechnology, Jaipur,

Rajasthan. Six coffee powders were taken for the analysis of fluoride content. Six coffee powder divided in two groups i.e. filter coffee and instant coffee.

STUDY DESIGN:

Preparation of Reagent Solution:

Standard Fluoride Solution:

1.5 g ammonium hydrogen di fluoride (NH₄F.HF) was weighed and dissolved in distilled water and diluted to 10 cm³. The solution contains 10000 mg L⁻¹ Fluoride. A serial dilution of the stock solution was prepared in the range 10000mg/L.

Alizarin Red Solution:

0.75 g alizarin red was weighed and dissolved in distilled water and made to 1000 cm³ in a volumetric flask.

Zirconyl Acid Solution:

0.345 g of zirconyl Chloride was weighed and dissolved in about 800 cm³ distilled water, then 33.30 cm³ concentrated H₂SO₄ was slowly added and stirred, followed by the addition of 101 cm³ HCl, the solution was stirred thoroughly and made up to 1000cm³. The color of the reagent turns from pink to yellow immediately if fluorides are present. *Sensitiveness*: 0.003 mg. of fluorine.

Spectrometric Determination of Fluoride:

5.0 cm³ each of alizarin red and zirconyl acid solutions were added to 100 cm³ of both standard and sample solutions, mixed thoroughly and allowed to stand for one hour for full colour development. Absorbance readings were taken at 520 nm.

Preparation of 3 Filter and Instant coffee samples for fluoride estimation in 0.2% w/v solution of total 6 coffee samples:

Instant coffee:

1. Nescafe Classic- - 0.2gm; 100ml DW
2. Nescafe Sunrise– 0.2 gm; 100ml of DW
3. BRU - 0.2 gm; 100 ml of DW

Filter coffee:

1. Coffee Day- 0.2gm; 100ml DW

Instant coffee

Coffee sample	Fluoride (mg/ml)	Standard deviation	Z-value	p-value	Mean
Nescafe classic	0.24	0.0458	+1.09	0.275	0.19
Nescafe sunrise	0.18		-0.218	0.827	
Bru– gold	0.15		-0.872	0.383	

Filter coffee

Coffee sample	Fluoride (mg/ml)	Standard deviation	Z-value	p-value	Mean
Coffee day	0.15	0.07937	-0.377	0.706	0.18
Chikmangloor	0.27		+1.13	0.258	
Ooty	0.12		-0.755	0.450	

DISCUSSION

Among the six coffee samples that were analyzed for fluoride, all six contained less than 0.5 ppm F; (Table). The low fluoride content of all of the types of coffee tested suggests that coffee is not a major contributor to total dietary fluoride intake. Since health professionals use fluoride content information to evaluate at risk populations for excessive fluoride consumption, continued monitoring and evaluation of foods and beverages is needed to provide current fluoride content data.

CONCLUSION

Maximum of found fluoride concentration in analyzed samples is low. It is very low than tea. We found the effect of sample’s package on fluoride levels. Would fluoride

2. Chickmangloor – 0.2 gm; 100ml of DW
3. Ooty- 0.2 gm; 100 ml of DW

RESULTS

The fluoride content in coffee powder was found to be not significant. The fluoride content in instant coffee powder was high in Nescafe (0.24 mg/L) and filter coffee was high in chikmangloor coffee (0.27mg/L).

concentration increase or decrease, it depends on how fine are plant cuttings (in fact on specific surface and for smaller cuttings it would be greater) and on country of origin, soil type, respectively. According the results, we would suggest to drink a coffee, because fluoride concentration is very low and/or below recommended maximum daily intake of fluoride. In normal way of drinking, for tested samples, people would obey manufacturer’s recommended procedure for coffee preparation and assure themselves of possible fluoride action.

REFERENCES

1. Warren DP, Henson HA, Chan JT. Comparison of fluoride content in caffeinated, decaffeinated and instant coffee. Fluoride 1996;29:147–50.

2. Tokalioglu S, Kartal S, Sahin U. Determination of fluoride in various samples and some infusions using a fluoride selective electrode. *Turk J Chem* 2004; 28:204-11.
3. Josipa G, Ante P, Marija B, Mia B. Determination of Fluoride Content in Tea Infusion by Using Fluoride Ion-Selective Electrode. *Int J Electrochem Sci* 2012;7:2918-27.
4. Antonio AG, Farah A, Santos KRN, Maia LC. The potential anticariogenic effect of coffee; Science against microbial pathogens. *Communicating current research and technological advances* 2011; 1027-32.
5. Slooff W et al. Basis document fluoride, Bilthoven, Netherlands, National Institute of Public Health and Environmental Protection
6. <http://www.indiacoffee.org>
7. Hanspal S. Consumer Survey on Sustainable Tea & Coffee Consumption; 2010
8. www.adha.org

How to cite this article: Anup N, Jain P, Jeph V, Biswas G, Shravani G, Sontakke P, Jhaharia A, Kumawat H. Evaluation of Fluoride Content of Commercially Available Different Coffee Powder in Jaipur – An In Vitro Study. *Arch of Dent and Med Res* 2015;1(3):24-27.