

REMOVAL OF FLUORIDE IN DRINKING WATER BY DRUMSTICK BARK AND ITS LEAVES

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Key words : Defluoridation, Drumstick bark and leaves, Spectrophotometer, pH meter.

ABSTRACT

This paper deals with the analysis of removal of fluorides from drinking water. A simple and economic method of defluoridation of drinking water is the adoption of drumstick bark and its leaves as an adsorbent. The botanical name of drumstick is *Muringa odecifera*. It has the high capacity of removing fluorides from the drinking water. Drumstick leaves are used as leafy vegetables in the diet of South Indians.

INTRODUCTION

In Vallioor Union of Tirunelveli District most of the people are dependent on ground water for drinking purpose. But the Ground water is contaminated with dissolved inorganic substances namely fluoride which makes the water unsafe for drinking. Fluoride, an element present in natural water and food is an universal phenomenon. Hence its intake in the diet becomes inevitable. Small concentration of fluoride in drinking water has beneficial effect on human body if taken in controlled quantity ie less than 1 ppm, preventing dental caries. Contrary Higher concentration causes serious dental and skeletal Fluorosis if its concentration is in greater than 1 ppm. The excess fluoride in drinking water can be removed by adopting various methods using various adsorbents.

The defluoridating agents may be divided into three basic types depending upon adsorption process, ion exchange process and based on some kinds of chemical reaction with fluoride.

In the present study the adsorption process has

been adopted for removal of excessive fluoride by using drumstick bark and its leaves.

EXPERIMENTS

Known weight of dry drumstick bark and wet drumstick leaves were boiled with known concentration of volume of standard solution of sodium fluoride and allowed to stand for 24 hours. It was filtered through Whatman No.42 filter paper and the filtrate was used for fluoride analysis by spectrophotometer.

The pH of the initial and after treatment of the solutions were measured by pH meter. The experiment was repeated by changing the weight of adsorbents.

The experimental values are given in Table 1. The treatment of dry drumstick bark reduced the fluoride concentration from 5 ppm to 2.4 ppm within an hour. After 24 hours the value of fluoride is slightly reduced than 1 hour treatment but pH of the solution is 8.69, after treatment, the solution becomes acidic ie pH=6.15. After 24 hours treatment,

Table 1. Defluoridation of drinking water by using Drumstick bark and its leaves

Materials used	Amount of material (mg)	Quantity of water (mL)	Fluoride concentration (ppm)			pH		
			Initial	After 1hr treatment	24 hr treatment	Initial	After	24hr 1hr
Dry drumstick bark	500	200	5	4.0	3.6	8.69	8.23	6.76
	1000	200	5	3.8	3.0	8.69	7.70	6.31
	1500	200	5	2.8	2.4	8.69	7.40	6.45
	2000	200	5	2.4	2.1	8.69	7.15	6.40
	2500	200	5	2.5	2.2	8.69	7.02	6.15
Wet drumstick leaves	100	200	5	3.0	2.9	8.64	8.52	8.40
	200	200	5	2.8	2.8	8.64	8.24	7.94
	300	200	5	2.3	2.3	8.64	7.92	7.40
	400	200	5	2.1	2.0	8.64	7.45	6.92
	500	200	5	2.1	2.0	8.64	7.09	6.52
Dry drumstick leaves	100	200	5	2.9	2.8	8.64	7.40	7.35
	200	200	5	2.8	2.7	8.64	7.35	7.12
	300	200	5	2.7	2.5	8.64	7.32	6.82
	400	200	5	2.4	2.4	8.64	7.31	6.49
	500	200	5	2.4	2.4	8.64	7.30	6.40

the solution became pale yellow and smell of the solution was changed.

Under the treatment of wet drumstick leaves, it reduced the values of fluoride from 5 ppm to 2.0 ppm after 24 hours treatment and pH of solution is changed from 8.64 to 6.52. But the treatment after an hour, it reduced the values of fluoride from 5 ppm to 2.0 ppm and pH of solution changed from 8.64 to 7.09. The resulting solution became green and smell of the resulting solution is slightly changed.

CONCLUSION

The experiments show promising results. But the wet drumstick leaves gave the resulting solution is in neutral position with minimum interval of time. South Indians use rice as the major diet with sambar by using vegetables. While preparing it they should add drumstick vegetables and drumstick leaves as leafy vegetables in view of defluoridation. Besides, another method to be followed is adding dry woodpieces of drumstick bark in open wells to get the maximum benefits.

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