FLUORIDE CONTENT OF POPULAR PERSIAN HERBAL DISTILLATES

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ABSTRACT: The fluoride ion (F) concentration levels of the 20 most popular herbal distillates sold in Iran were determined. The mean F content of the samples was 50 µg/L with a range of not detectable-340 µg/L. The estimated maximum daily, weekly, and monthly intakes of F were 34, 238, and 1020 µg/day respectively. The results of this study showed that the low concentration levels of F found in Persian herbal distillates should not normally significantly increase the F intake of consumers.

Keywords: Fluoride content of herbal distillates; Iran; Persian herbal distillates.

INTRODUCTION

Numerous and varied medical benefits have been claimed for herbal distillates and the use of medicinal herbs and herbal decoctions has increased significantly in recent years.[1-3] The main producing countries of herbal distillates are Iran, Turkey, and Egypt.[4] These countries are destinations for many tourists and they may use herbal distillates as a drink. The World Health Organization estimated that nearly 80% of the populations of developing countries relied on herbs for primary health care.[5] With this worldwide increase in the use of herbal distillates, consideration of their health implications is important.[6] The fluoride ion (F), a widely distributed element in the environment, is of special concern, because it can cause a wide range of adverse health effects.[7-11] Many studies have been done in Iran of the F content in drinking water, fish, air, and sea water[12-18] as well as research on its removal from drinking water.[19-23] However, to the best of our knowledge, no reports have been published on the F content of herbal distillates and the present study was undertaken to investigate this area.

MATERIALS AND METHODS

Twenty of the most popular herbal distillates were purchased from herbal distillate distribution shops in Bushehr, Iran. All of the purchased herbal distillates were produced in Meymand city, the main city in Iran for producing herbal distillates. All the herbal distillates bottles were stored in a dark place at room temperature in their original sealed plastic containers until the F analysis. The F analysis was made by the standard SPADNS method using a Spectrophotometer (M501 Single Beam Scanning UV/VIS, UK).

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RESULTS AND DISCUSSION

The claimed therapeutic properties and F contents of the herbal distillates are shown in the Table 1.

Table 1. Claimed therapeutic properties of the analyzed herbal distillates and their fluoride ion (F) concentration levels (µg F/L)

Common name	Scientific name	F (µg/L)	Claimed therapeutic properties
Fenugreek	*Trigonella foenum-graecum*	100	Treatment of digestive problems and antidiabetic
Walnut	*Juglans regia*	10	Anti-diarrhea, hypoglycemia
Alfalfa	*Medicago sativa*	*ND	Fattening, slimming treatment, blood purification
Yarrow	*Achillea*	70	Anticonvulsants, febrifuge
Lavender	*Lavandula stoechas*	*ND	Amplifier neurology soothing, Anticonvulsants
Fennel	*Foeniculum vulgare*	10	Antiseptic, palliative, and anti-inflammatory effects
Sycamore	*Platanus orientalis*	*ND	Improving blood circulation to brain and heart
Aloe vera	*Aloe vera*	10	Amplifier, blood purifier
Olive	*Olea europaea*	*ND	Disposal of gallstones, appetizer
Nettle	*Urtica*	60	Treatment of respiratory, anti-diarrheal, anti-inflammatory
Licorice	*Glycyrrhiza glabra*	*ND	Impact on the digestive system, treating swelling and ulcers
Orange blossom	*Citrus sinensis*	80	Invigorating for the skin, relaxing effect on mind and body
Fumitory	*Fumaria officinalis*	30	Bilary disorders, eye irritation
Dog-rose	*Rosa canina*	50	Carminative, skin care
Camelthorn	*Alhagi maurorum*	60	Blood purifier, kidney detersive
Peppermint	*Mentha*	340	Improvement of upset stomach and indigestion, skin irritation
Pussy willow	*Salix aegyptiaca*	*ND	Mild sedative, treating skin
Chicory	*Cichorium intybus*	40	Treatment of liver and gallbladder disorders
Rose	*Rosa damascene*	100	Mild sedative, skin treatments
Herbal mixture	-	50	Sedative, used for upset stomach
Minimum value		*ND	
Maximum value		340	
Mean value		50	
Std Deviation		74.46	

*None Detected

The mean F content of the samples was 50 µg/L with a range of not detectable-340 µg/L. The highest F content in the herbal distillates was 340 µg/L in peppermint, whereas F was not detected in 6 samples: alfalfa, lavender, sycamore, olive, licorice, pussy willow. The daily consumption of herbal distillates by local residents is normally less than one teacup (100 mL).[4] The estimated daily, weekly, and monthly intakes of F for all the herbal distillate samples were calculated (Table 2).

Table 2. The estimated daily, weekly, and monthly intakes of the fluoride ion (F, µg) *per capita* for the herbal distillate samples

Common name	Scientific name	Estimated F intake (µg)		
		Daily	Weekly	Monthly
Fenugreek	*Trigonella foenum-graecum*	10	70	300
Walnut	*Juglans regia*	1	7	30
Alfalfa	*Medicago sativa*	-	-	-
Yarrow	*Achillea*	7	49	210
Lavender	*Lavandula stoechas*	-	-	-
Fennel	*Foeniculum vulgare*	1	7	30
Sycamore	*Platanus orientalis*	-	-	-
Aloe vera	*Aloe vera*	1	7	30
Olive	*Olea europaea*	-	-	-
Nettle	*Urtica*	6	42	180
Licorice	*Glycyrrhiza glabra*	-	-	-
Orange blossom	*Citrus sinensis*	8	56	240
Fumitory	*Fumaria officinalis*	3	21	90
Dog-rose	*Rosa canina*	5	35	150
Camelthorn	*Alhagi maurorum*	8	56	240
Peppermint	*Mentha*	34	238	1020
Pussy willow	*Salix aegyptiaca*	-	-	-
Chicory	*Cichorium intybus*	4	28	120
Rose	*Rosa damascene*	10	70	300
Herbal mixture		5	35	150

The estimated maximum F daily intake for a single herbal distillate was 34 µg/day for peppermint with the corresponding weekly and monthly intakes being 238 µg/week and 1020 µg/month, respectively. Finally, in view of the increasing awareness of toxic effects of a high fluoride intake, particularly in children, it is

highly recommended that low-F bottled drinking water[12,13] is used to prepare herbal drinks in regions with elevated F levels in the drinking water sources.[9]

CONCLUSIONS

The results of this study showed that the low concentration levels of F found in Persian herbal distillates should not normally significantly increase the F intake of consumers. Nevertheless, it is highly recommended that low-F bottled drinking water is used to prepare herbal drinks in regions with elevated F levels in the drinking water sources.

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REFERENCES

1 Cohen P A, Ernst E. Safety of herbal supplements: a guide for cardiologists. Cardiovasc Ther 2010; 28:246-53.
2 Ebrahim AM, Eltayeb MH, Khalid H, Mohamed H, Abdalla W, Grill P, Michalke B. Study on selected trace elements and heavy metals in some popular medicinal plants from Sudan. J Nat Med 2012; 66:671-9.
3 Zhu F, Wang X, Fan W, Qu L, Qiao M, Yao S. Assessment of potential health risk for arsenic and heavy metals in some herbal flowers and their infusions consumed in China. Environ Monit Assess 2013;185:3909-16.
4 Moore F, Akhbarizadeh R, Keshavarzi B, Tavakoli F. Potential health risk of herbal distillates and decoctions consumption in Shiraz, Iran. Biol Trace Elem Res 2015;167:326-37.
5 World Health Organization. WHO traditional medicine strategy 2002-2005. Geneva: WHO; 2002.
6 Rafieian-Kopaei M, Shahinfard N, Rouhi-Boroujeni H, Gharipour M, Darvishzadeh-Boroujeni P. Effects of *Ferulago angulata* extract on serum lipids and lipid peroxidation. Evid Based Complement Alternat Med 2014;2014:680856. doi: 10.1155/2014/680856. Epub 2014 Feb 24.
7 Spittle B. Dyspepsia associated with fluoridated water. Fluoride 2008;41(1):89-92.
8 Shivarajashankara YM, Shivashankara AR, Rao SH, Bhat PG. Oxidative stress in children with endemic skeletal fluorosis. Fluoride 2001;34(2):103-7.
9 Dobaradaran S, Mahvi AH, Dehdashti S, Abadi DRV. Drinking water fluoride and child dental caries in Dashtestan, Iran. Fluoride 2008;41(3):220-6.
10 Ostovar A, Dobaradaran S, Ravanipour M, Khajeian A. Correlation between fluoride level in drinking water and the prevalence of hypertension: an ecological correlation study. Int J Occup Environ Med 2013;4(4):216-7.
11 Rahmani A, Rahmani K, Dobaradaran S, Mahvi AH, Mohamadjani R, Rahmani H. Child dental caries in relation to fluoride and some inorganic constituents in drinking water in Arsanjan, Iran. Fluoride 2010;43(3):179-86.
12 Dobaradaran S, Mahvi AH, Dehdashti S. Fluoride content of bottled drinking water available in Iran. Fluoride 2008;41(1):93-4.

13 Nabipour I, Dobaradaran S. Fluoride concentrations of bottled drinking water available in Bushehr, Iran. Fluoride 2013; 46(2):63-4.
14 Dobaradaran S, Mahvi AH, Dehdashti S, Dobaradaran S, Shoara R. Correlation of fluoride with some inorganic constituents in groundwater of Dashtestan, Iran. Fluoride 2009; 42(1):50-3.
15 Dobaradaran S, Fazelinia F, Mahvi AH, Hosseini SS. Particulate airborne fluoride from an aluminium production plant in Arak, Iran. Fluoride 2009; 42(3):228-32.
16 Dobaradaran S, Abadi DRV, Mahvi AH, Javid A. Fluoride in skin and muscle of two commercial species of fish harvested off the Bushehr shores of the Persian Gulf. Fluoride 2011;44(3):143-6.
17 Nabipour I, Dobaradaran S. Fluoride and chloride levels in the Bushehr coastal seawater of the Persian Gulf. Fluoride 2013;46(4):204-7.
18 Shams M, Dobaradaran S, Mazloomi S, Afsharnia M, Ghasemi M, Bahreini M. Drinking water in Gonabad, Iran: fluoride levels in bottled, distribution network, point of use desalinator, and decentralized municipal desalination plant water. Fluoride 2012; 45(2):138-41.
19 Boldaji MR, Mahvi A, Dobaradaran S, Hosseini S. Evaluating the effectiveness of a hybrid sorbent resin in removing fluoride from water. Int J Environ Sci Technol 2009; 6(4):629-32.
20 Shams M, Qasemi M, Dobaradaran S, Mahvi AH. Evaluation of waste aluminum filling in removal of fluoride from aqueous solutions. Fresen Environ Bull 2013; 22(9):2604-9.
21 Zazouli MA, Mahvi AH, Dobaradaran S, Barafrashtehpour M, Mahdavi Y, Balarak D. Adsorption of fluoride from aqueous solution by modified *Azolla filiculoides*. Fluoride 2014:47(4):349-58.
22 Dobaradaran S, Nabipour I, Mahvi AH, Keshtkar M, Elmi F, Amanollahzade F, Khorsand M. Fluoride removal from aqueous solutions using shrimp shell waste as a cheap biosorbent. Fluoride 2014: 47(3):253-7.
23 Dobaradaran S, Kakuee M, Pazira AR, Keshtkar M, Khorsand M. Fluoride removal from aqueous solutions using *Moringa oleifera* seed ash as an environmental friendly and cheap biosorbent. Fresenius Environmental Bulletin 2015; 24:1269-74.