TRADITIONAL TEA DRINKING IN SENEGAL A REAL SOURCE OF FLUORIDE INTAKE FOR THE POPULATION

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INTRODUCTION

It is now admitted that used daily systemically or topically at the optimal dose, fluoride prevents dental caries in man.
This caries prevalence has decreased over these last 20 years in developed countries where fluoride is widely used in caries preventive programs.
However used chronically at levels higher than optimal dose, fluoride has noxious effects in man. To avoid the occurring of these ones, it is not only necessary to know, but also to appreciate exactly all sources of fluoride intake for the population. But in Senegal except the sources of fluoridated dental products, the other sources like food for example, are not known with accuracy.

It happens that Senegalese people are great consumers of tea, and tea is one of the richest plants in fluoride.
Indeed, tea drinking after meals is a wide spread traditional practice in Senegal. More than 80 % of the population aged from to 15 to 60 years old drink decocted tea regularly at least once a day, that is to say after one of the two main meals (lunch and dinner). In some families tea is used for breakfast, in other families they drink tea 3 times daily, that is to say, in the morning, at noon and in the evening or at night.

Based on the frequency of tea drinking and for the richness in fluoride of the tea plant, the aim of this report is :
- To measure the real quantity of fluoride tea consumers in Senegal may ingest from that traditional practice, so through that study we will determine certainly one of the main sources of fluoride for the Senegalese population,
- To appreciate the place the practice could occupy in a caries preventive program,
- And finally, to study the possible role of the practice in the occurring and severity of dental fluorosis in the endemic areas of dental fluorosis.

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MATERIEL AND METHOD

Too many kinds of tea are available in Senegal but our study will concern the two ones more used by Senegalese people : the N.8147 and «the Special Gun Powder».
We prepare tea according to the traditional method with water, sugar and mint. So for 4 persons, and for each kind of tea we prepare 3 tea pots :
* The first one with 10,5 g of tea, 180 ml of water, the all boiled during 10 minutes, then add 25 g of sugar and finally serve according to taste,
* The second one like the previous, but with 120 ml of water and the same content of tea (people can add some tea if we want), 10 minutes of boiling, 3 g of mint leaves (fresh or dry). The all boiled again during 5 minutes with 25 g of sugar before serving,
* The third, which is the last one traditionally, is the continuation of the second teapot with only tea leaves in which we put 120 ml of water boiled during 10 minutes, 25 g of sugar added and serve. Sometimes people can add to the third teapot 5 g of dry tea and mint. The tools used to boil water are made of iron covered up by rust preventive.

We can say that generally tea makers don't measure exactly the weigh of dry tea, mint and sugar. It depends to the number of tea consumers, in this people can use the half, the quarter or the full drinking cup with dry tea. It's the same for the mint, with 3 or 4 small boughs of fresh mint. As for the sugar they use 3 lumps of sugar for each full cup. A lump of sugar is about 4,17 g of weight.

So the numbers we give here are averages.

Traditionally in a drinking tea session, 3 teapots are prepared in succession as described above whatever the number of persons and to each one a cup containing about 30 ml of decocted tea is served. This also is an average, because we are estimating here the half of the drinking cup we use.
So, we sent for analysis a cup of each teapot of each type of tea, that is to say 6 sample of teacup for 30 ml of water, sugar and 30 ml of decocted mint.
The analysis was done at the fluoride Laboratory of the

Eastman Dental Centre Oral Biology Department at Rochester N. Y USA.
They used the Taves Microdiffusion method associated to the Ion Fluoride Specific Electrod (13).

RESULTS

The fluoride analysis gave the following results.

Table 1 : Fluoride level (mg/l) of each ingredient other than the dry tea entering in the preparation of the drinking

Ingredients	Ionics F- (mg/1)	Total F(mg/1)
Water (30 ml)	0.195	0.217
Sugar (4,17 g)	0.285	0.295
Mint (30 ml)	2.173	2.355

Table 2 : fluoride proportion (mg/l) of each tea cup prepared from "tea N. 817"

Cups	Ionics F-(mg/1)	Total F(mg/1)
First cup (30 ml)	3.102	3.522
Second cup (30 ml)	4.840	7.392
Third cup (30 ml)	1.285	1.382
Total	9.227	12.297

Table 3 : - Fluoride proportion (mg/l) of each tea cup prepared from the tea «Special Gun Powder»

Cups	Ionics F- (mg/1)	Total F (mg/1)
First cup (30ml)	3.596	4.482
Second cup (30ml)	4.643	7.479
Third cup (30ml)	0.988	1.078
Total	9.227	13.039

DISCUSSION

We have to answer these 3 questions :

1. Does traditional tea drinking in Senegal constitute a real source of fluoride for the population ?
According to Senegalese people a tea drinking session means taking three cups of tea called «Three normal» served at some interval. . The average time necessary being 30 minutes. Some may do one session in one hour or more. Thus on average a tea consumer in Senegal takes «The three normal once daily, we state that, whatever the type of tea, the ingests daily, 0.830 mg (we are concerned here by ionic fluoride only). We know that ionic fluoride is directly available. (14). Otherwise someone who participates daily to 3 sessions of «Three normal ingests on average (0.830 mg F x 3 = 2.491 mg of ionic F.)
This is almost 2.5 times the level of in a litre of 1 mg fluoridaded water.
According to a later report concerning the optimal dose of fluoride in drinking water (15), this is a fluorotic dose, as in Senegal the optimal dose is 0.8 mg/l.
So, we reasonably consider the practice as a real source of fluoride intake for the population. And the results allow us to say that practice is a disastrous for the population according to the toxicity of fluoride.

2 - Have we to take into account that practice when setting up a caries preventive program in Senegal ?
In Senegal we don't drink tea really, we savour it because it's consumed hot. It's to certify that there is ineluctably a topical action of fluoride contained in the drinking tea (5, 6).
Then, there is a come back of the ingested fluoride by saliva, it may be always efficient to strengthen the resistance of the teeth in front of cariogenic acids since we need only 1 umolF/l to saturate saliva. This proportion is efficient to improve the teeth resistance in the mouth (1, 2).
In other respects we foresee studies to estimate the proportion of fluoride in the mouth during tea session and proportion of fluoride which comes back to the mouth by saliva in 1/2, 1 and 2 hours after taking a three normal».
In fact, we think that the practice is a good means of caries prevention among tea consumers. Certainly it is not very efficient when used alone but if we associate it to a safe oral hygiene we may have convincing results (10). A comparative study of the caries index (DMF/T) among tea-consumers and no tea-consumers will instruct us correctly on the credibility that we may allege to the practice in matters of dental caries prevention (9).
In addition we think we may use the decocted tea or decocted mint without sugar as fluoridated mouthrinse (7).
In other respect planning for coming academic years, we will be able to test these mint or tea mouthrinses in some elementary schools test as part of school health education and oro-dental disease prevention programs.

3 - Is traditional tea drinking involved in the occurring of dental fluorosis in Senegal ?

Tea drinking by children less than 8 years old is not a frequent practice because tea in considered as a powerful stimulant so, it disturbs children.

In Senegal, we have an area, children of endemic dental fluorosis, we think that in this area, children less than 8 years old consuming tea may initiate or strengthen their fluorotic lesion (4).

In addition in some localities where the dose of fluoride is close to the optimal one, tea drinking would initiate fluorotic lesion (4). It's to state that in other respects, we recommend decocted tea or mint without sugar as mouthrinses because children will not be tempted to drink these bitter liquids.

CONCLUSION

Tea is a plant cultivated mainly in Asia and above all in China.

We import it in Senegal : US $ 1,000 000/year (11).

Because decocted tea is considered as a good digestive and a delightful bracing it is widely consumed in Senegal. It is prepared according to a very picturesque, traditional method with rituals aspects. As tea is a plant rich fluoride, we studied the dose of fluoride ingested on average by a tea consumer in Senegal. Based on our results we know now those these practice in a real source of fluoride for the population.

At the same time it may play a major role in the field of caries prevention.

It might also initiate in certain conditions, the occurring of dental fluorosis even if it might be very mild.

However we envisage to improve that practice and to set it up as the basis of dental caries preventive program in the adult population, as well as in the elementary school population. In effect, we want to take advantage of the fact that the practice is well integrated in the habits of Senegalese population.

However, further studies are necessary to elucidate the real relationship between traditional tea drinking in Senegal and the population caries protect.

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ABSTRACT

Tea drinking after meals is a traditional practice in Senegal where more than 80 % of the population from 15 to 60 years old drink tea. According to the tradition, in one session, each tea consumer has to drink 3 cups of decocted tea. The content of a cup is about 30 ml of liquid. Some people drink tea three times daily, that is to say after each meal. Tea plant is rich in fluoride. To determine the effective intake of the Senegalese population from this source, we measured the fluoride concentration not only for each component of the prepared tea but also for each cup of prepared tea. For this study, we used the two main kinds of tea existing locally. The analyses have been done at Rochester, NY Eastman Dental Center, Oral Biology Dept Fluoride Laboratory using the Taves Microdiffusion Method and the fluoride Ion Specific Electrod. The results so that the mean total fluoride concentration of each cup, from the first to the third one, is : 4.0 mg F-/L , 7.436 mg F-/L and 1.230 mg F-/L. It means that on an average in one session, a Senegalese tea consumer has a daily fluoride intake of 1. 139 mg F-/L when taking in count the total fluoride and drinking only 90 ml of tea. If we consider the ionic fluoride the amount of daily ingested fluoride for someone who takes only 3 tea-pots of 30 ml each, is 0.830 mg.

To conclude, we state that this traditional practice may have a caries preventives effect. Further studies will be grateful for that practice when setting up a caries preventive program in our country. We will also be careful in extending that practice to children less than 8 years old because it might cause dental fluorosis as in Senegal the optimal dose of fluoride is 0.8 mg F-/L.

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