Fluoride (F) intake is recognized to be important to dental and bone health. Tea leaf is a known F accumulator and may contribute significantly to individual intake. The Fluoride Content of Brewed and Microwave Brewed Black Teas

**ABSTRACT**

Fluoride (F) intake is recognized to be important to dental and bone health. Tea leaf is a known F accumulator and may contribute significantly to daily F intake, and quality of fluoride intake and impact on the health of bones and teeth.

**METHODS AND MATERIALS**

1. **Step 1. Prepared Sampling Frame Data**
   - County and state code, name, and 2000 Population Census
   - Census block groups are geographically matched tap water samples, for inclusion in the USDA National Fluoride Database. Tap water samples were collected twice (over time) from 144 nationally representative locations in 72 counties, in 4 Census regions (2 residences per county). Thirty-six water composites were prepared by combining the samples from the 2 sites, from each time and from two counties, paired by closeness of location. Two brands of top-selling regular and one of decaffeinated teabags were purchased in one of the 4 locations corresponding to the water sampler for each of the 36 composites. For brewed teas, each teabag was steeped for 4 minutes in 180 mL boiled water (in an opaque plastic bag and tea bag holder) for 1 minute in a 1200-watt microwave, and steeped for another 30 seconds. Over all samples, the water brew temperature was 93.4 ± 2.52 °C (89.0 to 100 °C). The F content was determined by direct read using an ion-selective electrode method at University of Iowa. The mean F content for regular brewed tea was 373 ± 49 mcg/100g (n=63) and for decaffeinated tea was 270 ± 46 mcg/100g (n=34). The F content of regular brewed tea varied from 350 mcg/100g in the South to 395 mcg/100g in the Midwest. The F content of decaffeinated tea varied from 247 mcg/100g in the West to 293 mcg/100 g in the Midwest. The overall mean for F in regular brewed tea was 373 mcg/100g (n=63) and for decaffeinated tea was 270 ± 46 mcg/100 g (n=34). The mean F content in brewed tea was 4.5 times higher than the mean national content of the tap water, analyzed separately (n=33 data sets). The data are the first nationally representative fluoride values for brewed teas, and will provide valuable information for dental and bone health research community in assessment of fluoride intake and impact on the health of bones and teeth.

**RESULTS AND DISCUSSION**

The effect of brewing method, brand of tea, the caffeine level and region of tap water/tea collection on the F content of the brewed black tea was determined. The F content was determined several ways:

- **Decaffeinated tea (one brand, national mean) was 270 ± 46 mcg/100g:**
  - Microwave brew (one brand, national mean) was 322 ± 30 mcg/100g.

In addition:
- **No significant regional differences were shown across all tea brands, brews and caffeine level. In all cases, tea from the Midwest had the highest F values**
  - F in traditional brew tea was higher than microwaved tea: subtracting out the F from the water, F coming from traditional brew tea ranged from 29-58 mcg/100g. The F content of traditional brew was higher than from decaffeinated tea.
  - In all cases, most of the F was contributed by the tea leaves (range 74-85%, Table 2a).

**REFERENCES**


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