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A case of skeletal fluorosis?

Michael Godfrey

A 79-year-old lady presented with a history of diffuse sero-negative arthritis dating from early adulthood. Numerous investigations and therapies had failed to provide any significant benefit and both knees and a hip had been replaced when initially seen a year ago. On questioning at that time, she admitted to daily drinking at least six cups of black tea since childhood. She lives in a retirement village where there has not been water fluoridation since 1994. However, her fasting fluoride results (Medlab) were elevated:

- Serum fluoride 2.5µmol/L (Ref. range 0.3–2.2)
- Urine fluoride 58µmol (Ref. range 0–31)
- Fluoride: creatinine ratio 13.5µmol (Ref. range 0–3.1)

She used a standard fluoridated toothpaste but was otherwise not on any fluoridated medications. However, given the fact that her preferred tea exceeded 3mg fluoride/L¹ it is possible that she has been unwittingly overdosing for many years. Skeletal fluorosis from tea has been identified.² Furthermore, excessive use of fluoridated toothpaste caused severe arthritis initially diagnosed as ankylosing spondylitis with full recovery after stopping exposure.³ A year after stopping black tea drinking and changing to a herbal non-fluoridated toothpaste, this elderly woman's joint pain levels had markedly decreased with considerably improved mobility enabling her to have a long-awaited trip overseas.

Discussion

Fluoride exposures are pervasive. Traditionally, this country has been a major tea consumer and the consequences of fluoride in tea have recently been extensively covered with one cup of the most widely consumed tea brands supplying over 1mg of fluoride per teabag even without any added water fluoridation.¹ Absorption of fluoride from toothpaste at 1,000ppm are considerable and equivalent to, or more than from a cup of tea.^{1,4} Fluoride is present in

beverages, and in over 200 pharmaceuticals with some being given on a long-term daily basis, eg, atorvastatin, fluvastatin, fluticasone, celecoxib and fluoxetine.

Long-term accumulative exposures to fluoride even at low levels carries a risk of sub-clinical or stage-1 musculo-skeletal fluorosis presenting as joint pain or arthritis.⁵ Notably, arthritis is a leading cause of disability with 647,000 now affected in this country and annual costs exceeding \$3 billion.⁶ Chronic pain was also reported in a New Zealand community study with the most common pain locations being lower back (59%), pelvis/abdomen (49%), joints (39%), neck (34%), muscle (31%) and headache (31%).⁷ It would thus be logical to include possible fluorosis in the differential diagnosis of these patients with at least urine fluoride assessments. Notably, this woman's serum fluoride level was considerably higher than that of women in her age group living in a low fluoride area, with a mean serum level of 0.56µmol/l and 0.948µmol/l being the highest recorded with impaired renal function.⁸

Prescriptions for arthritis are among the highest on Pharmac lists with similar health problems being recorded in the Republic of Ireland, the heaviest tea-drinking nation and with long-term nationwide fluoridation. Notably, excessive tea consumption can cause skeletal fluorosis² as can toothpaste.³ The accumulating evidence could suggest that the population is potentially being overdosed with fluoride and certainly exposed to far more than the initial well-intentioned dental hypothesis of 1mg/day for caries prevention proposed in the US 70 years ago.

The findings in this case would indicate that further primary health investigations are warranted and for those interested, Dr Susheela, a leading fluoride researcher, gives a useful diagnostic protocol.⁹ Notably, the evidence presented here is but a fraction of the available peer-reviewed literature, demonstrating the potential for harm from this element as reviewed by Peckham and Awofeso.¹⁰

Competing interests:

Nil.

Author information:

Michael Godfrey, Retired GP, Tauranga.

Corresponding author:

Michael Godfrey, Retired GP, Tauranga.

mike@godfreymedical.nz

URL:

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