ORIGINAL ARTICLE

Dental fluorosis in the Cape Verde Islands: prevalence of clinical findings in an isolated island population

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ABSTRACT

Introduction

In October of 2005 the authors traveled to the Cape Verde Islands as part of a humanitarian group supported by *Healing the Children Northeast Inc*, in order to provide basic dental care to the relatively isolated island population of Brava, the smallest island of the Cape Verde Archipelago.

Aim of the study

Aim of this study is to present the clinical findings of the dental screening control in the isolated population of Brava island.

Methods

A total of 174 patients were screened, and it was determined, based upon clinical findings, that 73 (41.95%) of these patients demonstrated some degree of enamel mottling of the dentition. As this was a serendipitous and unexpected clinical finding in this patient population, samples of potable tap and/or drinking water from the island of Brava were obtained and transported to the United States for analysis as to fluoride concentration.

Results

The water samples demonstrated a fluoride concentration of 1.4 ppm, indicative of a high natural concentration of natural fluoride in the water samples obtained.

Conclusions

As such, this demonstrates a unique case of natural fluoride-induced enamel hypoplasia (dental fluorosis) in an isolated island population. As an initial descriptive study of this clinical finding in this isolated island population, this should serve as a basis for further study of the effects of high natural concentrations of fluoride on the island of Brava.

Keywords: *adenovirus, vector, green fluorescent protein, stereotaxy*

INTRODUCTION

Fluoride is of interest because of its toxic properties and its effect on dental enamel and bone. As natural fluoride is widely distributed in nature, the soils of different regions of the world vary greatly in their fluoride content, with higher fluoride concentrations being found in groundwater due to the presence of fluoride bearing minerals.[1] While fluoride can be absorbed from the gastrointestinal tract, via the pulmonary tree, or via the skin, the major site of absorption is via the gastrointestinal tract. As such, ingested fluoride acts locally on the intestinal mucosa, and can form hydrofluoric acid in the stomach, leading to gastrointestinal irritation and corrosive effects. As a result, signs and symptoms of acute fluoride toxicity by ingestion can occur within minutes of exposure.[2] Although fluoride can be detected in all organs and tissues, including the thyroid, aorta, and kidneys, fluoride is preponderantly deposited in the skeleton and teeth, and the degree of skeletal storage is related to intake and age. Following absorption, fluoride ions are promptly deposited in the skeleton and teeth where they become incorporated into the crystal lattice of hydroxyapatite, substituting for hydroxyl ions.

With regard to fluoride toxicity, this can be classified as acute or chronic. Fluorine and fluorides are cellular poisons which block the glycolytic degradation of glucose, and fluorides also can form an insoluble precipitate with calcium which causes hypocalcemia, with ingestion of 1 to 2 gm of sodium fluoride being potentially fatal. Acute fluoride toxicity usually results from accidental ingestion of insecticides or rodenticides which contain fluoride salts. In addition, one recent comprehensive review describes the biochemical and physiologic mechanisms involved with aluminum-fluoride complexes, and its effect on the development of fluorosis.[3]

In chronic fluoride toxicity, the major manifestation of chronic ingestion of excess amounts of fluoride can result in significant enamel defects known as **dental fluorosis**. Additionally, chronic fluoride toxicity can be characterized by osteosclerosis, weight loss, anemia, and joint pain. The bony changes demonstrated may include exostoses of the spine and genu valgum, and are usually seen only after prolonged high intake in adults. In its severest form chronic fluoride toxicity is a disabling disease, and has been referred to as *crippling fluorosis*.

The well-recognized and historically documented example of chemically induced **enamel hypoplasia** refers to the effects of chronic fluoride toxicity on the dentition, and although total fluoride intake will vary with total water consumption, fluoride-induced enamel hypoplasia, also referred to as **fluoride mottling**, is usually inconspicuous at levels below 1.0 ppm in the drinking water. Indeed, mottling of the enamel is one of the first visible clinical signs of an excessive intake of fluoride during childhood.

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