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FLUORIDE NEGATIVE IMPACT ON HUMAN HEALTH

Abstract
Fluoride inhibits demineralization and promotes remineralization in enamel. Acid resistant fluorapatite, fluorhydroxyapatite, calcium-fluoride formations are seen after systemic or topical fluoride applications. Water, salt and milk fluoridation, tablets, drops are used for systemic; toothpastes, rinses, varnish, gels are used for topical administration. Dental and skeletal fluorosis can be seen in chronic toxicity. Skeletal deformation, growth retardation occurs with bone accumulation and accumulation and adverse effects may occur in soft tissues like liver, kidney, brain and cerebellum. Neurodegenerative changes in the central nervous system has been shown in animal studies. Studies that associated high fluoride consumption and low Intelligence Quotient (IQ) levels were performed in countries like India, China with high fluoride in natural drinking water where the deficiencies in evaluating other factors in these studies doubt their reliability. Blood values and, therefore the differences in the accumulation in tissues after systemic and topical fluoride applications were taken into account while the overall effect of fluoride on human health are discussed.

Keywords: *fluoride, fluorosis, acute toxicity, chronic toxicity, intelligence*

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Flüorun insan sağlamlığına mənfi təsiri

Xülasə

Flüor demineralizasiyaya maneə törədir və minada remineralizasiyanı təşviq edir. Ftoridlərin sistemli və ya yerli tətbiqindən sonra turşuya davamlı flüorapatit, flüorhidroksiapatit, kalsium-flüorid birləşmələri müşahidə olunur. Ftoridlərin sistemli tətbiqi üçün su, duz və süd fluoridasiyası, tabletlər, damcılar istifadə olunur; diş pastaları, durulamalar, laklar, jellər yerli tətbiq üçün istifadə olunur. Flüorid əsas fəaliyyətini yerli tətbiqdən sonra tüpürcək və lövhədə aşağı səviyyədə aşkar edildikdə göstərir. Skelet deformasiyası, böyümə geriliyi sümüklərin yığılması ilə baş verir və qaraciyər, böyrək, beyin və beyincik kimi yumşaq toxumalarda mənfi təsirlər meydana gələ bilər. Heyvanlar üzərində aparılan tədqiqatlarda mərkəzi sinir sistemində neyrodegenerativ dəyişikliklər göstərilmişdir. Flüorun insan sağlamlığına ümumi təsiri müzakirə edilərkən qan dəyərləri və buna görə də sistemli və topikal flüorid tətbiqindən sonra toxumalarda yığılmadakı fərqlər nəzərə alınmışdır.

Açar sözlər: flüorid, flüoroz, kəskin toksiklik, xroniki toksiklik

Introduction

Today, initial caries lesions with protective applications instead of operative procedures control is preferred as a form of treatment is being done. It is used for protective applications the most important of these agents is fluorine (Dentistry, 2013: 165-168). Various fluorine applications by reducing enamel demineralization it acts by increasing remineralization. Some of the application methods of fluorine; social fluoridation of waters acting as toothpaste, mouthwash and with high fluorine content that can be applied professionally varnishes and gels (Skold-Larsson, Modeer, Twetman, 2000: 31-34).

Fluorine applications done "topical" or "systemically". However, this careful consideration of the activity mechanism of fluorine in classification should be evaluated because fluorinated water although consumption is thought to have a systemic effect, first on erupted teeth during swallowing produces a topical effect. From a different perspective tooth, which is thought to have a topical effect during the use of paste or similar agents ingestion may cause systemic effects (Tenuta, Cury, 2010: 9-17). The purpose of this review is to examine the fluorine applications, which have an important place in human health nevaluation of the negative effects.

Systemic fluoride during amelogenesis or after applying topical fluoride to immature enamel all of the hydroxylapatite crystals hydroxyl groups are replaced by fluorine to form florapatite (Hicks, Garcia-Godoy, Flaitz, 2004: 203-214).

$[Ca_{10}(PO_4)_6(F,OH)_2]$ may occur. However, in nature, fluorohydroxylapatite $[Ca_{10}(PO_4)_6(F,OH)_2]$ is usually formed by replacing some of the hydroxyl groups with fluorine. Formation of fluoroapatite and fluorohydroxylapatite it reduces stress and increases dissolution resistance in crystalline acid attacks (Hicks, Garcia-Godoy, Flaitz, 2004: 119-124; Limeback, 1999: 62-71). During the mineralization of the enamels of children exposed to flora prenatally, with the addition of fluorine, more homogeneous appearance in their dental enamel, dense crystal numbers in the interprismatic regions, larger prism sizes, higher mineral density, higher crystal structure, more fluorine and less carbonate content (Hellwig, Lennon, 2004: 258-262).

Systemic addition of fluorine to the diet also occurs by fluoridation of salts. Consumption amount of fluorine in use through salt shows individual differences. About 1-4 grams per day. Considering the consumption of fluorinated salt in the form of table salt, the fact that the salt contains fluorine at a dosage of 250 mg F/kg may cause dental fluorosis. Macpherson and Stephen (Yeung, 2008: 39-43), in their study investigating the fluorine concentrations in saliva after consumption of different foods prepared with fluorinated salt in adults, reported that there was a significant increase in salivary fluorine level 5 minutes after consumption of most foods, and this increased value returned to the initial stage in 20 minutes. As a result, with frequent intake of fluorinated foods it is considered possible to achieve levels of fluorine that may help maintain the potential karyostatic effect. In a recent study conducted in a region where fluoridated water was consumed (1.06 ppm), it was shown that saliva fluorine level increased significantly immediately after the use of fluorinated salt, and this increased level continued for 30 minutes. Fluorine in the water is effective in increasing salivary fluorine levels, but the supportive

effect of fluorinated salt is also clearly seen (Hedman, Sjoman, Sjostrom, Twetman, 2006: 158-162). After consumption of foods prepared with fluoridated salt, salivary fluorine levels show similar results to mouth rinsing with fluoridated milk, but are clearly lower compared to the use of topical fluoride agents such as fluoridated mouthwash, varnishes and toothpaste. It is advocated to recommend fluorine supplements to be consumed in the diet only in cases of fluoride deficiency (less than 0.3 ppm between 6 months and 3 years old and less than 0.6 ppm between 3 and 16 years old) and children with high caries risk, only in regions where there is not enough fluoride in drinking water (Alkhatib, Holt, Bedi, 2005: 32-36). Topical fluorine materials have been used clinically for about 35 years. Although it was previously reported that topical fluoride was effective in preventing the formation of dental caries, in the last ten years, it has been understood that topical fluorine provides remineralization, thus healing, not only in the formation of lesions, but also in initial enamel lesions (Macpherson, Stephen, 2001: 983-988; Petersson, Arvidsson, Lynch, Engstrom, Twetman, 2002: 40-43). Fluorine shows its main effect after eruption, especially when it is present in low amounts in dental plaque and saliva (Rozier, Adair, Graham, 2010: 80-89). In cases with high caries risk, risk control can be achieved as a result of frequent use of topical fluoride (Whitford, 1992: 49-54). The effectiveness of topical fluorine agents depends on the fluorine level in saliva after administration. Factors affecting the fluoride level in saliva; of the agent, the amount of which has passed since the application time and method of application (Opydo-Szymaczek, Opydo, 2010: 155-167). Fluorhydroxylapatite, one of the dissolution products of hydroxylapatite, together with low levels of fluorine in the oral environment when low levels of fluorine ions are applied with mouthwashes or toothpastes or florapatite is formed. Calcium fluoride acts as a reservoir for both calcium and fluorine and releases these ions during acid attacks.

It inhibits the dissolution of hydroxylapatite and promotes the formation of fluorohydroxylapatite (Wang, Wang, 2007: 43-47; Shulman, Wells, 1997: 150-158) Topical fluoride applications strengthen existing teeth in the mouth and show effectiveness in the post-emergence phase.

In vitro studies have shown that significant protective effects against caries are detected when the fluoride increase in saliva and plaque exceeds 0.3 ppm. (Newbrun, 1986: 199-218). The degree of fluorine retention in saliva is proportional to the amount and concentration of material used. Although fluorine retention rates in saliva and absorption into enamel and storage are not necessarily equal, data obtained from studies provide predictions about protective efficacy.

Similar to toothpaste content concentration (1000 ppm) fluorine mouthwash is used, the fluorine level in the saliva continues for a longer time (approximately 5 hours). A longer-term increase in the level of fluoride detected in saliva is associated with a greater effect on the mouth after fluoride mouthwash, as opposed to brushing attributed to the fact that it was not rinsed with water (Trivedi, Verma, Chinoy, Patel, Sathawara, 2007: 178-183).

When the fluorine gel is evaluated in terms of concentrated acid content or whether it is neutral or not, the fluorine level in the saliva (1.16 ppm) 7 hours after the use of the acidified gel (12,300 ppm APF) is compared to the fluorine level in the saliva (0.18 ppm) after the neutral sodium fluoride (22,000 ppm NaF) gel. is higher (Heath, Singh, Logan, McIntyre, 2001: 24-31).

Rinsing with a rinse solution prepared with toothpaste and water showed a greater effect than brushing with toothpaste. Therefore, rinsing the mouth with such a mixture suggests that it would be a good alternative for adults who need additional fluoride application, but it should be noted that in this application, the plaque removal effect provided by toothpaste is lacking (Seppa, Salmenkivi, Hausen: 84-87). Different in different fluorine varnishes patterns were observed and it was reported that one of the factors causing these differences was the viscosity of the varnish. Flora in the evening when it is administered, longer-term fluorine retention is provided in the saliva due to the decrease in salivary flow rate (Baez, Baez, Marthaler, 2000: 242-248).

Daily use of fluorine is important in protecting against dental caries. Fluorine also stimulates mitogenicity on osteoblasts and can increase mineral precipitation in bone, but on the other hand, fluoride when it rises above the threshold concentration, it has a toxic effect (Bjornstrom, Naji, Simic, Sjostrom, Twetman, 2004: 41-45). Gastrointestinal symptoms occur as a result of 3-5 mg/kg fluoride intake at one time. Acute fluoride toxicity is a rare condition characterized by abdominal pain, vomiting, diarrhea, hypersalivation, hypocalcemia, muscle spasms and fainting. There is no

specific treatment other than the administration of Ca, Mg or Al salts (Trautner, Siebert, 1986: 223-228). In one study, small amounts of fluoride, especially in young children (under 6 years of age) it has been shown that a possible toxic dose can be reached as a result of swallowing household products containing large amounts (Mellberg, Ripa, 1983: 290).

Fluoride intake that is slightly higher than the optimal dose but over a long period of time produces a picture of chronic fluoride toxicity. High concentrations and continuous use of fluoride in the developmental period may cause chronic fluorine toxicity, such as dental fluorosis and, in advanced cases, skeletal fluorosis (Kundu, Basavaraj, Singla, Gupta, Singh, Jain, 2015: 116-121). Fluorine it accumulates in the bone, thus reducing calcium intake and affecting growth. Therefore, pictures such as osteosclerosis, skeletal deformation and growth retardation may occur (Kim, Hayes, Williams, 2011: 1171-1176. 99% of the fluorine in the body is found in the skeletal system, and therefore, the fluorine levels in the bone play a decisive role for chronic flora exposure (Borysewicz-Lewicka, Opydo-Szymaczek, Opydo, 2007: 114-120). Dental fluorosis, since the preertive enamel maturation of permanent teeth is completed at the age of 8, except for the third molars. The risk is limited to 8 years of age (Evans, Darvell, 1995: 238-249). Incisional region, especially with aesthetic concern for teeth, this age is 15-24 months for boys and 21-30 months for girls (Shulman, Wells, 1997: 150-158).

Conclusion

Systemically ingested fluoride is excreted by the kidney. For this reason, the measurement of the fluorine level in the urine is used to determine the level and degree of exposure to the flora. The daily urinary fluoride excretion of children aged 4-6 years living in regions with optimal fluoride levels (0.8-1 ppm) is around 0.4 mg. The mean fluoride level in the urine of children living in the region with high fluorine level (5.55 ppm) was found to be significantly higher than in the region with low fluorine level (2.01 ppm), so there is an increase in the urine with the increase in the amount of fluoride consumed. In addition to the fluorine in the urine, the increase in the blood plasma level is also used to evaluate the effects of systemic fluorine. As a result of the evaluation of plasma fluoride levels after the use of fluorinated milk and water, it has been reported that although the initial absorption in milk causes a slower increase, plasma fluoride levels increase for a longer time due to the cumulative effect over time. The reason for the lower biouse potential of fluorinated milk, which is monitored in this way, is attributed to the retention of fluorine by coagulated milk proteins.

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