

Overview of Dental Fluorosis in Children

Karimi M*

Department of Pediatrics Dentistry, Sepideh Dental Clinic, Iran

***Corresponding Author:** Karimi M, Department of Pediatrics Dentistry, Sepideh Dental Clinic, Iran.

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Fluoride is an extraordinary supplement to protect the enamel and prevent teeth decay, but the over-dose usage of fluoride does not often end up in a good result. Children whose teeth have been exposed to fluoride for the first time in their first eight years of life are more likely to develop dental fluorosis. Although most fluorosis is mild and does not require treatment, the color changes caused by excessive fluoride are sometimes severe and even results in perforation of the enamel which compels parents to take the action for the sake of their children's dental esthetic and treatments. In spite of fluorosis can be prevented by having adequate knowledge of the fluoride sources and knowing how to manage this issue, parental precaution is the key to prevent dental fluorosis.

What is fluorosis?

Fluorosis develops when over fluoride intake occurs in which are accompanied by whitish (in mild cases) or brownish spots (in severe cases) of the teeth [1]. The severity of the complication varies from minor color changes to abnormalities on the tooth surfaces. The severity of dental fluorosis depends on the time and duration of the overexposure to fluoride, child's weight, the body response, physical activities, nutritional factors and bone growth [2]. Other factors that may prone the children to dental fluorosis are altitude [3], malnutrition and poor diet [4] and renal insufficiency [5].

One of the greatest concerns in dental fluorosis is the esthetics changes in permanent dentition which have seen in children who are excessively exposed to fluoride between 15 and 30 months of age [6,7]. It should be pointed out that the age between 1 and 4 years old is the most critical period to observe the fluoride overexposure [8] due to swallowing the toothpaste or overuse of the supplement contained fluoride; fortunately, children above age of 8 would not be at risk of dental fluorosis [9,10].

Fluorosis does not usually occur after teeth eruptions. Primary dentine fluorosis and enamel fluorosis can only happen during tooth formation, so fluoride exposure occurs in childhood [11]. The presence of these white spots alter the esthetic of the teeth, but is not considered a disease, and is often so mild that only an expert dentist can detect it.

Most cases of fluorosis are seen in children who have been over-consuming with fluoride supplementation, or during the brushing have swallowed some of the toothpaste.

Signs

Enamel may appear yellow to brown discoloration with pitted white-brown lesions that look like cavities. They are often defined as "mottled teeth" [12]. No significant changes in the teeth with mild fluorosis are seen, and only the dentist can notice this complication. Mild to moderate fluorosis causes the formation of stains, veins or white lines on the tooth. The teeth are perforated by intense fluorosis, and brown, black or gray spots are formed on them [13-15]. The enamel shape is also unnatural. In more severe cases, the teeth appearance may include stains ranging from yellow to dark brown, surface irregularities, and noticeable pits [13-15] that are difficult to clean. The Spots caused by fluorosis is permanent and becomes darker over time.

Diagnosis

The dentist asks about the fluoride intake of the child so to be sure the discoloration of the teeth is related to the fluorosis or not. He also asks the parent to explain whether the child has had current or previous illness or disabilities that might have affected and caused the damage to the teeth. The dentist examines the teeth and gums of the child and orders the radiograph to ensure that there is no tooth decay or other dental problems.

Some of the symptoms are also similar to the fluorosis symptoms in the appearance. The problems and defects of the skull or facial bones can cause damage to the enamel or dentin. In addition, a high fever or a trauma to the tooth, such as falling down in the infancy or early childhood, also leads to a change in the color of the tooth. The possibility of dental caries is also can be another factor to tooth discoloration; hence, any dental color changes should be checked by a specialist dentist.

Prevention

Adding fluoride to drinking water is one of the most effective preventative measures that have been implemented since the twentieth century [16,17]. Children should only take fluoride supplements when drinking water containing fluoride is not sufficient, and they are susceptible to teeth decays. So, it is advisable first to check if there is a fluoride drinking water, and then ask the dentist about the need for fluoride supplementation.

If the parents have a child under the age of six, it's best to put a small amount of toothpaste (less than a size of a pea) on his toothbrush and ask him to spit out the toothpaste after brushing and do not swallow that. Parents should not use flavored toothpaste, as the child may want to swallow it. They also should keep all fluoride-containing products including tubes of toothpaste and mouthwashes, out of the reach of children.

It is noteworthy that some foods and beverages, such as fruit juices, have the same concentration of fluoride as we see in drinking water. Furthermore, some mineral waters also have fluoride additives. So, parents should consider all fluoride absorption sources.

Treatment

This is a question that many parents may ask. What to do if there are white spots on the child's teeth, despite the prevention? Is there a good way to get rid of these ugly spots?

Parents remember that fluorosis only changes the appearance of the tooth and does not cause caries [18]. For this reason, most fluorosis treatments are used to cover white spots on the tooth.

Most of the fluorosis is mild and does not require any treatment. Spots sometimes only appear on the posterior teeth and cannot be seen. The appearance of teeth affected by moderate to severe fluorosis can be significantly improved by a variety of techniques. Most of them are aimed at masking the stains. The more intense fluorosis in the front teeth should be treated by removing the stains by methods such as bleaching [19-21], using MI paste with Microabrasion technique [22], covering with composites [23,24], crowns [20], or even veneers.

Composite bonding

Composite bonding is a popular method for correcting the smile pattern that fluorosis has negatively influenced its esthetic. This method is suitable for moderate to severe color changes. First, the affected area of the teeth is somewhat roughened and then covered with hard resin, which forms a strong bond with the tooth enamel; and covers the white dots of the tooth.

Although composites compare to the bleaching and micro abrasion kits are more appropriate and cover the white spots much better, they are strongly not recommended to use to hide the extended abrasion area and the big holes. In addition, the teeth treated with composite are susceptible to staining [25,26]. However, bonding is appropriate because it has less aggressive features in children at the age of primary school, who have not lost all of their primary teeth.

Porcelain veneer

A porcelain veneer is a good alternative to composite bonding [27]. The dentist covers the affected tooth surface with a veneer which is made up of ceramic layers. It is a highly durable solution for intense fluorosis, especially when the permanent teeth of the child have erupted.

If the discoloration is severe, and the enamel is perforated, Veneer will be the suitable one, since only a small portion of the tooth structure will be prepared. Therefore, if parents are worried about the loss of enamel in bonding, they should better to permit to do this.

Tooth whitening

This procedure is used to remove surface stains; note that bleaching teeth may temporarily worsen the appearance of fluorosis. The use of bleaching tapes, home bleaching kits, or even micro abrasion kits are sufficient for mild to moderate fluorosis therapy, but severe cases require wider treatment. Since there is no specific method for treating all fluorosis, parents have to be sure to consult with dentists before starting the treatment.

It should be noted that the tooth bleaching for children and adolescents is also a concern for both dentists and parents, and the safety always should be considered. Side effects of bleaching teeth have been documented. It is noteworthy that most of the research on bleaching has been performed on adult patients meanwhile the small numbers of published bleaching researches have used children as participant for their researches [28-32].

The more common side effects associated with bleaching teeth are tooth sensitivity and tissue irritation in both primary and permanent teeth. When bleaching products are used excessively by teens and young adults, it is a particular concern that overtreatment bleaching can cause harm to the tooth structures of these groups [33-35].

MI paste

It is a calcium phosphate product that is sometimes combined with methods like microabrasion to minimize tooth discoloration [36]. The porous area is needed to be pre-treated before applying the MI Paste. This pre-treatment involves using acid etching and microabrasion.

Mild fluorosis has a white appearance because there is altered mineralization at that site. If the best result is considered, the surface preparation of tooth structure is necessary. Preparation the surface with an etchant gel makes the superficial enamel more porous so that allows the ions to penetrate the subsurface region.

In order to obtain the best result, MI Paste should be applied daily before sleeping and should be remained in place overnight [37]. Moreover, it should cover all tooth surfaces and leave to dissipate without rinsing [37]. MI Paste works well in combination with fluoride [38-40]. The longer MI Paste is retained on the tooth surface, the better the result can be observed. This very effective technique is safe and ingestible. It has been classified by the FDA as generally recognized as safe. This means it is safe to swallow and can be used in patients of all ages [41-43].

Crown

Due to the size of the primary maxillary incisors, it is necessary to be restored with considering the retention, esthetic and resistance to fracture and wear. Consequently, these teeth are difficult to treat. Needless to say, most pediatric dentists do not agree with the treatment of fluorosis with covering the teeth with a crown. But, sometimes there are no other choices, and fabrication of a crown is the only treatment plan which can be achieved.

There are different types of crowns are used for aesthetic purposes in children which are included as the following [44]:

1. Resin veneered stainless steel crown
2. Facial cut out crown
3. Polycarbonate crown
4. Pedo pearls
5. Strip crowns
6. Pedo jacket crowns
7. New millennium crowns
8. ART glass crowns.

The last point

The presence of white spots on teeth is not considered a disease. Fluorosis does not lead to decay or other dental problems. Spots on the tooth surface can be treated with whitening of the tooth, veneer, or other special treatment for covering the tooth discoloration. Excess intake or exposure to any substances can be harmful. Fluoride is no exception; hence, it is advisable parents do not use any fluoride supplements without first speaking to a dentist.

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