# Increasing the Acid Resistance against Dental Erosion through Fluoride Therapy

S.Abirami, Dr.J.Sivabalan

*Research scholar, Assistant Professor,*
*Department of Chemistry,*
*Mother Teresa Women's University, Kodaikanal, India*

***Abstract*** — The dental erosion is the common problem of human beings around the world. It is caused due to the direct and indirect use of acid the result is the cause of erosion of enamel of tooth. It occurs due to the chemical reaction of the enamel with intrinsic and extrinsic non-bacterial acid. The enamel is the protective coating of the tooth which protects the sensitiveness of the tooth. When the enamel is erased gradually the sensitivity and pain will occurs. By increasing the acid resistance we can avoid this erosion problem. This paper proposes the fluoride therapy to increase the acidic resistance of tooth.

***Keywords***— Dental erosion, Acid water, fluoride therapy.

## I.INTRODUCTION

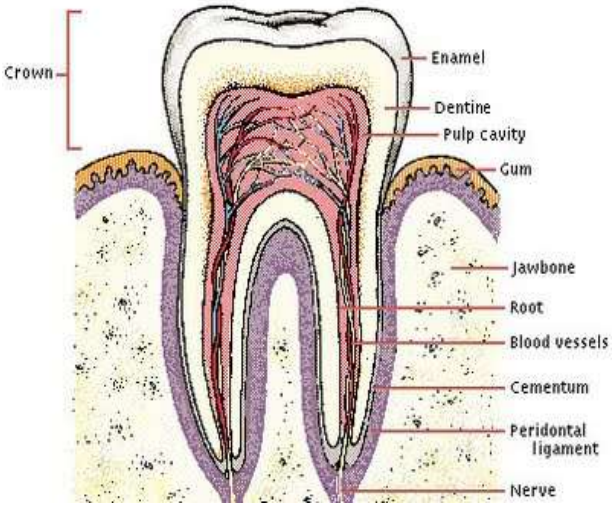
Generally the 70% of water available in Indonesian country has sodium content. Because of the content of the sodium, the acidity of the water is increased. Now days the dental erosion is increased worldwide. Due to the level of PH in the water the water get the acidity. By using the acid directly or indirectly the erosion will occurs. The enamel is the protective coatings of the tooth from pain and sensitivity, the acid react with the enamel and it become erosive.

The fluoride is the commonly used chemical in dental field; it is taken from the water soil and some natural elements. The fluoride provides remineralize to the tooth enamels and reconstruct the enamels. Generally our tooth is made up of three layer, the first layer is enamel which forms on the dentine layer. Dentine has poor sensitivity than enamel; the thickness of the enamel will shrinks because of the acid erosion. The fluoride helps to strengthen the enamel of tooth. The remaining section of this paper describes the structure and functions of teeth, acid water and operation of fluoride.

## II. STRUCTURE OF TEETH AND ITS FUNCTIONS

The teeth for the humans are playing an important role in our life, which helps to chew our food, digest our food and to speak. The human teeth is made up of several layers enamel, dentine, pulp cavity these are all collectively called crown which is attached on the gum. Generally human has two set of teeth on is primary teeth which is n the baby stage and secondary teeth which is permanent. Enamel is the first layer which covers the crown and it is made up of calcium and phosphorous it protects our tooth from decay.

Fig.1Human Tooth Structure



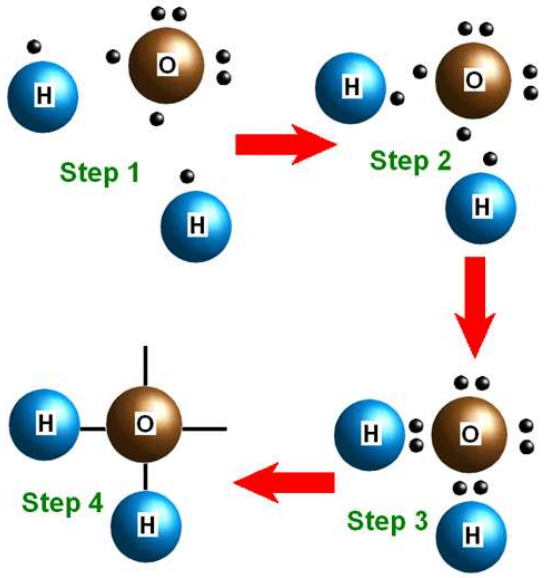

Dentine which lies below the enamel which looks like a bone, but it is somewhat less hard than enamel. Clementum covers the root of the tooth and anchor with the bone; it is very softer than enamel and dentine. To protect this softer layer from cavity by taking good care about gum. Pulp appears at the center of the teeth which consist of blood vessels and nerves. The enamel is made up of both the organic

and inorganic components the chemical formula is $Ca_{10}(PO_4)_6 \cdot 2(OH)$.

## III. ACID WATER

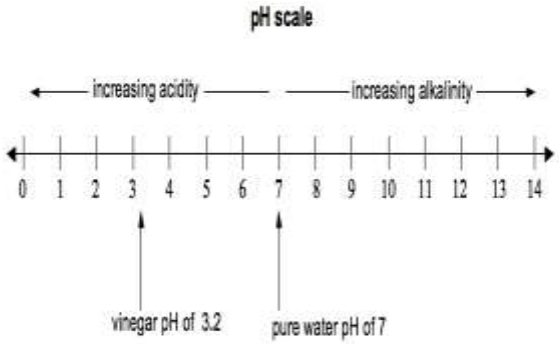
The chemical formula for the water is $H_2o$, which is made up of two hydrogen atoms and one oxygen atom that shares their electrons. The acidity of the water is measured by the PH scale.

Fig.2 $H_2o$




If the level of ph is less than 7 in water the water has acid properties, if the ph level is 7 the water is in purest form or if it is in more than 7 water goes to alkalinity. The figure shows the PH measurement scale

Fig.3 PH level scale




## IV. DENTAL EROSION

Dental erosion is otherwise called as acid erosion. It is the cause of intrinsic and extrinsic acid on the enamel and dentine of the teeth. By consuming acidic food causes the dental erosion and will creates pain and sensitivity. Fruit juice, sport drink and soda are the essential for creating the dental erosion because the PH level is very low in these types of drinks. To prevent the dental erosion, must stop the low ph foods. The dissolution of hydroxyapetite acid on the enamel creates the dental erosion. The symptoms for the tooth enamel erosion is as follows

- Yellowed teeth from thinned enamel
- Smooth, shiny surfaces on the teeth -- enamel erosion causes mineral loss on these areas.
- Cupping, or dents, that show up on the biting or chewing surfaces of the teeth
- Rough or irregular edges on the teeth, which can become cracked or chipped when enamel is lost
- Sensitive teeth or tooth pain when eating hot, cold, or sweet foods or drinks

Extrinsic acids such as the drinks that have low ph level are coke, Pepsi, sprite and other low ph beverages will affect the enamel. Many solid and semisolid drinks are acidic in nature. When the acidic content enters in to the mouth the salivary gland will accelerate the saliva flow to clear the acidic contents on the enamel. The guidelines to protect the dental erosion are as follows

- Reduce acidic foods and drinks
- Don't hold the acidic drinks in your mouth
- After taking acidic food rinse your mouth with water which helps to neutralize the acidic content on your enamel
- Chew sugar free gums after eating which helps to accelerate the saliva flow
- Don't brush after taking acidic food.
- Brush your teeth twice a day gently with fluoride paste
- Avoid dehydration and rehydration quickly during recovery.

## V. FLUORIDE THERAPY

Fluoride therapy is a method of delivering the fluoride to the teeth enamel surface in order to reduce the erosion of enamel. The erosion is occurs due to demineralization of teeth. Fluoride is on kind of mineral those naturally present in the foods, while eating food the teeth are mineralized using the mineral content of the foods and dematerialized while eating or drinking acidic content directly or indirectly. The demineralization and remineralization

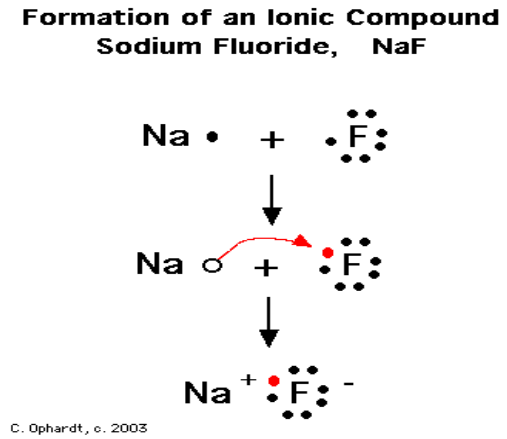
process occurs automatically. The minerals such as calcium fluoride and phosphate are remineralizing our tooth; the too much demineralization without less remineralization causes the dental erosion. The fluoride helps to prevent the dental erosion by providing resistance against acid and also fluoride helps to accelerate the remineralization of your teeth. The remineralize reaction of fluoride ion are as follows

1. Apatite dissolution with CaF2 formation: $Ca_{10}(PO_4)_6(OH)_2 + 20F^- \rightarrow 10\ CaF_2 + 6PO_4^{3-} + 2OH^-$
2. Crystal growth of fluorapatite from a supersaturated solution: $10\ Ca^{2+} + 6PO_4^{3-} + 2F^- \rightarrow Ca_{10}(PO_4)_6F_2$
3. Iso-ionic exchange of $F^-$ for $OH^-$ in apatite: $Ca_{10}(PO_4)_6(OH)_2 + 2F^- \rightarrow Ca_{10}(PO_4)_6F_2 + 2OH^-$

There is some methods to supply the fluoride to our teeth are as follows

- Water Fluoride
- Toothpaste
- Mouth rinses
- Gels/foam
- Varnish
- Dietary supplements

Fig.3 Formation of Sodium Fluoride




## VI. CONCLUSION

The tooth erosion is commonly occurs for all the humans because of the too mineralization. The fluoride therapy plays a vital role in dental field to protect and prevent our tooth against the dental erosion. The fluoride therapy has some advantages such as prevents tooth decay, increase the acid resistance, improve the strength of tooth enamel, reduce and eliminates the dental sensitivity, accelerate the remineralization etc.,. The fluoridation is not accepted as a result for dental erosion by all around the world. The future work is to make more and more experiments to increase the acceptance of fluoride therapy worldwide.

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