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Change in Texture of Enamel when Subjected to Arabica Coffee

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Abstract---

Aim: *To determine the change in texture of enamel of the freshly extracted teeth when subjected to Arabica coffee.* ***Materials and Method:*** *Six recently extracted teeth with no carious or pathologic lesion from patients undergoing orthodontic treatment whose first premolars are needed to be extracted due to crowding, are soaked in saline solution, will be used for this study. A random tooth will be utilized for the study of any texture analyzing the morphology of a tooth using SEM (Scanning Electron Microscopy).* ***Result:*** *After soaking the six specimens to Arabica coffee, the researchers observed each tooth clinically. Out of six specimens, five of them had changed in texture of enamel. This data proves that the acidity of the said coffee really affects the surface of the tooth. The researchers also observed that the root portion of the tooth had more roughened than the crown portion. The researchers proved that coffee can roughen the tooth surface with the help of Scanning Electron Microscopy (SEM) which they have used to view it microscopically.*

Keywords--- *Arabica Coffee, Irregularity, Plaque, Enamel.*

I. INTRODUCTION

Coffee is one of the most important beverage crops in the world; it is grown in over 80 countries in the tropical and subtropical regions. Approximately 100 species of the genus Coffee L. (Rubiaceae) are recognized. The most commercially important of these are C. Arabica L., also known as Arabica coffee and etc. Arabica coffee is a type of coffee made up from the beans of the Coffea arabica plant. Arabica originated in the southwestern highlands of Ethiopia and is the most popular kind of coffee worldwide, making up 60% or more of coffee production in the world (Dena Haines, 2019).

The mouth is the only normally-accessible site in the body that has hard non-shedding surfaces for microbial colonization. Each tooth, divided in to crown and root, and is composed of four tissues — pulp, dentine, cementum and enamel. Enamel, the hard protective substance that covers the crown of the tooth, is the hardest biological tissue in the body. It consequently is able to resist fractures during the stress of mastication. Enamel provides shape and contour to the crown of teeth and covers the part of the tooth that is exposed to the oral environment (Avery, 2000).

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II. LITERATURE REVIEW

Chemically, enamel is a highly mineralized crystalline structure. Hydroxyapatite in the form of crystalline lattice, is the largest mineral constituent (90%-92% by volume). The remaining constituents of tooth enamel include organic matrix proteins (1%-2%), and water (4%-12%) volume (Heymann, Swift Jr., Ritter, 2012).

Hardness can vary over the external tooth surface according to the location; also, it decreases inwardly, with hardness lowest at the dentino-enamel junction (DEJ). The density of the enamel also decreases from the surface to the DEJ. Enamel is a rigid structure that is both strong and brittle, which essentially increases the fracture toughness of the more superficial enamel (Heymann, Swift Jr., Ritter, 2012).

According to Moran (2009), erosion of teeth through acidic solutions, like coffee, is a common problem and can cause loss of tooth substance, sensitive teeth and adverse appearance. Studies have shown that the most important factor in erosion is the frequency of intake of the fluids causing erosion. Any drink with a pH of less than 7 (neutral), can result in acidic attack of the substance of tooth structure. The more acidic the fluid is, then, the more aggressive the action. The mechanism is to dissolve the mineral components of teeth.

III. METHODOLOGY / MATERIALS

Six recently extracted teeth with no carious or pathologic lesion from patients undergoing orthodontic treatment whose first premolars are needed to be extracted due to crowding, are soaked in saline solution, will be used for this study. The researchers will prepare six beakers (100 mL) with a single shot 20 mL of Arabica coffee. The researchers will immerse the freshly extracted teeth to the coffee for 3 minutes per day within seven days. A random tooth will be utilized for the study of any texture analyzing the morphology of a tooth using SEM (Scanning Electron Microscopy).

IV. RESULTS AND FINDINGS

Beaker	Texture
Beaker A	Roughened
Beaker B	Roughened
Beaker C	Slightly changed
Beaker D	Roughened
Beaker E	Roughened
Beaker F	Roughened

V. CONCLUSION

After soaking the six specimens to Arabica coffee, the researchers observed each tooth clinically. Out of six specimens, five of them had changed in texture of enamel. This data proves that the acidity of the said coffee really affects the surface of the tooth. The researchers also observed that the root portion of the tooth had more roughened than the crown portion. The researchers proved that coffee can roughen the tooth surface with the help of Scanning Electron Microscopy (SEM) which they have used to view it microscopically.

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