preventive effect of theobromine on enamel tooth surface

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Dental caries is a chronic irreversible infection that has been considered the most prevalent oral disease among children. It affects a large portion of the world's population by damaging the mineralized dental structures through a dynamic, multifactorial process. High sugar ingestion, poor oral hygiene, and enamel anomaly were the main predisposing factors responsible for developing dental caries. Early caries lesions in enamel are typically first detected as a white opaque area which is softer than the nearby sound enamel and becomes whiter when dried with air. An important area of interest in the preventive dentistry is the white spot lesion, because it is reversible. Many researchers, using different remineralizing agents, had investigated the management of white spot lesion. The traditional caries management strategies depend on drilling and replacement of the affected tissue with dental biomaterials. All these invasive actions are associated with loss of sound tooth structure and repeated series of restoration, that have major burden on both individuals and public health facilities. To overcome the limitations related with the traditional treatment methods, a number of advanced caries management protocols, which are either non-invasive or minimally invasive treatments have been suggested, before cavity formation. Fluoride has been widely recognized as an effective advocate of remineralization to increase enamel's resistance to acid attack by inhibiting mineral loss from the enamel tooth surface via complete surface absorption on the partially demineralized crystals and attraction ions from oral fluids. Considering of these negative consequences associated with these chemical components(fluoride), the interest in natural and herbal-based healthcare solutions, particularly various kinds of dentifrice, is growing. In terms of dental preventive products, the attention nowadays is being paid to the biocompatible materials. Theobromine and other natural and biocompatible fluoride-free products are gaining prominence in modern dental hygiene products) Theobromine (cacao extracts) had an effective dental benefit and fewer side effects when compared with fluoride. It is a crystalline, bitter tasting alkaloid powder. Theobromine increased the microhardness of the enamel surface, making teeth less susceptible to decay. Studies showed that theobromine increased apatite crystal size and improved mineral gain, strengthening enamel against future acid or erosion Theobromine is regarded as a more favorable choice because it exhibited lower toxicity when compared to fluoride. However, several studies have revealed that theobromine lacks remineralizing potential or a cariostatic effect. Given the existence of conflicting findings and the absence of prior research on the preventive impact of theobromine on the enamel tooth surface, further studies are necessary to investigate its preventive efficacy. Therefore, the objective of this study was to compare the effect of cacao extract (theobromine) and sodium fluoride solution on the intact and artificially carious lesion on enamel tooth surface. While many studies have deemed theobromine non 2 Introduction toxic, there is limited research available on the cyto-compatibility of cacao extract, particularly at the concentrations used in this study, therefore, the primary focus of this study is to investigate the impact of theobromine on intact and artificial carious enamel teeth surfaces and its potential effect on human normal cell viability.