Reliability and analysis of changes in bite marks at 0 and 24 hours

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ABSTRACT

Based on the concept of dental uniqness[1] if at the crime scene, bite marks are found on foodstuff like cheese, chocolate, candy, apple, preserved meats, they can be recorded[2,3,4] as they provide three-dimensional impression of the suspect's dentition.[5] The purpose of this study was to assess changes in bite marks with a passage of time and to see the utility of matching bite marks in both perishable and non-perishable objects with a passage of time at different temperature ranges.

The study was conducted at MPCD & RC, Gwalior, India. 20 volunteers were asked to bite 6 items each. Perishable items (apple, banana and burfi) and non-perishable items (wax, clay, and rubber). Photographs were taken with digital camera just after biting these items and after 24 hours of biting; both at temperature ranges of 24°C to 28°C and 36°C to 40°C respectively. Life size photograph of this bitten object was printed on transparent overlays and compared to hand drawn transparency prepared from suspect dentition using X-ray viewer. The comparison was done by two researchers of all the 960 transparencies.

The results were tabulated and the accuracy of bite mark analysis on all 6 items were analyzed by Kuskall-wallis ANOVA test. Our result showed that all objects gave a positive result on matching just after biting. After 24 hours, all items showed positive matching except banana and apples. Fisher exact test was done for in between group comparisons at 24°C to 28°C and it was found that bite marks on apple and banana matched significantly lower as compared to other perishable (burfi) and non-perishable (wax, clay, rubber) items ($p<0.001$). Although positive matching of bite marks present in burfi were comparatively less than non-perishable items yet the difference was not significant statistically ($p=0.231$). Further in between group comparisons at 36°C to 40°C showed that bite marks present in apple and banana matched significantly lower as compared to other perishable (burfi) and non-perishable (wax, clay, rubber) items ($p<0.001$). Burfi showed same number of matched bite marks as compared to non-perishable items thus showing no difference from non-perishable items ($p=1$).

This study helped in evaluating the fact that time lapse and temperature variations can affect the evidence present at the crime scene. The influence of the time lapse on the food depends on the kind of food examined.[6] Foodstuffs are subjected to considerable shrinkage and distortion that in turn distorts the marks in test media. Apples and banana loses a great deal of water content and become rusted so photography

should be done within a short time.[6]
Researchers have analyzed and interpreted effect of time and temperature on bite marks and have proposed a new simple, reliable and less technique sensitive procedure. Also highlighted the fact of decomposition, there occurs changes in perishable food items and more so in apples and bananas that make bite marks less reliable evidence.

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