Evaluation of Success Rate of Trace DNA in Different Sample Types

S.T. Upeksha[1*], H.A.B.M.D. Weththasinha[1], and L.R.T. Perera[2]

[1]Department of Physical Sciences and Technology, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka.
[2]Department of DNA and serology, Government Analyst's Department, Pelawatta, Sri Lanka.

*thiliniupekshapst@gmail.com

DNA analysis has become a prominent intelligence tool in identifying violent criminals in the criminal justice system. Touch DNA is the type of trace evidence found at crime scenes. The donor causes the transfer of the epithelial skin cells by physical contact with other objects, which leaves a trace amount of DNA on surfaces. In this study, cutting out and swabbing methods for sampling trace DNA evidence have been selected. This study was carried out to (a) determine the most effective and accurate ways for sampling the touch DNA evidence and (b) to analyze the success of DNA profiles of different types of touch evidence. The protocol was followed in two ways; the first way was a statistical evaluation of the success of DNA profiles of different types of criminal touch evidence categories analyzed for 2019, 2020, and 2021 years. The percentage of success of positive DNA profiles obtained for food, garment, cigarette buds, slippers, handles of knives, swabs of nails, and other items, was 60%, 80%, 92.59%, 20%, 53.5%, 33.34%, and 44.45%, respectively. Cigarette/"beedi" buds have represented a higher percentage of success in DNA profiles. The second attempt was to identify a better substrate for obtaining the maximum amount of DNA among selected items such as matches, fabric material, and chewing gums. This study proved that fabric material was the best substrate for obtaining the maximum amount of DNA. Then the researchers tried to select a better sampling method for fabric material to obtain the maximum DNA amount. According to quantification results, the cutting out method was the best sampling method out of the two sampling methods of cutting out and swabbing for fabric material. The study evaluated two different sampling techniques to obtain DNA from touch substrate, proving that the sampling method depends on the types of the substrates of touch evidence.

Keywords: Touch DNA, Sampling Methods, Quantification, DNA Profiles