



**ESTABLISHMENT OF PRIMARY CRIME SCENE IN A MYSTERIOUS MURDER CASE
THROUGH DNA-STR ANALYSIS:-A CASE STUDY**

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ABSTRACT

Crime scene often has most important role in solving a crime and identification of criminal. Criminal always hoodwink the law enforcement agencies by shifting the crime scene from its original place. Under this condition it is necessary to identify and establish real crime scene and proof it scientifically so that real culprit could be prosecuted in the court of law strongly. Forensic scientists play a crucial role in solving such crime. DNA fingerprinting is one of the important scientific tools that strongly individualize a person as well as it help to establish genetic link with biological relatives. The present case is dealt with the suspected honour killing of 20 year old girl in which her body was shifted 3-4 KM away from the actual crime scene to divert the investigation of case. But with the help of DNA profiling and blood stains obtained from primary crime scene and soil sample suspected for blood from secondary crime scene, real place of crime was established.

KEYWORDS:-DNA fingerprinting, STR analysis, Crime scene, Blood, Law enforcement agencies.

INTRODUCTION

A **crime scene** is any location that may be associated with a committed crime.^[1] In fact crime scene is "a location where a criminal act has taken place". Crime scenes can either be primary or secondary. A primary crime scene is the scene where the actual criminal activity took place. For example, in a murder investigation, the primary crime scene would be the scene where the murder occurred and the person's life was taken. However, there might be additional crime scenes involved as well. For example, the perpetrator might have relocated the body following the murder. Let's say the body was removed and placed in a wooded outdoor area. This would then become the secondary crime scene, as it will also likely yield clues that can assist in solving the crime.

The practice of identifying the properties of evidence and comparing pieces of evidence to each other or to a source of origin is what forensic scientists use to provide direct links between evidence and offenders. The advent of DNA typing has allowed scientists to match samples of blood, semen, and other materials to individual offenders. Use of these techniques makes it possible to

demonstrate links such as those placing an individual offender at a crime scene, determining injurious contact between a victim and a specific offender.

DNA profiling is the process of determining an individual's DNA characteristics, which are as unique as fingerprints. DNA analysis intended to identify a species, rather than an individual, is called DNA barcoding. DNA profiling is a forensic technique in criminal investigations, comparing criminal suspects' profiles to DNA evidence so as to assess the likelihood of their involvement in the crime.^[2] It is also used in parentage testing,^[3] STR analysis is a tool in forensic analysis that evaluates specific STR regions found on nuclear DNA. The variable (polymorphic) nature of the STR regions that are analyzed for forensic testing intensifies the discrimination between one DNA profile and another.^[4] The system of DNA profiling used today is based on PCR and uses simple sequences^[5] or short tandem repeats (STR). This method uses highly polymorphic regions that have short repeated sequences of DNA.

The present case study is dealt with identification of suspect from blood stain found at crime scene with the help of DNA-STR analysis as well as to establish the real place of crime.

MATERIAL AND METHODS

Material required

- Whatman FTA Classic Cards
- 1.2mm diameter Harris micro punch
- AutoMate Express™ Forensic DNA Extraction System
- AmpFLSTR® Identifiler® PCR Amplification Kit
- The GeneAmp® PCR System 9700 3130 Genetic Analyzer

Sample Collection: Blood samples were collected from the cases of FSL PATNA, which are as follows

1. Sample marked 'A' collected from wall of suspect house (Friend of Deceased's father, Prime suspect of murder)
2. Sample marked 'B' collected from floor of suspect house (Friend of Deceased's father)
3. Sample marked 'C' collected from cloth of deceased.
4. Sample marked 'D' collected from deceased's father as control sample.
5. Sample marked 'E' collected from Friend of Deceased's father as control sample (prime Suspect of Murder).
6. Sample marked 'F' collected from Secondary crime scene.

Extraction of DNA

The DNA from above samples was extracted using the PrepFiler Express Forensic DNA Extraction Kit. Cell

lysis using the PrepFiler Express Kit was performed by adding 500 µL of the PrepFiler lysis solution to the biological sample in a LySep column assembly. The PrepFiler lysis solution is prepared by mixing 500 µL of PrepFiler lysis buffer and 5 µL of 1.0 M freshly prepared dithiothreitol (DTT). The lysis mixture was incubated at 70 °C for 40 min with shaking at about 750 rpm using an Eppendorf Thermomixer. Following lysis, the LySep column assembly was centrifuged for 2 min at 10,000 x g to transfer the lysate to the sample tube. The lysate in the sample tube was processed on the Automate Express Forensic DNA extraction instrument using the PrepFiler Express instrument protocol. The DNA extracts obtained were stored at 4 °C and 20 °C for short- and long-term storage, respectively.

Quantitation of DNA

DNA extracted from above described sample was quantified using the Quantifiler Duo DNA Quantification Kit on an Applied Biosystems 7500 Real-Time PCR System according to manufacturer recommended procedures.

STR Analysis

Quantified DNA was processed for STR profiling using the AmpF®STR Identifiler PCR Amplification Kit. The extracted DNA were subjected to multiplexing PCR reaction for co-amplification of 15 microsatellite Loci of Autosomal STR and Amelogenin marker. Samples were amplified on a GeneAmp 9700 thermal cycler, electrophoresed on 3130 Genetic Analyzers, and analyzed using GeneMapper ID-X Software v1.1.1 according to manufacturer recommended procedures (Applied Biosystems).

Comparative chart of Allele distribution of different loci of DNA tested under Identifiler Plus kit

S.No	STR Loci	Sample Mark- A	Sample Mark - B	Sample Mark - C	Sample Mark-D	Sample Mark -E
01	D8S1179	10,14,13	11,14	10,13,14	13,16	11,14
02	D21S11	28,29,31.2,32.2	31,31.2	28,29,31.2,32.2	28,31.2	31,31.2
03	D7S820	9,10,11	10,11	9,10,11	7,11	10,11
04	CSF1PO	10,11,12	9,11	10,11,12	10,12	9,11
05	D3S1358	14,16,17	15,17	14,16,17	17,20	15,17
06	THO1	7,8,9,9.3	6,9.3	7,8,9,9.3	8, 9.3	6,9.3
07	D13S317	9,11	8,14	9,13,11,14	7,11	8,14
08	D16S539	9,13,11	8,11	9,13,11	9,11	8,11
09	D2S1338	19,24,22,23	17,24	19,24,22,23	19,22	17,24
10	D19S433	13,14.2,15,16	10,12	13,14.2,15,16	14,15	10,12
11	Vwa	14,19,16,17	16,17	14,19,16,17	16,17	16,17
12	TPOX	8,12,9	11	8,12,9	8,11	11
13	D18S51	13,14,16	13,15	13,14,16	13,15	13,15
14	D5S818	10,12	13	10,12	10,11	13
15	FGA	20,21,22,23	23,24.2	20,21,22,23	20,23	23,24.2
16	Amelogenin	XY and X	XY	XY and X	XY	XY

RESULT AND DISCUSSION

The result under STR analysis through AmpFLSTR® Identifiler® PCR Amplification Kit demonstrated that sample 'A' contain mix profile of one male and one

female. Profile generated for sample 'C' was found to be same that of sample 'A'. When these profiles were matched with profile of sample 'D' then it was found that female in sample 'A' and 'C' was daughter of 'D'.

The profile generated for sample 'B' was found same as that of sample 'E'. No yield DNA could be found for sample 'F'.

CONCLUSIONS

We have conducted STR analysis for various samples. Blood sample collected from wall of house of prime suspect contain DNA of female deceased as well as one unknown male, blood collected from floor of house of prime suspect contain DNA of prime suspect. This indicates that the deceased was murder in house of suspect and the prime suspect 'E', has involvement in under as well as shifting the body away from real crime scene. As no DNA was yielded for sample 'F', indicate absence of any biological fluid at shifted crime scene.

Hence, it concluded that the Primary crime scene was house of suspect and not the place 3-4 km away from house where body was shifted to divert the case.

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