

Analysis of Mass Number of Samples and Links Evidences Using DNA Finger Printing: Concludes act of Mob Lynching

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How to cite this article: Vikram A. Dhere, Deepak Y. Kudekar, Bhausaheb P. More. Analysis of Mass Number of Samples and Links Evidences Using DNA Finger Printing: Concludes act of Mob Lynching. Indian Journal of Forensic Medicine and Toxicology 2022;16(4).

Abstract

Mob lynching is the heinous crime in the world by which a group of people kills the criminal or suspects of crime. In 2018 forensic science team facing the challenge of such horrible crime. Forensic Science Laboratory received a mass number of exhibits and analysis of this large number of exhibits was critical, complex and time-consuming. Analysis of crime scene evidences recovered from suspects and biological samples of deceased along with their clothes were performed. Step by step analysis of these exhibits carried out by the detection of blood which minimizes the complexity of analysis and DNA profiling of these blood detected exhibits decreases the time cycle and increases the truthiness of analysis. DNA profiles obtained from a mass number of crime scene evidence and evidence recovered from suspects linked with DNA profiles of the deceased. This concludes the crime of mob lynching, uniqueness of the location and presence of a suspect at that time with the same location.

Keywords: Mob lynching, crime scene evidence, DNA fingerprinting, mass exhibits, DNA profiling, PCR, Mixed DNA.

Introduction

Mob lynching is a major issue in the world since the 18th century¹. Lynching is unlawful mob violence by a group of people to kill the individual that is a crook or suspected of a criminal offence against the community². There are various types of mob justice such as murder, burning, hanging, maiming, beating and having varied reasons like faux news, illiteracy, failure of the criminal justice system, social media and so on³. Many lynching cases recorded in the world in recent centuries and the collection and

analysis of evidence from such a complex crime is the biggest challenge in front of forensic experts. Step by step analysis of many evidence and convert them into proof against such heinous crime by finding links between criminals with a crime is the major challenge of a forensic scientist. Using modern techniques in forensic science and the tremendous efforts of a forensic team make it possible to find links in such a complex crime. DNA fingerprinting is one of the powerful and sensitive techniques used to prove crime against victims⁴⁻⁸.

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In India, DNA technology is generally used for the paternity and maternity testing, establishing identity in sexual offence cases, identification of deceased, concealment of birth cases, identification of accused in murder cases and wildlife species identification⁹. DNA profiling of blood, hair and saliva by performing STR-based analysis is the important evidence to solve the crime¹⁰⁻¹². Short Tandem Repeat (STR) markers are rich in the human genome and characterized by the high level of polymorphism used in DNA technology for the identification¹³. Blood is one of the vital evidence in most of the crime such as murder or rape¹⁴. Individual's gender and genetic information were provided by the DNA profiling of their biological evidence. Nowadays various advanced instruments and new methods of DNA extraction having different principles are available which removes the substances interfering with PCR and give a pure sufficient quantity of DNA¹⁵⁻¹⁹. Step by step analysis performed by the detection of body fluids on exhibits, determine species origin by cross-over electrophoresis(COE), extraction of DNA and their quantification, amplification using polymerase chain reaction (PCR) and electrophoretic separation²⁰⁻²⁸.

Material and Methods

1. PrepFiler Express™ Forensic DNA Extraction kit.
2. AmpFISTR™ Identifiler™ PCR Amplification Kit.
3. GeneScan™ 600 LIZ™ Size Standard v2.0.
4. Hi-Di™ Formamide.
5. Quantifiler® Human DNA Quantification Kit.

Instruments

6. AutoMate Express™ Forensic DNA Extraction System Catlog number: 4441763
7. This Instrument is compatible with the PrepFiler Express™ and PrepFiler Express BTA™ Forensic DNA Extraction kits.

8. Applied Biosystems 7500 Real-Time PCR System Catlog number: 4366604
9. Veriti™ 96-Well Thermal Cycler Catlog number: 4375786
10. Applied Biosystems 3500 Genetic Analyzer Catlog number: 4406017

One of the horrific crimes of mob lynching was happened in Rainpada village of Dhule district, Maharashtra, India. On 1st July 2018, five people of the Nathpanthi Davri Gosavi community came to Kakripada hamlet, positioned around one-and-a-half kilometres Rainpada, and commenced to beg. This nomadic tribe commonly travels from location-to-location and lives on alms. When they were given down from the bus, they interacted with the locals. It became alleged that a man, probably in an under the influence of alcohol state, started out to elevate an alarm that those five guys belonged to the cartel of kidnappers who abduct kids and eliminate their kidneys. Many villagers amassed round and commenced to thrash the sufferers. The sufferers have been dragged to Rainpada village in which a weekly marketplace operates on Sundays. Meanwhile, villagers had despatched messages to humans dwelling in close by hamlets to accumulate at Rainpada. Mob of humans wearing sticks and rods, beating them and become lynched to loss of life of five peoples.

In this case, five persons were killed by the group of people for the allegation of child-lifters. After a phone call from one of the villagers, police reach the village and investigate a crime scene and filed a complaint against a large number of peoples who are suspects of this heinous crime. On the basis of CCTV footage and eye witness, police officer identified twenty-eight suspects. The Forensic Science Laboratory, Nashik received huge number of evidence which was collected from the scene of a crime, recovered from suspects and Medical Officer (Table-1).

Table 1: Source and number of evidences received in Forensic Science Laboratory

Sources of evidence	Crime Scene	Suspects	Medical Officer	Total
Number of evidences	35	63	24	122

Instead of the above evidence, fifty-six blood samples of suspects also received for comparison. Total hundred and twenty-two evidence contain weapons, biological samples of deceased, pairs

of chappal, earth samples and clothes (Table-2). Weapons are generally wooden sticks, bamboo sticks, metallic rods, metallic plank, metallic pipes, metallic sheets, stones, bricks and plastic pieces.

Table 2: Nature and number of evidences received in Forensic Science Laboratory

Nature of evidences	Weapons	Clothes	Biological samples	Pairs of Chappal	Earth
Number of evidences	24	84	10	2	2

Detection of blood on the weapons and clothes:

Kastle-Meyer test also known as phenolphthalein test was performed for the detection of bloodstains on the weapons, chappals and garments. Out of these hundred and twenty-two pieces of evidence,

detection of blood on hundred and twelve-piece of evidence was performed. Blood was not detected on forty-six pieces of evidence. Results of the blood detection are as follows:

Table 3: Detection of blood on evidences

Nature of evidences	Weapons	Clothes	Pair of Chappal	Earth	Total
Blood detected on evidences	24	39	1	2	66

After the detection of blood, species origin of detected bloodstains was determined using cross-over electrophoresis.

Total fifty-five samples were performed for the DNA analysis.

Extraction of DNA:

DNA was extracted from the bloodstains and nail clippings using PrepFiler Express Forensic DNA Extraction Kit. Bloodstain detected on the surface edge of the plastic pipe, wooden log, wooden sticks, wooden planks, metallic pipe, metal rod, and metallic sheets were swabbed with a sterilized wet cloth piece. Extraction of bloodstains and nail clipping was performed by adding 500 µL PrepFiler™ Lysis Buffer to the LySep™ Column/tube assembly and the mixture was incubated for 40 min at 70 °C and 750 rpm in a Thermo shaker. After the cell lysis centrifuged the column/tube assembly for 2 minutes at 10,000 rpm. The collected lysate was placed for automated extraction run using the PrepFiler Express instrument

protocol on the Automate Express Forensic DNA extraction system. The isolated, purified DNA was stored at 4°C¹⁶.

Quantification:

Extracted DNA used to be quantified by using Quantifiler® Human DNA Quantification Kit (Applied Biosystems, Foster City, CA) on an Applied Biosystems 7500 Real-Time PCR System as per the protocols endorsed by the manufacturer.

PCR based STR Analysis:

The quantified DNA used to be processed for STR (Short Tandem Repeat) profiling using AmpFISTR® Identifiler PCR Amplification Kit with the assist of Veriti™ 96-Well Thermal Cycler according to the protocols endorsed through the producer [Fig-1]. This kit includes PCR Reaction mix, Primer set and Taq Gold Polymerase enzyme. A total of 1 ng of DNA was required for the amplification. Based on the quantitation, the volume of DNA was added up to 10 µL²¹.

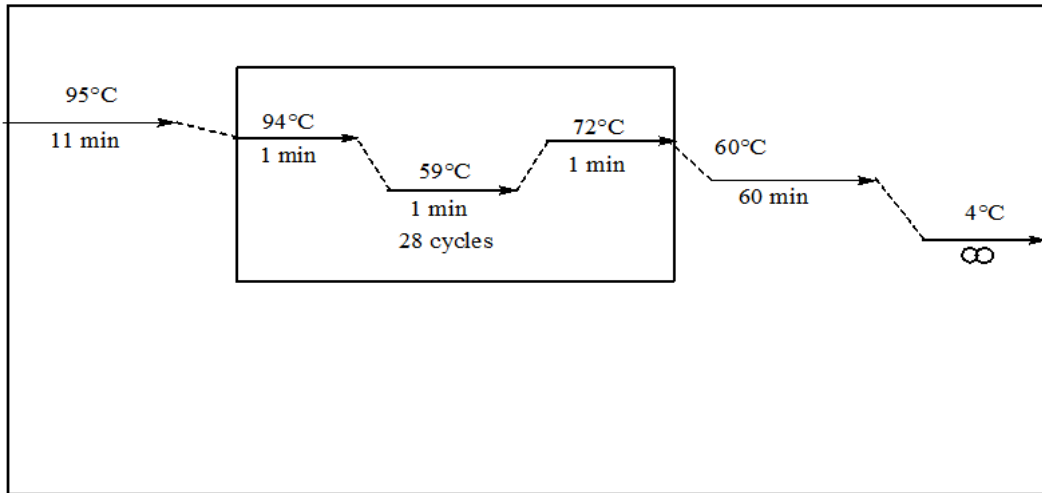


Fig 1: PCR Protocol for amplification of DNA

Capillary electrophoresis was performed on the 3500 Genetic Analyzer system (Applied Biosystems) by adding 1 μL /sample of PCR product to the mixture of Hi-Di Formamide (8.5 μL /sample) and GeneScan 600 LIZ Size Standard v2.0 (0.5 μL /sample). After the completion of electrophoresis, the sample was analysed using Gene Mapper® ID-X. Different fragments of DNA molecules were separated based on their size. Interpretation of DNA profiles was done by comparing with reference samples²³.

Results

The extracted DNA was typed at 15 STR Loci and gender-specific Amelogenin locus using the PCR amplification technique.

1. A mixed DNA profile was obtained from blood detected on the crime scene evidence of weapon-1 (Plastic pipe) matched with the DNA profile of the Deceased-3 and Deceased-5.
2. A DNA profile was obtained from blood detected on the crime scene evidence of weapon-3 (wooden log) and weapon-12 (metallic rod) are identical and from the same source of male origin and matched with the DNA profile of Deceased-1.
3. A DNA profile was obtained from blood detected on crime scene evidence of weapon-5 (wooden stick), weapon-7 (wooden plank), weapon-8 (metallic pipe), weapon -15 (metallic sheet), weapon -16 (metallic sheet), Pancha and cloth piece are identical and from the same source of male origin and matched with the DNA profile of Deceased-5.

4. A DNA profile was obtained from blood detected on the crime scene evidence of weapon-9 (metallic pipe) is of male origin and matched with the DNA profile of Deceased-4.
5. A DNA profile obtained from blood detected on the evidence recovered from Suspect-1, towel and full shirt and evidence recovered from Suspect-2, full shirt and wooden stick are identical and from the same source of male origin and matched with the DNA profile of Deceased-3.
6. Mixed DNA profiles obtained from the knicker of deceased-1 and full pant of deceased-2 matched with the DNA profiles of deceased-1 and deceased-5.

Discussion

In this case, the crime scene investigation team collects a huge number of evidence including a large number of weapons. Out of the hundred and twelve exhibits, blood was detected on sixty-six exhibit. Total fifty-five exhibit were performed for the DNA analysis from which DNA profiles are obtained from the twenty-seven sample. Control samples of the deceased was not available because the nail clippings of deceased collected by medical officer was soaked with blood. This is one of the major challenges of analysis which was overcome by cleaning the nail clippings with plenty of water multiple times and after the analysis single control DNA profiles of each deceased obtained. Out of the crime scene evidence, the DNA profiles of the eleven

number of evidence are linked with deceased profiles of which nine are weapons. Out of the evidence recovered from the suspects, the DNA profiles of the four piece of evidence link with the deceased profile of which one of them is a weapon. Out of the twenty-eight suspects identified by police officer two are directly linked with this crime by the DNA profiles of the evidence recovered from them matched with deceased profile. This is one of the examples of DNA fingerprinting which proves that it is the strongest evidence against criminals for the justice of deceased and their relatives.

Conclusion

Mob lynching is one of the complex and sensitive crime and time-bound analysis with conclusive results is the important aspect while dealing with a large number of exhibits. Detection of blood on mass number of exhibits minimise the number of exhibits for further analysis and decreases cost and time of analysis. Analysis of a large number of shreds of evidence showed the profiles obtained from suspects, deceased and crime scene exhibits links between them enhances truthiness of the result. Links between the DNA profiles of weapons and the deceased confirm the weapons used in crime. Links between the DNA profiles of exhibits recovered from suspects and deceased proves the involvement of suspects in this crime. Links between mixed DNA profiles of clothes of the deceased concludes the all the deceased were suffered at the same time with the same location. Overall results justify the act of mob lynching, their unique location and the presence of suspect on that location.

Conflict of interests: Nil.

Funding: The authors declare that there is no funding taken from any agency all the expenses are borne by authors.

Ethical Clearance: No involvement of human or animal in this research.

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