ORIGINAL RESEARCH PAPER
VOLUME-6 | ISSUE-5 | MAY - 2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A Case Study- DNA profiling compelled rapist father to go behind bars

Forensic Science

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ABSTRACT

In crime investigation, DNA fingerprinting is powerful tool in hands of biologist to detect criminal. DNA is isolated from different sources like Blood, Blood stains, Semen, Tissue, Bones, Hair in different cases of Murder, Rape, Dacoit, Individual Identification and Paternity. Most of the disputed paternity cases arise in the context of adultery or fornication, questioned legitimacy, guardianship, affiliation orders, divorce proceedings etc. In this sexual assault case, a girl aged 14, when her father raped her repeatedly, resulted to pregnancy and in spite of all the witnesses along with victim turned hostile; it was the only DNA test report that charged father after his paternity proved.

KEYWORDS:

DNA fingerprinting, Short Tandem Repeats, Polymerase Chain Reaction, POCSO Act.

Introduction:-

DNA fingerprinting proves a great importance in establishment of paternity of an individual [1,2,5,6]. The old conventional investigation based on blood antigen systems like blood groups, HLA Tissue typing is no more useful in such sensitive cases because of limitations [3]. The composition of DNA molecule is same from cell to cell, therefore the DNA in blood is identical to that in other biological material such as hair, semen, tissue, bone, saliva [4]. In 1984, Dr. Alec John Jeffreys, a British Geneticist first developed DNA fingerprinting technique used to identify individual [7]. They found that certain regions of DNA contained repeated DNA sequences. The regions with repeat units that are 2-6 base pair in length are called Short Tandem Repeats. The first STR multiplexes developed was quadraplex created by Forensic Science Services (FSS) that comprises four STR Loci [10]. The number of repeats in STR markers is highly variable among individuals, making these markers effective for human identification purposes. They are scattered throughout the genome [8,9]. These STRs can be simultaneously amplified with silver stained systems to over 15 STRs using multiplex color fluorescent tags and is used to detect individual identity and disputed paternity by way of capillary electrophoresis on 3130 Genetic Analyzer.

The instant case is from Nagpur, Maharashtra. Complainant reported to Police Station that her husband forcibly committed sexual intercourse with her daughter and threatened her not to disclose this fact to anyone. On several occasions he committed physical relations with her. As a result of which she became pregnant. Accordingly, victim was sent for medical examination and found 5 months pregnant. Thus, the complaint registered against under section 376(2)(f)(i)(h), 506 of I.P.C. and section 5 j (ii)(l)(n) punishable u/s 6 of POCSO Act 2012. After victim's delivery, investigation officer sent blood samples of accused, victim and baby to the Forensic Science Laboratory, Nagpur. During the course of analysis, accused father matched the obligate paternal alleles present in baby at all 15 STR Loci. Similarly, victim mother also matched the obligate maternal alleles present in baby at all 15 STR Loci. Thus, the DNA test concluded that accused and victim are biological parents of baby. Although, during the course of judicial trials, all the witnesses along with victim and complainant turned hostile, it was only DNA profiling report proved involvement of accused and sentenced him to suffer rigorous imprisonment for 10 years and to pay fine of Rs. 10,000/-.

Materials and Methods:-

AmpFlSTR PCR Reaction Mix
AmpliTaq Gold DNA polymerase
AmpFlSTR Primer set
Formamide
Size Standard
Allelic Ladder

Steps used in Analysis

Collection and preservation of blood samples
↓
Extraction of DNA
↓
Quantification of DNA
↓
PCR Amplification of DNA
↓
Electrophoresis
↓
STR Genotyping
↓
Conclusions

The analysis was conducted at DNA fingerprinting division Regional Forensic Science Laboratory, Nagpur, Maharashtra, India. After delivery of victim, her blood sample along with blood samples of her accused father and baby were collected by medical officer, received in laboratory. Analysis started after checking seals and labels of all exhibits.

Isolation of DNA:-

From all the three blood samples, DNA was extracted using organic extraction method. To each sample, Forensic buffer, Proteinase K, and 10% Sodium Dodecyl Sulphate was added, vortexed, quick spinned and incubated at 56^{o}Cfor 3 hrs. Then, Phenol : Chloroform : Isoamyl Alcohol (25:24:1, v/v) added, proteins are denatured and collected in the organic phase while nucleic acids remain in the aqueous phase. To the aqueous phase, 2M Sodium Acetate and chilled Isopropanol added to precipitate DNA. Precipitated DNA is finally dissolved in Tris EDTA buffer (pH8).

Quantification:-

Isolated DNA is quantified using 1% Agarose, 1X TAE buffer, ethidium bromide and bromophenol blue. The accurately quantified DNA is used for further analysis.

PCR based STR Analysis:-

Extracted DNA samples were amplified using AmpFlSTR® Identifiler kit with the help of PCR machine to increase the quantity of DNA[11]. Reaction mixtures used for PCR Identifiler were – Identifiler PCR Reaction Mix 10.5 µl, Taq Gold DNA Polymerase 0.5 µl, Primer set 5.5 µl and DNA sample 10 µl. Samples incubated at 95^{o}C for 11 min. Then amplified in 28 cycles selecting 94^{o}C, 54^{o}C and 72^{o}C as temperature of denaturing, annealing and extension respectively. Amplified DNA samples then kept at 60^{o}C for an hour and then at 4^{o}C till separation of STRs. PCR produces millions of DNA fragments of different sizes. Amplified products were separated and detected using 3130 Genetic Analyzer [12]. Simultaneous amplification of 16 STR Loci was completed and analyzed [13,14].

Results and Discussions:-

DNA extracted from blood samples of victim, accused and baby was typed at 15 STR Loci and gender specific Amelogenin Locus using PCR Amplification Technique (Table-1).

Table-1 :-

STR LOCUS	GENOTYPE		
	Victim	Baby of victim	Accused
D8S1179	10,10	10,10	10,12
D21S11	29,31.2	29,31.2	30,31.2
D7S820	10,11	10,11	10,11
CSF1PO	10,12	11,12	11,12
D3S1358	16,17	17,17	15,17
THO1	7,9.3	7,9	9,9.3
D13S317	11,12	12,12	12,12
D16S539	9,11	9,11	9,11
D2S1338	18,18	18,20	18,20
D19S433	13,14	14,14	14,14
vWA	16,17	16,19	16,19
TPOX	8,11	11,11	8,11
D18S51	13,21	21,21	14,21
AMELOGENIN	X,X	X,X	X,Y
D5S818	11,11	11,11	11,11
FGA	22,25	22,25	21,25

For all the different genetic systems analyzed with PCR, putative father (accused) matched the obligate paternal alleles present in baby at all 15 STR Loci. Similarly, mother (victim) also matched the obligate maternal alleles present in baby at all 15 STR Loci.

On the basis of above observations, it is concluded that accused (the real father of victim) and victim are the biological parents of baby delivered by victim.

In the instant case, during trial, the prosecutrix and her complainant mother both turned hostile as the accused was the only source of income for their family. It was the only DNA report compelled rapist father to go behind bars.

Conclusion:-

Child sexual abuse is a form of abuse in which an adult or older adolescent uses child for sexual stimulation. It is a kind of mental or physical violation of child with sexual intent [15]. Government of India passed special law called Protection Of Children from Sexual Offences (POCSO) in 2012 to punish accused for harassment of child less than 18 yr of age. In the instant case, victim was minor girl that too daughter of accused and he committed such heinous crime with her, therefore he is not entitled for any leniency. It was only DNA report on the basis of which accused sentenced to suffer rigorous imprisonment for 10 years and to pay a fine of Rs. 10,000/-. Thus, DNA profiling provides very strong evidence of involvement which is often enough to include the defendant to plead guilty.

Acknowledgement:-

We are thankful to our Director, Directorate of Forensic Science Laboratories, Mumbai, Home Department, Govt. of Maharashtra, India for his guidance and encouragement all the time extended to us. Also thankful to Miss Jyoti Vajani, Special Public Prosecutor for state for valuable co-operation.

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