

**INTERNATIONAL JOURNAL OF LAW
MANAGEMENT & HUMANITIES**
[ISSN 2581-5369]

Volume 3 | Issue 4

2020

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Scientific Evidence: The New Hot Potato in the Vernacular of Criminal Case Investigation

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ABSTRACT

The focus of this paper is to unravel the concept of scientific evidence during criminal case investigation. The initial chapters of the paper shall introduce the concept of scientific evidence and the various techniques of it. The importance of scientific evidence during criminal case investigation is explored in the forthcoming parts. International tests which have been implemented and the analysis of a few cases across the globe occupies the next segment. The legal provisions under the Indian law related to scientific evidence has been explained followed by the turning point of use of scientific evidence in the Indian judicial system. Finally, the authors view on the topic gives the concluding remarks.

Keywords: *Scientific evidence, forensic science, investigation*

I. INTRODUCTION

Criminal Justice System of any country is the basis of establishing peace and tranquility. It includes not only the judicial system but the investigating machinery as well. Criminal Justice is one of the critical areas of human rights where the legal system is tested on a continuous basis for preservation of peace and security in society on the one hand, and prevention of human dignity of both victims of crime and person accused of it, on the other. The Criminal Justice System consisting of Police, Judiciary and Correctional Institutions which play a major role in implementing human rights and thereby protect and safeguard the human rights of the citizens of a country. The Criminal Justice System has the power to control crime, prevent crime and punish the criminals.² Among the various functions conducted by organs of the criminal justice system, one of the most important roles is played by the investigative agency, the police forces. During the last few decades the police forces have started to rely on the scientific methods to narrow down the suspects and to finally catch the culprit. The merging of the fields of law and science has given birth to the concept of scientific evidence. The emerging techniques in the field of forensic science find an amiable welcome in the

¹ Author is an Advocate at Punjab and Haryana High Court, Chandigarh, India.

² Shruti Chaudhary, *Indian Criminal Justice System and Human Rights*, Volume 3 Issue 1 IJARnD 271, 2018.

black and white legal world. Forensic evidence is basically the physical evidence collected from the crime scene and after analyzing the data conclusions can be drawn from it. Forensic evidence can conclude the time and the manner in which the crime was conducted which would help the police forces to track down the criminal offender. The courts nowadays are more dependent on the medical evidence rather than the ocular evidence which was concluded by the court in the case of *Mahavir Singh v. State of M.P.*³

In the present scenario, the amalgamation of scientific technology and law enforcements has helped to achieve a more efficient criminal justice system.

II. MEANING AND CONCEPT OF SCIENTIFIC EVIDENCE

The concept of taking scientific evidence as an important aspect of criminal justice system in India is not a new one but has been prevalent since ancient ages. Sir William Herschel was one of the first few people who discovered 'fingerprinting' in the identification of suspects. While working for the Indian Civil Service, he began to use thumbprints on documents as a security measure to prevent the repudiation of signatures in 1858.⁴ Fingerprint evidence was first accepted in an Argentine Court in the 1890s and in English Court in 1902.⁵

The first recorded application of medical knowledge to the solution of crime in the 1248 Chinese Book Hsi DuanYu or the Washing Away of Wrongs, ways to distinguish between death by drowning or death by strangulation were described. Italian doctor, Fortunatus Fidelis is recognized as being the first person to practice modern forensic medicine, beginning in 1598.⁶

Scientific evidence is an inter-disciplinary subject which combines the two diverse fields- Law and Science. The usage of science in the field of law to prove a fact has been of utmost use and has answered many vague questions coming from the judges and has made it easier for lawyers to prove their cases when science is on their side. It includes techniques such as fingerprint analysis, DNA analysis, ballistic, firearms or explosive culture etc. It helps to convict those guilty of crime as well as can acquit the innocent.

³ (2016) 10 SCC 220.

⁴ Fingerprints, British Inventions Discoveries Creations and Innovations (May 19,2017), <http://madeupinbritain.uk/Fingerprints>.

⁵ David A. Thomas, Donald C. Clarke and Others, Crime, Encyclopædia Britannica (October 12, 2018), <https://www.britannica.com/topic/crime-law/Detection-of-crime>.

⁶ Kapil Dixit, UP cops using Forensic science to solve cases, TOI, (Feb 22, 2009, 04:04 AM), http://timesofindia.indiatimes.com/articleshow/4166961.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst.

Generally, the techniques employed by forensic scientists seem to stem from two principles.⁷

- 1.) Locard's Principle: Locard's exchange principle is a concept that was developed by Dr. Edmond Locard (1877-1966). Locard speculated that every time you make contact with another person, place, or thing, it results in an exchange of physical materials. He believed that no matter where a criminal goes or what a criminal does, by coming into contact with things, a criminal can leave all sorts of evidence, including DNA, fingerprints, footprints, hair, skin cells, blood, bodily fluids, pieces of clothing, fibers and more. At the same time, they will also take something away from the scene with them.⁸
- 2.) Principle of Individuality: Every object has its own individuality. Maybe from distance every object may seem similar but they are never same. Fingerprints and DNA may seem similar but they are plainly unique.

The synthesis of these two aforementioned principles helps forensic scientists in concluding with a 'yes' or 'no' answer for a particular case.

Forensic Science can be defined as application of scientific techniques in solving questions of legal interest. Forensic Science can be a wider term and scientific evidence comes as a tool under the wide ambit of Forensic Science.

III. TYPES OF SCIENTIFIC EVIDENCE USED IN CRIMINAL CASES:

1. DNA and Fingerprinting- DNA analysis or evidence may include biological evidence taken from skin cells, fingerprinting, bodily fluids, blood, or even hair. Because DNA or deoxyribonucleic acid is genetic material and differs between every individual who has a unique DNA profile, the results of these tests are said to be more than 99% accurate. Forensic DNA collection is one of the most powerful tools in crime detection. With increasing rate of sexual assault cases, DNA tool can be used in tracking down the offender. India has been known to the tool of DNA since 30 years but is still behind other countries. India completes about 10,000 cases per year. This is a very small number for the size of India and its crime rate. By comparison, the United Kingdom, a country 13 times smaller than India, completes DNA testing on an estimated 70,000 cases per year.⁹

⁷ B Robertson and GA Vignaux, *Interpreting Evidence: Evaluating Science in the Courtroom*, 3-4 (1995).

⁸ *Locard's Exchange Principle*, Forensic Handbook (Aug. 12, 2012), <https://www.forensichandbook.com/locards-exchange-principle/>.

⁹ Tim Schellberg, *India Should Make Forensic DNA a Priority in Sexual Assault Cases*, Live Law, (Feb. 4, 2018, 11:04 AM), <https://www.livelaw.in/india-make-forensic-dna-priority-sexual-assault-cases/>.

In a crime scene, there is always a possibility that DNA evidence can be found out but the problem in India is that constables who are the first ones to visit the crime scene are not trained to handle DNA samples and there is a huge possibility they might destroy important evidence. DNA testing as evidence is also not covered under Indian Evidence Act 1872 and Criminal Procedure Code 1973. The Bombay High Court in the case of *Anmol Singh Swarnsingh Jabbal v. The State of Maharashtra*¹⁰, upheld life term, relying upon DNA evidence, in addition to other evidences, for murder of a young lady engineer by her colleague in a case of one sided love.

In another case, the use of DNA technology helped to prosecute and convict the offender to death, who was accused of kidnapping and killing after gang rape of a 10 year old school girl by auto rickshaw driver and throwing the corpse of the victim in a running canal.¹¹ In Aarushi Talwar murder case, the Utttar Pradesh police were highly criticized for not taking samples of evidence with due care and attention. The forensic scientist also complained that 90% of the evidence collected was tampered. The Talwars were asked to do a Touch DNA test, because palm prints were found near Hemraj's body on the terrace. Touch DNA being the next big thing in the field of scientific evidence in which no blood or semen samples are required.¹²

2. Hair evidence- Experts can determine many things from a single hair including whether it is human, the race of the person, hair color, chemical composition, presence of toxins, and more. For the most part hair evidence is used to exclude someone suspected of a crime, as the only way to know for absolute certain a hair found at a crime scene is the suspect's if the root or follicle is attached, which can be DNA tested.¹³

3. Fibers: It may originate from carpeting, fabric, upholstery, curtains, even clothing. Classified as natural, synthetic, or manufactured. Fibers are often useful to those investigating a crime scene; due to the fact the origin of the fiber may be identified. A suspect may have a fiber from a victim's clothing on his or her own clothing, a carpet fiber on his or her shoe, etc.¹⁴

4. Firearm Identification or 'Ballistics': It is considered scientific or forensic evidence by some, although many criminal defense attorneys consider it "junk science" as the reliability of the evidence can be in question. Ballistics are often used by investigators to

¹⁰ 2014 SCC Online Bom 397 : 2014 (2) Bom CR (Cri) 361 : MANU/MH/0352/2014.

¹¹ State by the Inspector of Police v. Manoharan, 2015 Cri. LJ 1215 : MANU/TN/ 0496/2014.

¹² Pranjal Kshirsagar, *Aarushi trial: A double murder of forensics and investigation*, Firstpost, (Nov 26, 2013 07:49 AM), <https://www.firstpost.com/india/why-the-aarushi-trial-was-a-double-murder-of-forensics-investigation-1250025.html>.

¹³ <https://www.adamsluka.com/what-are-the-different-types-of-scientific-evidence-used-in-crim.html>.

¹⁴ *Ibid* 11.

determine the type of weapon used to commit a crime, the shooter's location based on the angle of trajectory of the bullet, the "rifling" of a spent bullet (marks made on the bullet while passing through the barrel) which can help determine the type of weapon used, and more.¹⁵

5. Narco-analysis: This test involves injecting certain drug(such as sodium pentothal, scopolamine and sodium amytal) that causes the subject to enter into a semi-conscious state where questions are posed to him, assuming that he will answer what he would try not to reveal in his fully conscious state.¹⁶

6. Polygraph Test: Commonly known as the 'lie-detector' test is wrongly named, since it is a detector of autonomous arousal, not of lies. Measurement of hyper-arousal state is based on variation in rate of blood pressure, respiratory rate, skin conductance and electromyography.¹⁷

7. Brain Mapping: It measures the changes in the electrical field potentials produced by the sum of the neuronal activity in the brain by means of electrodes placed on the surface of the skin covering the head and face. The changes directly related to specific perceptual or cognitive events are called event-related potentials. Commonly used method in India is called as Brain Electrical Activation Profile test, also known as the 'P300 Waves test'.¹⁸

IV. INTERNATIONAL TESTS USED AROUND THE GLOBE

- **The Frye Test**

The Frye Test (General Acceptance Test): This was the first important ruling in America regarding the admissibility of scientific evidence. The court stated: 'Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential forces of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field to which it belongs'. The Frye Test has two aspects- the principle or scientific technique and the acceptance. The negative point of the Frye Test was that it would take considerable amount of time and a lot is dependent on the scientific community than the Court of Law.¹⁹

¹⁵ *Ibid* 12.

¹⁶ Suresh Bada Math, *Supreme Court judgment on polygraph, narco-analysis & brain-mapping: A boon or a ban*, 134(1) IJMR 4-7.

¹⁷ *Ibid* 14.

¹⁸ *Supra* note 14.

¹⁹ Dr. M.P.Kantak et. al, *Utility of Daubert Guidelines in India*, 26(3). JIAFM 110, 110-111 (2004).

- **The Daubert Guidelines**

These guidelines were laid down in the landmark judgment of *Daubert vs. Merrel Dow Pharmaceutical, Inc* in United States. The court concluded that the Federal Rules of Evidence superseded the Frye Rule and that the rigid general acceptance rule should not come on the way of a reasonable minority scientific opinion in the form of new and emerging research based on reliable studies. It also laid down factors for the basis of scientific evidence which are also known as The Daubert Guidelines.

They are:

- 1) The content of the testimony can be (and has been) tested using the scientific method;
- 2) The technique has been subject to peer review, preferably in the form of publication in peer review literature;
- 3) There are consistently and reliably applied professional standards and known or potential error rates for the technique;
- 4) Considers general acceptance within the relevant scientific community.

These to test were the very initial tests on which the rules of acceptance of scientific evidence were formulated.²⁰

V. LEGAL PROVISIONS RELATING TO SCIENTIFIC EVIDENCE

Medico legal is an amalgamation of the medical and the legal field and it includes an endless scope in the field of litigation. It is therefore important for the legal world to be equipped with the basic knowledge of forensic science. Due to lack in advancement in the field of science during earlier times, investigation was largely subjective, which further gave rise to controversy and legal troubles in the courtroom.

Indian Evidence Act, 1872

The term 'evidence' has been defined in section 3 of the Indian Evidence Act, 1872. Section 27 and section 45 are relevant in the light of 'scientific evidence'.

Section 27 talks about 'disclosure of statement'. In the case of *Navaneethakrishnan V/s The State by Inspector of Police*²¹ it was held that section 27 of Indian Evidence Act, 1872 permits derivative usage of custodial statements by an accused are admissible to the extent that they prove correct by the discovery of facts.

²⁰ *Supra* note 17.

²¹2018 Cri.O.P.4610.

In *Jagroop Singh v. State of Punjab*²² there was recovery of weapon of offence made in pursuance of the disclosure statement of the accused and same was held admissible in the court of law.. It can be thereby said that reliability on medical evidence is increasing by the coming time since there is a huge possibility of witnesses to turn hostile but the medical evidence will always be accurate there has been any tampering of evidence.

Section 45 deals with Expert Evidence. It runs as : *“When the court has to form an opinion upon a point of foreign law or of science or art or as to identity of handwriting or finger impressions, the opinions upon that point of persons specially skilled in such foreign law, science or art or in questions as to identity of handwriting or finger impressions are relevant facts. Such persons are called experts”*

Section 45 makes the opinion of experts valid and admissible under the court of law. In the case of *Gajraj v. State (NCT) of Delhi*²³, it was held that the accused can be convicted on the basis of scientific evidence. This scientific evidence may be of any kind, be that mobiles phones, internet, DNA samples, etc.

Section 293 of the Code of Criminal Procedure: It deals with reports of certain Government scientific experts. This sections states that if it fits, the court may summon or examine any such expert according to the subject matter of the case.

The Code of Criminal Procedure (Amendment) Act of 2005: Certain sections were added and some amended in Criminal Procedure Code in 2005, for the betterment of women, especially those who are victims of sexual abuse. To facilitate the examination of a person charged of rape as early as possible, after his arrest, S. 53A was added to the original Code to provide for his examination by any registered medical practitioner. Sub-Section 2 of S. 53A makes it mandatory to collect material for DNA profiling from the accused. The same has also been included in the Explanation of S. 53A and S. 54: "examination shall include the examination of blood, blood stains, semen, swabs incase of sexual offences, sputum, sweat, hair samples and finger-nail clippings by the use of modern and scientific techniques including DNA profiling and such other tests which the medical practitioner thinks necessary in a particular case. Section 164A provides for the examination of the person of the victim within 24 hours of receiving the information or commission of the crime by an RMP employed by the government or any local authority or any RMP of the area, with the consent of such woman or by any person competent to give consent on her behalf. The detailed

²²AIR 2012 SC 2600.

²³2010 CrI.A.P.2272.

examination shall include collection of material for DNA profiling (sub-Section 2).²⁴

VI. EXPEDITION EMBARKED BY INDIAN JUDICIARY ON THE CONCEPT OF DDTs

“It has become appallingly obvious that our technology has exceeded our humanity.”—Albert Einstein²⁵

The deception detection tests (DDT) includes polygraph, narco-analysis and brain-mapping. They help in revealing enclosed information in criminal cases and have been used by investigating agencies. These tests were known to help the investigating agencies to extract the truth but recently the apex court of India has clearly stated that DDTs will not be administered without consent.

The first Narco-analysis test was done in Forensic Science Laboratory, Bangalore in 2001 on an individual associated with offences committed by Veerappan. For conducting the test, NHRC has laid down certain guidelines to the effect that the test should only be administered if the consent of the subject is obtained before a Magistrate and therefore, the police cannot by themselves conduct the test whenever they deem appropriate.²⁶

The Bombay High Court, in a significant case of *Ramchandra Ram Reddy v. State of Maharashtra*, upheld the legality of the use of DDTs. The court held that the evidence received on the basis of DDTs is admissible in the court. Keeping in view the high rise of technology induced crimes, the use of these scientific techniques proved to be useful. The judgment also upheld that these tests included minimal body harm. Surender Koli, main accused in the Nithari case, was brought to Forensic Science Laboratory in Gandhinagar in January 2007 for narcoanalysis. Polygraph test was conducted on Moninder Singh Pandher and his servant Surender Koli, accused of serial killing of women and children in Nithari, to ascertain the veracity of their statements made during their custodial interrogation. Various confessional statements were made by the accused under the effect of the drug, he could remember the names of the females he had murdered and revealed his urge to rape them after murdering them.²⁷

VII. TURNING POINT OF SIGNIFICANCE OF DDTs IN INDIAN JUDICIAL SYSTEM

The Indian judiciary finally recognized and condemned the abusive nature of narco-analysis, brain-mapping, and polygraph tests.

²⁴ Harish Dasari et al., *Recent amendments in the Laws pertaining to crimes against women: An overview*,30(4) J Indian Acad Forensic Med, 259, 263-264.

²⁵ www.brainyquote.com.

²⁶ Barcelona Panda, *Narco-Analysis and its Evidentiary Value in India*, The Practical Lawyer, Oct. 31, 2018.

²⁷ *Ibid* 24.

The Supreme Court's recent decision in *Smt. Selvi & Ors. v. State of Karnataka*²⁸ prohibited all involuntary administration of such tests, holding them to be "cruel, inhuman and degrading treatment".

The Supreme Court took this decision in the light of International Human Right and the rights enshrined by the constitution. The Supreme Court disagreed with High Courts on the area of taking the help of these tests on the scope of the reliability, self-incrimination protection and substantive due process rights.

1. Unreliability of tests: Supreme Court criticized the validity of narco analysis, brain mapping and polygraph tests. Many High Courts had approved of these tests in the past but Supreme Court questioned the reliability of these tests saying that these tests could lead to discovery of false evidence and misleading information. This de-mystification of the techniques allowed the Court to carry out a thorough analysis of the various constitutional rights at stake, namely rights against self-incrimination and substantive due process rights, a study that the High Courts were unable or unwilling to do.

2. Right against self-incrimination: The Supreme Court overruled decisions of High Courts stating conducting narco analysis, brain mapping and polygraph tests violates the subject's right against self-incrimination in contravention of Article 20(3) of the Indian Constitution.

3. Substantive due process rights: Supreme court again departed from the stance taken by lower courts. The apex court found that these tests violated the right to privacy of the subject. The court also declared that these tests were inhumane and cruel in their conduct and there is a possibility that the subject can suffer harm during these tests.²⁹

VIII. REFURBISHING FORENSIC SCIENCE IN INDIA

Post 2008 Mumbai attacks, the Home Ministry appointed a committee to give the 'Perspective Plan for Indian Forensics' and declared 2010 a 'Year of Forensic Science'. However, the reports and recommendations of these committees have not been implemented apart from the merging of Government Examiner of Questioned Documents (GEQD) with Central Forensic Science Laboratory (CFSL). Suggestions given by committee such as to privatize forensic laboratory has not been thought through since this move would jeopardize the authenticity of evidences collected and may lead to false information and convicting of an

²⁸AIR 2010 SC 1974.

²⁹ *Narco analysis: Supreme Court sets out the truth*, The Milli Gazette, May 22, 2013, <http://www.milligazette.com/news/7290-narco-analysis-supreme-court-sets-out-the-truth>.

innocent person.³⁰ In 1968, the Ministry of Home Affairs, Government of India, set up a Forensic Science Laboratory for Delhi Police and the Central Bureau of Investigation under the administrative control of the Central Bureau of Investigation. This laboratory now provides expert opinion on various aspects of Forensic Science concerning crime investigation.³¹ The dire need of forensic investigators has forced the government to take necessary actions. The Supreme Court in the case of *Dharam Deo Yadav v. State of U.P.*³² emphasized on the need to adopt scientific methods in criminal case investigation.

The major influence of Malimath Committee has impacted the Indian legislations in a positive manner. The report recommended the amendment of sections of Criminal Procedure Code to give an amiable welcome to scientific evidence in the courts.

National Human Rights Commission has also played a vital role in the battle of forensic science. Since there is no specific law relating to the DDTs such as narco-analysis, polygraph test and brain mapping and every court has different adaptation in each case. Therefore certain guidelines were published 'Guidelines for the Administration of Polygraph Test (Lie Detector Test) on an Accused' in 2000. These are to be observed in the absence of any laws. The guidelines are as follows:

1. No Lie Detector Tests should be administered except on the basis of consent of the accused. An option should be given to the accused whether he wishes to avail such test.
2. If the accused volunteers for a Lie Detector Test, he should be given access to a lawyer and the physical, emotional and legal implication of such a test should be explained to him by the police and his lawyer.
3. The consent should be recorded before a Judicial Magistrate.
4. During the hearing before the Magistrate, the person alleged to have agreed should be duly represented by a lawyer.
5. At the hearing, the person in question should also be told in clear terms that the statement that is made shall not be a 'confessional' statement to the Magistrate but will have the status of a statement made to the police.

³⁰ Dr. T.R Baggi, Why is forensic science stunted and static in India?, The Hindu, (Sept. 11, 2011), <https://www.thehindu.com/opinion/open-page/why-is-forensic-science-stunted-and-static-in-india/article2442491.ece>.

³¹ Isha Tyagi & Nivedita Grover, *Development of Forensic Science and Criminal Prosecution-India*, Vol.4 IJSRP. 1 (2014).

³² 2006 CrI. A.P 369.

6. The Magistrate shall consider all factors relating to the detention including the length of detention and the nature of the interrogation.
7. The actual recording of the Lie Detector Test shall be done by an independent agency (such as a hospital) and conducted in the presence of a lawyer.
8. A full medical and factual narration of the manner of the information received must be taken on record.³³

IX. CONCLUSION

The present level of application of forensic science in crime investigation is somewhat low in the country, with only 5-6% of the registered crime cases being referred to the FSLs and Finger Print Bureau put together. There is an urgent need to bring about quantum improvement in the situation, more so when the conviction rate is consistently falling over the years in the country. With only 103 Laboratories and about 17 Regional Laboratories in the country whereas in USA there are about 320 Forensic Science Laboratories (including private sector Laboratories). It would, thus, appear that the number of Forensic Science Laboratories in the country is grossly inadequate and certainly not commensurate with our requirements.³⁴ Another major problem faced by our country in the field of Forensic Science is the lack of knowledge about forensic science which in turn affects the number of well trained investigating officers in the field of forensic science. Forensic education is lacking in our country and for that purpose field trips to forensic laboratories should be arranged in schools and colleges. Acknowledging the need of betterment in forensic field in India, more courses should be set up for students who are interested in the field of forensic science. The investigating agencies should train their officers in the department of forensic science as well so that they handle the evidences carefully. They should be trained to apply scientific methods in the investigation of crime. Various Central and State Forensic Laboratories should be opened for easy convenience to police forces in tracking down culprits. Since the traditional methods of criminal investigation such as physical torture and interrogation are going against our human rights, it is now the time to rely on scientific evidence. In India, the need for better forensic team is highly required and for that it is necessary forensic laboratories are opened in the regional areas and well trained forensic scientists are equally a part of the investigating team in the same way police forces are.

³³ Gaurav Yadav, *Guidelines for Lie Detection / Narco analysis / Polygraphy etc Test*, The Priest, <http://www.thepriest.in/2015/08/guidelines-for-lie-detection-narco.html>.

³⁴ Committee on Reforms of Criminal Justice System, Government of India, Ministry of Home Affairs, Volume I, 2003.