

Analysis on the Use of Forensic Science Techniques in the Criminal Justice System of India

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Abstract: *In Criminal Investigation Forensic Science is extremely influential, because of its preciseness and accurateness which escalates the probability of successful investigation and trial due to its logical nature, it has a dynamic role in the criminal justice system. It makes it easier for courts to reach reasonable conclusions by cutting down the probability of injustice. In the 21st century almost all over the world, it is used widely in criminal investigations. Forensic Science is not a peculiar discipline rather it is a parasol expression that entails erstwhile specialities of science and connects to all other subjects of medical science. It is an application of wisdom paired with skills and experience developed from early aspects of medicine, tocolgy and, surgery. Forensic science is a method of evidence collection within the boundaries of the legal system. Forensic Evidence aims to stipulate assistance in steering criminal investigations and to provide exact data to the courts on which they can depend for deciding criminal cases. The current paper produces the pertinency of scientific and modern techniques of forensic science in criminal investigation and its position in maintaining law and order in society and also paper covers the legislative framework regarding the applicability of Forensic Science in criminal investigations with the supportive judgements by the Indian Judiciary.*

Keywords: Forensic Science, Forensic Evidence, Science, Crime, Criminal Investigation, DNA

I. INTRODUCTION

The law is the basis of a society, and the judiciary is responsible for the interpretation of the law. Society of the 21st century is modern and vibrant, but not steady. So that is why when society changes the law ultimately changes. In the Indian criminal justice system application of Science and Technology for Crime Identification and Criminal Investigation is not new. At the current stage of society with the developing science and technology crimes have become complicated. Regardless of development, a lot of citizens are ignorant of the function that science and technology play in the identification of crimes and offenders as well as the investigation. In its application through legal boundaries, it is identified as “Forensic Science.” Earlier, it was legal medicine, which originally came into the arena of science and, as such, the opinion of medical practitioners has been sought over the centuries to uncover the root cause of the death of an individual, whether it is natural or unnatural. From the 16th Century, when medical practitioners started to write about the use of forensic science until the end of the 18th century, brought light on the first evidence of modern pathology.¹“The first laboratory of forensic science was established by Edmund Locord of France 1910,”² the progress of forensic science has been used to find answers to mysteries, to resolve crimes, and to convict criminals. Since then the field of forensic science is transforming precipitously because of new technologies and methods. Nowadays scientists conduct DNA tests, high-performance liquid chromatography, mass spectrometry, 3-D computers and new hi-tech technologies to recreate the crime and the incident for investigation. Forensic science is cutting-edge technology in today’s world of criminal investigations and can answer crucial questions arising out of investigations, it

¹van den Tweel JG, Taylor CR. *A brief history of pathology: Preface to a forthcoming series that highlights milestones in the evolution of pathology as a discipline*, Virchows Arch.,457(1):3-10, Jul (2010).

²Rosemary Frollini, *Super Sleuths: Solving the Crime with Forensic Science*, <https://www.cmu.edu/gelfand/lgc-educational-media/super-sleuths/index.html>.

is an integral part of the criminal justice system. Science and law together become progressively complicated, to make sure justice is done through fair procedure. Scientific evidence poses the noteworthy possibility of an enormously precise factual investigation and lessening the ambiguity for the court in deciding the matters. The discipline of forensic science is founded on various scientific fields including physics, chemistry, and biology which emphasise physical evidence through recognition, identification and evaluation. Forensic science acquires data significant to legal evidence as it uses an extensive range of sciences, and for that, it is a vital part of the criminal justice system.

In India, forensic development had its first setup at Madras, presently Chennai, Tamil Nadu, with the first Chemical Examiner's Laboratory in 1849, the Anthropometric Bureau in 1892, the Finger Print Bureau in 1897, the Inspectorate of Explosives in 1898, the Office of Government Handwriting Expert in 1904, Ballistics Laboratory in 1930. After the independence Republic of India established the first Central Forensic Science Laboratory (CFSL) at Calcutta in 1957, followed by Chandigarh in 1961 and 1965 at Hyderabad.³

Forensic science can provide evidence to prove the existence of crime and the connection between crime and offender through conducting examinations of physical Tests and administering other tests such as DNA, Fingerprints, Narco-Analysis, Polygraph, Handwriting etc., by interpreting the data acquired through tests and by giving true testimony in the court of law by forensic experts showing clear and concise relationships between crime and offender. Forensic science through its scientific knowledge has become an essential part of criminal cases and judgements by providing scientific facts to the courts. For deciding criminal matters testimony of forensic experts has become a trustworthy factor because their testimony is established only on scientific facts and these experts are not bothered about the outcome of the trial.

II. RESEARCH METHODOLOGY

In the paper "ANALYSIS ON THE USE OF FORENSIC SCIENCE TECHNIQUES IN THE CRIMINAL JUSTICE SYSTEM OF INDIA," the mode of data collection is secondary sources available from parliamentary debates, legislations, government reports, magazines, published papers, news articles, and journals. The method followed is purely Doctrinal.

III. FORENSIC SCIENCE & TECHNOLOGY

At the initial stage of forensic investigation, the forensic team collects the samples and processes them to collect legal evidence. These scientific measurements consist of test analysis, fingerprint detection and identification, chemical analysis, and body fluid management. It is significant to underline that this is the blend of science and technology that permits forensic experts to function scientifically and perform tests.

1) **DNA:** "Deoxyribose Nucleic Acid" commonly known as DNA, in forensic investigation DNA profiling is the most reliable method. It gives an individual a genetic imprint, this organic substance originates in each living cell. DNA can be found in wide-ranging sources like blood, sperm, bone, saliva, hairs, nails etc. DNA profiling technology is a stroke of luck in science and aiding homo sapiens without any prejudice, which bestows an accurate identity.

The admissibility of DNA as forensic evidence in criminal matters each time varies, deciding its admissibility in a court of law, which is capable of satisfying the judge and its reliability on the evidence presented always depends on the accurate collection of samples, storage and documentation. In the Indian Evidence Act, 1872 there is no such provision that specifies DNA profiling except for "paternity tests under Section 112 of the act."⁴ To address the issue of science and technology concerning forensic evidence no specific provisions are laid under the

Code of Criminal Procedure, 1973 as well. An investigating officer under Section 53 of Cr.P.C. confronts various challenges to congregate evidence, which denotes advanced means, to illustrate the guilt of the accused. The Amendment in 2005 under Cr.P.C. has inserted two sections i.e. 53A and 164A in the act empowering the investigating officer to accumulate DNA samples from the Victim and Accused with the assistance of a medical practitioner. The

³Dr. Gopal Ji Mishra & Dr. C. Damodaran, *Perspective Plan for Indian Forensics*, https://www.mha.gov.in/sites/default/files/2022-09/IFS%282010%29-FinalRpt_0%5B1%5D.pdf

⁴Nikhat Parveen v Rafiqi, 2023 SCC OnLine Del 6751.

sections permit the medical examination of the rape victim and the accused of rape, but the admissibility of this evidence hangs around in doubt as an outlook of the Supreme Court and various High Courts persists debatable. Scientific accuracy and findings of DNA tests do not pose ambiguity in the view of a judge but in certain cases, admissibility remained in doubt for legal reasons, constitutional proscription, and at times public policy.

To address this issue, the “DNA Technology (Use and Application) Regulation Bill, 2019 was introduced in Lok Sabha by the Minister for Science and Technology, Mr. Harsh Vardhan, on July 8, 2019. The Bill provides regulation, use and application of Deoxyribonucleic Acid (DNA) technology for establishing the identity of certain classifications of persons involving the victims, offenders, suspects, undertrials, missing persons, unknown deceased individuals and for matters connected therewith or incidental to that, after discussions in parliament it was referred to standing committee, and on basis of a report by Standing Committee the said bill was withdrawn in 2023.”⁵

“To address the issue of forensic evidence and admissibility, the provisions laid down in new criminal laws under *Bhartiya Nyaya Nagric Suraksha (second) Sanhita, 2023* mandates forensic investigation for offences punishable with seven years of imprisonment or more. In such cases, Forensic experts will visit the crime scene to collect evidence and record the process on a mobile phone or any other electronic device,”⁶ and yet-to-be-implemented.

2) **Narco-Analysis:** The Narco-Analysis also known as the Truth Serum test, is a “method that involves the intravenous administration of drugs like sodium pentothal, scopolamine and sodium amytal which causes the individual to enter into several stages of anaesthesia. In that hypnotic stage, the individual becomes less inhibited and is more likely to divulge information, which would usually not be revealed in the conscious state. He or she may also divulge all his/her fantasies, personal wishes, impulses, instinctual drive, illusions, delusions, conflicts, and misinterpretations etc., the disadvantage of this method is that some individuals retain their ability to deceive even in a hypnotic state. The drugs used do not assure that the individual will speak only the truth. The statements made in a hypnotic state are not voluntary and also not in a clear state of mind; hence these have not been admitted as evidence in the court of law. Although this method was recognised since World War II, but has not been backed by any scientific research to justify its claim.”⁷ Throughout the activity of the narco-analysis test, drugs inoculated into the body of an individual affect the power of thinking, which ultimately results in the revelation of information regarding the incident.

The High Court of Kerala stated in *M. C. Sekharan and Ors.*⁸ case that the test may serve the truth but it is explicitly against the fundamental rights of the accused. The use of such methods unsympathetically affects the health of whom it is applied and the individual may become schizophrenic.

Allahabad High Court in the matter of *Abhay Singh vs. State of U.P.*,⁹ stated during an interrogation of the accused in custody this method can be adapted to reveal the mysteries related to crime and to find out the truth. If it is beneficial in the discovery of facts describing the offence, it should be used and applied, and the courts must not obstruct the conduct of the exercise.

3) **Polygraph:** This method also known as the Lie Detector test, is a measurement that records the bodily response involving blood pressure, pulse rate, and respiration of an individual during interrogation. Polygraph test speculates that the accused is uprightly spotted in a hyperarousal state in measurements.

“On 12 November 1999, the National Human Rights Commission provided guiding principles for the execution of the test on an individual, which were as follows: i) No lie Detector test should be administered without the consent of the accused. An option should be given to the accused as to whether he wishes to avail the test. ii) If the accused volunteers for the tests, he should be given access to a lawyer. The police and the lawyer should explain the physical, emotional

⁵Ministry: Science and Technology and Earth Sciences, *The DNA Technology (Use and Application) Regulation Bill, 2019*, <https://prsindia.org/billtrack/the-dna-technology-use-and-application-regulation-bill-2019>.

⁶Ministry: Home Affairs, *Bhartiya Nyaya Nagric Suraksha (second) Sanhita, 2023*, <https://prsindia.org/billtrack/the-bhartiya-nagrik-suraksha-second-sanhita-2023>.

⁷Math SB. *Supreme Court judgment on polygraph, narco-analysis & brain-mapping: a boon or a bane*, *Indian J Med Res.* 134(1):4-7, Jul,(2011).

⁸1980CRI. L. J. 31.

⁹2009 Cri. L. J. 2189.

and legal implications of such a test to him. iii) The consent should be recorded before a Judicial Magistrate. iv) During the hearing before the Magistrate, the accused should be duly represented by a lawyer. v) At the hearing, the person 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. vi) The Magistrate shall consider all factors relating to the detention including the length of detention and the nature of interrogation. vii) The actual recording of the Lie Detector Test shall be done in an independent agency (such as a hospital) and conducted in the presence of a lawyer.viii) A full medical and factual narration of the manner of information received must be taken on record. These guidelines of the Commission were circulated to the Chief Secretaries and DGPs of States as well as Administrators and IGPs of UTs by a letter dated 11 January 2000.”¹⁰

In *Selvi & Ors. Vs State of Karnataka*,¹¹ concerns have been raised about the investigation through psychoanalytical tests without the due consent of the accused, the apex court of the country ruled that execution of techniques like narco-analysis, lie-detector and brain mapping without the consent of the accused violates the person’s right against self-incrimination as well as right to life and personal liberty under the article 20(3) and 21 of the Indian Constitution respectively.

4) **Fingerprints:** In a criminal investigation, fingerprint identification is a crucial tool, due to its uniqueness. Fingerprints take shape in the womb and grow over the time as baby grows. It can be changed only through permanent scars. Fingerprints are unique, even identical twins have dissimilar prints. The motive behind collecting fingerprints is to identify the suspect. Generally, three types of fingerprints can be found latent, patent, and plastic. Latent fingerprints formed by the sweat and oil on the surface of the skin, are invisible to bare eyes to be seen it requires the administration of basic powder techniques or chemicals. Patent fingerprints are usually formed by blood, grease, ink, or dirt and are visible to the naked eye. Plastic fingerprints can be made by impressions on fresh paint, wax, soap, or tar this also can be seen to the naked eye. Criminals not only leave fingerprints but sometimes lip prints are found on glasses, cups and spoons and even footprints left on soil or dirt, likewise tyre marks, bite marks, and toe prints by bare feet. All these types of prints can be useful as evidence in criminal trials and convictions.

5) **Handwriting:** Section 47 of the Indian Evidence Act permits the test to identify handwriting by experts when a court has to form an opinion on any document whether written or signed, related to the case. It is, therefore, for the party, who produces an expert shall have the requisite skills. The Hon’ble Supreme Court stated in *Ajay Kumar Parmar’s* matter that “The opinion of a handwriting expert is fallible/liable to error like that of any other witness, and yet, it cannot be brushed aside as useless. There is no legal bar to prevent the Court from comparing signatures or handwriting, by using its own eyes to compare the disputed writing with the admitted writing and then from applying its observation to prove the said handwriting to be the same or different, as the case may be, but in doing so, the Court cannot itself become an expert in this regard and must refrain from playing the role of an expert, for the simple reason that the opinion of the Court may also not be conclusive. Therefore, when the Court takes such a task upon itself, and findings are recorded solely based on comparison of signatures or handwriting, the Court must keep in mind the risk involved, as the opinion formed by the Court may not be conclusive and is susceptible to error, especially when the exercise is conducted by one, not conversant with the subject. The Court, therefore, as a matter of prudence and caution should hesitate or be slow to base its findings solely upon the comparison made by it. However, where there is an opinion whether of an expert, or of any witness, the Court may then apply its own observation by comparing the signatures, or handwriting for providing a decisive weight or influence to its decision.”¹²

6) **Forensic Ballistic:** This is the branch of Forensic Science also known as Ballistic Fingerprinting, that studies bullets and firearms to find out the connections relating fired bullets and the firearm used, the aim of forensic ballistic is to assist the court with scientific evidence regarding the use of bullets in crime.

¹⁰Guidelines on Administration of Lie Detector test, <https://nhrc.nic.in/press-release/guidelines-administration-lie-detector-test>.

¹¹2010 (7) SCC 263.

¹²*Ajay Kumar Parmar vs State of Rajasthan*, AIR 2013 Supreme Court 633.

IV. FINDINGS AND SUGGESTIONS

The area of forensic science with the latest technologies and methods transforming tremendously. Nowadays, scientists conduct DNA tests, high-performance liquid chromatography, mass spectrometry, and 3-D computer imaging as well as innovative methods to rebuild the scenes of crimes and incidents. Modern forensics makes it easier to expose hidden crimes and convict the offender or acquit the innocent. In the matter of “Dharam Dev Yadav vs State of U.P.”,¹³ the Hon’ble Supreme Court of India deliberated on the significance of Forensic Evidence, particularly in brutal and organised crimes. Supreme Court observed that forensic science has a pioneering role in establishing the element of the crime, identifying the suspect, and determining the guilt or innocence of the accused. “Modern Science plays a dynamic role in criminal investigations and trials, through the identification of victims and suspects of crimes, accidents, disasters, and wars. Forensic experts administer tests such as DNA, Fingerprints, Narco-Analysis, Polygraph, Handwriting etc., to prove the connection between crime and suspect or offender. While observing the Indian Forensic set-up prudently, there are several inadequacies and drawbacks required to be attended for appropriate execution. In India reliability of forensic evidence is negatively affected by the dearth of research, proper legislation, and the non-availability of databases. In India, there is an urgent need for proper legislation to address the issues of forensic science and evidence, it is suggested that applicable provisions and special legislation dealing with the assessment of forensic evidence in the Indian Evidence Act and the Cr.P.C. should be inserted, to facilitate modern technologies and its effective use in investigations and trials.

Ministry of Home Affairs, Government of India to evaluate the forensic set-up in India and the enhancement of forensic science appointed two advisers, retired IG & Director FSL Punjab State Dr. Gopal Ji Mishra and retired Director, Forensic Science Department, Tamil Nadu Dr. C. Damodaran. In 2010 came up with the report titled ‘Perspective Plan for Indian Forensics’,¹⁴ however implementation of the entire report is yet to be done. Parliament of India in September 2020, passed two legislations, The National Forensic Science University (NFSU) Act,¹⁵ which provides the establishment of regional centres for education and research in India and universities assistance to State Governments to enhance the process of crime investigation, detection and prevention, and the Rashtriya Raksha University (RRU) Act,¹⁶ to arrange and foster global standards of learning and research in policing, law enforcement, cyber security, artificial intelligence and risk management.

The new criminal laws under Bhartiya Nyaya Nagric Suraksha (second) Sanhita, 2023 mandates forensic investigation for offences punishable with seven years of imprisonment or more. In such cases, Forensic experts will visit the crime scene to collect evidence and record the process on a mobile phone or any other electronic device,¹⁷ and yet-to-be-implemented.

V. CONCLUSION

From the above discussions, it is ostensible that there is an exigent requirement for the implementation of Forensics in India, to provide speedy and efficient justice for its citizens, where eyewitnesses turn hostiles in a court of law, the judiciary can depend on forensic evidence for smooth justice. Locard was the first person to theorise the “Principle of Interchange in 1910, when someone commits a crime, he/she always leaves something behind, that was not there before, and carries away something that was not on the person when he/she arrived.”¹⁸ Even today this is the basic principle of criminal investigation and it applies to traces of evidence left behind by criminals.

¹³2014 (5) SCC 509.

¹⁴Supra note 5.

¹⁵Ministry of Law and Justice, *The National Forensic Science University Act, 2020*, https://www.mha.gov.in/sites/default/files/NFSUAct2020_05102020.pdf

¹⁶Ministry of Law and Justice, *The Rashtriya Raksha University Act, 2020*, https://www.mha.gov.in/sites/default/files/TheRashtriyaRakshaUniversityAct2020_05012021.pdf

¹⁷Supra Note 8.

¹⁸Supra Note 2.

In a modern and vibrant society, advancements in technology, socio-economic turmoil, population growth, instant communication means, and easy-going access to scientific knowledge have certainly changed the way crime takes place presently. The astonishing developments in science and technology allowed hi-tech advancements in forensic science involving various disciplines, forensic science is essential in the criminal justice system and it should be used on a widespread scale in criminal investigations. Nowadays, it is necessary to embrace scientific techniques in criminal investigations, as they play a vital role in the investigation, by way of DNA profiling, Fingerprints, Narco-analysis, and Polygraph tests to find offenders. Forensic reports are mainly dependent on the quality of the collected samples by investigating officers, for that forensic training should be made mandatory for investigating officers.

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