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FORENSIC SCIENCE AND MISCARRIAGE OF JUSTICE- Rhythm Dahiya¹**Abstract:**

Forensics is a mentality for logical and critical thinking required for decision making in any ecosystem, including court situations. It is not just an expert view or technology-driven discoveries. Probity in evidence-based arguments is infused with forensic vision, which guarantees the acceptability of a fact. Procedural justice is guaranteed in every procedure involving forensic information, be it social, political, economic, legal, or technological. The field's horizons could be expanded with the aid of forensic intelligence. Authors use terms like "Community Forensics," "Forensic Journalism," "Social Media Forensics," "Environmental Forensics," "Financial Frauds," and "Banking Forensic" to broaden the scope of this specialised field.

The term "forensic aid" is also used to discuss how society as a whole needs to understand this issue in order for vulnerable and marginalised groups to have access to justice. A humble attempt is made to elucidate the limitless scope of the suggested terms and their ability to uphold democratic ideals, guarantee the rule of law, and guarantee the right to a dignified existence and means of subsistence.

Since the beginning of time, "justice" has remained the fundamental element of life and liberty regardless of place or time, and the belief that justice has not been served correctly is the primary catalyst for all disagreements. Finding the truth and averting injustice are the goals of criminal investigations and trials.³ The pillars of responsive government necessary to establish a just society are "Justice, Truth, and Evidence." The "truth" of a fact basically helps the court to administer justice. Truth and justice, however, are both abstract concepts, and "evidence," a material instrument, aids in determining the truth and confirming a fair trial. Evidence that is supported by science is therefore the triumph of justice over falsehood.

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A rapidly expanding field, forensics began as a synthesis of the social sciences and pure sciences, particularly law. It made a stunning entrance into courtrooms. It has contributed to the scientific tempering of the evidence system transformation by integrating impartial and equitable validation. The field of forensic science has come to represent the investigation's procedural fairness and its ultimate goal of restoring confidence in the legal system. Admissibility in a court of law is established by the impartiality, scientific validity, and probity of forensic evidence, which can be utilised honourably to either demonstrate innocence or inculcation (to prove guilt). In fact, the right to a fair trial depends on the integrity of the investigation, and forensics will help ensure that the trial proceeds as quickly as possible by clearing up confusion and revealing the truth while evaluating the evidence.

Herein, this paper is focused on the current aspects and position of forensic science in criminal justice system, including the controversial body of forensic science supported by statistical data, highlighting via case laws the developments and importance of forensic science for courts and the evaluation.

Key words:

Forensic science, DNA, laboratories, India, developments, criminal, courts, investigation, police, reports, statistics

Statement of problem:

Forensic science is one of the most essential element of criminal justice, fulfilling several roles in criminal investigations and recognizing the suspect, seldom missing piece and negligence in conducting reports leads to injustice.

Research Methodology:

Qualitative and Quantitative methods were applied for this study, the study was based on the interpretation of the statistical data with close relation to the acquired theory. The study is meant to interpret the causes and effects of forensic science which led to seldom criminal injustice.

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The present research is studied from variety of channels which includes external sources such as internet, organisational data and statistics.

Introduction:

Understanding the concept of forensic science:

In India, forensic evidence is essential to the criminal justice system. In order to guarantee justice and equity in criminal proceedings, it offers an impartial and scientific foundation for determining a suspect's guilt or innocence. Establishing the facts of a case and identifying the criminals are two other uses for forensic evidence.

Where science and law collide is in forensic science. It is highly significant in both civil and criminal cases. The tangible evidence retrieved from the crime site is known as forensic evidence. The fragments of evidence discovered at the scene of the crime are crucial for the foundation of a just verdict. With the documents serving as the major evidence, they are regarded as secondary evidence. In a court of law, primary and secondary evidence are offered to aid the judge in comprehending the facts and rendering a decision.

Any tangible or digital evidence that can be utilised to solve a crime is considered forensic evidence. Crime scenes, victims, suspects, and witnesses may provide evidence. A wide number of fields are included in forensic science, such as digital forensics, toxicology, ballistics, DNA analysis, and fingerprint analysis. Forensic experts and forensic laboratories provide the specific training and skills needed for the collection, analysis, and interpretation of forensic evidence.

Technology and methods from a variety of scientific fields, including medicine, biology, chemistry, pharmacology, and so on, are used in forensic science. For instance, physics was used to pattern the blood that was discovered at the location. While chemistry can assist in ascertaining the cause of death or the combination of medications in the body, biology aids in the identification of the deceased body.

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In recent times, there has been a notable surge in the utilisation of forensic evidence within the Indian criminal court system. This is because forensic laboratories have been established all over the nation and there is a growing recognition of the value of scientific evidence in criminal investigations. The top forensic laboratory in India is called the Central Forensic Science Laboratory (CFSL), and it has regional branches spread throughout the nation.

The legal system is not new to the idea of forensic science. In 1902, Argentina became the first nation to use forensic evidence in a criminal investigation. The suspect was identified through the presentation of fingerprint evidence by Sir William Herschel. Since ancient times, even the Indian justice has depended on evidence such as post-mortems, DNA analyses, and fingerprints. The application of sophisticated forensic techniques, such as lie detectors and narco-analysis, has also increased recently. The forensic study has strengthened the basic tenet of criminology—namely, that no crime is perfect. It promotes equity by helping to find the guilty guilty and to pardon the innocent.

Literature review:

A wide range of scientific fields are included in forensic science, such as toxicology, digital forensics, ballistics, DNA analysis, and fingerprint analysis. The investigation of crime scenes, the gathering, processing, and presenting of evidence in court all depend heavily on these disciplines. The significance of forensic science in the Indian "Criminal Justice System" (CJS) has gained attention in recent years. By offering scientific evidence to support the investigation and resolution of criminal cases, it plays a critical function in the CJS. Numerous obstacles that impact the calibre and dependability of forensic evidence are present in the Indian criminal justice system's use of forensic science. ²

By overcoming these obstacles, the Indian criminal justice system can be strengthened, forensic evidence's quality and reliability can be increased, and justice can be delivered in a trustworthy and equitable manner. In order to guarantee that the Indian criminal justice system is strong, dependable, and compliant with global best practices, it is necessary to assess and improve the application of forensic science. In order to better understand the various forensic scientific domains, the Indian criminal justice system's current legal

²Prapti Kothari, "Exploring the Role of Forensic Science in Indian Criminal Justice System". 2023 Sept. 7 (last visited on April 30, 2024)

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framework, and relevant judicial precedents, this research study will identify obstacles and offer suggestions for future development.

The notion of justice is an essential component of any civil society. Courts are ultimately in charge of allocating justice in an appropriate manner. People's level of faith in the Court is determined by their actions about a truth. The significance of this idea increases while discussing the Criminal Justice System. There are cases where the true offender gets freed after an innocent person is falsely convicted. We refer to this as a miscarriage of justice.³

The advancement of DNA technology has given criminal investigations new perspectives. It has also given the criminal justice system a substantial amount of supporting scientific evidence. It is imperative that special legislation and legal changes be implemented in order to address the legal dogmas, paradoxes, and applications of DNA technology in relation to the fast evolving socio-economic issues of Indian society. The DNA bill is going to be passed by the Indian government. The committees set up to provide feedback mostly spread the myth that a person's DNA profile contains private genetic data that may be exploited. This law, which strikes a balance between long-standing legal precepts, human rights, and cutting-edge scientific research, will undoubtedly prove to be a crucial component in addressing current legal concerns and the moral practice of DNA testing.⁴

A significant part of the Indian criminal justice system is played by forensic science. The primary goal of forensic science is to obtain sufficient data and facts; competent medical examiners and forensic scientists meet this demand, and their judgement determines whether or not the evidence can fairly convey the case's facts. The advantage of forensic science is that it may be applied to any type of criminal case, including homicide, rape, and murder investigations, are the offences for which forensic science is most useful. Scientific evidence is necessary to establish the offence in every case prosecuted in a court of law. Additionally,

³Available at <https://articles.manupatra.com/article-details/Innocent-Behind-Bars-Challenges-and-Remedies> (last visited on April 30, 2024)

⁴Available at <https://ejfs.springeropen.com/articles/10.1186/s41935-022-00309-y#Sec12> (last visited on April 30, 2024)

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the Indian criminal justice system adopted the forensic science method to provide a scientific conclusion for cases in order to facilitate this process.⁵

We are living in a period of the knowledge revolution, and as a result of technological improvement, India's crime rate has suddenly and dramatically increased. And then there is a need to enhance the legal system, which is why forensic science was created to provide the scientific justification for cases. In modern cases, forensic science provides the scientific evidence needed to establish a suspect's guilt or innocence, aiding in the rendering of a decision that complies with the law.

History:

In India, the use of science and technology for crime detection, investigation, and justice administration is not new. Even though forensic science as we know it now was unknown to our forefathers, scientific approaches appear to have been applied in some capacity to criminal investigation. The approximately 2300-year-old Kautilya's Arthashastra contains a thorough reference to it. Thousands of years ago, Indians examined different patterns in the papillary lines.

It is assumed that they were aware of the uniqueness and durability of fingerprints, which they employed as a form of identification. Even the regular contributor to Nature, Mr. KM Kata, said that the Chinese records demonstrated that fingerprints were used in a prehistoric southern Indian empire. Indians had aware for a very long time that the handprints, or Tarija, were distinct and inimitable. Until it was established via scientific research that fingerprint recognition was a foolproof method of identification, the centuries-old practice of illiterate Indians using their fingerprints as a form of signature was viewed by some as purely ceremonial (Flawless, Perfect).

Chemical examiner laboratories:

⁵Available at <https://ylcube.com/c/blogs/role-forensic-science-indian-criminal-justice-system/> (last visited on April 30, 2024)

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It became necessary to isolate, detect, and estimate the different poisons absorbed in the human system throughout the nineteenth century when the law enforcement agencies were having trouble keeping up with the number of poisoning deaths. Therefore, in 1849, the Department of Health at the then-Madras Presidency established the first Chemical Examiner's Laboratory for this purpose.⁶

Anthropometric bureau:

Although there was considerable progress in identifying poisons, the identification of individuals, more especially, criminal was still done quite randomly. In order to identify the prisoner if he was ever implicated in another crime, police officers would attempt to commit the convict's face to memory. The Criminal Investigation Department (CID) began keeping records of all known criminals, complete with a description of their look, with the advent of photography. Following the creation of Bertillon's anthropometric system in 1878, India adopted the method for personnel identification, as did other nations. As a result, an anthropometric bureau was established in Calcutta in 1892 to keep anthropometric records of criminals.⁷

Finger print bureau:

The District of Hooghly (Bengal) Collector, William Herschel, discovered that a person's fingerprints remained the same throughout his life. In order to protect the government's interests against native contractors disputing contracts, Herschel used his expertise to create a system for registering the finger or thumb impressions of contractors. Subsequently, he expanded his registration process to include jail rules for identifying formerly incarcerated individuals.⁸

Department of explosives:

As the usage of explosives for subversive purposes increased, it became important to identify any purposeful or unintentional explosion causes. The first chief inspector of explosives was appointed in 1898, and his headquarters were located in Nagpur. This marked the beginning

⁶Available at <https://www.lawinsider.com/dictionary/chemical-examiner> (last visited on May 05, 2024)

⁷Available at <https://www.bioline.org.br/request?jp00100#:~:text=With%20the%20invention%20of%20Bertillon's,established%20in%201892%20at%20Calcutta>. (last visited on April 05, 2024)

⁸Available at <https://www.studocu.com/in/document/amity-university/criminal-law/finger-print-bureau-of-india/37162462> (last visited on May 05, 2024)

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of the Department of Explosives. Later, three sub-offices and five regional offices were established in Gwalior, Madras, Bombay, Agra, and Calcutta. They became proficient in offering scientific hints regarding explosives and potential explosion causes. Their knowledge was useful for developing different laws under the Explosives & Petroleum Act as well as for police investigations into explosion-related offences.⁹

Ballistics laboratory:

To handle the inspection of weapons, the Calcutta Police established a small ballistic laboratory and hired an Arms Expert in 1930. Other State CIDs set up tiny ballistics laboratories to aid in their criminal investigations as the threat posed by firearms increased.¹⁰

Indian academy of forensic science:

In 1960, the Indian Academy of Forensic Sciences (IAFS) was founded. This academy launched a biannual scientific publication that functioned as a platform for forensic science ideas to be shared with other international organisations. The Academy's duties also included organising yearly scientific conferences and seminars and helping to organise forensic science lectures. Actually, the Government of India formed the Neutron Activation Analysis Unit in response to this Academy's request in order to meet the nation's forensic requirements.¹¹

But the Institute's ultimate goal was to become a complete academic organisation connected to a university. The Institute of Criminology and Forensic Science (ICFS) was founded in Delhi in 1971 with the specific goals of doing research in criminology and forensic science and providing training to in-service staff. This was done with the aforementioned goal in mind.

Additionally, it was intended for the Institute to consist of two separate colleges: the Faculty of Forensic Science and the Faculty of Criminology. Both faculties were to be staffed by a number of distinguished researchers and professors with sufficient training and real-world experience.

⁹Available at <https://www.indiastandardsportal.org/standardbodycontent.aspx?StandardBodyId=17> (last visited on May 05, 2024)

¹⁰Available at <https://cfslhyd.gov.in/Ballistics%20Division.html> (last visited on May 06, 2024)

¹¹Available at <http://iafmonline.in/> (last visited on May 06, 2024)

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Fields of forensic science under Indian Criminal Justice System:¹²

Narco-Analysis Test: Narcosis is a drug-induced state of unconsciousness. A procedure known as "narco-analysis" involves injecting a subject with a substance to send them to sleep or into a sleepy condition, and then questioning them while they are in this state. This technique has been used to jog a witness's memory. An individual undergoing a Narco-Analysis test is rendered incapable of thinking due to the effects of the drug injected into him.

Polygraph, often known as the polygraph test: is a method of recording psychological activity. The word "polygraph" translates to "many writings." The idea is that when someone lies, it makes him anxious, which in turn leads to mental excitement. In an attempt to conceal the happiness, the adrenal glands are prompted to release Adrenalin, which, once entering the bloodstream, determines the force per unit area, heart rate, and breathing rate. When psychological changes are recorded, they are collectively referred to as Polygrams, and they are examined to determine whether the suspect was emotionally stressed out by the questions posed during the lie detection test.

Brain mapping, often known as the P300 test: is another name for this technique: "Brain wave finger printing." Using this method, the suspect is initially questioned and interviewed to see if he is withholding any important information. In addition to having sensors fastened to the top, the individual is positioned in front of a computer monitor. A few images and sounds are shown to the suspect, and they are made to hear them. The attached sensor tracks and documents P300 waves and electrical activity in the brain, which are generated whenever the subject is in contact with a stimulus. There are no questions posed to the suspect.

In this way, the brain's fingerprint and the information about the relevant crime and crime scene that is stored in the brain correspond. In the event that the subject is innocent, the test records no such P300 wave. The Bangalore Forensic Laboratory is the main laboratory in India that employs this technique. The scientific expert's opinion is only one piece of

¹²Available at <https://www.freelaw.in/legalarticles/Forensic-science-under-criminal-laws-in-India> (last visited on May 11, 2024)

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evidence that must be taken into account and valued for its evidentiary value; the Court takes into account all other available proofs in addition to this one.

DNA Profiling: In forensic science, DNA profiling is one of the most trustworthy methods of investigation. The word "deoxyribose nucleic acid," which is an organic material that provides each living cell with its own genetic blueprint, is shortened to "DNA." Sources of DNA include blood, saliva, bone, and semen. Fredrick Micscher made the initial discovery of DNA in 1869[5]. DNA testing are very successful because, with the exception of twins, no one's DNA is identical to another. Three billion to one is the probability that two pieces of DNA will be identical. Furthermore, because it is unchangeable, it is dependable. A DNA test is used in a number of situations to identify disfigured dead corpses etc.

Fingerprints: One of the most important pieces of evidence that criminal detectives use is fingerprint evidence. People's fingertips have a unique pattern of ridges from birth. Rich in sweat pore formation, the ridges create a pattern that doesn't go away. When the skin regenerates, the same pattern will be visible regardless of whether the skin is split. Fingerprints often contain whorls, loops, and arches as patterns. These substances leave patterns on fingers that accumulate along the ridges; these patterns make up the fingerprints that the police need at the scene of an illegal activity.

Challenges in integrating forensic in criminal justice system:

Just over 3000 reporting officers, or experts or scientists, make up the 4500 forensic science people (approximately) employed in Indian forensic laboratories; the remaining personnel are support staff. With 1.38 billion people living in India today, the strength of its scientific community pales in contrast to the volume of criminal cases that overflow India's forensic science laboratories. According to the 1980 Bureau of Police Research and Development (BPR&D) standards, which were later updated in 2000 and 2005 by the Directorate of Forensic Sciences, the workload in fields such as DNA, toxicology, biology, document examination, and cyber forensics is four to five times greater than that of other disciplines.

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Approximately forty percent of the positions in Forensic Laboratories are unfilled, and the government must act quickly to fill them.¹³

There are over 22,000 pending cases at Delhi's forensic science laboratory. The delayed reports are amongst the biggest impediments to a speedy trial. According to Delhi government data till October end, four unit at Rohini FSL- ballistics, chemistry, cyber forensics and DNA have a cumulative pendency that is almost as same a year ago.¹⁴

Survey (Financial Year Wise), Central Forensic Science Laboratory:

Financial Year	Cases Received	Cases Reported	Pending Cases
2011-12	14	07	07
2012-13	04	08	03
2013-14	25	26	02
2014-15	69	67	04
2015-16	107	75	36
2016-17	83	80	39
2017-18	221	160	100
2018-19	238	168	170
2019-20	293	231	232
2020-21	303	422	113
2021-22	1247	826	561
2022-23	1313	949	925

Above table provides the statistics of cases received, reported and pending for the examination under the laboratory, if we emphasize on the year 2022-23 the cases had raised abruptly as comparison to the year 2021-22.¹⁵

Another table showing the survey:

¹³Available at <http://www.cdfd.org.in/> (last visited on May 15, 2024)

¹⁴ Editorial, "reports pending fsl justice delayed" The Times of India, 2023

¹⁵Available at <https://www.cfslghy.gov.in/case-stats.html> (last visited on May 20, 2024)

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LAST THREE YEARS CASE DATA OF CFSL, CHANDIGARH FROM¹⁶

Year(s)	Received		Examined		Pending	Court Evidence	SOC	Lectures
	Cases	Parcels	Cases	Exhibits	Cases			
2014-15	2932	5395	2039	50770	1933	395	53	97
2015-16	2568	6201	3136	59720	1295	451	57	88
2016-17	2290	4863	2966	83303	572	454	31	79

In India's Forensic Science Laboratories, there were about 0.5 million cases that needed to be examined in 2005. The current state of unresolved cases in 2021 is likewise not better; it is believed that there are between 0.7 and 0.8 million cases outstanding in Indian forensic science laboratories. In this context, the percentage of cases sent to FSLs in India is between 10 and 12 percent of all crimes reported in the various states.

The number of cases pending could increase to around eight times if all cases of cognizable crimes are sent to FSLs for review. It is also important to note that the delays in the judicial system's decision-making process result from the fact that toxicology and DNA reports in FSLs are still pending for six to two years. According to India's new laws, DNA testing is needed in all cases of sexual assault.¹⁷

Numerous ethical concerns regarding DNA have been documented in the past. When using DNA testing for legal purposes, concerns about DNA falsification, theft, and other DNA databank-related matters are crucial. In the UK, DNA theft is now considered a criminal offence. It is impossible to overlook any biological sample that makes DNA analysis easier or raises the possibility of biological samples being implanted incorrectly. There is no

¹⁶Available at [https://www.cfslchandigarh.gov.in/\(S\(4by15togifusc3dkncfaxgp5\)\)/Annual-Reports.aspx](https://www.cfslchandigarh.gov.in/(S(4by15togifusc3dkncfaxgp5))/Annual-Reports.aspx) (last visited on May 30, 2024)

¹⁷Available at

https://cag.gov.in/uploads/download_audit_report/2017/Report_No.3_of_2017_Performance_Audit_of_Modernisation_of_Police_Forces_Government_of_Uttar_Pradesh.pdf (last visited on May 30, 2024)

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technology that can distinguish between samples that were purposefully or dishonestly inserted at the crime scene and those that are real. DNA is frequently thought to have originated from a real biological source. Unbelievably, a small number of researchers have demonstrated how to create a desired DNA profile from any biological material.¹⁸

Discussions:

A thorough examination of the Indian Forensic situation reveals a number of flaws and dangers that must be avoided for it to operate effectively. The Indian Supreme Court examined the value of forensic evidence in the case of **Dharam Dev Yadav v. State of Uttar Pradesh**, particularly in cases involving more violent and well-planned crimes.¹⁹

The most alarming issues in Forensic Science are the erroneous convictions based on faulty forensic evidence.²⁰

Based on DNA testing, over 318 prisoners who had previously been erroneously convicted due to flawed forensic evidence were freed from prison.²¹

Due to a lack of education and training, the majority of investigating officers are not sufficiently skilled in the gathering, preserving, packaging, and sending of forensic evidence in relation to crime scene investigations. Therefore, in order to modify scientific techniques, the investigative skills must be updated. In addition, scientific auditing ought to be conducted at the crime scene in order to allay legal concerns.²²

Since investigating officers (IOs) are the first to respond to crimes and get at the scene immediately, their work is another area of concern. They have a duty to treat the crime scene with the highest level of sophistication and scientific knowledge. These investigators are not properly trained in gathering and safeguarding evidence from the crime scene, nor do they have the necessary scientific equipment. These IOs, who respond to crimes as first responders, need to be aware of what evidence needs to be gathered from a crime scene. Currently, the IOs are not in possession of any guidelines that could advise them on what

¹⁸Available at <https://ejfs.springeropen.com/articles/10.1186/s41935-022-00309-y#Abs1> (last visited on May 30, 2024)

¹⁹Available at <https://indiankanoon.org/doc/39335671/> (last visited on Jun 05, 2024)

²⁰Available at <https://digitalcommons.unl.edu/nlr/vol86/iss1/2/> (last visited on Jun 05, 2024)

²¹Available at <https://scidoc.org/articlepdfs/IJFP/IJFP-2332-287X-03-201.pdf> (last visited on Jun 05, 2024)

²²Available at <https://www.sciencedirect.com/science/article/abs/pii/S0379073821000244?via%3Dihub> (last visited on Jun 05, 2024)

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evidence needs to be gathered from a crime scene in order to get successful convictions by court.²³

Inference and recommendations:

DNA technology has been supporting legal proceedings worldwide since 1985. Numerous nations, including the UK, USA, and Russia, have passed laws pertaining to DNA and changed existing policies to incorporate scientific advancements into the legal framework. A number of inconsistencies in the current Indian legislation underscore the need for legislative amendments in addition to the DNA-specific bill's adoption. Achieving a balance between freshly passed regulations, public interests, and established legal concepts is crucial.

CrPC amendments are necessary since Secs. 53-A and 164-A are insufficient to address the problem. According to reports, these revisions only apply to cases of rape and do not apply to other offences. Moreover, specialists from the CCMB and CDFD are not included in Sec. 293 of the CrPC. These scientists' report must be included in the CrPC in order for it to be claimed as evidence.

As demonstrated by the **Bhoopala Subramaniam case**, where the court lacked the authority to order blood collection and DNA testing if the subject refused to provide a sample, there are no provisions in the CrPC or the IEA to conduct a blood test for a minor or his mother in the event of a maternity dispute.²⁴ While in case of **Swati Lodha vs state of Rajasthan**, the Rajasthan High Court sentenced that taking a sample of venous blood can't be termed as the violation of Article 20(3) of the Constitution of India.²⁵ The Supreme Court made important remarks regarding the value and admissibility of DNA evidence in the **Sharda v. Dharmpal case**. The right to privacy cannot be regarded as an unassailable right, the court declared. In cases where there are disputes between the parties' fundamental rights, the right that is more consistent with public morality will be given priority.²⁶

²³Available at <https://www.sconline.com/blog/post/2022/12/10/integrating-forensic-techniques-in-indian-criminal-justice-system/#fn5> (last visited on 05, 2024)

²⁴Available at <https://indiankanoon.org/doc/40401/> (last visited on Jun 09, 2024)

²⁵Available at <https://indiankanoon.org/doc/1147672/#:~:text=Swati%20applied%20that%20the%20blood,expert%20as%20evidence%20of%20sexual> (last visited on Jun 09, 2024)

²⁶Available at <https://indiankanoon.org/doc/149969440/> (last visited on Jun 09, 2024)

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In the **Kantidev v. Poshiram** paternity dispute case, the court determined that the scientifically accurate results of the DNA test are insufficient to avoid the conclusiveness of Section 112. Accordingly, the court acknowledged the scientific accuracy of the DNA evidence but did not take it into consideration when making a decision in accordance with Section 112 of the IEA. The Indian government has already established a number of commissions and committees to study police reforms, including the topic of forensics and scientific crime investigation.

Although the forensics recommendations made by these commissions and committees were included in their reports, they have not yet been fully implemented. The Supreme Court also directed the states to implement New Police Act based on Model Police Act prepared by the Government of India. The states implemented the new Police Act. The act as implemented (on the basis of Model Police Act) in states, mentions the necessity of Forensic Science in crime investigations.²⁷

the Ministry of Home Affairs' decision to heavily include forensic methods into the investigation and prosecution of all crimes carrying sentences longer than six years. This is an essential and important step in getting an arrest in a timely manner so that perpetrators can be successfully convicted. However, the government needs to solve the problem of inadequate infrastructure at the forensic labs because it is required to collect forensic samples from the crime site and examine them in forensic labs. The State and Central governments must make investments in brand-new, better-equipped facilities, as well as in staff and lab personnel training at all levels—district, state, and federal. For the purpose of managing a crime scene effectively and preventing the physical evidence from being contaminated, investigating officers and first responders to crimes need to have additional, sufficient scientific training. For the forensic professionals to definitively prove the numerous parts of criminal commission, the veracity and dependability of forensic technology must also be improved. After being put to the test under the strictest evidentiary and scientific guidelines, the judicial system is forced to depend on forensic evidence to successfully convict offenders.²⁸

²⁷Available at <https://www.mha.gov.in/sites/default/files/PoliceReforms%28E%29181013.pdf> (last visited on Jun 09, 2024)

²⁸Available at <https://www.sconline.com/blog/post/2022/12/10/integrating-forensic-techniques-in-indian-criminal-justice-system/> (last visited on Jun 09, 2024)

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For the first time, the DNA profiling bill for criminal investigations was drafted in 2003. In order to provide suggestions on a DNA profiling law, the Department of Biotechnology (DBT), Government of India, established the DNA Profiling Advisory Committee in 2006. The Human DNA Profiling Bill of 2007 came after this. Due to the lack of an outline of privacy concerns, NGOs and others criticised this measure. The DBT-constituted expert group deliberated on the bill's concerns in 2013. Once more, privacy and security issues kept this from being introduced in parliament. The Law Commission of India filed its 271st report in 2018 and it was titled 'Human DNA Profiling-A Draft Bill for the Use and Regulation of DNA-Based Technology'.

January and July of 2019 saw the introduction of the DNA Technology (Use and Application) Regulation Bill 2019 in the lower house of the Indian Parliament. This ten-chapter bill sought to identify victims, offenders, missing persons, children, and unidentified deceased persons. The DNA technology (use and application) regulation bill 2019 included provisions for the DNA Regulatory Board, accreditation and setup of a DNA laboratory, DNA databank, information security, funding budget, penalties for offences like information disclosure, etc., and aimed at securing the future of DNA profiling in India.²⁹

Conclusion:

The preceding conversations make it quite clear that India's forensics sector has to be strengthened immediately if the people of the nation are to receive prompt, efficient justice. In modern society, the criminal justice system can primarily rely on the forensic evidence when eyewitnesses become hostile in court.

The kinds of samples that the investigating officers send for laboratory testing have a direct impact on the calibre of forensic reports. Therefore, it should be required that investigating personnel have forensic training. Judges and public prosecutors, who are responsible for presenting and assessing forensic evidence, ought to get similar training.

The number of pending cases which is results in delay of justice and affects the prosecution directly, the tempering with the evidences such as DNA sample etc., needed to be kept under surveillance appropriately.

²⁹Available at <https://prsindia.org/billtrack/the-dna-technology-use-and-application-regulation-bill-2019> (last visited on Jun 14, 2024)

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The forensic laboratories is required to be established with updated officers and staff members so that reports can be drawn out correctly, there were issues of budget provided for these laboratories by central government should be addressed so that they functions well, the training of Investigation officer requires regular updates as it plays the main role while collection of samples.

Therefore, forensic science plays vital role delivery of justice but requires focus from legislature ,executive and judiciary to function it properly.



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