

Importance of Forensic Science in Law Domain

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ABSTRACT: *In India, the mechanism of implementation of science and technology in crime identification and investigation and justice administration is not newly discovered. Presently, a foremost addition is performed by forensic science in sphere of criminal justice by presenting facts that could help determine the wrongdoings of accused. Contrary to what is displayed over many “Crime Investigating Shows” on TV, forensic science demands higher understanding and is tangled while explaining to bench, especially when not from science background. Perhaps because of naivety of scientist or there were inconsistencies in the facts presented, when a prosecution fails in the courts, it raises the possibility of failure in attaining justice. The execution of the expertise and methods of different fields of science into legal sphere is discussed under Forensic Science. The scientific discipline associated with proving criminal offences is Forensics is branch of science serving as evidence proving offences. This paper provides an insight to importance of Forensic Science in criminal cases.*

KEYWORDS: *Forensic Science, Investigation, Developments, Evidences, Criminalistics, Ballistics.*

INTRODUCTION

In India, the mechanism of implementation of science and technology in crime identification and investigation and justice administration is not newly discovered. Though our older generation had different interpretation of forensic science than currently existing forensic science, but while conducting investigations at that time, similar scientific methods are seemed to be referred as they are today. The detailed reference can be tracked down in the 'Arthashastra' of Kautilya, which was given structure around 2300 years ago. As an example, by studying their behaviour and physiological changes occurring in them in the presence of poisons, Arthashastra explains methods for detecting poisons with the aid of birds.

Forensic science, sometimes denoted with term “criminalistics” was first developed by individuals who developed techniques recognizing evidence and comparison methods and others who understood the need to integrate these values with the justice system. In describing and executing the laws, forensic science puts in the understanding of science. The fact that forensic science and law are two different branches and also investigating officers are different from forensic scientists is important to pen down. Forensic scientists do not interrogate and detain suspects, considering how they are depicted on television, and do not necessarily investigate places where crime got executed. To recreate for ascertaining “who, what, where, when and how” regarding incidents, by using the methods of science and the logic of scientific analysis, forensic science relies on many disciplines. A forensic scientist's key tasks are to examine physical evidences found, interpret the findings and testify in front of court.[1]

This branch has a significant role in solving matters, be it of criminal or civil nature. Forensic scientists aid in assessing the death reasons, identifying suspects of crimes, identifying body remains, tracking electronic money transfer, detecting internet fraud and identity theft, and reconstructing incidents in cars.

Initially, the core areas with applicability of forensic science were biology, chemistry, and medicine. In India, forensic science became prominent topic to talk through a TV show named “CID” which ruled in entertainment industry for numerous years. It is true to admit that in reality may be this process is quite dull and boring but forensic scientists discharge invaluable function of establishing link between evidences found and crime scenes. For example, fingerprints, injuries, weapons, computer data, DNA, and many more. Through reconstructing faces from bones, and often animating or digitally ageing them, or examining corpses to determine the cause and time of death, forensic scientists often help solve crimes.

DISCUSSION

1. *Meaning of Forensic*

Science is not obligated to furnish ultimate solutions, completely curbing crime from its occurrence, but it does play an important role in the precise and logical way of finding incidents that have happened in a crime. It is possible to understand forensic science as the research and implementation of science to matters of law. The nexus between science and law establishes and introduces new ways and techniques to bring out realities into light.

Forensis is the originator of the expression “forensics” and is Latin for “relating to the forum”. During the Roman period, their forum was regarded a “multidimensional negotiation” and “finding the fact of matters” space where people and objects took part in politics, law, and the economy together.

The expression “Forensic Science” can be understood as the use of science to respond to questions of legal domain. More accurately, when evidences are acquired from place where crime took its final structure and examined by the forensic scientists as an integral part of investigation using several methods and equipment to analyze those evidences.¹

2. *Nature and Scope of Forensic Science*

The ideology and procedures of all conventional sciences, such as biology, physics and chemistry forms the base of forensic science. But looking at current status, it has established its own divisions in recent years, such as fingerprints, anthropometry, analysis of the crime scene, track marks, examination of challenged records, and forensic ballistics. Forensic Science lays down these specific branches. It is an amalgamation of topics of similar nature that incorporates many branches of learning used for investigating crime scenes and obtaining evidence to be used in a court of law trial for the prosecution of criminals.[2]

Key progresses in the department of brain fingerprinting, serology, criminal profiling, narco-analysis, voice analysis, etc. have freshly been produced. Forensic science is often referred, as already stated, as a synonym for criminalistics. A wide variety of behaviours are protected by both expressions. Forensic science covers forensic medicine, odontology, anatomy, psychiatry, toxicology, examination of documents questioned, and weapons, instrument markings, and fingerprint examination, as well as criminalistics, in a wider context.

In criminal, civil and social contexts, possible to an extent, forensic science is incorporation of almost all scientific expertise and serves as a vital and trained instrument that makes the dispensation of justice possible. It aims to elaborate all the theories of science in a manner resolving problems of legal interest. In context to criminal and civil investigations, forensic science is now a highly specialized investigative tool and is an integral part of the criminal justice system answering all relevant queries of case. It involves all well-known techniques such as fingerprint analysis, DNA analysis, explosives and ballistics, weapons, culture, etc. [3]

3. *Categories of Forensic Science*

3.1. *Criminalistics*

The key concern of this branch of science was the detection, identification, individualization and assessment w.r.t. physical evidence using natural science principles and procedures in the field of legal nature. It embraces analyzing trace evidence such as glass, dirt, hair, fibers, blood, and physiological fluids such as semen, saliva, urine, etc. and upon the essence of gathered physical evidence, recreation of events is executed. The span of the field is elaborated differently by various forensic scientists. Some require the review of weapons and instrument markings and the documents questioned as part of

¹ Dr. Sonia Kaul Shali, Applicability of Forensic Science in Criminal Justice System in India With Special Emphasis on Crime Scene Investigation, June 25, 2018

criminalistics. Given the repercussions of the term, illegal conduct is not confined to criminal matters. They are used in cases concerning civil law and also in regulatory matters. Criminalists are named assigned to people who are engaged in a career of criminalistics. Firebombing accelerant and explosive traces, substance recognition and the understanding of various patterns and imprints are often included by criminalists. Within the regime of forensic science, it is regarded as one of the extensive branch.

3.2. Forensic Odontology

Odontology is comprehended as “the scientific study of the structure and diseases of teeth, especially in order to identify people and help solve crimes”.² This branch is also named as forensic dentistry. When after crime, the body turns into an unrecognizable condition, this branch of forensic dentistry helps to locate victims. By inspecting their teeth, mouth positioning and overall mouth structure is the procedure to perform forensic odontology. By examining the widening and structure of teeth and other restorative dental corrections such as filling, forensic dentists or odontologists assist with the comparative recognition of a human. Also, this branch has its usage in criminal cases for bite mark research.

3.3. Forensic Toxicology

Toxicology is “a science that deals with poisons and their effect and with the problems involved”.³ Chemicals accepted legally possessing the potential for abuse are deemed as controlled substances. This involves illicit drugs such as cocaine or opium and prescription drugs such as oxycodone. In helping law enforcement agencies fight opioid abuse and drug-based violence, perceiving and identifying these controlled substances plays a significant role.

In order to monitor for the presence of toxins and drugs, forensic toxicology undergoes process of biological sampling. In matters of accidents on road, poisoning, sexual harassment, etc., this forensic science division has crucial importance. Toxicology reports furnish valuable information on the presence of drug in an individual during any incidence. It also defines whether the quantity of substances taken up at the therapeutic dosage is as per defined standard or surpasses the appropriate level. This branch of forensic science is constantly evolving and needs a contemporary approach, since new forms of drugs are evolving every day.

3.4. Forensic Anthropology

The branch exclusively looks into matters that help ascertaining gender, height, age and ethnicity, by analyzing injured human remains or skeletons. It also brings the approx. time of death into picture by finding any injuries and inspecting them. These studies offer investigators useful insights into the recognition of victims, especially in matters when the bodies are in unrecognizable positions. To ascertain relationship with the height of the people, connotation of footprints or shoe-print evidence may also be used⁴.

3.5. Impression and Pattern Evidence

Testament in relation to any impression is regarded as proof generated when two articles possessing adequate strength come in touch with each other creating an "impression." A two-dimensional apprehension such like fingerprints or a three-dimensional one like markings on a bullet could be recognized under its regime.

Fingerprints are distinctive patterns created from friction lines and furrows as seen over finger and thumb pads. The pattern of fingerprints, like the leftover impression, belongs to friction ridges on the individual finger, when a finger dipped in ink is pressed against a paper. Friction ridge patterns are categorized into

² <https://dictionary.cambridge.org/dictionary/english/odontology>

³ <https://www.merriam-webster.com/dictionary/toxicology>

⁴ Gowsia Farooq Khan, Sheeba Ahad, *Role Of Forensic Science In Criminal Investigation: Admissibility In Indian Legal System And Future Perspective*,

three. Friction ridges consist of one or more connected ribbons and represent an elevated portion of the print skin.

Loops are the prints which recur to take structure of loop and return to point from where they are originated. Whorls are referred as circular or patterns of spiral nature resembling tiny whirlpools. Arches generate a wave-like design of flat arches and preliminary arches. Instead of flat arches, tented arches rise to a shaper stage. Around 5% of all types of patterns make up Arches.

Examination of pattern proof requires recognizing and evaluating additional details engraved in impression. When used in combination, impression along with pattern evidence can aid in creation of crucial ties to a crime scene with suspects or tool.

3.6. Forensic Pathology and Medico legal Death Investigation

A branch of pathology that aims to derive the root of death by inspecting a corpse is forensic pathology. In order to surmise evidence permissible in the court premises, forensic medicine thus requires the processing and examination of medical samples.

As illustration, wound pattern recognition may help identify the weapon used to make the wound. In addition, forensic pathologists may investigate entry and exit wounds in casualties associated with the use of weapons or any other projectiles. A forensic scientist thus, may come up to critical conclusions about the nature of death whether it was natural, criminal or accidental.

3.7. Trace Evidence

Where two artifacts have established contact to each other, trace evidence are created automatically. Any 'trace' of the artifacts will be swapped when a person or an entity touches another object. This is the principle backing fingerprint analysis, tire and footprint analysis, and fiber analysis. By sprinkling the region with a powder that adheres to the oils in the fingerprint, technicians acquire fingerprints out of its surfaces. To bring the fingerprint for analyzing, it is carried to the lab with the application of tape used for lifting fingerprints from the surface. Forensic scientist fills in the lacuna with plaster to track down the footprint, tire track or other pattern existing in exterior areas of crime place. They can be safely ejected ones they have gain solid structure. That structure is sent to respective laboratory and is kept till required or equated with suspected objects.

3.8. Ballistics

Ballistics is a forensic technology that encounters motion, conduct, movement, angular motion and the effect of projectiles, such as bullets, rockets, missiles, bombs, etc. Ballistics has been used in criminal cases in particular. To understand explicitly, analyzing the bullet gathered from a crime scene may reveal the kind of gun used to shoot it and whether in past, it has from the part other crime. The ballistic details are currently registered in a large database that can be accessed by law enforcement agencies across the globe⁵.

3.9. Questioned Documents Examination

Questioned Documents Examination (QEE) is a specialized subject of forensic science that relates to such documents probably contested in court. The examination is conducted with key purpose to lay out evidence of suspicious or questioned documents using a range of scientific postulates and techniques. Alteration, paper analysis, obliteration, forgery, validity determination, origin, or any other issue is integral part of such examination.

Intended writing or writings of second pages can be considered as is an imprint left on the pages kept beneath the top page upon which anything is written. The pressure put through pen along with the width of the paper helps determine impression of the writing. Writing with indentation on following pages may not

⁵ *Supra note 2*

be identical to what is reflected on the top paper surface. Experts are qualified to identify indented documents that may have been inserted after the fact that maybe an original text has modified or goes missing. Indented writing has its significance in connecting evidence with each other.

Years ago, a low angle oblique light and photography have detected and decoded indented written content. Recently, an instrument called the Electrostatic Detection Apparatus is applied to create an indented transparency film visual image.

Appliances for Electrostatic Detection Apparatus works by the creation of an electrostatic representation of the indented writing, visualized by the deployment of charged toners. This sensitive process of imaging reacts to sites of microscopic fiber damage at the surface of a paper which were produced during manuscript by abrasive interactions with overlying surfaces.

3.10. DNA Evidences

DNA proof uses the unique gene markers that distinguish people, either to identify an individual or as part of a particular person's property. DNA evidences are needed to be acquired from the articles with which the person has establish his contact and has laid body fluids like saliva, semen or blood upon that article. The scientist carries out tests that recognize genetic markers and generate a profile that is specific to him and can be compared with a sample taken by another human. Scientists might even try to get ample blood from evidence to assess the existence of alcohol, narcotics, toxins or chemical products in toxicology⁶.

4. Forensic Science and Legal Statutes

Forensic professionals are primarily concerned with gathering, examining and presenting evidence from the crime scene to the court. Indian law sees the forensic scientists as professionals and in the implementation of justice it gives due weighting. Whilst there is no clear forensic science law in India, clauses in some criminal laws play an important role in supplying forensic evidence.

The Indian Evidence Act 1872 specifies that the opinions of specially trained persons in the field of science or the identification of handwriting or fingerprinting are the relevant facts when the court has to reach a conclusion on a point of information or the recognition of fingerprints. These individuals are referred to as experts.

It gives a forensic scientist authority to obtain and examine samples under the Criminal Procedural Code. Section 53 of the Code embraces the examination at the policeman's request of the person charged by the medical practitioner where there is a fair cause to suspect a person's examination would include proof of crime. In the case of rape cases, the physician shall be given equal powers.

The Prevention of Terrorism Act, 2002, also mentions a forensic analysis of suspect samples. In order to obtain a sample of handwriting, finger prints, pictures of footprints, photos, blood, saliva, semen, hair, the voice of a convicted person, a rational offender who is participating in an offence, it is provided that if an investigating officer requests in writing to the Court to do so, it is legally valid for the court to issue directions for sample collection to conduct forensic examination under this Act.

5. Landmark Cases

5.1. State of Maharashtra v. Maria Monica Susairaj and Emile Jerome Joseph.

This is a renowned with name "Neeraj Grover Murder Case". It involves prosecution where the victim Neeraj Grover, resident of Andheri, Mumbai, was working with creative team of Balaji Telefilms Ltd. and first accused is a Kannada actress who got shifted to Mumbai for in April 2008. Victim helped him to establish his feet in TV industry. For some time she resided with victim only where they came into a relationship. After some time accused 1 took a flat on rent and shifted there.

⁶ Justice Jitendra N. Bhatt, A Profile Of Forensic Science In Juristic Journey

When accused 1 didn't get any role in TV industry, she developed a grudge against victim and planned to kill him with the assistance of accused 2. To execute their plan accused 2 flew to Mumbai from South. Both of them committed murder of victim at flat of accused 1.

To escape the punishment, both the accused made an attempt to demolish the traces of committed murder. The body was converted to small pieces and was put in a sports bag by accused. Accused 2 borrowed a car and with that sports bag both the accused moved outskirts of city and burned that bag by sprinkling petrol over it. All the possible evidences were eliminated by the accused from her house as well.

Parallel to this, when his family members came to know that he is missing, an FIR was filed in Mumbai Police Station but no traces of victim were found. After some days accused 1 called the police and handed over the victim's phone to them.

While interrogating with persons associated to victim, accused 1 herself confessed the commission of murder of victim along with accused 2 in front of police. Also, a disclosure regarding place where victim's body was burned was made by the accused. Police recovered the remains of body of victim.

6. *Role of Forensic Science*

Evidences derived through Forensic analysis holds utmost importance in this case when there were no eyewitnesses of commission of crime. The reliance of court upon forensic science can be perceived from the fact that a forensic scientist specialized in DNA forensic was demanded to make his presence in court by both the parties to throw light upon the forensic examinations conducted at every stage of this case.

An officer who conducted investigation stated how proficiently the DNA samples were collected from the crime place even in condition where the traces were totally knocked down by the accused. The forensic scientists have managed to acquire samples of DNA even when the door lock containing blood stains were wiped by the accused to destroy evidence.

Apart from this, remains of victim's body were located by the police like burnt bones, teeth, etc. through which the identification of victim seemed impossible. Again, forensic science took the lead and conducted DNA testing which establish the connection of victim with his parents. Three teeth, the femoral bones and some other residue were obtained from the forensic experts in order to retrieve the DNA sample.

6.1. *Nirbhaya Case.*

This case relates to the crime of rape. Victim was resident of Delhi. The victim with his friend were waiting for convenience to reach their home as they were coming back after watching movie on December 16th 2012. It was about 9 pm and they boarded the bus as one of the culprits forced her to do so. Soon the lights of the bus were turned off and the friend of the victim was badly beaten by the persons sitting in the bus. The window glasses of the bus were packed by the black sheets through which stuffs carried out inside the bus cannot be seen by the outsiders.

The victim was dragged at the back portion of the bus where 6-7 men raped her through oral, vaginal and anal. Apart from this, rods were also inserted into her body through vaginal. One of the culprit was even minor. Not only that victim was sexually assaulted, but her body has been mutilated beyond human understanding. Her intestines have been cut and private parts have been brutalized. Later she was declared dead on 29 December due to numerous organ failures, internal bleeding and heart attack.

7. *Role of Forensic Science*

The destiny of the alleged offenders in the December 16, 2012 gang rape and murder case was marked with accuracy by scientist backed by forensic evidence including DNA, fingerprints and bite marks analysis as defined by the Supreme Court.

DNA examination conducted by forensic scientist proved the connection culprits with victim and also the fingerprint traces found revealed that one of the culprits Vinay Sharma had its presence in bus during the commission of such brutal crime.

With regard to dentistry, a division of the forensics department for examining bite marks, J. Dipak Misra's bench claimed that the examination report on the record was "completely and utterly reliable" because bite marks were found similar with convicts tooth structure, and there was no reason to doubt them. Recently, criminals of such brutal rape were awarded with capital punishment by Apex Court of India and were hanged till death.

8. *Education and Growth of Forensic Science in India*

There is a rise in the population of the world. Unemployment thus becomes a big spike to initiate crime. The technical review of the facts found at the scene of the crime is one of ways to increase the conviction rate. A universally accepted principle is that education leads the way to adoption of changes. Thus, it can be the most successful arms that can be used to transform the planet.

Forensic Science shall be imposed as an essential subject in curriculum of education system. There are numerous branches offering courses for undergraduate programmes. Several institutes or universities and other institutions having postgraduate, diploma and certificate courses to study forensic science are existing in nation. But it feels sad to witness that students opting this branch for their course of study are not offered with accurate jobs in return. The hidden cause is because jobs in these sectors are limited to the Government laboratory only, thus nullifying their training and education.

Nonetheless, it is recorded that horizon of these jobs has been expanded. Apart from laboratories held by government at state and central level now private laboratories have been instituted and they are assisting the bench at courts. They have work openings for students with Forensic Science background. The private forensic labs here are very negligible in number and are still struggling with the acceptance of their findings in relation to the legal system.

The point that needs attention even after the establishment of private labs is that a selection criterion for forensic science students in particular has not been laid down. During the establishment of aforementioned labs, forensic science had no traces and no special education was provided for the same. Persons having qualification in subjects like science field, more precisely graduation or post-graduation in any subject of science were awarded jobs in such labs. Now, forensic science stream has evolved but no changes have been introduced to selection criteria of such labs as they were framed for selecting persons possessing qualifications in Physics, Chemistry, Botany, etc. These labs now demand scientists having qualifications in Forensic science subject but still "Physics, Chemistry, Botany, etc." students are getting preferred over actually qualified ones, especially in government labs. In spite of pursuing degree in Forensic Science, students along with their skills are overlooked by sticking to outmoded selection rules.

CONCLUSION

There was a deficiency of formal forensic procedure in the ancient nation, which helped criminals avoid punishment. The criminal investigations and trials, that time were focused upon forced confessions and evidence from witnesses. It has been unanimously accepted that for courts to derive logical conclusions, medical and forensic evidence holds a significant role. Ancient procedures, however, reflected many descriptions of techniques that indicated the concepts produced currently in forensic science.

Forensic science is an innovative research approach flowing in current era, used in criminal and civil investigations. It holds the proficiency to retort to critical questions and forms a requisite part of the framework of criminal justice. Labs have been established at state and national level by government to assist police, courts and other as required during investigation stage or examination.

Forensic evidences are acquired from the place where crime is executed as a part of investigation by forensic experts. Each gathered proof is so special in its own that to draw the conclusion, it becomes

important to evaluate it and examine it separately. Often, complicated cases demand the review and interpretation of the evidence, gathered by many experts specializing in the same area.

Altogether, forensic science constitutes an area that becomes exciting and evolving with each passing day as new technological changes pops up faster and beyond one's thinking capacity just like new kinds of crime are still turning up every time. Investigating bodies like International Forensic Sciences (IFS) and Central Forensic Science Laboratory (CBI) are sort of substitution to solve the pending cases. The cause behind it is that approx. 30 million criminal cases are on hold in nation.

It is a time to encourage and involve skilled medical practitioners to perform medical legal work and parallel to it, the environment in the courts should be compatible to the medical witness. At crime scenes, criminals almost often leave evidence or collect it inadvertently. The ability to perceive evidence is continuously improving, and it is given consideration in many court cases. It is introduced by expert witnesses to juries and judges and has helps aided them in resolving cases.

Different organizations have realized the need to recognize and include more and more forensic professionals within expert testimony. This is of paramount significance in looking at the outcome of the case, because if good experts lack court participation, the gap would be filled by less objective practitioners, potentially impacting the justice system.

