

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

Volume 9 | Issue 4

2026

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Forensic Evidence in Crimes Against Women in India: Legal Admissibility and Evidentiary Challenges in the Age of Advanced Forensic Technologies

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ABSTRACT

In India, cases relating to crimes against women pose particular evidentiary difficulties, so forensic evidence plays a key role in proving culpability where eyewitness testimony is absent. This paper examines advanced forensic technologies, legal admissibility and the practical issues relating to forensic evidence in cases of crimes against women, such as sexual assault, domestic violence and other related offences. It considers the legislation that regulates forensic evidence, the judicial principles of admissibility, and the way in which scientific evidence is being reinterpreted by the courts. Specific focus is placed on improper collection, contamination, delayed forensic examination, lack of a chain of custody, and the fluctuating quality of forensic infrastructure, all of which often compromise the probative value of evidence. Gender-specific issues are also examined, including the re-traumatisation of victims in medico-legal processes, the underreporting of crime, and the societal biases that influence both the investigation and the outcome of the trial. Through a critical analysis of judicial pronouncements and conditions on the ground, the paper highlights the disconnect between the theoretical soundness of forensic science and its actual use in sex-based crimes. It argues that strengthening forensic procedures, making them victim-sensitive, and increasing judicial literacy in forensic science can improve evidentiary reliability and contribute to substantive justice.

Keywords: masculinity, court of law, social conditions, evidentiary analysis, criminal justice system

I. INTRODUCTION

A. Background and Context of Forensic Evidence in Crimes Against Women in India

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Forensic evidence has emerged as a critical tool in the pursuit of justice for crimes against women in India, especially in cases of sexual assault and domestic violence. The presence of forensic evidence in a case can lead to the exoneration or conviction of the offender; the evidentiary value that can be gleaned from forensic evidence is often high and can bolster the victim's testimony. More modern forensic techniques have also been seen to enhance the evidentiary value of such crimes; however, in order to utilise these techniques, legislation must evolve and implement such changes (Billah, 2025).

The above phenomena, comprising the advances made, include various limitations that impede the growth and effective use of forensic evidence. As a result, law enforcement agencies, lacking proper training in recent forensic methodologies, often employ lower-quality evidential organisation and collection methods, which diminishes the reliability of a case (Kaur et al., 2021). As stated by Ahlawat and Sharma (2024), insufficiencies associated with resource constraints and infrastructure further increase this concern owing to the inability to access improved forensic technology, thus impacting the ability to investigate accurately through the use of technology. A further limiting influence on women in these cases is the societal stigma associated with those who have been victims of gender-based violence (GBV), providing a disincentive for women to report an incident or to cooperate with law enforcement investigating these incidents. This multiplicity of issues creates a need for a new approach to systems, specifically targeted at having an impact on both advancements in technology and education in law enforcement.

II. LEGAL FRAMEWORK AND ADMISSIBILITY OF FORENSIC EVIDENCE

A. Overview of Legal Standards for Forensic Evidence in India

The framework of law that relates to the admissibility of forensic evidence in India is principally governed by the *Bharatiya Sakshya Adhiniyam, 2023*. The Act establishes that, in order for any type of evidence (forensic included) to be admissible in court, it must meet certain criteria, such as relevance, reliability and the need for the evidence to follow specific scientific processes as established by acceptable practice. The existence of these criteria demonstrates the need for forensic evidence to have both probative value and integrity within the judicial process of a country. The Act establishes not only what is considered to be relevant evidence, but also, by necessary implication, provides that the relevant evidence must come from a scientifically valid source to ensure that its credibility is upheld in law.

Recent amendments and court interpretations have extended the parameters of the evidential regime as it relates to forensic evidence, particularly with respect to offences against women,

reflecting an awareness of the developments of forensic technology and an acknowledgment that evidential standards will continue to change with the advances of science. Innovations such as DNA analysis and digital forensics require the courts to adjust their evidential assessment regimes to include new types of evidence, while at the same time providing for the issues that may arise in legal proceedings by way of the authenticity or reliability of the evidence presented to the court (Fekry Moussa, 2021). The courts have increasingly stressed the need for corroborating forensic evidence with other sources of evidence to alleviate any prejudicial influence created by bias against individual forensic evidential processes (Billah, 2025).

Although there have been advances in the field of forensic science, there remain limitations on many aspects of the uniformity of legal standards across all jurisdictions, as well as the expertise level of individual practitioners. The differences in how practitioners apply those standards may ultimately impact the effectiveness of using forensic evidence during prosecutions for crimes against women. It is evident that thorough, consistent training and the standardisation of forensic procedures are still required to overcome this persistent problem (Khare & Singla, 2022). As new technological advances become available, legal frameworks will also need to continue developing to ensure justice is served while still adhering to strict evidentiary standards.

B. Provisions and Admissibility Criteria Relating to Forensic Evidence in the Bharatiya Sakshya Adhiniyam, 2023

The *Bharatiya Sakshya Adhiniyam, 2023* provides an evidentiary framework that is especially relevant to violent crimes against women, where forensic and electronic evidence are frequently the only or primary types of evidence that can conclusively ascertain whether someone committed a violent act against a woman (for example, rape, sexual assault, domestic violence, acid attacks and dowry deaths), and are often the principal forms of evidence relied upon by the prosecution to establish the defendant's guilt. For that reason, expert testimony, electronic records, presumptions regarding the burden of proof, documentary evidence and cross-examination should all be carefully considered when assessing their utility with respect to the protection of women's rights and the right to a fair trial.

i. Expert Opinion (Section 39(1)) and Sexual Offences

Understanding sexual assault or rape is impossible without an expert opinion, which is commonly provided by a physician, medical doctor or specialist upon the completion of a medical examination, forensic examination and/or DNA testing. Forensic examination of bodily samples, injury reports and DNA profiling will form the basis of the prosecution's evidence.

Under Section 39(1), expert opinions will be relevant for the court to form its opinion regarding scientific matters. For example, expert medical testimony may corroborate the survivor's evidence in a case of sexual assault or rape. While an expert's opinion is advisory, it is not binding or conclusive. In addition, reliance on an expert's opinion to diminish a survivor's credibility due solely to the presence or absence of injury is unfair, in light of the fact that the absence of injuries does not prove the absence of sexual assault or rape. Thus, while forensic science can substantiate a conviction and establish the guilt of those committing the offence of rape, it should not be regarded as depriving the survivor's testimony of credibility.

ii. Electronic Evidence (Section 63) and Cybercrimes Against Women

Section 63 is particularly important for cybercrimes, including any offence involving the use of the internet (for example, cyber-stalking, creating fake digital profiles to harass another, morphing images of a woman as a form of revenge pornography, or any digital action that threatens physical harm to a woman). In many cybercrime cases, electronic records, including but not limited to electronic communications, call records, CCTV footage and social media posts, will constitute the principal evidence in support of a case. The requirement of certification under Section 63 serves to establish the authenticity of evidence in a case. Tampering with or altering electronic evidence may occur; however, proper certification will establish the authenticity of the evidence, which is essential for establishing sufficient proof of an offence against a woman. The requirement of proper certification may also pose challenges when attempting to secure electronic evidence, particularly because electronic data often has an extremely brief lifespan.

iii. Presumptions as to Documents (Sections 78 to 93) and Dowry Death Presumptions

Sections 78 to 93 are very relevant to dowry death and cruelty cases, where documentary evidence will likely include medical reports, suicide notes, forensic reports and electronic communication documents produced from proper custody. The presumption exists only for the purpose of lightening the burden on the prosecution with respect to procedure. It is important to note that the presumptive evidentiary weight can benefit the prosecution; however, since the presumption is rebuttable, the accused has the right to cross-examine any witness regarding the authenticity of any document admitted into evidence. Therefore, the judiciary must find an appropriate compromise that serves women with a fair trial and protects the rights of the accused.

iv. Burden of Proof (Sections 104 to 120) and Protection of Women

The burden of proof is always on the prosecution to prove beyond a reasonable doubt that the accused committed the offence with which he has been charged. The use of forensic evidence, including DNA testing, medical evaluation and electronic communication records, is very relevant to the prosecution's discharge of its burden in a case involving a violent crime against a woman. While the prosecution bears the burden of proving guilt beyond a reasonable doubt, there is no shifting of that burden simply because the allegation is of a serious nature or has significant emotional elements. The trial judge must guard against emotional bias or scientific bias in determining which evidence is admissible and how to assess each piece of evidence. Likewise, the trial judge must ensure that no procedural irregularities or technical defects prevent the victim from receiving justice. The presumption of innocence applies to the accused at all times until proven guilty; however, the nature of the offence may also require the courts to rely on scientific evidence to end impunity.

v. Documentary Evidence and Survivor Testimony

Documentary evidence (Sections 94 to 103), including forensic medical reports and DNA analysis, may prevail over the survivor's testimony when the contents of the document are relevant to the issue or crime being charged. Documentary evidence may include, but is not limited to, medical examination reports, DNA test results, electronic communications and any other documentation in the possession of the prosecution or the police. In a case involving a crime against a woman, survivor testimony is very often the basis for the conviction of the accused, and the survivor's testimony may be relied upon alone in support of a conviction, provided that it reflects truthfulness and is corroborated by other testimony and/or evidence. In addition, forensic evidence may be used as corroborative evidence to support or to negate a survivor's testimony. The courts should not create an absolute requirement that an accused cannot be convicted without scientific evidence.

vi. Cross-Examination (Sections 144 and 148) and Fair Trial

Cross-examination in criminal trials involving violent crime is one of the most necessary components of a fair trial. Although cross-examination serves the accused's right to a fair trial and ensures the ability to contest the evidence presented in support of the criminal charge, it must not simply be used to harass the survivor or to destroy the survivor's character. Expert witnesses, forensic experts and medical examiners must be rigorously cross-examined to test the reliability of their testimony and the evidence they provide to the court. In addition, cross-examination must be regulated by the courts to ensure that women are not further victimised by the criminal justice system through secondary victimisation arising from the manner in which

the accused conducts cross-examination of the survivor. Therefore, procedural fairness and sensitivity must coexist throughout the presentation of the evidence and testimony in any trial involving a sexual assault or rape.

In India, the admissibility of forensic evidence in legal proceedings regarding crimes against women is mainly determined by the standards of relevance and reliability defined in the *Bharatiya Sakshya Adhiniyam, 2023*. To be deemed relevant, forensic evidence must make a direct contribution to the fact-finding process of the case, enabling an equitable trial. It should also be directly related to the allegations of gender-based violence that have been made, so that the use of forensic evidence can assist judges in making determinations of fact rather than hinder them (Billah, 2025). In addition, the integrity of forensic evidence is contingent upon strict compliance with the methods and protocols established for collection, storage and analysis. Deviations from established methods would affect the evidentiary value of forensic evidence and expose it to challenge. The chain of custody for forensic evidence is also extremely important; any break in the chain can create doubt about its authenticity and reliability, which can ultimately impact the outcome of the case (Kaur et al., 2021). Lastly, the rapid development of forensic technology makes it necessary to update methods and protocols on a continuing basis to keep pace with new developments in forensic science (Upadhyay et al., 2023). As such, it is critical that forensic evidence satisfy both the legal requirements and the scientific standards for the successful prosecution of crimes committed against women under Indian law.

III. LEGAL AND EVIDENTIARY CHALLENGES IN THE ADMISSIBILITY OF FORENSIC EVIDENCE

The legal framework regulating the adjudication of forensic evidence in Indian law is marked by considerable uncertainty, resulting in the inconsistent application of jurisprudence and leading to an increased risk of miscarriages of justice. Courts regularly experience difficulty in assessing forensic evidence and therefore apply different standards for its consideration, reducing the reliability of the evidence in the prosecution of crimes against women. The differences in the application of the standards for evaluating forensic evidence may create disparate outcomes through the subjective application of judicial officers and may violate the doctrine of equal justice under the law.

Examples of challenges related to the admissibility of forensic evidence include preserving an adequate chain of custody, confirming the qualifications of forensic experts, and applying new technologies to established legal processes. The integrity of forensic evidence relies heavily on its being handled consistently and carefully from the collection of the evidence to its

presentation in a courtroom; any lack of care can damage the credibility of the evidence and therefore the outcome of a case (Kaur et al., 2021). Furthermore, with the development of new forensic techniques, including explainable AI for digital forensics, the courts must adapt their jurisprudential structure to be able to accept and utilise the newly developed techniques while ensuring the integrity of evidentiary standards (Billah, 2025). The need for adaptation is especially apparent in cases involving gender-based violence, where the ability to effectively utilise forensic evidence can be crucial to advocating for and providing justice to the victim (Roshni Yooshing, 2023). Accordingly, addressing the challenges within the framework regulating the admissibility of forensic evidence is critical to improving both the effectiveness and fairness of the legal process in dealing with crimes against women in India.

The credibility and accuracy of court decisions will be called into question if there are difficulties in processing forensic evidence relating to crimes committed against women in India. The most pressing concern is a lack of uniform guidelines for obtaining, securing, storing and analysing forensic evidence. Without common procedures for handling forensic materials, there is an increased chance that they will be contaminated or deteriorate before they can reach the courtroom, and therefore lose their evidentiary value. For example, biological evidence can be damaged or corrupted by poor storage conditions and unqualified transportation methods (Kaur et al., 2021). This indicates that the timely acquisition of the necessary evidence is critical to establishing the correlation between the victim and the perpetrator.

Another obstacle that adds to this problem is that many police personnel lack the training and experience needed to process and evaluate advanced forensic technology, which may cause inaccurate evidence processing. In addition, these same police personnel may not possess the skills to identify and document digital evidence, which creates additional hurdles to the admissibility of evidence and prevents justice for victims (Fekry Moussa, 2021). Without ongoing educational programmes that develop the competency of police officers, forensic evidence is at grave risk of not being documented or reviewed in accordance with best practices.

These systemic deficiencies indicate an immediate need for reforms to strengthen the effectiveness of forensic systems by creating standards for handling forensic evidence and providing comprehensive training to police officers. The successful resolution of these issues will benefit both the process of ensuring that victims of crime receive a fair trial and society as a whole, by improving public trust in the justice system's ability to investigate allegations of crimes against women.

IV. LANDMARK JUDICIAL PRONOUNCEMENTS SHAPING FORENSIC JURISPRUDENCE IN INDIA

A. *Selvi v. State of Karnataka* (2010)

The Supreme Court's landmark judgment in *Selvi v. State of Karnataka* addressed the parameters of scientific interrogation techniques, focusing on narco-analysis, polygraph tests and the Brain Electrical Activation Profile as potentially violating an individual's fundamental rights. The Court concluded that the involuntary administration of any of these tests is equivalent to testimonial compulsion and therefore a violation of Article 20(3) of the Constitution (the prohibition against self-incrimination). Additionally, pre-trial investigative processes are protected under Article 20, which extends the right against self-incrimination beyond trial testimony directly to pre-trial investigation.

The Supreme Court identified that forcing an accused to undergo any of the tests involved in the case violates Article 21 of the Constitution (the right to life and personal liberty), since it violates an individual's mental privacy and bodily integrity. The Court also referenced the distinction between physical evidence (fingerprints and the like) and testimonial evidence derived from psychological techniques. However, the Court stated that these tests could be administered on a voluntary basis with informed consent and with strict adherence to due process requirements. The outcome of this case altered the constitutional limitations on the application of forensic investigation techniques in the Indian judicial system.

B. *State of Bombay v. Kathi Kalu Oghad* (1961)

The foundational case for Article 20(3) is *State of Bombay v. Kathi Kalu Oghad*. At issue was whether the defendant's providing of fingerprints, handwriting and signatures amounted to self-incrimination. The Supreme Court distinguished between testimonial evidence and physical evidence. It ruled that Article 20(3) of the Constitution protects an individual against the compelled communication of personal knowledge (testimony), and not the collection of identifying physical characteristics. Thus, it was determined that obtaining a fingerprint as physical evidence was not a violation of this Article. The principles laid out in this judgment were later relied upon in *Selvi*, specifically in relation to the distinction between types of evidence.

C. *State v. Sushil Sharma* (2007): The Tandoor Murder Case

Forensic science, in the form of DNA profiling, successfully identified the remains of Naina Sahni, the victim in the Tandoor Murder case, and the DNA analysis provided convincing

evidence to convict the perpetrator. Not only did DNA evidence identify the remains, but it also established evidentiary material for the prosecution to rely upon in a circumstantial case, thereby reinforcing the confidence of the criminal courts in forensic science through the appropriate use of chains of custody and expert witness testimony.

D. Mohd. Aman v. State of Rajasthan (1997)

Mohd. Aman v. State of Rajasthan provided important guidance from the Supreme Court on the collection and preservation of forensic evidence. The fingerprint evidence was subjected to scrutiny and, because of discrepancies in the way it was collected and handled, it was not relied upon to convict the accused. The Court pointed out that, while scientific evidence is based on scientific principles, it is not always foolproof. If the chain of custody is broken or sufficient safeguards are not adhered to, such evidence will not be admissible in a criminal case, and the defendant cannot be convicted on insufficiently reliable fingerprint evidence. This case holds great significance because it emphasises that scientific evidence must meet standard evidentiary thresholds and cannot serve as the basis for conviction when the prosecution cannot prove the defendant's guilt beyond a reasonable doubt. The Court must examine the evidence through an appropriate assessment of the forensic process used to produce it, rather than blindly accepting the evidence as true.

E. Nand Kishor v. State & Anr (2025)

The *Nand Kishor v. State & Anr* ruling by the Delhi High Court demonstrates, to a greater extent than many previous cases, an evolving use of forensic science within the judicial process. In this case, the Court permitted DNA testing of bloodstains on clothing as substantive evidence, even after the completion of trial testimony, in a circumstantial case. The ruling signals the conclusion that scientific truth cannot be sacrificed to the procedural intricacies of the courtroom.

V. IMPACT OF TECHNOLOGY ON EVIDENCE COLLECTION AND ANALYSIS

The advent of advanced forensic tools such as digital forensics and DNA profiling in India is revolutionising the way evidence is collected for crimes committed against women. These technologies provide an improved means of gathering accurate and reliable forensic evidence that can lead to better legal outcomes. In cases of sexual assault, DNA profiling can provide detailed individual identification of a suspect and a better correlation between a suspect and the crime scene (Kaur et al., 2021). Digital forensic advancements give law enforcement agencies the ability to collect relevant electronic evidence from multiple sources to prove the occurrence of cybercrimes against women (Ahlawat & Sharma, 2024).

Although both technologies are relatively advanced, there remain a number of significant challenges related to using them in the legal system. First, there is a lack of uniformity in applying standardised procedures and protocols across jurisdictions. Additionally, law enforcement and legal professionals require increased specialised training if they are to take full advantage of the potential of these advanced techniques (Roshni Yooshing, 2023). If law enforcement and legal professionals fail to understand how to use these advanced forensic tools properly, or use them inappropriately, it could result in missing potentially admissible evidence and lead to a miscarriage of justice for victims. While technology provides opportunities to enhance evidentiary standards for crimes committed against women, the lack of uniform guidelines and the continued need for training must be addressed in order to achieve the full potential of these advanced forensic tools for legal purposes.

VI. STRATEGIES FOR OVERCOMING EVIDENTIARY CHALLENGES

Developing consistent protocols for collecting, preserving and analysing forensic evidence is critical to elevating the trust and acceptance of this type of evidence within the legal system. At present, different jurisdictions have vastly different practices that lead to major obstacles throughout the judicial process, especially when it comes to crimes against women. Establishing uniform standards for the collection, preservation and analysis of forensic evidence will help ensure that the evidence presented has been collected, preserved and analysed according to a standard of quality and integrity, which will increase its credibility in a court of law (Billah, 2025).

In addition, improving the education and training of law enforcement and judicial personnel to help them better understand new forensic technology will help them critically analyse forensic evidence and make better decisions when conducting investigations and trials (Kaur et al., 2021). Initiatives of this kind will contribute to a more comprehensive integration of forensic science into the legal system, as well as to a fairer process for those who have been victimised by gender-based violence.

VII. CONCLUSION

The integration of advanced forensic technologies has markedly improved the accuracy and reliability of evidence in crimes against women in India. These innovations, which include sophisticated methods for collecting and analysing biological and electronic evidence, enhance investigative outcomes and support judicial processes. For instance, advancements in forensic DNA analysis and digital forensics provide law enforcement with robust tools to establish connections between perpetrators and victims, thereby reinforcing evidentiary integrity (Billah,

2025). However, significant challenges persist regarding the legal admissibility of such evidence within the Indian judicial framework. Variations in the interpretation of evidentiary standards by different courts can lead to inconsistencies that undermine the potential impact of these technologies (Fekry Moussa, 2021).

To address these legal ambiguities, a multifaceted approach is necessary. This includes revising existing legal frameworks to accommodate technological advancements while ensuring that they align with the principles of justice and victim rights. Comprehensive training programmes for law enforcement officials and members of the judiciary on forensic methodologies are essential to enhance their understanding and application of such evidence (Ahlawat & Sharma, 2024). Furthermore, increasing public awareness of forensic science can empower victims by informing them about their rights and the resources available for seeking justice (Roshni Yooshing, 2023).

Moreover, addressing evidentiary challenges necessitates ongoing training and awareness programmes tailored for law enforcement and legal professionals. These initiatives can enhance the competency of personnel involved in handling forensic evidence, ensuring that victims receive equitable treatment within the justice system (Ahlawat & Sharma, 2024). Such multifaceted approaches are crucial for fostering a more effective response to gender-based violence, ultimately reinforcing societal norms surrounding accountability and protection for vulnerable populations.

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