

A CRITICAL ANALYSIS OF THE ROLE OF MEDICAL EVIDENCE IN CRIMINAL TRIALS

With Special Reference to the Indian Legal Framework and Comparative Jurisprudence

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ABSTRACT

Medical evidence constitutes a foundational pillar of modern criminal adjudication. This article undertakes a comprehensive critical analysis of the role of medical and forensic evidence in criminal trials, with primary focus on the Indian legal framework and comparative reference to the United Kingdom, the United States, and Australia. It examines the conceptual basis of medical evidence, the statutory framework for its admissibility under the Bharatiya Sakshya Adhiniyam, 2023, and predecessor legislation, the typology of forensic disciplines deployed in criminal proceedings, the institutional arrangements for expert testimony, and the systemic challenges that undermine the effective use of forensic science in criminal courts. Drawing on landmark decisions of the Supreme Court of India and comparative judicial authority, the article identifies critical gaps in infrastructure, documentation, and judicial forensic literacy, and proposes comprehensive legislative, institutional, and operational reforms.

Keywords: *Medical Evidence, Forensic Science, Criminal Trials, Expert Testimony, Bharatiya Sakshya Adhiniyam, DNA Evidence, Forensic Pathology, Indian Evidence Act, Daubert Standard, Evidentiary Standards.*

I. Introduction

The administration of criminal justice has always demanded objective, reliable, and cogent evidence upon which the guilt or innocence of an accused may be determined beyond reasonable doubt. Among the many categories of evidence that come before criminal courts, medical evidence occupies a position of singular importance. It bridges the gap between the physical reality of crime and the legal process of proof, translating biological, physiological, and forensic data into judicially cognisable forms. Whether in a case of homicide, sexual assault, grievous hurt,

poisoning, or road accident, the opinion of a medical professional and the results of forensic examination frequently determine the outcome of trial.

Medical evidence in criminal trials encompasses a vast spectrum of material: post-mortem reports and autopsy findings, wound certificates, opinions of forensic pathologists, toxicological analyses, DNA profiling, serological tests, radiological imaging, and psychiatric evaluations. Courts have historically treated such evidence with cautious respect, acknowledging both its probative weight and its susceptibility to error.

Medical evidence occupies a position of singular importance in criminal adjudication it bridges the gap between the physical reality of crime and the legal process of proof, translating biological and forensic data into judicially cognisable forms.

In the Indian legal context, the framework governing medical evidence is principally drawn from the Bharatiya Sakshya Adhinyam, 2023 (BSA), the Bharatiya Nagarik Suraksha Sanhita, 2023 (BNSS), and the Bharatiya Nyaya Sanhita, 2023 (BNS) – the trilogy of statutes that replaced the colonial-era Indian Evidence Act, the Code of Criminal Procedure, and the Indian Penal Code. Despite the centrality of medical evidence to criminal adjudication, significant lacunae and challenges persist, including conflicting expert opinions, contested methodologies, inadequate forensic infrastructure, and problems of evidentiary chain of custody.

II. Conceptual Framework – Medical Evidence in Criminal Law

2.1 Definitions and Distinctions

The term 'medical evidence' must be distinguished from cognate concepts with which it is often conflated. 'Forensic evidence' is a broader category encompassing all forms of scientific evidence physical, digital, chemical, biological applied in legal proceedings, of which medical evidence is a subspecies concerned specifically with biological and physiological data. 'Expert opinion' is the procedural form in which medical evidence is most commonly presented: a qualified expert communicates findings and conclusions to the court in a manner that assists the trier of fact.

The relevance of medical evidence to criminal law arises from the fundamental structure of criminal offences. Most serious crimes murder, culpable homicide, rape, grievous hurt, poisoning require proof of physical harm, biological contact, or physiological effect. Without medical evidence, criminal trials would

be impoverished, and the risk of injustice both wrongful conviction and wrongful acquittal would be significantly enlarged.

2.2 Historical Evolution in India

The history of medical evidence in Indian criminal law begins with the colonial period. The establishment of the Chemical Examiner of the Government of Madras in 1849 the first forensic toxicology laboratory in Asia marked the institutional beginnings of forensic medicine in India. The Indian Evidence Act of 1872, drafted by Sir James Fitzjames Stephen, provided in Section 45 for the admissibility of expert opinion on questions of science or art.

The post-independence period saw significant expansion in forensic infrastructure: the establishment of the Central Forensic Science Laboratory (CFSL) in 1953, the growth of state FSLs, and the emergence of specialised institutes. The late twentieth century brought transformative developments – DNA profiling raised fundamental questions about admissibility of novel scientific techniques and the rights of accused persons. The Supreme Court's decision in *Selvi v State of Karnataka* (2010) marked the Court's most sophisticated engagement with the relationship between constitutional rights and forensic evidence.

The enactment of the Bharatiya Sakshya Adhinyam, 2023, the Bharatiya Nagarik Suraksha Sanhita, 2023, and the Bharatiya Nyaya Sanhita, 2023, represents the most recent chapter in this evolution, introducing provisions on mandatory forensic examination, electronic records, and the evidential status of scientific reports.

III. Admissibility and Evidentiary Standards

3.1 The Legal Framework

The admissibility of medical evidence in Indian criminal trials is primarily governed by the Bharatiya Sakshya Adhinyam, 2023. The foundational provision for expert testimony, formerly Section 45 of the Indian Evidence Act and now preserved in the BSA, provides that opinions of persons specially skilled in science

are relevant facts. The Supreme Court has interpreted 'science' broadly to encompass forensic disciplines such as DNA analysis, ballistics, toxicology, and psychiatry.

The Bharatiya Nagarik Suraksha Sanhita, 2023, restructures the procedural framework. Section 334 preserves the admissibility of post-mortem reports prepared by government medical officers. Section 336 preserves the statutory admissibility of reports by government scientific experts. Critically, Section 176(3) mandates forensic examination of crime scenes in cases involving offences punishable with seven or more years of imprisonment a provision of far-reaching significance for the landscape of criminal investigation.

3.2 The Reliability Standard

Indian courts have not adopted the formal gatekeeping role that American courts exercise under the Daubert standard, which requires trial judges to make a preliminary finding that the methodology underlying an expert opinion is scientifically reliable before it may be presented to the jury. In the Indian system, expert opinions are admitted relatively freely, subject to the general relevance requirement, and questions of reliability go to the weight to be accorded to the opinion rather than its admissibility.

The Supreme Court has, however, developed a set of principles for the evaluation of expert medical testimony. In *State of Haryana v Bhagirath* (1999), the Court held that the opinion of a medical expert is to be weighed against the totality of evidence and is not to be taken as conclusive. In *Madan Gopal Kakkad v Naval Dubey* (1992), the Court affirmed that the court is not bound by the opinion of a medical expert and may form its own opinion by drawing reasonable inferences from the evidence as a whole.

The Indian approach – freely admitting expert opinion while carefully calibrating its weight – demands judicial vigilance. Judges must be equipped with sufficient

forensic literacy to critically evaluate the foundations of forensic claims without the aid of a formal reliability test.

IV. Types of Medical Evidence in Criminal Trials

4.1 Forensic Pathology and Post-Mortem Examination

Forensic pathology is the cornerstone of medical evidence in homicide and suspicious death cases. The forensic pathologist determines cause of death, manner of death, and, where possible, time of death and the nature of the agent or weapon responsible. The post-mortem report a comprehensive document recording all findings is the principal vehicle through which forensic pathological evidence enters the trial.

The determination of time of death (post-mortem interval) is one of the most contested areas of forensic pathology. Multiple modalities are used body temperature (algor mortis), rigor mortis, hypostasis, putrefaction, and entomological evidence each with its own range of error. Courts have consistently recognised this uncertainty, requiring pathologists to express estimates as ranges rather than precise points.

4.2 Forensic Toxicology

Forensic toxicology is the application of toxicological science to crimes involving toxic substances. The Chemical Examiner to the Government is the principal agency responsible for toxicological analysis. Poisoning cases present complex evidentiary challenges: the forensic toxicologist must identify the substance, establish that the concentration is consistent with a lethal dose, and consider post-mortem redistribution which can alter drug concentrations after death.

4.3 DNA Evidence and Biological Profiling

DNA profiling has emerged as the most powerful individual identification technique in forensic science. In *Anil Kumar v State of UP* (2019), the Supreme Court held that DNA

evidence, when properly collected, preserved, and analysed by an accredited laboratory and presented by a qualified expert, constitutes strong circumstantial evidence of identity. The Court emphasised, however, that DNA evidence must be evaluated in conjunction with other evidence and is not conclusive in isolation.

The DNA Technology (Use and Application) Regulation Bill, 2019 passed by the Lok Sabha but not yet enacted seeks to establish a national DNA database, prescribe standards for forensic DNA laboratories, and regulate the collection and use of DNA profiles. When enacted, it will significantly transform the framework for DNA evidence in criminal trials.

4.4 Forensic Psychiatry and Psychology

Forensic psychiatry provides critical evidence in cases engaging questions of mental state the insanity defence, fitness to plead, and the assessment of dangerousness. Section 22 of the Bharatiya Nyaya Sanhita, 2023 (formerly Section 84 IPC) excuses from criminal liability a person who, at the time of the act, was incapable of knowing the nature of the act by reason of unsoundness of mind. The forensic psychiatric examination in insanity cases requires the psychiatrist to assess the accused's mental state at the time of the alleged offence an inherently retrospective and uncertain determination.

V. Expert Witnesses and Forensic Professionals

5.1 The Legal Status of Expert Witnesses

The expert witness occupies a unique position in the adversarial system. Unlike the ordinary witness, who is confined to testifying about facts within personal knowledge, the expert witness is permitted to offer opinions and conclusions that draw upon specialised knowledge beyond the competence of the trier of fact. In India, the qualification of a witness as an expert is a matter for the court, with no prescribed minimum qualifications or formal accreditation requirements in contrast to Australia (where evidence acts prescribe qualification

requirements) and the United States (where Federal Rule 702 imposes specific conditions).

5.2 Conflicting Expert Opinions

One of the most challenging evidentiary scenarios arises when the prosecution and defence each call expert medical witnesses who give diametrically opposed opinions. The Supreme Court has held that when confronted with conflicting expert opinions, courts should prefer the opinion that is more consistent with the other evidence in the case, is better supported by the reasoning and data presented, and is given by the expert with greater qualifications and direct experience with the subject matter.

The court is not an umpire that mechanically accepts the better-credentialed expert. It is a critical evaluator that must assess the intrinsic quality of the reasoning, the reliability of the methodology, and the consistency of the opinion with the totality of evidence.

VI. Legal Framework – Comparative Perspectives

6.1 The United Kingdom

The United Kingdom has developed a sophisticated forensic science infrastructure, anchored by the Forensic Science Regulator Act, 2021, which created a statutory Forensic Science Regulator with power to enforce quality standards across all forensic science providers. The Criminal Practice Directions require expert witnesses to comply with detailed obligations of transparency, including disclosure of the methodology employed, the peer-reviewed literature supporting their conclusions, and any literature inconsistent with their opinion.

6.2 The United States

The United States has the most developed framework for the admissibility of expert scientific evidence, centred on the Daubert trilogy. The original Daubert decision in 1993 replaced the 'general acceptance' test of Frye v

United States (1923) with a multi-factor reliability inquiry, requiring trial courts to consider whether the theory or technique has been tested, subjected to peer review, has a known error rate, and is generally accepted within the relevant scientific community.

The National Academy of Sciences' 2009 report, *Strengthening Forensic Science in the United States: A Path Forward*, found that many traditional forensic disciplines bite mark analysis, hair comparison, bloodstain pattern analysis lacked adequate scientific validation, generating ongoing validation research that has, in some jurisdictions, led to the exclusion of previously accepted forensic techniques.

6.3 Australia

Australia's Uniform Evidence Acts follow a structured approach, with Section 79 of the Evidence Act 1995 providing that expert opinion evidence is admissible if the witness has specialised knowledge based on training, study, or experience, and the opinion is wholly or substantially based on that knowledge. The High Court of Australia in *Honeysett v The Queen* confirmed that this requirement operates as a reliability filter, excluding opinions not grounded in established expertise.

VII. Landmark Judicial Decisions on Medical Evidence

7.1 Virsa Singh v State of Punjab (1958)

The earliest landmark on medical evidence in the Supreme Court established the model of using medical findings as building blocks for legal conclusions. The Court's analysis of the relationship between the medical finding (nature and location of the wound and its sufficiency to cause death in the ordinary course of nature) and the legal standard (intention under Section 300(3) IPC) has characterised the Court's approach to medical evidence ever since.

7.2 Sharad Birdhi Chand Sarada v State of Maharashtra (1984)

This decision established the 'five golden principles' for the evaluation of circumstantial evidence – that the circumstances must be fully established, consistent only with guilt, of a conclusive nature, excluding every possible hypothesis except guilt, and forming a complete chain. The case involved an alleged homicide by poisoning, and the Court's careful evaluation of toxicological findings in conjunction with clinical history and behavioral evidence exemplifies how courts convert complex scientific findings into legally operative conclusions.

7.3 Selvi v State of Karnataka (2010)

The constitutional dimensions of forensic evidence were most comprehensively addressed by the Constitution Bench in *Selvi*, which unanimously held that the involuntary administration of narco-analysis, polygraph testing, and BEOS techniques constitutes a violation of the right against self-incrimination under Article 20(3) and the right to life and personal liberty under Article 21. The Court's reasoning articulates a general constitutional framework: the individual's right to mental privacy and bodily integrity is protected against state intrusion even in the investigative context.

7.4 Anil Kumar v State of UP (2019)

The Supreme Court's most comprehensive treatment of DNA evidence affirmed its admissibility as expert opinion under Section 45 of the Evidence Act, held that a positive DNA match is highly probative evidence of identity, and emphasised the importance of maintaining a proper chain of custody. While not formally adopting the Daubert reliability inquiry, the Court's insistence on procedural integrity represents a significant step towards a more rigorous assessment of the evidentiary foundations of forensic science claims.

VIII. Systemic Challenges

The effective use of medical evidence in Indian criminal trials is impeded by a constellation of

systemic challenges spanning investigative, forensic, prosecutorial, and judicial dimensions:

- **Infrastructure Deficit:** District hospitals performing post-mortem examinations frequently lack qualified forensic pathologists, relying instead on general physicians without specific forensic training. State Forensic Science Laboratories carry backlogs of thousands of cases, creating delays of two to five years in the delivery of forensic results essential to the progress of trials.
- **Chain of Custody:** Protocols for chain of custody are inconsistently implemented, particularly in the collection of biological samples at crime scenes. Mislabeled samples, inadequately sealed containers, and the use of non-sterile collection materials can render samples useless or unreliable.
- **Medico-Legal Documentation:** Studies consistently document significant deficiencies in documentation incomplete recording of injury characteristics, failure to note the age of injuries, absence of diagrams or photographs, and the use of generic terminology that renders findings difficult to evaluate.
- **Judicial Forensic Literacy:** Most Indian judges, trained exclusively in law, do not possess the forensic literacy required to critically evaluate scientific evidence. The absence of a scientific assessor system means that courts confronting complex forensic questions must do so without technical assistance.

IX. Recommendations for Reform

9.1 Legislative Reforms

The principal legislative reform recommended is the enactment of a comprehensive Forensic Evidence Act that consolidates and systematises the statutory provisions governing the collection, analysis, admission, and

evaluation of forensic evidence in criminal proceedings. Such a statute should establish minimum qualifications for expert witnesses in specified forensic disciplines, create a statutory duty of disclosure for expert witnesses, and establish an accreditation requirement for forensic laboratories, making the admission of forensic reports conditional upon the issuing laboratory's accreditation by NABL.

9.2 Institutional Reforms

The primary institutional reform recommended is the establishment of a National Forensic Science Commission, modelled on the UK Forensic Science Regulator. Such a body should set and enforce quality standards for forensic science providers, promote research and validation of forensic techniques, maintain a register of accredited forensic experts and laboratories, investigate complaints about forensic practice, and publish annual reports on the state of forensic science in India.

9.3 Procedural and Operational Reforms

Procedural reforms include the development and promulgation of standard operating procedures for the collection, preservation, transport, and analysis of biological evidence; the incorporation of forensic science literacy modules in the training curricula of police academies, prosecution services, and judicial training institutes; the reform of medico-legal practice in hospitals through revised curricula and standard digital documentation formats; and the creation of a Legal Aid for Forensic Evidence scheme under which indigent accused persons may obtain publicly funded independent forensic analysis.

X. Conclusion

The role of medical evidence in criminal trials is not merely a technical legal question; it is a matter of fundamental justice. This article has demonstrated that medical evidence occupies a position of critical importance in Indian criminal trials, particularly in cases of violent crime, sexual offences, and death, where the prosecution's case is often built substantially

upon forensic pathological, toxicological, or biological evidence.

The Indian statutory framework now contained primarily in the Bharatiya Sakshya Adhinyam, 2023, and the Bharatiya Nagarik Suraksha Sanhita, 2023 provides an adequate but incomplete basis for the regulation of forensic evidence in criminal proceedings. Comparison with the United Kingdom, the United States, and Australia reveals important innovations that India has not yet adopted.

The systemic challenges confronting the effective use of medical evidence

inadequate forensic infrastructure, deficiencies in documentation, weaknesses in chain of custody, insufficient judicial forensic literacy, and the absence of independent forensic assessment for indigent accused persons together constitute a structural deficit that undermines the justice-enhancing potential of forensic science. The reforms proposed in this article are not optional refinements but essential components of a criminal justice system that aspires to be both scientifically credible and constitutionally sound.

The accuracy of criminal verdicts, the protection of the innocent, and the conviction of the guilty each depend, in a significant proportion of cases, on the quality, integrity, and proper judicial evaluation of forensic and medical evidence. The urgency of meaningful reform cannot be overstated.

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