



INTERNATIONAL JOURNAL OF HUMAN RIGHTS LAW REVIEW

An International Open Access Double Blind Peer Reviewed, Referred Journal

Volume 5 | Issue 5 | 2026

Art. 04

Errors in Evidence: The Forensic Path to Wrongful Conviction: How Flawed Forensic Practices Undermine Justice Systems

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Recommended Citation

Ria Runwal, *Errors in Evidence: The Forensic Path to Wrongful Conviction: How Flawed Forensic Practices Undermine Justice Systems*, 5 IJHRLR 38-51 (2026).

Available at www.ijhrlr.in/current-issues/.

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Errors in Evidence: The Forensic Path to Wrongful Conviction: How Flawed Forensic Practices Undermine Justice Systems

ABSTRACT

This paper investigates how faulty forensic procedures lead to erroneous convictions. Even though forensic science is frequently seen as impartial and trustworthy, a number of incidents show that mistakes in the gathering, analysis, and expert testimony of evidence compromise the administration of justice. The study highlights systemic flaws in the application of forensic evidence by synthesizing scientific literature, legal frameworks, and case law. It contends that structural flaws in evidentiary standards, judicial reliance, and expert responsibility lead to unjust convictions rather than individual errors. In order to improve admissibility requirements, increase forensic reliability, and prevent injustices, the report suggests revisions. Beyond technical issues, the study highlights the human cost of erroneous convictions: communities losing faith in the legal system, innocent people being imprisoned, and families being split apart. It investigates how unvalidated forensic procedures, confirmation bias among experts, and inadequate admissibility requirements create a dangerous pathway from bad science to unjust verdicts. The study shows that change is necessary to restore justice systems' trust by placing forensic errors within both scientific and legal contexts. This study's contribution is a multi-layered reform approach that combines expert accountability, judicial gatekeeping, scientific validation, and comparative learning from global practices. It concludes that forensic evidence should be viewed as a tool that necessitates ongoing examination, openness, and ethical responsibility rather than as incontrovertible truth. Then and only then will forensic science be able to fulfill its promise to uphold justice rather than undermine it.

KEYWORDS

Wrongful conviction, Forensic errors, Expert testimony, Admissibility of evidence, Criminal justice reform

RESEARCH QUESTION

How do flawed forensic practices contribute to wrongful convictions, and what reforms are necessary to strengthen evidentiary standards in criminal justice systems?

INTRODUCTION

Fairness, truth, and accountability are the cornerstones of the criminal justice system. Its fundamental tenet is that no guilty person should be exempt from responsibility and no innocent person should be punished. However, a worrying reality is revealed by the history of several jurisdictions: unjust convictions are recurrent failures rather than isolated incidents. Forensic evidence holds a contradictory position among the several causes of these injustices. Although it is frequently portrayed in court as impartial, scientific, and uncontested, in reality, faulty forensic techniques and improperly used expert witness have frequently compromised justice.

The goal of forensic science was to serve as a link between science and law, using evidence to reveal the truth. However, forensic procedures' weaknesses are frequently concealed by the air of scientific certainty surrounding them. Courts have convicted people based on evidence that was later shown to be untrustworthy thanks to methods like handwriting analysis, bite mark comparison, and even improperly used DNA testing. The issue is systemic rather than just a technical one. Without challenging its scientific validity or acknowledging its potential for bias, juries, attorneys, and courts often consider forensic testimony as definitive.

Erroneous convictions ruin lives, undermine public confidence in the legal system, and draw attention away from the actual criminals. Every instance of wrongful conviction represents a collective failure of the legal system to fulfill its most basic obligation, which is to administer justice, rather than merely a human tragedy.

This paper places forensic mistakes in the larger context of criminal justice. It looks at how defective forensic procedures lead to erroneous convictions, why courts still use them in spite of their obvious drawbacks, and what changes are required to restore the integrity of evidentiary standards. The study makes the case that forensic reform is necessary rather than optional by fusing ideas from case studies, legal frameworks, and scientific research. Forensic evidence runs the risk of leading to injustice rather than the truth if it is not rigorously validated, subject to judicial review, and held accountable.

PROBLEM IDENTIFIED

Most people agree that forensic science is essential to contemporary criminal justice. To establish facts, connect suspects to crimes, and offer scientific certainty in court processes, courts rely on forensic evidence. But erroneous convictions brought about by forensic mistakes highlight a serious and unsettling issue: the very science intended to provide

justice can, when faulty, result in injustice.

Errors can happen at any point, from gathering evidence at crime scenes to analyzing it in a lab to providing expert testimony in court. Results can be distorted by contamination, misinterpretation, and exaggeration of findings. Even though some forensic techniques, including microscopic hair comparison and bite-mark analysis, have been discredited, they are still used in court. If samples are handled improperly or procedures are disregarded, even trustworthy techniques like DNA testing may not work.

Since it calls into doubt the validity, reproducibility, and dependability of forensic methods, this problem is significant from a scientific standpoint. Forensic evidence runs the risk of becoming subjective opinion rather than objective fact in the absence of strict scientific criteria. Because erroneous convictions compromise the constitutional guarantees of a fair trial, due process, and protection against unlawful punishment, it is significant from a legal standpoint. Additionally, they undermine public confidence in India's and other countries' legal systems.

Whether forensic blunders are individual errors or signs of systematic flaws in forensic institutions, training, and monitoring is still unclear and represents a research need. The issue is institutional rather than just technical: forensic labs frequently lack accountability, independence, and accreditation. On the other hand, evidence may be admitted by courts without rigorous assessments.

This paper will therefore analyze how flawed forensic practices contribute to wrongful convictions, focusing on both scientific fallibility and legal admissibility. It will explore reforms such as independent forensic commissions, stricter admissibility standards, and international best practices. The scope is deliberately limited to forensic error as a cause of wrongful conviction, excluding other factors such as eyewitness misidentification or prosecutorial misconduct. Within 3,500 words, the paper will provide an analytical study of forensic fallibility and propose pathways to strengthen both science and justice.

SCIENTIFIC LITERATURE

- There is a concerning discrepancy between perception and reality in the corpus of scholarly literature on forensic procedures. Although forensic science is frequently presented as impartial and unfailing, research continuously demonstrates that many methods lack thorough scientific confirmation.
- Unvalidated techniques: The subjectivity and lack of reproducibility of techniques like bite mark analysis, hair

microscopy, and handwriting comparison have drawn a lot of criticism. Research shows a high incidence of mistake, with various experts frequently coming to different conclusions based on the same data.

- Limitations of DNA testing: Although DNA evidence is regarded as the "gold standard," research has shown that contamination, incorrect labeling, and statistical misunderstanding are dangers. Wrongful convictions can result from even minor mistakes in laboratory methods
- Expert prejudice: According to research, "confirmation bias" occurs when forensic specialists unintentionally match their conclusions with investigation expectations. This raises the possibility of inaccuracy and compromises objectivity.
- Comparative studies: International research highlights the lack of peer-reviewed validation and standardized techniques in many forensic fields, especially from the U.S. National Academy of Sciences (2009 report). Academic writing in India has expressed similar worries about systemic flaws in forensic credibility.

LEGAL FRAMEWORK

Section 45 of the Indian Evidence Act of 1872

Focuses on professional judgment. People who are expert in areas like science, handwriting, or fingerprinting may be called upon by courts. Judges must consider expert opinions in conjunction with other evidence because they are advisory rather than definitive.

Section 293 – Criminal Procedure Code, 1973

Oversees reports from government scientists, such as handwriting specialists and forensic analysts. Although courts may call the expert for cross-examination if the findings are contested, they might be entered as evidence without formal proof.

Bharatiya Nagarik Suraksha Sanhita, Section 336, 2023

Ensures continuity in the event that the original expert is not available (due to transfer, retirement, or death). Allows successor officers or experts to testify on the report, ensuring trials are not delayed.

Both reliance and vulnerability are reflected in the legal structure that governs forensic evidence. Although statutory restrictions disclose weaknesses in guaranteeing the accuracy of forensic testimony, courts

frequently recognize it under the presumption of scientific reliability.

Section 45 of the Indian Evidence Act of 1872 permits the admission of expert views in cases involving science, handwriting, or finger impressions. However, because the Act does not provide criteria for scientific validation, courts must rely more on the reputation of experts than on empirical reliability.

The Criminal Procedure Code (CrPC) offers forensic examination procedures during investigations, however it offers few procedural protections. Expert accountability and monitoring of laboratory procedures are lacking.

- BNSS provisions: The Bharatiya Nagarik Suraksha Sanhita (BNSS) does not establish more stringent admissibility standards, but it does maintain the dependence on expert testimony.
- Judicial practice: Indian courts frequently accept forensic evidence without challenging its scientific basis. In contrast, U.S. jurisprudence developed standards for scientific admissibility in cases such as *Daubert v. Merrell Dow Pharmaceuticals*.
- Comparative law: Forensic evidence must pass stringent admissibility requirements in a number of jurisdictions, which call for evidence of dependability, peer review, and established mistake rates. The absence of such regular checks in India's framework raises the possibility of erroneous convictions.
- As a result, the legal system exhibits a fundamental flaw: although forensic evidence is allowed, there aren't enough protections to guaranty its accuracy. Expert testimony is heavily relied upon by courts, yet this reliance may result in injustices if it is not supported by science.¹

CRITICAL ANALYSIS

The frequency of erroneous convictions brought about by faulty forensic procedures exposes serious structural flaws in the criminal justice system. These blunders stem from structural flaws in the way courts, investigators, and policymakers handle forensic evidence rather than being unique errors made by certain experts.

First, forensic testimony is overused by judges. Because they believe that scientific evidence is intrinsically trustworthy, courts frequently regard expert opinions as definitive. This mistaken trust ignores the fact that numerous forensic methods, such as hair microscopy and bite mark

¹ BNSS (Bharatiya Nagarik Suraksha Sanhita, 2023)
BNS (Bharatiya Nyaya Sanhita, 2023)
CrPC (Code of Criminal Procedure, 1973)

analysis, have been discredited internationally and lack scientific support. However, such evidence is still accepted without close examination in India and other jurisdictions.

Second, the judicial system is deficient in protections. The Indian Evidence Act permits expert testimony, but it does not call for evidence of known mistake rates, peer review, or scientific credibility. Because of this disparity, courts depend more on the credibility of experts than on empirical support. In contrast, judges must evaluate the scientific validity of evidence before admitting it in accordance with U.S. jurisprudence under the Daubert standard. Due to the lack of such standards, verdicts in India may be influenced by untrustworthy evidence.

Third, independent oversight and accountability are frequently lacking in forensic labs and experts. Experts are rarely held accountable for giving false testimony, and mistakes in evidence gathering, contamination, or misinterpretation are rarely looked into. This lack of accountability fosters a culture in which unethical behavior can go unpunished.

Lastly, case examples illustrate the human cost of these mistakes. Due to improper use of forensic evidence, innocent people have been imprisoned for years while the true offenders have stayed free. These stories demonstrate that forensic errors are not only technical shortcomings but also personal tragedies that erode the legitimacy of the legal system and erode public confidence in it.

CONTRIBUTION

This paper contributes to the ongoing debate on wrongful convictions by proposing a framework for forensic reform that integrates scientific, legal, and policy perspectives. putting up a paradigm for forensic reform that incorporates legal, scientific, and policy viewpoints, this research adds to the current discussion on unjust convictions.

The unique contribution of this study is to reframe forensic reform as a human need rather than just a technical or legal necessity. Wrongful convictions are more than simply numbers; they are a symbol of broken lives, devastated families, and communities that have lost trust in the legal system. Every innocent person imprisoned as a result of faulty forensic evidence serves as a warning that science can be used as a weapon rather than a defense when it is misused. This article makes the case that reform must go beyond procedural changes and restore justice systems' impartiality, dignity, and trust by emphasizing the human cost.

The study first suggests that forensic methods be validated scientifically. Only evidence that has undergone extensive testing, undergone peer review, and demonstrated repeatable outcomes should be admitted by courts. This is a moral precaution as well as a technological one. Only the most trustworthy science should be permitted to have an impact when someone's freedom is at risk.

The brief also advocates for court admission guidelines. Before presenting forensic evidence to jurors, judges must serve as gatekeepers, making sure it satisfies precise reliability standards. This changes accountability from relying solely on experts to conducting a methodical assessment of scientific validity. It gives judges the authority to shield people from the perils of pseudoscience passing for reality.

Third, expert accountability is emphasized in the study. Although they sometimes work without supervision, forensic specialists have enormous influence over verdicts. Experts would continue to be accurate, cautious, and accountable if professional regulating organizations, ethical norms, and disciplinary procedures were established. Accountability turns forensic testimony from an unbridled power into a controlled, just profession.

Fourth, the article promotes learning from other jurisdictions by comparison. Stricter admissibility requirements and doubts about forensic reliability have been raised by nations like the United States and the United Kingdom. By applying these lessons to its own situation, India can develop a hybrid model that embraces international best practices while honoring local circumstances.

The study concludes by placing forensic reform in the context of larger criminal justice reform. Investigation, prosecution, and judicial training are all intertwined with forensic science. Rebuilding public confidence in the judicial system will require a comprehensive strategy that incorporates ethical duty, legal protections, and scientific rigor. The goal of reforming forensic procedures is to reinforce the justice system's dedication to truth and justice, not just to stop erroneous convictions.

The paper's contribution is essentially human and systemic: it provides a road map that integrates expert accountability, judicial responsibility, scientific rigor, and comparative learning, all based on the understanding that mistaken convictions are human tragedies. By doing this, the discussion shifts from technological solutions to a justice-centered perspective in which forensic science benefits rather than harms people.

LIMITATIONS FOUND

Although this research emphasizes the risks associated with defective

forensic procedures, it is crucial to recognize its limits.

First, the study's main focus is on forensic mistakes that lead to erroneous convictions. Although they frequently combine with forensic errors to generate miscarriages of justice, other contributory factors, such as eyewitness misidentification, coerced confessions, or incompetent legal representation, are not thoroughly discussed here.

Second, the analysis may not accurately reflect the practical reality of forensic practice in every jurisdiction because it is based on case studies and published literature. The trustworthiness of forensic science differs among laboratories, geographical areas, and legal systems because to its diversity. This essay cannot claim to be a comprehensive representation of the world.

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Lastly, neither empirical fieldwork nor interviews with judges, attorneys, or forensic professionals are included in the article. Although it was outside the purview of this version, such source data could enhance the study.

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CASE LAWS

State of Maharashtra v. Damu (2000)

The Supreme Court stressed in this decision that expert testimony cannot serve as the only foundation for a conviction. The Court noted that although expert testimony and forensic reports are admissible under the Indian Evidence Act, they must be supported by additional trustworthy evidence. The ruling emphasized the possibility of erroneous convictions if judges just rely on expert testimony without conducting independent verification. The Court emphasized that expert testimony should be carefully considered because it is advisory in nature and prone to bias, human error, or methodological shortcomings. This case is important because it emphasizes the idea that in criminal cases, forensic evidence must supplement other types of proof, not take their place.

Murari Lal v. State of Madhya Pradesh (1980)

In *Murari Lal*, the Supreme Court addressed the validity and admission of expert handwriting opinions. According to the Court, handwriting analysis is admissible under Section 45 of the Evidence Act, but it does not prove authorship beyond a reasonable doubt. The ruling warned against considering expert opinion as definitive and acknowledged the inherent subjectivity of handwriting comparison. The Court stated that it is hard to be absolutely certain because handwriting differs depending on a number of circumstances, including age, health, and writing conditions. Therefore, before serving as the foundation for a conviction, handwriting evidence must be supported by additional relevant evidence. This case demonstrates judicial knowledge of the necessity for careful interpretation and the technical limitations of handwriting analysis.

Ramesh Chandra Agrawal v Regency Hospital 2009

The Supreme Court clarified criteria for assessing expert testimony in this case. According to the Court, expert testimony ought to be reliable, grounded in solid scientific principles, and subject to court review. It underlined that courts must evaluate the technique and logic underlying expert opinions rather than accepting them at face value. The ruling reaffirmed that expert testimony is simply one component of the evidence and needs to be considered in conjunction with other facts. Crucially, the Court emphasized that expert judgments should be stated in terms of probability rather than certainty, in line with the empirical fact that forensic disciplines frequently allow only qualified conclusions.

This case is authoritative in demonstrating that the validity of the underlying research is just as important to the admissibility of expert testimony as expertise.

NRC Report 2009 Forensic Science

The National Research Council's 2009 report *Strengthening Forensic Science in the United States: A Path Forward* found that many forensic disciplines, apart from DNA, lacked rigorous scientific validation, standardized protocols, and established error rates. It warned that courts often expect forensic evidence to prove guilt, while the underlying science permits only probabilistic conclusions such as "consistent with" or "supports." The report recommended independent oversight, uniform standards, and better training and accreditation to ensure reliability. Its findings highlight how overstating forensic certainty can contribute to wrongful convictions, underscoring the need to align legal admissibility with scientific limits.

Santosh Kumar Singh v. State 2006

The Supreme Court of India looked at the use of forensic evidence in a criminal trial involving rape and murder accusations. The Court emphasized the value of forensic reports but advised against accepting them as final evidence in the absence of supporting evidence. According to the ruling, forensic evidence must be considered in conjunction with other relevant evidence and cannot support a conviction on its own unless it is unquestionable and supported by science. The Court emphasized that forensic findings must be interpreted carefully since mistakes in collection, preservation, or analysis can compromise justice, and it denounced investigative shortcomings.

CONCLUSION

One of the most serious shortcomings of legal systems is wrongful convictions, and faulty forensic procedures are a major contributing factor to this catastrophe. When forensic evidence lacks validity, accountability, or appropriate judicial examination, it might deceive judges even if it is frequently regarded as scientific reality. Families are split apart, innocent lives are lost, and public confidence in the legal system declines.

This paper makes the case that forensic reform is necessary rather than discretionary. Courts must impose expert accountability, establish explicit admissibility rules, and demand scientific validation. To ensure that science advances justice rather than undermines it, policymakers must incorporate forensic reform into more comprehensive criminal

justice changes.

The future demands bravery and cooperation: states must invest in dependable forensic infrastructure, courts must serve as gatekeepers, and scientists must maintain discipline. Then and only then will forensic evidence be able to live up to its promise, serving as a protection for justice and truth rather than a route to erroneous conviction.

The issue of erroneous convictions brought on by faulty forensic procedures is a human and legal emergency. Although forensic science was brought into the legal system with the promise of impartiality and truth, when it is used improperly, it can lead to injustice. Families have been split up, communities have lost faith in the justice system, and innocent people have spent years behind prison. This study has demonstrated that forensic errors are systemic failures that originate from inadequate scientific validation, judicial overreliance, and a lack of accountability rather than individual errors.

The wrongful convictions are not just legal errors; they are human tragedies. Reforming forensic practices is both a technical necessity and a moral duty. By demanding scientific rigor, judicial scrutiny, and expert accountability, justice systems can transform forensic evidence from a source of error into a safeguard of truth. This is the path toward restoring dignity, fairness, and trust in the rule of law.

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